

Wattle Grove South MRS Amendment Area Ecological Survey Effort

Hesperia Property Pty Ltd for Western Australian Planning Commission

Technical Memo





We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We pay respect to Elders past and present and in the spirit of reconciliation, we commit to working together for our shared future.





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1. Purpose and Scope

This memorandum provides a summary of the ecological survey effort undertaken for the Metropolitan Region Scheme (MRS) Amendment 1388/57 – Wattle Grove South.

The Western Australian Planning Commission (WAPC) is proposing to rezone approximately 126 ha of 'Rural' zoned land to 'Urban' under the MRS. The MRS amendment area is located within Wattle Grove, bound by Welshpool Road East and Crystal Brook Road to the north, and Tonkin Highway to the west. The MRS amendment area is approximately 30 km east of the Perth Central Business District (CBD) and is located within the City of Kalamunda. The MRS amendment area covers a total of 126 ha and is comprised of 77 lots.

This memo provides an overview of the following flora, vegetation and fauna surveys and assessments that have been undertaken within the MRS amendment area:

- 360 Environmental (2018) desktop assessment (Appendix A);
- AECOM (2020) desktop and detailed field surveys (Appendix B); and
- JBS&G various surveys in 2021 and 2022 (Appendices C to F).

These surveys and assessments are intended to inform the environmental impact assessment of MRS Amendment 1388/57 and will inform the environmental management framework that will be further referenced in the Environmental Review Document.



1.1 Survey overview

The majority of the MRS amendment area (Figure 1-1) has been previously surveyed by AECOM (2020) as part of the City of Kalamunda's preparation of a concept plan for the wider Crystal Brook (Wattle Grove South) investigation area. Additional targeted survey work was undertaken by JBS&G between 2021 and 2022 to provide supplementary ecological data for the MRS amendment area not covered by previous survey effort or to provide further targeted surveys. The majority of the MRS amendment area, being 69 of the 77 lots (representing approximately 92% by area), has been subject to some form of ecological assessment. Thirteen of the lots were surveyed based on observations made from the fence line of road and adjacent lots and detailed aerial photography. Eight privately owned lots were unable to be surveyed due to limited access.

The fauna, flora and vegetation survey effort within the MRS amendment area is summarised below and depicted in Figure 1-2.

Summary of ecological survey within the MRS amendment area

360 Environmental (2018) and AECOM (2020) have previously undertaken desktop assessments of the MRS amendment area as part of a consideration of the broader Wattle Grove (South) locality. AECOM (2020) also conducted site survey's and assessment for flora, vegetation and fauna.

Five further supplementary surveys of the MRS amendment area were completed by JBS&G during 2021 and 2022:

- Tree survey (February 2021): Habitat tree survey of various lots and the Victoria Road reserve.
- Targeted flora survey (August 2021): Drakea elastica on Lot 254 Victoria Road;
- Supplementary vegetation and flora assessment (October 2021): Various lots;
- Reconnaissance vegetation and flora assessment (January 2022) (Appendix F): Various lots, including from lot boundaries; and
- Further reconnaissance vegetation and flora assessment of targeted lots (October 2022).





Figure 1-1 MRS Amendment Area



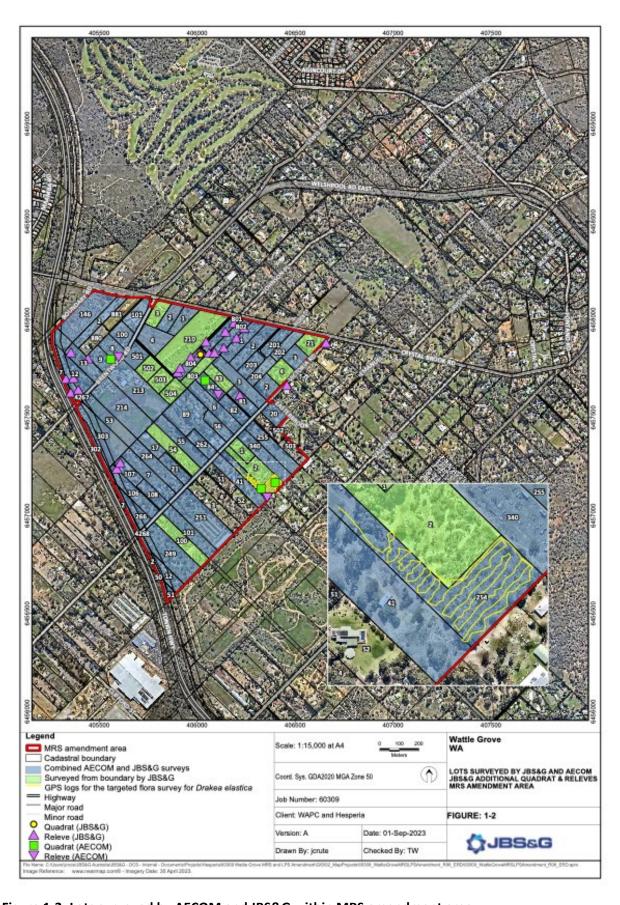


Figure 1-2: Lots surveyed by AECOM and JBS&G within MRS amendment area



2. Desktop Assessments

2.1.1 Conservation Significant Flora

360 Environmental (2018) and AECOM (2020) undertook desktop assessments for the Wattle Grove (South) locality. Further desktop assessments were undertaken in September 2023 by JBS&G to verify the validity of the previous searches, with new database requests submitted to the Department of Biodiversity, Conservation and Attractions (DBCA) for both the Threatened and Priority Flora Database and the Western Australian Herbarium Database. A total of 83 flora taxa of conservation significance were identified by the searches, with 60 potentially occurring within a 5 km buffer of the MRS amendment area. A 10 km buffer was requested; however, DBCA determined that a 5 km buffer was appropriate for the MRS amendment area, based on the number of records available in the general area and the range of local species, and that this flexibility caters for complexity, ensuring meaningful results.

The potential for these plants to occur within the site was assessed and based on general habitat requirements and distribution. Twenty Threatened and 61 Priority flora species were considered to have the potential to occur within the site (Table 2-1). The JBS&G 2023 database search results are presented in Table 2-1.

Further, two conservation significant flora taxa were identified by AECOM (2020) to have been historically recorded within the site:

- Conospermum undulatum (T) listed under the Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the State Biodiversity Conservation Act 2016 (BC Act)
- Isopogon autumnalis (P3), previously named Isopogon drummondii listed under the Department of Biodiversity Conservation and Attraction's (DBCAs) Priority flora lists

Table 2-1: Threatened and Priority flora potentially occurring within 5 km of MRS amendment area

Species	Conser	Potential to occur (based on	
(Common name (if applicable))	EPBC Act	BC Act	desktop assessment)
Grevillea thelemanniana	Critically Endangered	Critically Endangered	Possible
(Spider Net Grevillea)			
Ptilotus pyramidatus	Critically Endangered	Critically Endangered	Unknown
Synaphea sp. Fairbridge Farm (D.	Critically Endangered	Critically Endangered	Likely
Papenfus 696)			
Caladenia huegelii	Endangered	Critically Endangered	Unknown
(Grand Spider Orchid)			
Drakaea elastica	Endangered	Critically Endangered	Likely
(Glossy-leaved Hammer Orchid)			
Calytrix breviseta subsp. Breviseta	Endangered	Critically Endangered	Likely
Thelymitra magnifica	-	Critically Endangered	Likely
(Crystal Brook Star Orchid)			
Andersonia gracilis	Endangered	Vulnerable	Possible
Austrostipa bronwenae	Endangered	Endangered	Likely
Banksia mimica	Endangered	Vulnerable	Possible
(Summer Honeypot)			
Darwinia apiculata	Endangered	Endangered	Possible
(Scarp Darwinia)			
Diuris purdiei	Endangered	Endangered	Unknown
(Purdie's Donkey Orchid)			
Eremophila glabra subsp. Chlorella	Endangered	Endangered	Likely
Macarthuria keigheryi	Endangered	Endangered	Possible
Lepidosperma rostratum	Endangered	Endangered	Likely
Thelymitra stellata	Endangered	Endangered	Likely
(Star Orchid)			
Acacia anomala	Vulnerable	Vulnerable	Possible
(Grass Wattle)			



Common name (if applicable) EPEC Act SCA ct desktop assessment)	Species	Conserv	Potential to occur (based on	
Acadia aphylia Vulnerable Vulnerable Possible Reaffects gracilis Sicherder Tailtower) Vulnerable Vulnerable Possible Sicherder Tailtower) Possible Sicherder Tailtower) Vulnerable Vulnerable Possible Sicherder Tailtower) Vulnerable Vulnerable Possible Marcelotia oustraliens Vulnerable Vulnerable Possible Marcelotia oustraliens Vulnerable Vuln				
ILeafless Rock Wattle Vulnerable Vulnerable Vulnerable Confirmed				
(Slender Tailflower) Vulnerable Vulnerable Confirmed	Anthocercis gracilis	Vulnerable	Vulnerable	Possible
Elechanis keighery Vulnerable Vulnerable Possible Morelotia austrollensis Vulnerable Unlikely Goodenia austrollensis Vulnerable Unlikely Goodenia austrollensis Endangered Endangered Possible Unlikely Unlikely				
Morelotic austroliensis	Conospermum undulatum	Vulnerable	Vulnerable	Confirmed
Goodenia arthrotricha Endangered Endangered Possible	Eleocharis keigheryi	Vulnerable	Vulnerable	Possible
Endangered Endangered Endangered Possible	Morelotia australiensis		Vulnerable	
Diuris drummondii (Toli Donkey Orchid) Corchid) C	Goodenia arthrotricha	Endangered	Endangered	Possible
Dechid Possible	Grevillea curviloba	Endangered	Endangered	Possible
Schoenus Sp. Beaufort (G.J. P1 Possible		Vulnerable	Threatened	Unlikely
Reighery 6291) Boronia humifusa	, , , , , , , , , , , , , , , , , , ,	-	P1	Possible
P2				. 655.2.6
P2	Boronia humifusa	-	P1	Possible
P2		-	P2	Possible
Pathysace ramosissima Passible Schoenus benthamii Passible Passible		-	P2	Possible
Schoenus benthamii	Comesperma griffinii	-	P2	Likely
Schoenus capillifolius -	Platysace ramosissima	-	P3	Possible
Schoenus sp. Waroona (G.J. P3	Schoenus benthamii	-	P3	Possible
Schoenus sp. Waroona (G.J. P3 Possible	Schoenus capillifolius	-	P3	Possible
Reighery 12235	Schoenus pennisetis	-	P3	Possible
Stylidium aceratum - P3 Possible Styphelia filifolia - P3 Unknown Thysanotus anceps - P3 Possible Isopogon autumnalis (Previously Isopogon drummondii) Isotropis cuneifolia subsp. Glabra P3 Possible Idicasuarina grevilleoides P3 Possible Iacksonia gracillima P3 Possible Iacksonia gracillima P3 Possible Idicasuarina grevilleoides P3 Unlikely Idicasuarina grevilleoides P3 Unlikely Idicasuarina grevilleoides P3 Unlikely Idicasuarina grevilleoides P3 Unlikely Idicasuarina grevilleoides P3 Possible Idicasuarina grevilleoides P3 Itikely Idicasuarina grevilleoides P3 Itikely Idicasuarina grevilleoides P4 Possible Idicasuarina grevilleoides P4 Itikely Idicasuarina grevilleoides Idicasuarina grevilleoides Idicasuarina grevilleoid	Schoenus sp. Waroona (G.J.	-	P3	Possible
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Thysanotus anceps -	Stylidium aceratum	-	P3	Possible
Isopogon autumnalis (Previously Isopogon drummondii) Isopogon drummondii) Isotropis cuneifolia subsp. Glabra P3 Possible Allocasuarina grevilleoides P3 Possible Jacksonia gracillima P3 Possible Myriophyllum echinatum P3 Possible Babingtonia urbana P3 Unlikely (Coastal Plain Babingtonia) P3 Unlikely Jackson greridifolia subsp. Vernalis P3 Unlikely Bahksia pteridifolia subsp. Vernalis P3 Unlikely Byblis gigantea P3 Unlikely (Rainbow Plant) P3 Possible Comesperma rhadinocarpum P3 Possible Comesperma rhadinocarpum P3 Possible Comesperma rhadinocarpum P3 Possible Comesperma rhadinocarpum P3 Possible Desuptive Beaufortia purpurea P3 Possible Eryngium pinnatifidum subsp. P3 Possible Eryngium pinnatifidum subsp. P3 Likely Palustre (G.J. Keighery 13459) E7/90 Likely Likely Halgania corymbosa P3 Possible Eryngium sp. Subdecumbens (G.J. P3 Likely Halgania corymbosa P3 Possible Halgania corymbosa P3 Possible Folonting Bog-rush Likely Lasiopetalum bracteatum P4 Likely Likely Likely	Styphelia filifolia	-	P3	Unknown
Isotropis cuneifolia subsp. Glabra P3 Possible Allocasuarina grevilleoides P3 Possible Jacksonia gracillima P3 Possible Jacksonia gracillima P3 Possible Jacksonia gracillima P3 Possible Lasiopetalum glutinosum subsp. P3 Unlikely Glutinosum P3 Possible Myriophyllum echinatum P3 Possible Myriophyllum echinatum P3 Possible Babingtonia urbana C(Coastal Plain Babingtonia) Banksia pteridifolia subsp. Vernalis P3 Unlikely Byblis gigantea P3 Unlikely (Rainbow Plant) Comesperma hadinocarpum P3 Possible Comesperma rhadinocarpum P3 Possible Comesperma rhadinocarpum P3 Possible Comesperma hadinocarpum P3 Possible Descuprina gracilis P3 Possible P4 P5 P5 P5 P5 Carex terticaulis P3 Possible Eryngium pinnatifidum subsp. P4 Likely Halgania corymbosa P3 Possible Acacia horridula P3 Possible Cacia natars P4 Likely Likely P5 P5 P5 Likely P5 P5 Likely Likely Likely Likely Likely P5 Likely Likely Likely Likely Likely Likely Likely Likely Likely Likely	Thysanotus anceps	-	P3	Possible
Isotropis cuneifolia subsp. Glabra	Isopogon autumnalis (Previously	-	P3	Confirmed
Allocasuarina grevilleoides - P3 Possible Jacksonia gracillima - P3 Possible Lasiopetalum glutinosum subsp. Glutinosum subsp. Beaufortia purpurea (Slender-fruited Comesperma) Asteridea gracilis - P3 Possible Eryngium pinnatifidum subsp. P3 Unkely Eryngium pinnatifidum subsp. P3 Possible Eryngium sp. Subdecumbens (G.J. Keighery 5390) Haemodorum loratum P3 P3 Possible P3 Possible P3 Possible P3 Possible P3 Unlikely Unlikely Unlikely P3 Unlikely P4 Unlikely P5 P	Isopogon drummondii)			
Jacksonia gracillima	Isotropis cuneifolia subsp. Glabra	-	Р3	Possible
Lasiopetalum glutinosum subsp. Glutinosum Meionectes tenuifolia Meionectes tenuifolia Meionectes tenuifolia Babingtonia urbana (Coastal Plain Babingtonia) Banksia pteridifolia subsp. Vernalis Byblis gigantea (Rainbow Plant) Chamaescilla gibsonii Comesperma rhadinocarpum (Slender-fruited Comesperma) Asteridea gracilis Beaufortia purpurea (Purple Beaufortia) Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459) Carex tereticaulis Fya Pasible Pya Possible Pya Possible Pya Possible Pya Possible Pya Possible Likely Pya Likely Haemodorum loratum Pya Likely Halgania corymbosa Pya Possible	Allocasuarina grevilleoides	-	P3	Possible
Glutinosum P3 Possible P3 P0ssible P4 P0ssible	Jacksonia gracillima	-	P3	Possible
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Myriophyllum echinatum-P3PossibleBabingtonia urbana (Coastal Plain Babingtonia)-P3UnlikelyBanksia pteridifolia subsp. Vernalis Byblis gigantea (Rainbow Plant)-P3UnlikelyChamaescilla gibsonii Comesperma rhadinocarpum (Slender-fruited Comesperma)-P3PossibleAsteridea gracilis Beaufortia purpurea (Purple Beaufortia)-P3PossibleEryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)-P3LikelyCarex tereticaulis Eryngium sp. Subdecumbens (G.J. Keighery 5390)-P3LikelyHaemodorum loratum Halgania corymbosa Acacia horridula Schoenus natans (Floating Bog-rush)-P4PossibleLikely Possible-P4Possible		-	Р3	Possible
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Carex tereticaulis-P3PossibleEryngium sp. Subdecumbens (G.J. Keighery 5390)-P3LikelyHaemodorum loratum-P3LikelyHalgania corymbosa-P3PossibleAcacia horridula-P3LikelySchoenus natans (Floating Bog-rush)-P4PossibleLasiopetalum bracteatum-P4Likely		-	P3	Likely
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Acacia horridula - P3 Likely Schoenus natans (Floating Bog-rush) - P4 Possible Lasiopetalum bracteatum - P4 Likely		-	-	
Schoenus natans - P4 Possible (Floating Bog-rush) - P4 Likely		-		
(Floating Bog-rush) Lasiopetalum bracteatum - P4 Likely		-		
Lasiopetalum bracteatum - P4 Likely				
		-	P4	Likely
Cyanicula ixioides subsp. Ixioides - P4 Unknown		-		



Species	Cons	Potential to occur (based on	
(Common name (if applicable))	EPBC Act	BC Act	desktop assessment)
Senecio leucoglossus	-	P4	Possible
Stylidium longitubum	-	P4	Possible
(Jumping Jacks)			
Stylidium striatum	-	P4	Possible
(Fan-leaved Triggerplant)			
Verticordia lindleyi subsp. Lindleyi	-	P4	Likely
Ornduffia submersa	=	P4	Unknown
Acacia oncinophylla subsp.	-	P4	Likely
Patulifolia			
Drosera occidentalis	-	P4	Unknown
(Western Sundew)			
Calothamnus accedens	=	P4	Possible
Aponogeton hexatepalus	-	P4	Possible
Bolboschoenus fluviatilis	-	Р3	Unlikely
Calandrinia uncinella	-	P1	Possible
Calectasia grandiflora	-	P2	Possible
Commersonia sp. Lesmurdie (A.A.	-	P2	Unlikely
Mitchell 11429)			
Cyanothamnus tenuis	-	P4	Unlikely
Diuris brevis	-	P2	Possible
Hydrocotyle lemnoides	-	P4	Possible
Johnsonia pubescens subsp.	-	P2	Possible
Cygnorum			
Pimelea rara	-	P4	Unlikely
Pithocarpa corymbulosa	-	Р3	Unlikely
Rytidosperma racemosum var.	-	P2	Possible
racemosum			
Thysanotus cymosus	-	Р3	Unlikely

2.1.2 Threatened and Priority Ecological Communities

The BC Act defines an ecological community as a naturally occurring assemblage of organisms that occurs in a particular habitat. In most instances on the Swan Coastal Plain, an ecological community has been determined based on their floristic community type (FCT) and some Commonwealth listed Threatened Ecological Communities (TECs) may correspond with more than one FCT at a State level.

The number of TECs and Priority Ecological Communities (PECs) identified as potentially occurring within the MRS amendment area reflects the unique landforms that occur in a highly fragmented environment at the base of the Darling Scarp. This area is influenced by the Scarp and the Swan Coastal Plain and supports a mix of Banksia and Eucalyptus woodlands, Heath shrublands and wetlands.

The 2023 desktop assessment identified 6 TECs listed under the EPBC Act and 11 TECs listed under the BC Act and 3 PECs listed by the DBCA as having a likely or greater chance of occurrence in the MRS amendment area (See Table 2-2). Of these, the Commonwealth-listed Banksia Woodlands of the Swan Coastal Plain TEC (which is listed as Priority 3 by the DBCA) and 2 State-listed TECs have been identified as occurring in discrete areas within the MRS amendment area.



Table 2-2 Threatened and Priority Ecological Communities identified in the desktop assessment

	Conservation	Code	
Community	State (WA)	EPBC Act (Cth)	Presence in the MRS amendment area
Banksia Woodlands of the Swan Coastal Plain	Р3	E	Present (See section 3.1.4)
Incorporating the State listed TECs and PECs:			
Banksia attenuata woodlands over species rich dense shrublands (FCT/SCP 20a)	CR		Present (See section 3.1.4)
Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (FCT/SCP 20b)	CR		Present (See section 3.1.4)
 Low lying Banksia attenuata woodlands or shrublands (FCT/SCP 21c) 	Р3		• Absent
SCP20c Shrublands and Woodlands of the Eastern Swan Coastal Plain (FCT20c)	CR	E	Absent
Clay Pans of the Swan Coastal Plain		CE	Absent
Incorporating the State listed TECs:			
Herb rich saline shrublands in clay pans (FCT/SCP 07)	EN		• Absent
Herb rich shrublands in clay pans (FCT/SCP 08)	EN		• Absent
Shrublands on dry clay flats. (FCT/SCP 10a)	EN		• Absent
SCP 3a Corymbia calophylla – Kingia australis Woodlands on Heavy Soils of the Swan Coastal Plain (FCT/SCP 3a)	CR	Е	Absent
SCP3b Corymbia calophylla – Eucalyptus marginata Woodlands on Sandy Clay Soils of the southern Swan Coastal Plain (FCT/SCP 3b)	EN	-	Absent
SCP3c Corymbia calophylla – Xanthorrhoea preissii Woodlands and Shrublands, Swan Coastal Plain (FCT/SCP 3c)	EN	Е	Absent
Central Northern Darling Scarp Granite Shrubland Community	P4	-	Absent
SCP02 Southern Wet Shrublands, Swan Coastal Plain (FCT/SCP 02)	CR	-	Absent
Muchea Limestone – Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain	EN	E	Absent

Conservation Codes	State (WA)	Federal
Endangered	EN	E
Critically Endangered	CR	CE
Vulnerable	VU	V

Priority (rated in order of significance from 1 to 4) P Not applicable



2.1.3 Conservation Significant Fauna

Conservation significant fauna database searches were conducted using a 10 km buffer surrounding the MRS amendment area using the EPBC Act Protected Matters Search Tool (PMST) and the DBCA Threatened, Specially Protected, and Priority Fauna database by AECOM (2020) and JBS&G in 2022. An additional database search was conducted in September 2023 by JBS&G to verify the validity of the previous searches.

The 2023 desktop assessment identified a total of 33 fauna taxa of conservation significance as potentially occurring within a 10 km buffer of the MRS amendment area (Table 2-3). The majority of these taxa are associated with wetland (and other discrete) habitats that are within a 10km radius but do not occur within the MRS amendment area. The EPBC Protected Matters Search identified five fauna species listed as Marine under the EPBC Act which only pertains to Commonwealth Land.

As such, of the 33 conservation significant fauna taxa identified in the desktop assessment, up to 7 species are considered to have the potential to occur based on presence of suitable habitat within the MRS amendment area, including 3 species (black cockatoo) listed under both the BC and EPBC Act. The likelihood for each species to occur within the MRS amendment area is provided in Table 2-3.

As the site is predominantly cleared of native vegetation and used for rural purposes, the site does not provide large areas of intact or connected habitat. The surrounding environment (external to the MRS amendment area) is also predominantly cleared and consists of rural land uses containing limited native vegetation. Large areas of intact vegetation are located east of the site, within the Lesmurdie Falls National Park, which is considered to provide higher quality fauna habitat. The Greater Brixton Street Wetlands, located to the west of the site and physically separated by Tonkin Highway, also provides higher quality fauna habitat. There are some discrete areas of good (and better) quality remnant vegetation and scattered trees located within the MRS amendment area. An assessment of the likelihood for each species to occur included consideration of the habitat types within the MRS amendment area.





Table 2-3: Threatened and Priority Fauna potentially occurring within 10 km of the MRS amendment area

Scientific Name	Common Name	Conservation Status		Likelihood of occurrence within the MRS Amendment Area	
		State (WA)	Federal		
Leioproctus douglasiellus	a short-tongued bee	EN	CR	Unlikely	
Neopasiphae simplicior	a short-tongued bee	EN	CR	Unlikely	
Glossurocolletes bilobatus	a short-tongued bee (southwest)	P2		Possible	
Zanda baudinii	Baudin's cockatoo	EN	EN	Possible	
Neelaps calonotos	black-striped snake, black-striped burrowing snake	Р3		Unlikely	
Oxyura australis	blue-billed duck	P4		Unlikely	
Zanda latirostris	Carnaby's cockatoo	EN	EN	Likely	
Westralunio carteri	Carter's freshwater mussel	VU	VU	Unlikely	
Hydroprogne caspia	Caspian tern	MI	MI	Unlikely	
Australotomurus morbidus	cemetery springtail, Guildford springtail	P3		Unlikely	
Dasyurus geoffroii	chuditch, western quoll	VU	VU	Unlikely	
Tringa nebularia	common greenshank	MI	MI	Unlikely	
Actitis hypoleucos	common sandpiper	MI	МІ	Unlikely	
Thalasseus bergii	crested tern	MI	МІ	Unlikely	
Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU	Likely	
Plegadis falcinellus	glossy ibis	MI	МІ	Unlikely	
Kawanaphila pachomai	grey vernal katydid (southwest)	P1		Unlikely	
Tringa stagnatilis	marsh sandpiper, Little greenshank	MI	МІ	Unlikely	
Myrmecobius fasciatus	numbat, walpurti	EN	EN	Unlikely	
Pandion haliaetus	osprey	MI	МІ	Unlikely	
Falco peregrinus	peregrine falcon	OS		Unlikely	
Lerista lineata	Perth slider, lined skink	Р3		Unlikely	
Isoodon fusciventer	quenda, southwestern brown bandicoot	P4		Likely	
Setonix brachyurus	quokka	VU	VU	Unlikely	
Acanthophis antarcticus	southern death adder	Р3		Unlikely	
Phascogale tapoatafa wambenger	south-western brush-tailed phascogale, wambenger	CD		Unknown	
Idiosoma sigillatum	Swan Coastal Plain shield-backed trapdoor spider	P3		Possible	
Hydromys chrysogaster	water-rat, rakali	P4		Unlikely	
Notamacropus irma	western brush wallaby	P4		Unlikely	
Platycercus icterotis xanthogenys	western rosella (inland)	P4		Possible	
Pseudemydura umbrina	western swamp tortoise	CR	CR	Unlikely	
Tringa glareola	wood sandpiper	МІ	MI	Unlikely	
Bettongia penicillata ogilbyi	woylie, brush-tailed bettong	CR	EN	Unlikely	

Conservation Codes	State (WA)	Federal
Endangered	EN	E
Critically Endangered	CR	CE
Vulnerable	VU	V

Priority (rated in order of significance from 1 to 4) P Not applicable





3. Field Survey Results and Discussion

3.1 Flora and Vegetation

3.1.1 Vegetation Communities

Six native vegetation communities were described and mapped by AECOM (2020) for the broader Wattle Grove South area. Of these, three occur within the MRS amendment area. These communities fall into two broad categories of Banksia Woodland and *E. marginata* Woodland (AECOM 2020). Vegetation descriptions for those communities present in the MRS amendment area are provided in Table 3-1 and shown Figure 3-1. The delineation of vegetation communities was supported by cluster analysis of floristic data. The cluster outcomes as identified using AECOMs quadrat and relevé data (Q09, Q06, Q13, R12, R14 and R05) (AECOM 2020) and the single quadrat data collected by JBS&G in 2022 (S01) are provided below. The quadrat and relevé data sheets are provided in Appendix C.

Table 3-1: Vegetation Community Descriptions

Description	Additional Details	Photograph
BmXpEc Banksia Woodland Banksia menziesii, Allocasuarina fraseriana and Eucalyptus todtiana low open woodland over Xanthorrhoea preissii, Eremaea pauciflora var. pauciflora and Stirlingia latifolia low open shrubland over Ehrharta calycina*, Dasypogon bromeliifolius and Anigozanthos manglesii subsp. manglesii mixed grass and forbland (AECOM 2020). Represents Federal TEC Banksia Woodlands of the SCP and WA TEC B. attenuata and/or E. marginata woodlands of the eastern SCP (SCP20b) (AECOM 2020).	Survey effort: Q09 (AECOM quadrat) R12 (AECOM relevé) R14 (AECOM relevé) Species richness: 80 native and 12 weed species (AECOM 2020).	Source: AECOM 2020
BaEpPf Banksia Woodland	Survey effort: Q6 (AECOM quadrat)	
Banksia attenuata, Banksia menziesii and Eucalyptus todtiana low open woodland over Eremaea pauciflora var. pauciflora, Hibbertia hypericoides and Allocasuarina humilis low shrubland over Phlebocarya filifolia, Mesomelaena pseudostygia and Lepidosperma leptostachyum low sedgeland (AECOM 2020). Represents Federal TEC Banksia Woodlands of the SCP. One patch also represents the WA TEC Banksia attenuata woodlands over species rich dense shrublands (SCP20a). Supports the Threatened Conospermum undulatum and Priority 3 Isopogon drummondii (AECOM 2020).	Q13 (AECOM quadrat) S01 (JBS&G relevé) Species richness: 88 native and 7 weed species.	Source: AECOM 2020
EmMpLp	Survey effort:	
E. marginata Woodland Eucalyptus marginata subsp. marginata and Allocasuarina fraseriana mid open forest over Mesomelaena pseudostygia and Tetraria octandra low sedgeland with Lomandra preissii, Tricoryne elatior and Dampiera linearis low open forbland (AECOM 2020).	R05 (AECOM relevé)	
Larger patch of this community surveyed in wider Wattle Grove South survey area (but outside of MRS amendment area) represents WA TEC <i>B. attenuata</i> and/or <i>E. marginata</i> woodlands of the eastern SCP (SCP20b) (AECOM 2020).		Source: AECOM 2020
Significantly Altered Includes planted, gardens, scattered trees (both native and introduced). Condition considered Completely Degraded.	N/A	N/A



Of the mapped vegetation communities, three represent remnant native vegetation while the remaining two represent highly modified or planted vegetation communities. Areas previously subject to clearing or development have been identified as 'Cleared'. Areas not subject to a site assessment have been extrapolated based on adjacent environmental values, review of aerial imagery and where possible, visual assessment from adjoining lots and road reserves. The area each vegetation community occupies within the site is provided in Table 3.3.

Table 3-2: Vegetation Communities

Vegetation Community	Area (ha)	Percentage Total (%)
Remnant Native Vegetation		
BaEpPf	4.23	3.37
BmXpEc	0.42	0.34
EmMpLp	0.13	0.10
Total Remnant Native Vegetation	4.70	3.73
Highly Modified Vegetation		
Planted	2.80	2.23
Scattered Trees	26.90	21.42
Other		
Cleared	91.10	72.54
Grand Total	125.58	100

3.1.2 Vegetation Condition

Vegetation condition within the MRS amendment area varied from 'Excellent' to 'Completely Degraded' and is described in Table 3-3 and shown in Figure 3-2. The condition map reflects the current land use which comprises numerous landholdings and contains a mixture of land uses including residential and rural living, composite business along Welshpool and Brentwood Roads and horticulture (including turf farm). The turf farm located across Lots 303, 53, 214 and 213, south of Brentwood Road, has discontinued operations in the last 6 months. There is a former poultry farm located at Lot 251 within the south-east portion of the site, that ceased operations over a decade ago. The Dampier to Bunbury natural gas pipeline (DBNGP) also runs along the western edge of the site adjacent to Tonkin Highway. The majority of rural residences comprise cleared paddocks, grasslands (lawn) and maintained gardens.

Table 3-3: Vegetation Condition within the Amendment Area

Vegetation Condition	Area (ha)	Percentage Total (%)
Excellent	3.41	2.71
Very Good	0.1	0.08
Good	0.24	0.19
Degraded	0.13	0.10
Completely Degraded	24.95	19.87
Cleared	96.74	77.04
Total	125.58	100



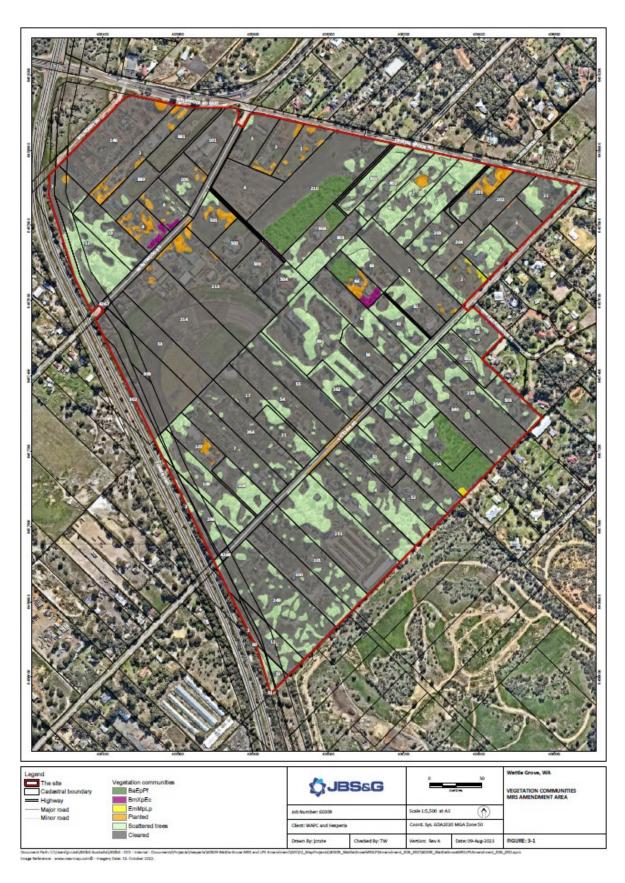


Figure 3-1: Vegetation Communities within the MRS amendment area



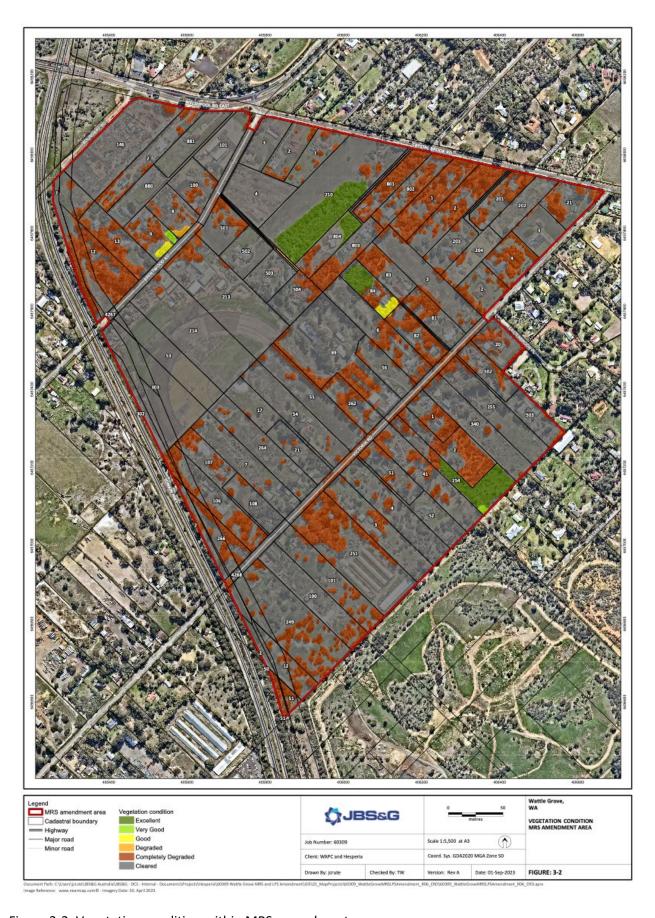


Figure 3-2: Vegetation condition within MRS amendment area



3.1.3 Floristic Community Type Analysis

An FCT analysis was undertaken by JBS&G ecologists in accordance with the EPA Technical Guidance – *Flora* and *Vegetation Surveys for Environmental Impact Assessment* (2020), utilising the Keighery et al. (2020) Swan Coastal Plain (SCP) dataset, compiled with the site survey datasets.

This analysis incorporated all of the quadrats from the broader AECOM (2020) study area that were placed within the vegetation communities observed within the MRS amendment area. Although some of the quadrats themselves were outside of the study area, using these quadrats enabled a better and more robust FCT analysis. All but one of these quadrats were surveyed by AECOM in 2019, with the other quadrat surveyed by JBS&G in 2021. The JBS&G quadrat was located in vegetation that has become degraded due to adjacent clearing; however, the information from this quadrat is still valuable as it represents a larger patch of vegetation nearby that could not be directly accessed for survey purposes. The locations of these quadrats are shown in Figure 1-2. The FCTs inferred from the analysis include:

- FCT/SCP 20a B. attenuata woodlands over species rich dense shrublands
- FCT/SCP 23a central B. attenuata -B. menziesii woodlands
- Potential for FCT/SCP 20b Banksia attenuata Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain

The FCT analysis results were used to inform the TEC and PEC assessment discussed in Section 3.1.4 (Appendix D). Details for each quadrat, with the highest percentage in similarity to the SCP quadrats, and the inferred FCT conclusions are presented in Table 3-4.

The MRS amendment area occurs at the confluence of three major landforms; the Foothills (Ridge Hill Shelf) (east), the Pinjarra Plain, and a combination of Bassendean Dunes and Pinjarra Plain. Because of this, one of the inferred FCTs remain slightly cryptic as it is unclear what landform they would represent at this scale. Furthermore, low similarity was observed across all quadrats analysed, suggesting poor comparability to the SCP data. A number of factors would influence this, such as position of survey area along the base of the Darling Scarp – species present may not be typical of that landform due to the proximity of the scarp, single quadrat sampling event, drying climate; and isolation of native vegetation patches and existing disturbances (AECOM 2020).

The areas of remnant native vegetation within the MRS amendment area are small and range in size from 0.05 to 2.07 ha. Given these small areas, it is believed that the sampling undertaken is representative of the vegetation communities present at each occurrence. Through single site insertion of the quadrat results from the vegetation surveys undertaken against the Keighery (2020) Swan Coastal Plain (SCP) dataset, it was found that definitive flora community types could be attributed to the native vegetation for the majority of the MRS amendment area, and therefore, it is considered that the small number of quadrats sampled provides sufficient information on the vegetation communities present within accessible properties present in the MRS amendment area.



Table 3-4 Inferred FCTs for Remnant Native Vegetation within the MRS Amendment Area

Vegetation unit	Total area within MRS amendment area (ha)	Quadrat (# of species)	Inside MRS area?	FCTs based on similarity	Dendro- gram FCTs	Inferred FCT
BaEpPf	4.233	4 (62)	No	20b (Site: Rush02) 0.37%	20a, 20c, 20b.	TEC Banksia attenuata woodlands over species rich
Banksia Woodland				20a (Site: hart01) 0.37%		dense shrublands (FCT/SCP 20a).
Banksia attenuata, Banksia				20a (Site: activ01) 0.34%		
menziesii and Eucalyptus				20a (Site: APBF-2) 0.34%		However, there may be an ecotone and/or some overlap
todtiana low open				20a (Site: m5303) 0.34%		with 20b, 20c, 23a and/or 23b.
woodland		6 (52)	Yes	20c (Site: talb8) 0.43%	20a, 20c, 20b.	The soil and landform units correspond to those of 20a;
				23b (Site: ELE03) 0.43%		all of these quadrats include Isopogon autumnalis, which
over Eremaea pauciflora				23a (Site: Perth06) 0.42%		is a taxa useful in distinguishing FCT/SCP 20a from all of
var. pauciflora, Hibbertia				23a (Site: Kens01) 0.42%		the eastern southern Swan Coastal Plain FCT/SCPs (3a,
hypericoides and Allocasuarina humilis low		13 (57)	Yes	S09 (Site: BNR18) 0.42%	20a, 20c, 20b.	3b, 3c, 20b, 20c)
				23b (Site: ELE28) 0.42%		The quadrats sampled contained 12 out of the 19 typical
shrubland over <i>Phlebocarya</i>				23a (Site: perth08) 0.4%		species identified by Gibson et al (1994), and 10 out of
filifolia, Mesomelaena				23a (Site: Tele01) 0.39%		the 12 identified as 'common' for this FCT by DPAW
pseudostygia and				20a (Site: activ01) 0.39%		(2016): Banksia attenuata, Bossiaea eriocarpa, Hibbertia
Lepidosperma		JBSG01 (50)	Yes	23a (Site: Tele01) 0.44%	21a, 21b, 21c.	huegelii, Hibbertia hypericoides, Petrophile linearis,
leptostachyum low				20a (Site: activ03) 0.44%		Scaevola repens, Stirlingia latifolia, Mesomelaena
sedgeland.				21a (Site: card7) 0.43%		pseudostygia, and Alexgeorgea nitens. Two of the
				20a (Site: KOON-1) 0.43%		quadrats also contain Daviesia nudiflora which can be
						useful in differentiating 20a from 20b and 20c.
BmXpEc	0.424	9 (38)	Yes	23a (Site: perth04) 0.45%	20b, 20a, 20c.	May be Banksia attenuata – B. menziesii woodlands
Banksia Woodland				23a (Site: Kens01) 0.44%		(FCT/SCP 23a), however there is some similarity with
Banksia menziesii,				23a (Site: Tele01) 0.43%		other FCT/SCPs such as 20a and 20b, and there are some
Allocasuarina fraseriana and				23a (Site: perth08) 0.42%		species present (Cyathochaeta avenacea, Dasypogon
Eucalyptus todtiana low				20a (Site: activ03) 0.41%		bromeliifolius, and Morelotia octandra (previously
open woodland over		18 (41)	No	28 (Site: wire01) 0.40%	21a, 23a, 4,	Tetraria octandra), which imply lower-lying landforms
Xanthorrhoea preissii,				23a (Site: perth08) 0.40%	21c	and heavier soils than are typical for this FCT.
Eremaea pauciflora var.				20a (Site: activ03) 0.38%		
pauciflora and				23a (Site: Tele01) 0.38%		
•		19 (45)	No	20a (Site: activ03) 0.41%	20a, 20c, 20b.	-
Stirlingia latifolia low open				20b (Site: Rush02) 0.4%		
shrubland over *Ehrharta				23a (Site: Tele01) 0.38%		
calycina, Dasypogon				23a (Site: Kens01) 0.38%		
bromeliifolius and Anigozanthos manglesii				•		





Vegetation unit	Total area within MRS amendment area (ha)	Quadrat (# of species)	Inside MRS area?	FCTs based on similarity	Dendro- gram FCTs	Inferred FCT
subsp. <i>manglesii</i> mixed grass and forbland.						
EmMpLp E. marginata Woodland Eucalyptus marginata subsp. marginata and Allocasuarina fraseriana mid open forest over Mesomelaena pseudostygia and Tetraria octandra low sedgeland with Lomandra preissii, Tricoryne elatior and Dampiera linearis low open forbland.	0.13	20 (44)	No	23a (Site: perth04) 0.35 % 23a (Site: perth08) 0.34% 23a (Site: bibra01) 0.33% 20a (Site: activ03) 0.33% 20b (Site: card5) 0.33%	21a, 21c, 23a, 4	Inconclusive; may be TEC Banksia attenuata — Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (FCT/SCP 20b), as per AECOM (2020) conclusions. FCT/SCP 20b is known from pre-European vegetation complexes at the base of the Darling Scarp and largely on the Forrestfield unit (Ridge Hill Shelf), Guildford unit (Pinjarra Plain), and Southern River Unit, which aligns with the surveyed location, however it is primarily known to occur between Byford and Yarloop, both of which are considerably south of this location. According to DBCA (2023), this FCT differs from FCT/SCP 20a and 20c in the presence of understorey species that can include Grevillea pilulifera, Babingtonia camphorosmae, Hibbertia vaginata, Caladenia flava, Hakea stenocarpa and Conostylis setosa: None of the abovementioned species were recorded in this quadrat, however this does not definitively indicate that it is not FCT/SCP 20b. FCT/SCP 20b is also characterised by and the general absence of Alexgeorgea nitens - a common component of FCT/SCP 20a —not observed in this quadrat.



3.1.4 Threatened and Priority Ecological Communities

Native vegetation was mapped over 4.70 ha within the survey area. Conservation-significant ecological communities occur within four major vegetation patches (Figure 3.3) (Appendix E). Two of these include TECs, and another one may include very small and heavily degraded patches of another TEC (pending verification). The four patches are:

- Patch 1: Contained within Lot 254 is 1.8 ha of BaEpPf which is inferred as being FCT/SCP 20a (refer to Table 3-4), which is a State-listed TEC (Critically Endangered). Whilst FCT/SCP 20a is not a Commonwealth-listed TEC, 0.99 ha is in excellent condition (contains AECOM quadrats 6 and 4), and meets the condition threshold requirement for the Commonwealth-listed Banksia Woodlands of the Swan Coastal Plain TEC. Located adjacent on Lot 2 is 0.82 ha of BaEpPf which is mapped as completely degraded and is not included as part of the Commonwealth-listed Banksia Woodlands of the Swan Coastal Plain TEC. Also, a small (0.05 ha) area of the Eucalyptus woodland which may be FCT/SCP 20b TEC (contains AECOM quadrat 5), in very good condition. Patch 1 also supports occurrences of threatened flora species Conospermum undulatum (Vulnerable) and priority flora Isopogon autumnalis (Priority 3).
- Patch 2: Contained within Lot 84 is 0.35 ha of BaEpPf which is inferred as being FCT/SCP 20a (contains AECOM quadrat 13) and 0.14 ha of BmXpEc which is inferred as being FCT/SCP 23a; however there is some similarity with other FCT/SCPs such as 20a and 20b (refer to Table 3-4) (contains AECOM relève 12). FCT/SCP 20a is a State-listed TEC (Critically Endangered) and whilst this patch represents two discreet areas that are different vegetation communities and inferred FCTs they are broadly defined as Banksia Woodland. Furthermore, due to the connection of canopies of trees these two areas are considered representative of the same patch. Whilst the area falls outside the required 0.5 ha by a minute amount the precautionary principle has been applied and therefore, the patch meets the threshold requirements for the Commonwealth listed Banksia Woodlands of the Swan Coastal Plain TEC. Patch 2 also supports occurrences of threatened flora species Conospermum undulatum (Vulnerable) and priority flora Isopogon autumnalis (Priority 3).
- Patch 3: Contains approximately 0.3 ha of BmXpEc which is inferred as being FCT/SCP 23a (refer to Table 3-4) (contains AECOM quadrat 9 and relève 8), which is not a State-listed TEC and whilst it is broadly considered to be Banksia Woodlands, this patch is not considered to be representative of the Commonwealth-listed Banksia Woodlands of the Swan Coastal Plain TEC due to its degradation and patch size.
- Patch 4: a total of 2.07 ha of BaEpPf which is inferred as being FCT/SCP 20a (refer to Table 3-4) (contains JBS&G quadrat S01), which is a State-listed TEC, and given it is in excellent condition it meets the condition threshold requirement for the Commonwealth-listed Banksia Woodlands of the Swan Coastal Plain TEC. Patch 4 also supports occurrences of threatened flora species *Conospermum undulatum* (Vulnerable) and priority flora *Isopogon autumnalis* (Priority 3).





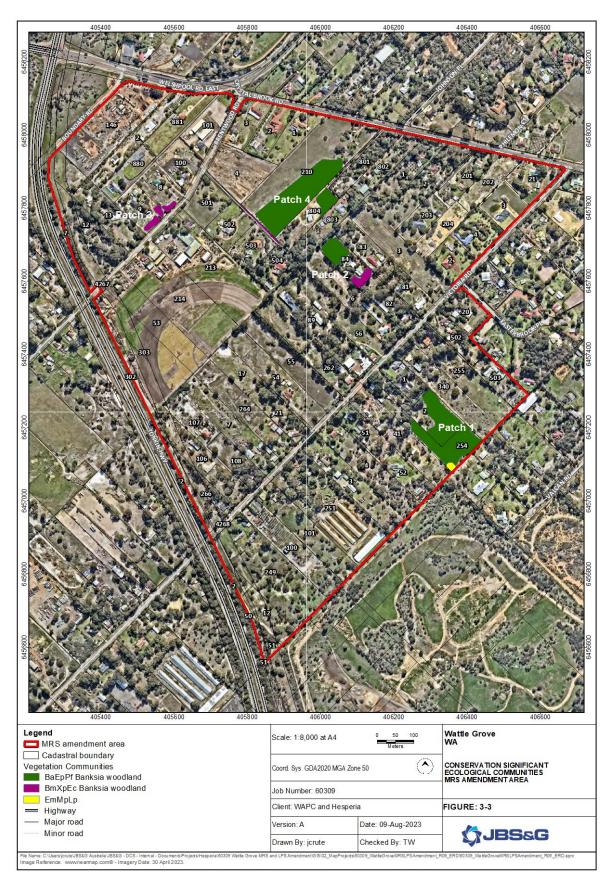


Figure 3-3: Conservation Significant Ecological Communities within the Amendment Area



3.1.5 Conservation Significant Flora

AECOM undertook an ecological spring survey, incorporating flora and vegetation in October 2019 (AECOM 2020). The survey recorded data from twelve quadrats and eight relevés, covering a broader area of the Wattle Grove locality. The result of this survey has been augmented by the further survey work by JBS&G. It is considered that the MRS amendment area has been adequately surveyed and values appropriately assessed.

AECOM (2020) recorded two conservation significant flora taxa, concentrated in two localised areas, within the MRS amendment area (Appendix B).

- Conospermum undulatum (T)
- Isopogon autumnalis (P3), previously named Isopogon drummondii.

The AECOM field survey was undertaken at an appropriate time to identify conservation significant orchid species if present. JBS&G conducted flora and vegetation surveys in October 2021 and August and October 2022, incorporating both previously surveyed and unsurveyed lots within the MRS amendment area.

In addition, flora surveys conducted by JBS&G in January 2022 recorded observations of conservation significant flora from the boundary of Lots 210 and 801. Observations of Lot 210 and Lot 801 noted the presence of *Conospermum undulatum* (T) and *Isopogon autumnalis* (P3).

Conospermum undulatum (waxy-leaved smokebush) is an erect shrub which grows to 1.5 m height and is characterised by its fibrous, longitudinally fissured stems and wide leaves with wavy margins. It is listed as Vulnerable under the BC Act and EPBC Act and is ranked as Vulnerable (VU) under World Conservation Union (IUCN 1994) Red List criterion B1+2c, with its main threats being listed as further land clearing, poor habitat quality, road and firebreak maintenance, inappropriate fire regimes, weeds, recreational activities and rabbit grazing (DEC 2009). Conospermum undulatum is recorded from 25 historical populations, comprising 83 subpopulations. However, only 20 populations currently contain extant plants (DEC 2009). It occurs on sand and sandy clay soils, often over laterite, on flat or gently sloping sites between the Swan and Canning Rivers. A few records are from slightly swampy habitat. Habitat critical to the survival of Conospermum undulatum includes the area of occupancy of important populations and areas of similar habitat surrounding important populations (DEC 2009). Important populations of Conospermum undulatum are listed in the species' recovery plan.

Isopogon autumnalis is an erect shrub growing to 1 m height with cream-yellow flowers and mostly terete leaves (Rye and MacFarlane 2019). It is listed as a Priority 3 taxon by DBCA. It is known from a large range extending from the southern Lesueur Sandplains through the Swan Coastal Plain and Dandaragan Plateau to the Northern Jarrah Forrest. It prefers white, grey or yellow sand, often over laterite. It was previously known as *Isopogon drummondii* but was renamed in 2019 due to lack of a type specimen and descriptions being based on cultivated specimens (Rye and MacFarlane 2019). Variants of the taxon with larger leaves were transferred to *Isopogon sphaerocephalus*.

Two additional conservation significant flora species, *Banksia mimica* and *Lasiopetalum glutinosum* subsp. *glutinosum*, were identified in the 2018 desktop assessment through DBCA records (360 Environmental 2018). *Banksia mimica* was previously recorded southeast of the Crystal Brook Road and Brentwood Road junction. All properties in this vicinity have since been cleared for residential development, and no native vegetation remains. *Banksia mimica* was not recorded during the field survey (AECOM 2020) or by JBS&G during subsequent site surveys.

Records of Lasiopetalum glutinosum within the site are associated with Paganoni Swamp, approximately 60 km southwest of the site (360 Environmental, 2018)). The occurrence of Lasiopetalum glutinosum within the site is therefore considered a result of mapping inaccuracies. AECOM determined that the species is unlikely to occur within the site, given it is associated with lateritic outcrops on the Darling Scarp. AECOM (2020) did not identify Lasiopetalum glutinosum during the survey or JBS&G during subsequent site surveys.



Targeted flora survey - Drakea elastica

On 25 August 2021 an experienced JBS&G ecologist visited Lot 254 Victoria Road, Wattle Grove to undertake a targeted flora survey for conservation significant species. Vegetation at Lot 254 is an open to sparse *Banksia* woodland over closed, medium-low shrubland. As previously discussed, the vegetation (BaEpPf) within Lot 254 has been inferred as FCT/SCP 20a *Banksia* attenuata woodlands over species rich dense shrublands.

The survey primarily targeted the Threatened (T) orchid species *Drakaea elastica*. a small, tuberous orchid, whose distinctive leaves appear at ground level in late winter. Remnant native vegetation within the lot was traversed at 10 m intervals and the ground was observed for *Drakea elastica* leaves. The survey tracks were recorded on a Garmin™ GPS (Figure 1.2).

No *Drakaea elastica* were identified by this survey, though one other conservation significant taxa, *Conospermum undulatum* (T), previously identified from Lot 254, was observed in abundance. *Isopogon autumnalis* (P3), previously named *Isopogon drummondii*, was also seen in abundance. *Conospermum undulatum* (T) was also visible, flowering, in the adjacent Lot 2.

Vegetation within the remnant was in Very Good to Excellent condition, but with significant invasive weed species at the edges. Significant weed taxa observed during the *D. elastica* survey included **Acacia iteaphylla* (Flinders Range wattle), **Leptospermum laevigatum* (Victorian tea tree), **Cytisus proliferus* (tree lucerne), **Eragrostis curvula* (African love grass), **Ehrharta longifolia* (annual veldt grass) and **Asparagus asparagoides* (bridal creeper).

Understory vegetation was dense and leaf litter at the site had built up to around 20 cm depth, mostly obscuring the ground, and resulting in high fuel loadings that may present a fire hazard. This also resulted in a low level of detectability for *Drakea elastica*, though in such circumstances, it was unlikely to be present as any individuals would not receive sufficient light.



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3.2 Fauna

3.2.1 Terrestrial Fauna Habitat

A terrestrial fauna survey was undertaken by AECOM in October 2019 (Appendix B), which primarily focused on mapping fauna habitats and assessing their potential to be utilised by conservation significant fauna species within the wider Wattle Grove area. Fauna habitats were assessed for specific habitat components, including consideration of structural diversity and refuge opportunities for fauna. The survey covered a broader area than the site, and six broadly defined habitats were mapped in the survey area, with only three of these habitats mapped within the MRS amendment area. Further surveys undertaken by JBS&G have corroborated the findings of the AECOM surveys within the MRS amendment area.

Fauna habitats within the MRS amendment area has been severely compromised through historic and ongoing land uses, which have resulted in the clearing of the majority of native vegetation, and degradation of the little remnant native vegetation through ongoing rural land uses. The remnant vegetation provides the greatest significant of fauna habitat, comprising Banksia Woodland and Eucalyptus Woodland, which exist in four distinct patches (Figure 3.3). Eucalyptus Woodland was mapped as Completely Degraded and Very Good, where Banksia Woodland was mapped as completely Degraded to Excellent.

The habitat types of 'Planted and Maintained Gardens' and 'Scattered Trees' are both highly disturbed and highly degraded. These habitat types contain a mixture of native and non-native eucalypt trees, as well as other introduced species such as Cape Lilac and Jacaranda. The main distinction between the two habitat types is the understorey; understorey is not present in the Scattered Trees habitat and is variable in the Planted and Maintained Gardens habitat. These habitat types, whilst highly degraded, retain some value for species of conservation significance, namely black cockatoos. These habitat types may be utilised as breeding, roosting and/or foraging habitat by the Forest Red-tailed Black Cockatoo, Carnaby's Cockatoo and Baudin's Cockatoo.

The majority of the MRS amendment area lacks any natural attributes and is now only utilised by generally common and widespread fauna species with non-specific requirements which allow them to persist in disturbed to highly disturbed habitats. As a result, the fauna diversity is well below levels present prior to historical disturbances having occurred. Due to these factors, most of the MRS amendment area has very little conservation significance to fauna in general.

The terrestrial fauna habitat is described in Table 3-5 and Figure 3-4.



Table 3-5: Fauna Habitats Recorded within the MRS amendment area

Fauna Habitat	Description	Conservation Significant Species with Potential to Utilise Habitat	Area within MRS amendment area	Representative Photo
Banksia Woodland	This habitat generally comprised a low open woodland of Banksia and Eucalyptus over a low open shrubland on loamy, sandy brown soil (AECOM 2020). The habitat is generally considered high quality due to presence of Banksia, its complexity and limited disturbance levels. Habitat quality is reduced where areas are significantly degraded due to impacts from clearing and edge effects (AECOM 2020). Significant habitat characteristics include (AECOM 2020): dense understorey common logs of various sizes are common fine and course leaf litter common to abundant bare ground occasionally present absence of stones and boulders Large mature trees in rare to occasional abundance Large hollows generally absent, small hollows common.	 Generally good quality foraging habitat for Carnaby's Cockatoo and Baudin's Cockatoo (AECOM 2020) Low to moderate quality foraging habitat for the Forest Red-tailed Black Cockatoo (AECOM) Contains occasional breeding tree for black cockatoos (AECOM 2020) Habitat for Quenda (AECOM 2020). 	4.66 ha	Source: AECOM 2020



Fauna Habitat	Description	Conservation Significant Species with Potential to Utilise Habitat	Area within MRS amendment area	Representative Photo
Eucalyptus Woodland	This habitat is variable throughout the survey area though generally contains a Eucalyptus woodland / open forest over a low shrubland over sandy brown soils (AECOM 2020). This habitat is considered high to moderate (depending on degree of degradation) quality due to the structural complexity and disturbance levels (AECOM 2020). Significant habitat characteristics include (AECOM 2020): presence of large mature eucalypts dense understorey occasionally present logs of various sizes in variable abundance fine and course leaf litter common bare ground occasionally present absence of stones and boulders large hollows occasionally present, small hollows common soils of areas at base of Darling scarp contained pea-gravel	Potential foraging, breeding and roosting habitat for (AECOM 2020): Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Baudin's Cockatoo Habitat for Quenda (AECOM 2020)	0.13 ha	Source: AECOM 2020



Fauna Habitat	Description	Conservation Significant Species with Potential to Utilise Habitat	Area within MRS amendment area	Representative Photo
Planted and Maintained Gardens	Highly variable habitat including areas of planted and maintained native and introduced vegetation (AECOM 2020). The habitat is considered low to moderate quality due to disturbance levels and limited habitat complexity (AECOM 2020). Significant habitat characteristics include (AECOM 2020): mature trees rare variability of understorey, with areas of dense understorey generally absent general lack of hollows bare sandy ground abundant absence of stones, boulders and rock crevices.	Predominantly foraging habitat, but also occasionally potential breeding and roosting habitat for (AECOM 2020): Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Baudin's Cockatoo Habitat for Quenda (AECOM 2020).	2.80 ha	Source: AECOM 2020
Scattered Trees	This habitat is varied and contains large mature native and non-native eucalypt trees, as well as other introduced species such as Cape Lilac and Jacaranda. Trees were generally recorded over cleared areas. (AECOM 2020) The significant fauna habitat characteristics include (AECOM 2020): presence of large mature trees absence of dense understorey small hollows are common, large hollows are rare logs of all sizes are rare to occasionally present	Potential foraging, breeding and roosting habitat for (AECOM 2020): Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Baudin's Cockatoo Marginal habitat for Quenda (AECOM 2020).	26.90	Source: AECOM 2020



Fauna Habitat	Description	Conservation Significant Species with Potential to Utilise Habitat	Area within MRS amendment area	Representative Photo
	 course and fine litter are present but generally only under trees. bare sandy ground abundant absence of stones, boulders and rock crevices. 			Source: AECOM 2020 Source: AECOM 2020



Fauna Habitat	Description	Conservation Significant Species with Potential to Utilise Habitat	Area within MRS amendment area	Representative Photo
Cleared Ground	Generally consists of areas which have been cleared (e.g. paddocks) and now comprise bare soil and / or weeds (may contain the occasional shrub/ tree), or hardstand areas (e.g. roads). Habitat is considered very low quality.	This habitat may contain the occasional individual foraging tree/ shrub for black cockatoos.	91.10 ha	



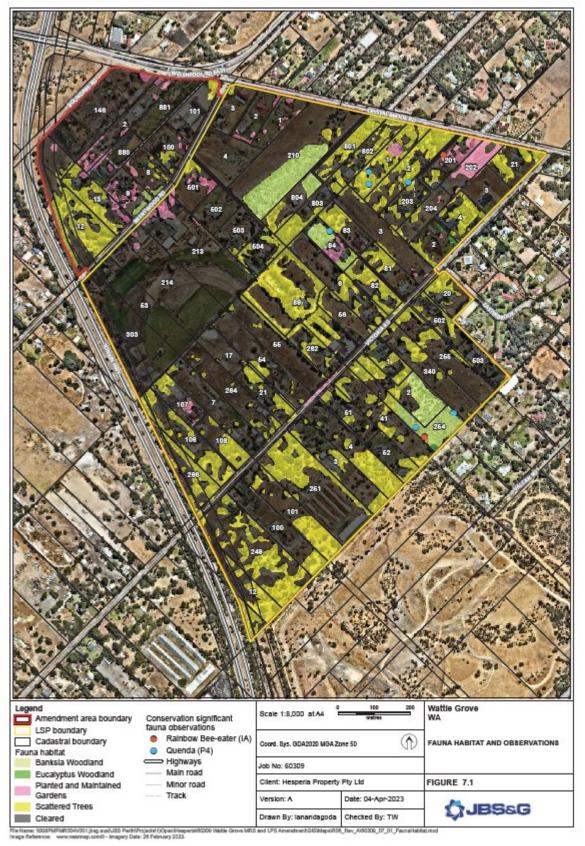


Figure 3-4: Fauna habitat





3.2.2 Terrestrial Fauna Occurrence

Fifty-one vertebrate fauna species were recorded within the MRS amendment area and in adjacent areas during the AECOM and JBS&G field surveys. This comprised 36 bird, 11 mammal, one amphibian and three reptile species. The species observed during field surveys are presented in Table 3-6.

Table 3-6: Fauna Species Observed During Field Surveys

Species	Common Name	Status	Observations
Birds			
Anas superciliosa	Pacific Black Duck	Native	Observed in artificial ponds
Anthochaera carunculata	Red Wattlebird	Native	Commonly seen and heard throughout survey area
Cacatua roseicapilla roseicapilla	Galah	Native	Observed multiple times during survey
Cacatua sanguinea	Western Corella	Native	Small flock observed in trees
Cacomantis flabelliformis	Fan-tailed Cuckoo	Native	Heard in trees in paddock
Calyptorhynchus banksii	Forest Red-tailed Black Cockatoo	Native	Two birds observed foraging in Marri tree, multiple birds seen flying over area, multiple observations of foraging evidence
Chenonetta jubata	Australia Wood Duck	Native	Observed multiple times during survey
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	Native	Heard multiple times
Colluricincla harmonica	Grey Shrike thrush	Native	Heard in Flooded Gums adjacent drainage line
Corvus coronoides	Australian Raven	Native	Commonly seen and heard throughout survey
Cracticus tibicen	Australian Magpie	Native	Commonly seen and heard throughout survey
Cracticus torquatus	Grey Butcherbird	Native	Observed flying through maintained gardens
Dace/a novaeguineae	Laughing Kookaburra	Naturalised exotic	Commonly seen and heard throughout survey area
Dromaius novaehollandiae	Emu	Native	Individual observed in an enclosure
Petrochelidon nigricans	Tree Martin	Native	Flock of 10 birds observed flying in survey area
Gerygone fusca	Western Gerygone	Native	Seen in survey area
Grallina cyanoleuca	Magpie Lark	Native	Commonly seen and heard throughout Survey
Gavicalis virescens	Singing Honeyeater	Native	Common throughout survey area
Malurus splendens	Splendid Fairywren	Native	Seen and heard twice in survey area
Merops ornatus	Rainbow Bee-Eater	Native	Multiple observations recorded throughout survey area
Ocyphaps lophotes	Crested Pigeon	Native	Observed several times
Pardalotus striatus	Striated Pardalote	Native	Commonly seen and heard throughout survey area
Pavo cristatus	Common Peafowl	Introduced	Heard several times
Phaps chalcoptera	Common Bronzewing	Native	Observed several times in survey area
Phylidonyris niger	White-cheeked Honeyeater	Native	Observed multiple times in survey area
Phylidonyris novaehollandiae	New Holland Honeyeater	Native	Commonly seen and heard throughout survey
Platycercus spurius	Red-capped Parrot	Native	Observed individuals and foraging evidence multiple times
Platycercus zonarius	Australian Ringneck	Native	Commonly seen and heard throughout survey area
Rhipidura leucophrys	Willie Wagtail	Native	Commonly seen and heard throughout survey area
Spilopelia senegalensis senegalensis	Laughing Turtle Dove	Introduced	Seen and heard multiple times in trees and flying over survey area
Taeniopygia guttata	Zebra Finch	Native	Two finches observed in Jarrah tree
Threskiornis moluccus	Australian White Ibis	Native	Observed multiple times during survey
Todiramphus sanctus	Sacred Kingfisher	Native	Individual in tree in maintained garden
Zanda latirostris	Carnaby's Cockatoo	Native	Foraging evidence observed
Zosterops lateralis	Silver-eye	Native	Observed twice in survey area, flying through trees and in



Species	Common Name	Status	Observations
Canis familiaris	Dog	Introduced	Common throughout survey area
Capra hircus	Goat	Introduced	Observed in paddock
Equus asinus	Donkey	Introduced	Observed in field
Equus cabal/us	Horse	Introduced	Horses observed in multiple paddocks in survey area
Felis catus	Cat	Introduced	Seen once during survey
Isoodon fusciventer	Quenda	Native	Observed directly and indirectly (conical digging and scat) several times in survey area
Lama glama	Llama	Introduced	Observed in field
Macropus fuliginosus	Western Grey Kangaroo	Native	Observed directly and indirectly several times in survey area
Oryctolagus cuniculus	Rabbit	Introduced	Observed directly and indirectly several times in survey area
Ovis aries	Sheep	Introduced	Observed in paddock
Vulpes vulpes	Red Fox	Introduced	Multiple scats recorded
Amphibians			
Crinia glauerti	Clicking Froglet	Native	Multiple
Reptiles			
Cryptoblepharus buchananii	Buchanan's Snake- Eyed Skink	Native	Seen multiple times on trees throughout survey area
Pogona minor minor	Western Bearded Dragon	Native	Observed in survey area
Tiliqua rugosa rugosa	Bobtail	Native	Observed twice during survey

3.2.3 Conservation Significant Terrestrial Fauna

Four of the 51 recorded vertebrate fauna species are identified as having some conservation significance, including three birds and one mammal, summarised as follows:

- Forest Red-Tailed Black Cockatoo *Calyptorhynchus banksii* (listed as Vulnerable under the EPBC Act and the BC Act).
- Carnaby's Cockatoo Zanda latirostris (listed as Endangered under the EPBC Act and the BC Act).
- Quenda *Isoodon fusciventer* (listed as Priority 4 by DBCA). Refer to Plate 3 for photographs of Quenda diggings and scat recorded within the survey area.
- Rainbow Bee-Eater *Merops ornatus* (listed as Marine under the EPBC Act). Species listed as Marine under the EPBC Act are only considered significant in Commonwealth land and as the MRS amendment area does not contain Commonwealth land, these species will not be further discussed within the report.

Based on the desktop assessment and the field survey, an additional conservation significant fauna species is also considered to have the potential to utilise the habitats within the survey area:

Baudin's Cockatoo Zandi baudinii - listed as Vulnerable under the BC Act and the EPBC Act.

Black Cockatoo Survey

Targeted Black Cockatoo surveys were conducted to identify potential breeding, roosting and foraging habitat for the three threatened black cockatoo species that occur in WA, as all three species have the potential to utilise the habitats present in the MRS Amendment Area:

- Carnaby's Cockatoo Zanda latirostris (Endangered under both EPBC and BC Acts);
- Baudin's Cockatoo Zanda baudinii (Endangered under both EPBC and BC Acts); and
- Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso (Vulnerable under both EPBC and BC Acts).



The AECOM and JBS&G surveys were undertaken in accordance with the DSEWPaC (2012), the draft DotEE (2017) and the DAWE (2022) referral guidelines for all three black cockatoos, as were relevant at that time. These survey's will inform future habitat assessment and reporting.

Quenda

The quenda (*Isoodon obesulus*) is a medium-sized ground dwelling marsupial of the bandicoot and bilby family (Marsupialia: Peramelemorphia) and is endemic to the south-west of Western Australia. This species is identified as a Priority 4 species at a state level under the BC Act, however it is not listed as threatened under either State or Commonwealth legislation. Like many small-to-medium sized Australian marsupials, quenda have suffered a drastic population decline post European settlement and it is estimated that their historical range distribution has contracted by approximately 40% (Abbott 2008). The Priority 4 listing means that this species is categorised as "Rare, Near Threatened and other species in need of monitoring".

The species is found in forest, woodland, heath and shrub communities, and preferred habitat usually consists of a combination of sandy soils and dense heathy vegetation. Quenda are known to inhabit urban backyards, urban parklands, bush fragments, and conservation reserves, even where no predator control programs occur (Bryant, Kobryn, Hardy, & Fleming, 2017; Howard *et al.*, 2014; Valentine *et al.*, 2013). However, they prefer dense, understory vegetation and are found in both open forest, and dense vegetation near swamps and watercourses (Valentine *et al.*, 2013). They are currently found in an arc along the Swan Coastal Plain with some sightings near Geraldton in the North extending past Cape Naturaliste and Cape Leeuwin to the south, through to Albany and Esperance in the southeast.

The habitat types of Cleared and Scattered trees do not provide favourable habitat for quenda, as they lack the dense understorey vegetation and cover that the species prefers. The preferred Quenda habitat, primarily the Banksia Woodland, will be retained in Conservation areas to ensure the species can continue to occupy the MRS amendment area. Quenda are not considered to be conservation significant in the context of the proposed MRS amendment area due to the Priority 4 listing and limited suitable habitat.

Rainbow Bee-eater

Whilst the Rainbow Bee-eater has historically been listed as a migratory species of conservation significance, it, has since been removed from the EPBC migratory species list. Currently, the Rainbow Bee-eater is only listed under the EPBC Act as "Marine", and therefore are only considered conservation significant in Commonwealth marine environments. In addition, the Rainbow Bee-eater is currently considered to be a low priority for management, although population size and trends have not been quantified, the population size is assumed to be reasonably large and there is little documented evidence of population declines (DAWE, 2021). Subsequently, this species is not considered to be conservation significant in the context of the proposed MRS amendment area.



4. Adequacy of Flora and Vegetation Surveys

4.1 Key Flora and Vegetation Survey Guideline Requirements

The flora and vegetation surveys considered in this memo were conducted in accordance with the EPA's (2016a) Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment as outlined in Table 4-1.

Table 4-1 Flora and vegetation guidance requirements (EPA 2016a)

Survey Aspect	Overview of guideline requirement
Survey Timing	The recommended survey timing for surveys on the swan coastal plain is spring (September, October, November)
Survey Effort	A detailed survey should include assessment of quadrats, multiple sampling periods and targeted surveys where appropriate
	A minimum of three quadrats should be sampled in each vegetation unit, with additional quadrats proportional to the size of the vegetation. To clarify vegetation unit boundaries, additional quadrats can be deployed.

4.2 Flora and Vegetation survey adequacy assessment

4.2.1 Survey 1: Wattle Grove South Ecological Surveys AECOM (2020)

An assessment of the accuracy and validity of the AECOM (2020) ecological survey against the EPA's Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (2016a) has been undertaken. This technical guidance provides a range of potential limitations and constraints that may affect the thoroughness of a field survey and the conclusions reached. Results of this assessment are provided below in Table 4-2. In summary, the survey was predominately constrained by access restrictions within the survey area, however it is considered to provide an adequate level of survey for lots accessed for the purposes of the MRS amendment.

Table 4-2 AECOM (2020) potential limitations and constraints

Potential limitation	Impact on assessment	Comment
Availability of contextual information at a regional and local scale	Not a constraint	The survey was undertaken on the Swan Coastal Plain which has been well studied and documented with ample literature available. Furthermore, two desktop assessments were undertaken of the site in question (360 Environmental 2018; AECOM 2020) which informed the field survey methodology.
Competency / experience of the team carrying out the survey, including experience in the	Not a constraint	Competency and experience of field personnel is presented within Section 4.2 of the report. The field survey was undertaken by Floora de Wit, an ecologist with
bioregion surveyed		13 years of experience undertaking flora and vegetation assessments on the Swan Coastal Plain. Her qualifications include:
		 Bachelor of Science (Environmental Biology); and Postgraduate Diploma (Environmental Management and Impact Assessment).
Completeness and further work which might be needed (i.e., was the relevant survey area fully surveyed).	Potential constraint	Floristic data was collected from 4 non-permanent quadrats and 3 relève's within the MRS amendment area. Data collected included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment, and presence / absence of disturbance.
Was the appropriate area fully surveyed (effort and extent)	Not a constraint.	Floristic data was collected from 4 non-permanent quadrats and 3 relève's across the MRS amendment area. Quadrats were 10x10 m in size. Vegetation type and vegetation condition was mapped across the entirety of the survey area.
Access restrictions within the survey area	Constraint	Access to undertake the flora assessment was not provided for a number of private lots within the project area. Of the 77 private



Potential limitation	Impact on assessment	Comment
		properties within the MRS amendment area, 52 (67%) were available for surveying.
Survey timing, rainfall, season of survey	Potential constraint	The survey was undertaken in October 2019 following a period of below average rainfall in the preceding months.
		A total of six flora species of conservation significance were determined likely to be present within the study area based on a desktop assessment. Of these species, the following three would not be flowering during the time in which the survey was undertaken:
		Banksia mimica – December to February
		Haemodorum loratum – November
		Isopogon drummondii – February to June
Disturbance that may have affected the results of the survey such as fire, flood or clearing	Not a constraint.	Vegetation within the study area is highly fragmented as a result of clearing for rural and residential purposes. Additionally, degrading processes that are currently active within the site include:
		edge effects;weed incursion; anda drying climate.

4.2.2 Survey 2: Targeted Flora, Habitat and Supplementary Flora & Vegetation surveys JBS&G 2021 and 2022

Five further flora and vegetation surveys have been completed of the MRS amendment area by JBS&G as follows:

- Tree survey (February 2021): Habitat tree survey of various lots and the Victoria Road reserve.
- Targeted flora survey (August 2021): 1,500 m meandering survey at 10 m intervals throughout approximately 1.65ha.
- Supplementary spring vegetation and flora assessment (October 2021): Various lots, including 1 quadrat, and numerous relève and observation points.
- Reconnaissance vegetation and flora assessment (January 2022) (Appendix F): Various lots, including relève and observation points.
- Further reconnaissance vegetation and flora assessment of targeted lots (October 2022): Various lots, including relève and observation points.

The supplementary surveys in 2021 included a targeted flora survey in late winter for Drakea elastica on Lot 254 Victoria Road and spring survey in October for Lots 12 and 13 Brentwood Road, Lots 81, 106 and 107 Victoria Road and Lots 210 and 804 Crystal Brook Road. One quadrat and one relève were surveyed in the areas of vegetation on each of these previously unsurveyed lots, with the exception of Lot 210, as access to this lot was still not granted at the time.

In lieu of this limited access, the surveying botanists made observations of Lot 210 from the fence line shared with the adjacent Lot 804. The observations were adequate to enable vegetation type and condition mapping to be extrapolated for Lot 210, using the Keighery scale (1994), which is consistent with the mapping completed for all other lots surveyed within the MRS amendment area.

In January 2022, JBS&G undertook a reconnaissance flora and vegetation assessment which included observations from the boundary of several other previously unsurveyed lots where access had still not been granted. This survey included Lots 21, 801, 802 and 803 Crystal Brook Road and Lot 4 (No.36) Victoria Road. Vegetation type and condition were assessed based on visual observations made from the fence line of adjacent lots.



In October 2022, JBS&G undertook a further reconnaissance flora and vegetation assessment, to provide further gap analysis. Data from multiple relève's and observation points was collected across Lots 1, 54 and 83 Victoria Road, Lots 502, 503 and 504 Brentwood Road and Lot 3 Crystal Brook Road.

As such, the majority of the MRS amendment area (~92%) has been subject to an ecological assessment. Survey effort has focused on areas of remnant native vegetation, based on aerial imagery assessments undertaken as part of desktop surveys. All areas of intact remnant native vegetation identified in the desktop assessments has been subject to some form of field survey.

Table 4-3 displays the evaluation of the Targeted Flora survey, supplementary vegetation and flora assessment, and reconnaissance vegetation and flora assessment from lot boundaries undertaken by JBS&G in 2021 and 2022, against a range of potential limitations that may have had effect on that assessment. Based on this evaluation, the assessment has not been subject to constraints that would affect the thoroughness of the assessment and the conclusions reached. It is considered that these surveys provide an adequate level of survey to meet EPA guidance for the purposes of the MRS Amendment.

Table 4-3: Targeted Flora and Supplementary Flora & Vegetation surveys JBS&G (2021 & 2022) – limitations and constraints.

Potential limitation	Impact on assessment	Comment
Availability of contextual information at a regional and local scale	Not a constraint	The survey was undertaken on the Swan Coastal Plain which has been well studied and documented with ample literature available. Furthermore, desktop assessments were undertaken of the site in question which informed the field survey methodology
Competency / experience of the	Not a constraint	The field surveys were undertaken by:
team carrying out the survey, including experience in the bioregion surveyed		Rachael Pratt, senior ecologist with over 20 years of experience undertaking flora and vegetation assessments on the Swan Coastal Plain).
		Richard Lloyd, principal ecologist with over 20 years of experience.
Completeness and further work which might be needed (i.e., was the relevant survey area fully surveyed).	Not a constraint.	Floristic data was collected from 1 non-permanent quadrat, and numerous relève's and observation points across the site. A targeted survey was undertaken in August 2021, comprising 1500 m of meandering survey at 10 m intervals throughout approximately 1.65 ha at Lot 254 Victoria Road. Data collected included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment, and presence / absence of disturbance.
Was the appropriate area fully surveyed (effort and extent)	Not a constraint.	Floristic data was collected from 1 non-permanent quadrat, and various relève's and observation points across the site. Quadrats were 10x10 m in size. Vegetation type and vegetation condition was mapped across the entirety of the survey area.
Access restrictions within the survey area	Potential constraint.	Access to undertake the targeted flora and supplementary flora and vegetation surveys was not provided for all of the previously surveyed and 8 previously non surveyed lots, and a further 13 lots were surveyed from the boundary of the property.
Survey timing, rainfall, season of survey	Potential constraint	Flora and vegetation surveys were undertaken on 25 August 2021, 7 October 2021, 24 January 2022, 22 August 2022 and 6 October 2022.
		A total of six flora species of conservation significance were determined likely to be present within the study area based on a desktop assessment. Of these species, two would not be flowering during the time in which the survey was undertaken. These include:
		Haemodorum loratum – November
		Isopogon drummondii – February to June



Potential limitation	Impact on assessment	Comment
Disturbance that may have affected the results of the survey such as fire, flood or clearing	Not a constraint.	Vegetation within the study area is highly fragmented as a result of clearing for rural and residential purposes. Additionally, degrading processes that are currently active within the site include: edge effects weed incursion a drying climate.



5. Adequacy of Fauna Surveys

5.1 Key Fauna survey guideline requirements

The fauna surveys considered in this memo were conducted in accordance with key survey requirements prescribed by EPA's (2020) Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment as outlined in Table 5-1.

Table 5-1 Fauna guidance requirements (EPA 2020)

Survey Aspect	Overview of guideline requirement
Survey Timing	The recommended survey timing for surveys on the swan coastal plain is generally September for December.
Survey Effort	Surveys for EIA should use primary techniques to develop species inventories. Supplementary techniques can then be used to build on and refine results as necessary. Primary techniques include but are not limited to Pit Traps, Funnel Traps, Aluminium box traps, cage traps, spotlighting and head torching, observation – bird surveys, opportunistic observations, searching for tracks and signs, acoustic surveys – audible calls and ultrasonic calls, and camera traps

5.2 Fauna survey adequacy assessment

The majority of the site has been subject to an ecological or Black Cockatoo Habitat Assessment.

AECOM (2020) conducted a Level 1 fauna survey in accordance with Technical Guidance – Terrestrial Fauna Surveys (EPA 2016b) and Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (EPA 2016c). The fauna survey was conducted by AECOM's Ecologist in conjunction with the detailed flora and vegetation survey. Conducting the two surveys concurrently enabled consistent and clear mapping of the fauna habitats and vegetation communities. The Level 1 fauna survey primarily focused on mapping of fauna habitat and assessing this habitat for potential utilisation by conservation significant fauna species. Fauna habitats were assessed for specific habitat components, including consideration of structural diversity and refuge opportunities for fauna.

Records of all observed fauna and birds, species identified from distinctive calls and details of indirect evidence such as scats, tracks and diggings were documented. Particular attention was given to searching for conservation significant species identified in the desktop assessment as having potential to occur in the area. All observations were made between daylight hours of 0700 and 1700.

A targeted black cockatoo survey was conducted in conjunction with the Level 1 fauna survey and detailed flora and vegetation survey by AECOM Ecologists and Botanist. This survey was conducted over multiple mobilisations due to site accessibility, including 9 and 10 September 2019; 1 to 4, and the 8 October 2019; 18 and 21 November. JBS&G conducted a further tree survey over various lots within the MRS amendment area in February 2021 to supplement the habitat survey data.



6. Conclusions

The significant ecological findings from the assessment of the MRS amendment area are outlined below:

- Timings for the surveys undertaken for the Proposal were considered adequate based on EPA guidance, i.e. a primary survey and targeted survey undertaken during the spring season. The surveys were undertaken across multiple years with effort focused on areas of remnant native vegetation.
- The survey effort undertaken within the MRS amendment area is considered appropriate based on EPA's (2016a) guidance:
 - The area of greatest impact and habitat loss, areas of native vegetation and Banksia Woodlands, have been extensively surveyed over multiple years and seasons.
 - The MRS amendment areas has been surveyed with sufficient detail to characterise the receiving environment and to assess the vegetation condition, with targeted surveys undertaken to identify flora of conservation significance. In particular, the presence of TECs and a PEC within the MRS amendment area has been identified and FCT analysis undertaken.
 - An adequate number of quadrats have been undertaken within vegetation units (with the exception of vegetation unit EmMplp due to the small area of this unit located in Lot 254 Victoria Road) i.e. a minimum of three quadrats have been sampled in each vegetation unit. Information on flora and vegetation has been provided in a report that aligns with the requirements of the EPA (2016a). Desktop reviews and interrogation of recommended spatial data and existing ecological survey reports has been completed, with this information used to guide survey planning, with specific reference to determining the presence or absence of flora or ecological communities of conservation significance.
- Surveys over the Amendment Area meet the requirements for a detailed survey. Targeted searches for flora of conservation were completed. Information on survey effort and the location of quadrats is provided in all Appendix C as required by EPA (2016a) guidance.



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8. Limitations

Scope of services

This report ("the report") has been prepared by JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

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Environmental conclusions

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Appendix A 360 Environmental (2018) Environmental Assessment Report



Various Lots, Wattle Grove

Environmental Assessment Report

Prepared for:

Burgess Design Group

April 2018

peopleplanetprofessional

Document	Revision	Prepared by	Reviewed by	Admin Review	Submitted to Client	
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2188AB	2 CLIENT DRAFT	СМ	-	NL	1x electronic	13/03/18
2188AB	3 CLIENT FINAL	СМ	KC	NL	1x electronic	24/04/18

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Appendix A EPBC Protected Matters Report

Appendix B DBCA Naturemap Report

Appendix C WIN Groundwater Bores

1 Introduction

1.1 Background

360 Environmental Pty Ltd was commissioned by Burgess Design Group Pty Ltd on behalf of the City of Kalamunda to prepare an environmental assessment report (EAR) for various lots bound by Tonkin Highway, Kelvin Road, Welshpool Road East, Fontano Road, Judith Road and Crystal Brook Road in Wattle Grove ('the site').

The purpose of this EAR is to inform a feasibility study on the future rezoning of the site from 'Rural' to 'Urban' under the Metropolitan Region Scheme (MRS).

The site is approximately 325 ha in size and is located approximately 14.75 km southeast of Perth's Central Business District (CBD). The site is situated within the City of Kalamunda local government area and is zoned 'Special Rural' and 'Rural Composite' under the City's Local Planning Scheme No. 3 (LPS 3).

1.2 Environmental Assessment Objectives

This Environmental Assessment Report (EAR) provides an overview of the general environmental features of the Site and includes an overview of the Site's remaining biological and social environment including wetlands, Aboriginal and non-Aboriginal Heritage sites, regional soil types, hydrology, geomorphology, flora, vegetation and fauna, planning context and social environment as determined through a review of existing information.

1.3 Scope of Works

The scope of works for this study is as follows:

- Literature review of relevant environmental and planning documents;
- Desktop review of geology, regional surface hydrology and groundwater information using databases and digital mapping information;
- Preliminary acid sulfate soils (ASS) assessment, including review of ASS risk mapping and local soil types;
- Desktop site assessment of contamination and review of historical and current land uses;
- Detailed desktop assessment of flora, vegetation, fauna from searches of the Department of Biodiversity, Conservation and Attractions' (DBCAs) Threatened and Priority searches, NatureMap and the Commonwealth's Protected Matters Search Tool:
- Review of mapped conservation areas;

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- Desktop heritage (Aboriginal and non-Aboriginal) assessment;
- Identification of other environmental issues associated with proposed rezoning;
 and
- Formulation of a report detailing the above.

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2 Key Environmental Legislation and Policies

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is the central piece of environmental legislation which protects Matters of National Environmental Significant (MNES) and broadly, to conserve Australia's biodiversity. If a proposed action is likely to have a significant impact on any MNES, a referral to the Commonwealth Department of the Environment and Energy (DEE) is required.

2.2 State Legislation

2.2.1 Environmental Protection Act 1986

The Environmental Protection Act 1986 (EP Act) is the key legislative tool for environmental protection in Western Australia. It is administered by the Environmental Protection Authority (EPA) and the Minister for Environment. Under Part IV of the EP Act, the EPA undertakes environmental impact assessment of proposals and schemes to provide advice on environmental acceptability of developments. The environment impact assessment process provides an orderly and systematic evaluation of a proposal and its potential impact on the environment. A critical component of the assessment is the consideration of ways in which the implemented proposal could avoid or reduce any potential impact on the environment.

2.2.2 Relevant Legislation and Regulations

All future rezoning and development will be required to comply with the requirements of other relevant state legislation and regulations. Table 1 provides a summary of the key state legislation and regulations relevant to the proposed residential development.

Table 1. Key State Legislation

Key Legislation	RESPONSIBLE GOVERNMENT AGENCY	ASPECT
Aboriginal Heritage Act 1972	Department of Planning, Lands and Heritage	Archaeological and ethnographic heritage
Aboriginal Heritage Regulations 1974	Department of Planning, Lands and Heritage	Archaeological and ethnographic heritage

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KEY LEGISLATION	RESPONSIBLE GOVERNMENT AGENCY	ASPECT
Agricultural and Related Resources Protection Act 1976	Department of Primary Industries and Regional Development	Weeds and feral animals
Biosecurity and Agriculture Management Act 2007	Department of Primary Industries and Regional Development	Weeds / pests / diseases
Bush Fires Act 1954	Department of Fires and Emergency Services	Bush fire control
Conservation and Land Management Act 1984	Department of Biodiversity Conservation and Attractions Department of Agriculture	Flora and fauna / habitat / weeds / pests / diseases
Conservation and Land Management Regulations 2002	Department of Biodiversity Conservation and Attractions Department of Agriculture	Flora and fauna / habitat / weeds / pests / diseases
Contaminated Sites Act 2003	Department of Water and Environmental Regulation	Management of contaminated soils and water
Environmental Protection Act 1986	Environmental Protection Authority Department of Water and Environmental Regulation	Part IV – Environmental Impact Assessment Part V – Works Approvals and Licences
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Department of Water and Environmental Regulation	Clearing of native vegetation
Planning and Development Act 2005	Department of Planning, Lands and Heritage	Structure planning and subdivision approval
Rights in Water and Irrigation Act 1914	Department of Water and Environmental Regulation	Governs management of the use, service and health of water and watercourses (including beds and banks). Water licensing is required in all proclaimed areas and for all artesian groundwater wells throughout the state.

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KEY LEGISLATION	RESPONSIBLE GOVERNMENT AGENCY	ASPECT
Wildlife Conservation Act 1950	Department of Biodiversity Conservation and Attractions	Wildlife conservation and protection

2.2.3 Relevant Standards, Guidelines and Policies

Future development is subject to compliance with applicable standards, guidelines and policies developed by the State's regulators to assist proponents in understanding the minimum requirements for environmental protection. The following table details the key standards, guidelines and State Planning Policies relevant to future residential development of the site (Table 2).

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Table 2. Relevant Standards, Guidelines and Policies

DOCUMENT	DESCRIPTION
EPA Policies and Guidance	
Statement of Environmental Principles, Factors and Objectives (EPA 2016a)	This statement communicates the EPA considers the object and principles of the EP Act, uses environmental factors and objectives to organise and systemise environmental impact assessment, taking a holistic view of the environment and considering significance of a proposal.
Environmental Factor Guideline – Flora and Vegetation (EPA 2016b)	Provides guidance to protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Environmental Factor Guideline – Terrestrial Environmental Quality (EPA 2016c)	Provides guidance with the objective to maintain the quality of land and soils so that environmental values are protected.
Environmental Factor Guideline – Terrestrial Fauna (EPA 2016d)	Provides guidance with the objective to protect terrestrial fauna so that biological diversity and ecological integrity at maintained.
Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016e)	Provides technical guidance to ensure adequate flora and vegetation data of an appropriate standard are obtained and used in environmental impact assessment.
Technical Guidance – Terrestrial Fauna Surveys (EPA 2004)	Provides technical on the direction and information on general standards and protocols for terrestrial fauna surveys for environmental impact assessment.
Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses (EPA 2005)	Provides guidance on the generic separation (buffer) distances between Industrial and Sensitive land uses to avoid conflicts between these land uses.
Guidance Statement No. 6: Rehabilitation of Terrestrial Ecosystems (EPA 2006)	Provides guidance to ensure the return of biodiversity in rehabilitated areas by increasing the quality, uniformity, and efficiency of standards and processes for rehabilitation of native vegetation in Western Australia and to allow more effective monitoring and auditing of outcomes.
Guidance Statement No. 33: Environmental Guidance for Planning and Development (EPA	Provides information and advice to assist land use planning and development processes to protect, conserve and enhance the environment.

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DOCUMENT	DESCRIPTION
2008)	Describes the processes the EPA may apply under the EP Act to land use planning and development in Western Australia, and the environmental impact assessment process applied by the EPA to schemes.
Guidance Statement No. 41: Aboriginal Heritage Assessment (EPA 2004b)	Provides guidance on the EPA's position on the assessment of Aboriginal heritage and information that the EPA will consider when assessing proposals where Aboriginal heritage is a relevant environmental factor.
Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004d)	Provides guidance and information on the EPA's expected standards and protocols for terrestrial flora and vegetation surveys to environmental consultants and proponents.
WA Environmental Offsets Policy (EPA 2011)	Seeks to protect and conserve environmental and biodiversity values for present and future generations. The policy ensures that economic and social development may occur while supporting long term environmental and conservation values.
EPA Bulletins	
Environmental Protection Bulletin No. 1: <i>Environmental Offsets</i> (EPA 2014b)	Clarifies how the EPA will consider offsets through the environmental impact assessment process.
State Planning Policies	
State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region (WAPC 2010)	Provide policy and implementation framework that will ensure bushland protection and management issues in the Perth Metropolitan Region are appropriately addressed and integrated with broader land use planning and decision making. Ensure the long-term protection of biodiversity and associated environmental values.
State Planning Policy 2.9: Water Resources (WAPC 2006)	Provides clarification and additional guidance to planning decision-makers for consideration of water resources identified as having significant economic, social, cultural or environmental values.
State Planning Policy 3.7: Planning in Bushfire Prone Areas (WAPC 2015)	Provides guidance on the implementation of effective risk- based land use planning and development to preserve life and reduce the impact of bushfire on property and

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DOCUMENT	DESCRIPTION		
	infrastructure.		
Road and Rail Transport Noise and Freight Considerations in Land Use Planning (WAPC 2009)	Provides guidance to promote a system in which sustainable land use and transport are mutually compatible.		
Department of Water and Environmental Regulation (DWER) Guidelines			
Assessment and management of contaminated sites Guideline (DER 2014)	Provides guidance on the assessment and management of contaminated sites in Western Australian within legislative framework of the Contaminated Sites Act 2003 and the Contaminated Sites Regulations 2006.		
Identification and investigation of acid sulfate soils and acidic landscapes (DER 2013)	Provides guidance to assist with the identification, assessment and management of acid sulfate soils in Western Australia.		

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3 Planning Context

3.1.1 Shire of Kalamunda Local Planning Scheme No. 3

Under the City of Kalamunda's LPS 3, the site is zoned 'Special Rural' or 'Rural Composite'.

3.1.2 Draft Perth and Peel @3.5 Million Sub-regional Planning Framework

The draft Perth and Peel @ 3.5 million suite of strategic land use planning documents aim to accommodate 3.5 million people by the year 2050. The WAPC identified part of the Site as 'Urban Expansion' in the draft Metropolitan Perth and Peel Sub-regional Planning Framework (WAPC 2015).

3.1.3 Draft Perth and Peel Green Growth Plan for 3.5 million

In response to the draft Perth and Peel Sub-Regional Frameworks, the draft Perth and Peel Green Growth Plan for 3.5 million (draft GGP) has been prepared. The draft Green Growth Plan proposes to secure upfront Commonwealth environmental approvals and streamline State environmental approvals for development required to support growth to 3.5 million people. The Plan also aims to provide protection of bushland, rivers, wildlife and wetlands through implementation of a strategic conservation plan (DPC 2016).

The site has been identified under the draft GGP as having areas identified within the:

- Urban class of action area; or
- Rural Residential class of action area; or
- Area not within the Urban, Industrial or Rural Residential classes of action (DCP 2016).

The site has also been identified as having areas mapped as Broad and Specific Commitments and Values under the draft GGP (DCP 2016).

The draft Broad Commitments and Values relate to seeking an overall conservation outcome where further work is needed to determine when intervention is required to reach an outcome. Draft Broad Commitments and Values include the following environmental aspects (DoP 2017):

- Threatened fauna habitat;
- Vegetation complexes of more than 10 % and less than 30 % remaining;
- Negotiated planning solution and rural complementary Bush Forever areas with three classes of action mapped;

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- Resource Enhancement Wetlands with remnant vegetation and a 50 m buffer;
 and
- Conservation Category Wetlands 50 m buffer.

The draft Specific commitments relate to draft commitments for protecting a specific occurrence of an environmental value, including (DPC 2016):

- Threatened flora;
- Threatened Ecological Communities;
- Conservation Category Wetlands;
- Vegetation complexes with less than 10 % remaining;
- Bush Forever areas within three classes of action mapped (excluding those within the 'rural complementary' or 'negotiated planning solution' categories); and
- Short-tongued Bee (Leioproctus douglasiellus) distribution.

Some areas within the site have known existing approvals where the draft commitments do not apply (while such approvals remain valid). These approvals include Part IV or V Division 2 of the *Environmental Protection Act 1986* or under subdivision approval; or for matters of national environmental significance under Part 9 of the EPBC Act.

3.1.4 City of Kalamunda Local Biodiversity Strategy

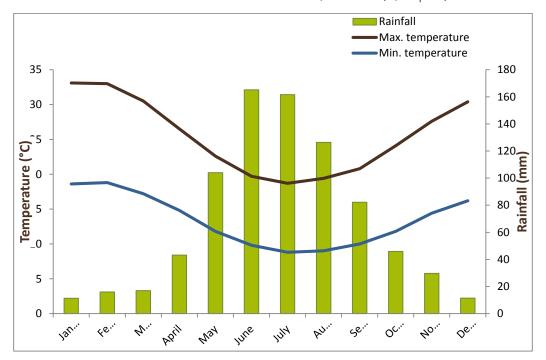
The City of Kalamunda's Local Biodiversity Strategy has been developed in anticipation of future urban development encroaching into natural assets. The Strategy aims to strategically plan natural area protection to ensure biodiversity conservation is incorporated into decision making processes. The Strategy focusses on protection of natural areas containing endemic species or ecological communities that are described as having high biodiversity values (Local Natural Areas (LNAs)). LNAs are natural areas outside of management by the DBCA and Bush Forever Sites, where Local Government Authorities can exercise the most control. The site does not contain any LNAs (Shire of Kalamunda 2008).

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4 Site Environmental Features

4.1 Climate

The Site is within a warm Mediterranean climate with warm summers and cool winters. Weather data was collected between 1961 and 2017 from the Gosnells City Station (#009106) located approximately 5.7 km southeast from the Site. The annual mean maximum temperature is 25.5 $^{\circ}$ C and the annual mean minimum temperature is 13.4 $^{\circ}$ C. The annual mean rainfall was recorded at 820.3 mm (BoM 2017) (Graph 1).



Graph 1: Climate Statistics for 1961 and 2017 Gosnells City Station (BoM 2017)

4.2 Topography

The elevation across the site ranges from 21 m Australian Height Datum (AHD) to 79 m AHD, falling from the east to the west (Figure 2) (DoW 2010).

4.3 Regional Geology and Soils

Surface geology profile mapping at 1: 250 000 indicates the geology of the Site is typically basal conglomerate overlain by dune quartz with heavy mineral concentrations associated with the Kwinana Group and the Yoganup Formation, and alluvial sand and clay with shallow-marine and estuarine lenses and local basal conglomerate associated with the Guildford formation (GSWA 2008):

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Soil Landscapes and Land Systems mapping has identified the Site is within the following land systems (DAFWA 2012):

- Pinjarra System: Poorly drained coastal plain with variable alluvial and Aeolian sands; and
- Forrestfield System: Duplex sandy gravels, pale deep sands and grey deep sandy duplexes.

The (then) Department of Agriculture and Food (DAFWA) Soil Subsystems mapping indicates the Site is within the following soil subsystems (DAFWA 2008):

- Pinjarra Gf3 Phase: Level to very gently sloping plain. Poorly drained mottled yellow earths with loamy topsoil;
- Pinjarra Gf6 Phase: Seasonally inundated swamps with very poorly drained uniform non-cracking clays;
- Pinjarra Gf7 Phase: Minor rises with deep rapidly drained brownish, siliceous or bleached sands underlain by mottled yellow clay;
- Forrestfield (D Range) F1 Phase: Foot and low slopes (<10%) with deep rapidly drained siliceous yellow brown sands, and pale or bleached sands with yellowbrown subsoil;
- Forrestfield (D Range) F2 Phase: Well drained foot and low slopes. Gravelly yellow or brown duplex soils with sandy topsoil;
- Forrestfield F4 Phase: Incised stream channels within gentle slopes with deep acidic yellow duplex soils and sandy alluvial gradational brown earths; and
- Forrestfield (D Range) F8 Phase: Slopes 3-15%. Moderately well drained gravelly duplex soils with sandy loam to loam topsoil.

4.4 Hydrogeology

4.4.1 Groundwater

Data from the Perth Groundwater Map indicates the groundwater table ranges between 12 m Australian Height Datum (AHD) and 17 m AHD. Groundwater flows from east to west (DWER 2017a).

The Site is not within a Public Drinking Water Source Area (DWER 2017a).

4.4.2 Surface Water

Yule Brook, a major tributary, exists 55 m to the north of the site, separated by Welshpool Road East (Figure 4) (DoW 2012a).

An un-named minor non-perennial watercourse traverses the northern portion of the site connecting to Yule Brook in the northeast. In addition, another minor perennial

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watercourse traverses along the boundary in the south-western corner of the site (DoW 2012a)

The site also contains three constructed earth dams and two perennial lakes. A constructed minor drain extends south of Crystal Brook Road to a constructed dam (Figure 4) (DoW 2012a).

The site is not within a mapped 100 Year ARI Floodplain Area (DoW 2015).

4.4.3 Wetlands

A wetland is defined in Schedule 5 of the *Environmental Protection Act 1986* as a 'an area of seasonally, intermittently or permanently waterlogged or inundated land, whether natural or otherwise, and includes a lake, swamp, marsh, spring, dampland, tidal flat or estuary' (Hill *et al.* 1996).

Desktop mapping has identified that small portions along the western boundary of the Site (along Tonkin Highway) are mapped as Conservation Category (CCW) and Resource Enhancement wetlands (Figure 4) (DPaW 2017).

Wetland categories and their management objectives are described within Table 3 below:

Table 3. Wetland Categories and Management Objectives (WAPC 2005)

CATEGORY	CATEGORY DESCRIPTION	MANAGEMENT OBJECTIVES
Conservation Category	High conservation and ecological value	To preserve the wetlands (natural) attributes and functions
Resource Enhancement	Moderate natural and human use attributes that can be restored or enhanced	To restore wetlands through maintenance and enhancement of wetland functions and attributes
Multiple Use	Little remaining important wetland attributes, functions and ecological value	To use, develop and manage wetlands in the context of water, town and environmental planning

4.5 Contamination

4.5.1 Acid Sulfate Soils

Desktop mapping has identified the entire Site as having 'Moderate to Low' risk of acid sulfate soils (ASS) risk within 3 m of natural soil surface and 'High to Moderate' risk beyond 3 m (DER 2014) (Figure 5).

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4.5.2 Contaminated Sites

Under the *Contaminated Sites Act 2003*, contaminated sites must be reported to the DWER, investigated and, if necessary, remediated.

Review of DWER's Contaminated Sites Database has identified there are no registered contaminated sites within the Site, however, there are four contaminated sites within a 1 km radius (DWER 2017b) (Table 4) (Figure 5):

Table 4. Contaminated Sites Within the Vicinity of the Site (DWER 2017b)

Loт	NATURE AND EXTENT OF CONTAMINATION	STATUS	DISTANCE FROM SITE (KM)
Lot 804 on Plan 59983, Kenwick	Fragments of asbestos containing material (ACM) are present within the soils at the Site	Contaminated - Restricted Us	0.41
Lot 9005 on Plan 40777, Maddington	Landfill gases have been identified along the eastern boundary and the southwest corner of the Site. Hydrocarbon-impacted groundwater was identified across the majority of the Site. Asbestos impacted fill was identified beneath the landfill capping layer across a majority of the Site.	Contaminated - Restricted Use	1.61
Lot 7, Former Caltex Service Station, Welshpool Rd, Wattle Grove.	Surface and subsurface soils are impacted with hydrocarbons. Groundwater beneath the Source and Affected Sites is impacted with hydrocarbons.	Contaminated - remediation required	0.90
Lot 566 Orchard Road, Maddington	Hydrocarbons (such as from petrel or diesel) are present in groundwater beneath the south-western portion of the Site.	Remediated for Restricted Use	1.40

4.6 Reserves and Conservation Areas

Desktop mapping has identified that the Site is not within any conservation areas. However, there are a number of conservation areas abutting the site and within a 2 km radius (Figure 6). Five Bush Forever sites (ID: 50, 51, 53, 320 and 387) exist within 2 km of the site to the north, south and west (DoP 2014).

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Several lots outside of the site boundary have been identified as DBCA Managed Lands that are managed and vested under the Conservation and Land Management Act 1984 (CALM Act) (DPaW 2016) (Figure 6).

4.6.1 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are identified and protected under the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*. Under the Notice, it is an offence to kill or destroy vegetation within an ESA without a Native Vegetation Clearing Permit (NVCP).

A number of Environmentally Sensitive Areas (ESAs) impinge the site (Figure 6) (DER 2014b). DWER's online Clearing Permit System has identified that the ESAs across the Site refer to the presence of the following; Declared Rare Flora (DRF) or a Threatened Ecological Community (DWER 2017c).

Cross referencing data obtained from DBCA's Threatened and Priority Flora database and the TEC/PEC database search, these ESA's refer to the location of the following two DRF and the area of vegetation within 50 m of the DRF location:

- Wavy Smoke-bush (Conospermum undulatum); and
- Summer Honeypot (Banksia mimica).

4.7 Flora and Vegetation

4.7.1 Bioregion

The Site is located within the Swan Coastal Plain and the Jarrah Forest bioregions of the Interim Biogeographic Regionalisation of Australia (IBRA).

The Swan Coastal Plain Perth subregion (SWA02) is a low lying coastal plain composed of colluvial and Aeolian sands, alluvial river flats and coastal limestone rising to duricrusted Mesozoic sediments in the east. Outwash plains are extensive only in the south, while a complex series of seasonal wetlands and swamps extends from north to south. Vegetation comprises heath and/or Tuart woodlands on limestone, Banksia and Jarrah- Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvial soils, Casuarina obesa on out-wash plains, and paperbark (Melaleuca spp.) in wetland areas (Mitchell et al. 2002).

The Northern Jarrah Forest subregion (JF1) incorporates the area east of the Darling Scarp, overlying Archaean granite and metamorphic rocks of an average elevation of 300 m, capped by an extensive lateritic duricrust, dissected by later drainage and broken by occasional granite hills. In the east, the laterite becomes deeply dissected until it compresses isolated remnants. Rainfall is from 1300 mm on the scarp to approximately 700 mm in the east and north. Vegetation comprises Jarrah – Marri forest in the west with Bullich and Blackbutt in the valleys grading to Wandoo and Marri woodlands in the east with Powder bark on breakaways. There are extensive but localised sand sheets

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with *Banksia* low woodlands. Heath is found on granite rocks and as a common understorey of forests and woodlands in the north and east. The majority of the diversity in the communities occurs on the lower slopes or near granite soils where there are rapid changes in site conditions (Williams *et al.* 2001).

4.7.2 Broad Vegetation Types

Vegetation mapping of the Swan Coastal Plain subregion of WA was completed on a broad scale (1:250,000) by Beard (1980). These vegetation units were re-assessed by Shepherd et al. (2001) to account for clearing in the intensive land use zone, dividing some larger vegetation units into smaller units.

The Site is within three vegetation units described below (Shepherd et al. 2001) (Figure 7):

- Pinjarra 3: Medium forest; Jarrah Marri;
- West Darling 4: Medium woodland; Marri and Wandoo; and
- Pinjarra 968: Medium woodland; Jarrah, Marri and Wandoo.

Remnant vegetation statistics of the IBRA region and the above vegetation association is detailed in Table 5.

Table 5. Remnant Vegetation Statistics (Government of Western Australia 2016)

	PRE-EUROPEAN (HA)	CURRENT EXTENT (HA)	% REMAINING	% REMAINING IN DBCA RESERVES
IBRA Region Swan Coastal Plain	1,501,221.93	578,432.17	38.53	37.85
IBRA Region Jarrah Forest	4,506,660.26	2,416,018.14	53.61	69.17
State wide				
Beard Veg Assoc No. 3	2,661,405.06	1,806,812.23	67.89	81.22
Beard Veg Assoc No. 4	1,054,279.89	293,367.54	27.83	22.78
Beard Veg Assoc No. 968	296,877.84	95,642.43	32.22	57.30
In IBRA Sub-region SWA02				
Beard Veg Assoc No. 3	16,754.96	2,798.11	16.70	12.66
Beard Veg Assoc No. 4	13,107.83	1,903.81	14.52	13.36

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	PRE-EUROPEAN (HA)	CURRENT EXTENT (HA)	% REMAINING	% REMAINING IN DBCA RESERVES
Beard Veg	136,188.20	8,967.05	6.58	21.83
Assoc No. 968	130,100.20	0,907.00	0.50	21.00
In IBRA Sub-regio	n JF01			
Beard Veg	908,099.69	723,075.06	79.63	83.87
Assoc No. 3	906,099.09	723,075.00	79.03	03.07
Beard Veg	614,200.81	198,940.05	32.39	30.36
Assoc No. 4	014,200.61	190,940.03	32.39	30.30
Beard Veg	72,007.43	53,204.08	73.89	60.30
Assoc No. 968	72,007.43	55,204.06	73.69	00.30
Local Government	Authority – City	of Kalamunda		
Beard Veg	26,414.55	21,061.60	79.73	89.46
Assoc No. 3	20,414.55	21,001.00	19.13	09.40
Beard Veg	2,882.29	2,046.48	71.00	58.89
Assoc No. 4	2,002.29	2,040.40	71.00	30.03
Beard Veg	663.60	95.65	14.41	1.25
Assoc No. 968	003.00	90.00	14.41	1.20

The biodiversity conservation goals are based on the national targets for biodiversity conservation as set out in *The National Objectives and Targets for Biodiversity Conservation 2001 – 2005*, which aim to:

- Prevent clearing of ecological communities with less than 30% of the original extent remaining;
- Recover ecological communities with less than 10% of the original extent remaining; and
- Protect threatened species and ecological communities.

The State Government acknowledges that 30% representation of the original extent of each vegetation type is regarded as the threshold level below which species loss appears to accelerate exponentially at an ecosystem level, and 10% representation of the original extent of each vegetation type is regarded as the level representing 'endangered' (WAPC 2011). Based on the figures provided above for representation across the State, all vegetation types, except **West Darling 4** are above the 30% target. Within the City of Kalamunda, all vegetation types except **Pinjarra 968** are above the 30% target. However, it is important to note that in comparison, there is a small proportion of **Pinjarra 968** within the City of Kalamunda's boundary.

Vegetation complexes of the Southwest botanical district have been mapped by Heddle *et al.* (1980). Four vegetation complexes exist across the site which relates to the underlying soil profile (Figure 7):

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- Guildford Complex: Open forest to tall open forest and woodland;
- Southern River Complex: Open woodland;
- Forrestfield Complex: Open forest and fringing woodland; and
- Darling Scarp Complex: Low open woodland to lichens.

4.7.3 Declared, Rare and Priority Flora

Database searches were undertaken to identify the conservation significant flora species occurring or potentially occurring within a 5 km radius of the site. The searches included the DEE's Protected Matters Search Tool (PMST), DBCA's NatureMap database and DBCA's Threatened and Priority Flora database request (DEE 2017; DBCA 2017a; DBCA 2017b).

Review of the database searches identified 75 conservation significant flora species as potentially occurring within the site and a likelihood assessment of the species was undertaken (Table 6) (Figure 8).

Table 6. Likelihood Assessment of Conservation Significant Fauna Species Occurring Within the Site (DEE 2017; DBCA 2017a; b)

	CONSERVATION	LIKELIHOOD OF	
Taxon	EPBC	DBCA	OCCURRENCE IN SITE
Calectasia cyanea	Critically Endangered	Threatened	Possible
Grevillea thelemanniana subsp. thelemanniana	Critically Endangered	Threatened	Possible
Ptilotus pyramidatus	Critically Endangered	Threatened	Unknown
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	Critically Endangered	Threatened	Likely
Andersonia gracilis	Endangered	Threatened	Possible
Austrostipa bronwenae	Endangered	Threatened	Likely
Banksia mimica	Endangered	Threatened	Unknown
Caladenia huegelii	Endangered	Threatened	Unknown
Calytrix breviseta subsp. breviseta	Endangered	Threatened	Likely
Chamelaucium sp. Gingin	Endangered	Threatened	Possible
Darwinia apiculata	Endangered	Threatened	Possible
Diuris drummondii	Endangered	Threatened	Unknown
Diuris purdiei	Endangered	Threatened	Unknown
Drakaea elastica	Endangered	Threatened	Likely
Eremophila glabra subsp. chlorella	Endangered	Threatened	Likely
Eucaluptus x balanites	Endangered	Threatened	Likely
Grevilea curviloba subsp. incurva	Endangered	Threatened	Likely
Lasiopetalum pterocarpum	Endangered	Threatened	Possible

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	CONSERVATION STATUS		LIKELIHOOD OF	
TAXON	EPBC	DBCA	OCCURRENCE IN SITE	
Lepidosperma rostratum	Endangered	Threatened	Likely	
Macarthuria keigheryi	Endangered	Threatened	Possible	
Thelymitra stellata	Endangered	Threatened	Likely	
Acacia anomala	Vulnerable	Threatened	Possible	
Acacia aphylla	Vulnerable	Threatened	Possible	
Conospermum undulatum	Vulnerable	Threatened	Likely	
Diuris micrantha	Vulnerable	Threatened	Possible	
Drakaea micrantha	Vulnerable	Threatened	Unknown	
Eleocharis keigheryi	Vulnerable	Threatened	Possible	
Amanita quenda	-	Priority 1	Possible	
Calandrinia sp. Piawaning	-	Priority 1	Likely	
Schoenus sp. Beaufort (G.J. Keighery 6291)	-	Priority 1	Possible	
Thelymitra magnifica	-	Priority 1	Likely	
Comesperma griffinii	-	Priority 2	Likely	
Comesperma rhadinocarpum	-	Priority 2	Unknown	
Isotropis cuneifolia subsp. glabra	-	Priority 2	Possible	
Lepyrodia curvescens	-	Priority 2	Possible	
Melaleuca viminalis	-	Priority 2	Possible	
Schoenus Ioliaceus	-	Priority 2	Possible	
Acacia horridula	-	Priority 3	Likely	
Amanita wadjukiorum	-	Priority 3	Likely	
Babingtonia urbana	-	Priority 3	Unlikely	
Banksia pteridifolia subsp. vernalis	-	Priority 3	Unlikely	
Byblis gigantea	-	Priority 3	Unlikely	
Chamaescilla gibsonii	-	Priority 3	Possible	
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	-	Priority 3	Likely	
Eryngium sp. Subdecumbens (G.J. Keighery 5390)	-	Priority 3	Likely	
Haemodorum Ioratum	-	Priority 3	Likely	
Isopogon drummondii	-	Priority 3	Possible	
Lasiopetalum glutinosum subsp. glutinosum	-	Priority 3	Likely	
Meionectes tenuifolia	-	Priority 3	Possible	
Myriophyllum echinatum	-	Priority 3	Possible	
Pithocarpa corymbulosa	-	Priority 3	Possible	
Platysace ramosissima	-	Priority 3	Possible	

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Tayou	CONSERVATION STATUS		LIKELIHOOD OF
Taxon	EPBC	DBCA	OCCURRENCE IN SITE
Schoenus benthamii	-	Priority 3	Possible
Schoenus capillifolius	-	Priority 3	Possible
Schoenus pennisetis	-	Priority 3	Possible
Stylidium aceratum	-	Priority 3	Possible
Stylidium periscelianthum	-	Priority 3	Possible
Styphelia filifolia	-	Priority 3	Unknown
Thysanotus anceps	-	Priority 3	Possible
Acacia oncinophylla subsp. patulifolia	-	Priority 4	Likely
Aponogeton hexatepalus	-	Priority 4	Likely
Boronia tenuis	-	Priority 4	Unlikely
Centrolepis caespitosa	-	Priority 4	Unknown
Cyanicula ixioides subsp. ixioides	-	Priority 4	Unknown
Drosera occidentalis subsp. occidentalis	-	Priority 4	Unknown
Hibbertia montana	-	Priority 4	Possible
Hydrocotyle lemnoides	-	Priority 4	Likely
Lasiopetalum bracteatum	-	Priority 4	Likely
Ornduffia submersa	-	Priority 4	Unknown
Pimelea rara	-	Priority 4	Possible
Schoenus natans	-	Priority 4	Possible
Senecio leucoglossus	-	Priority 4	Possible
Stylidium longitubum	-	Priority 4	Possible
Stylidium striatum	-	Priority 4	Possible
Verticordia lindleyi subsp. lindleyi	-	Priority 4	Likely

24 flora species were considered Likely to occur due to the presence of suitable habitat and close proximity to previous records. 35 species were considered Possible and four considered Unlikely to occur within the site. 12 species had an unknown likelihood of occurrence due to the lack of available data.

Several occurrences of the following five DRF species have been identified as occurring within or close to the boundary of the site based on the DBCA Threatened Priority Flora database search (DBCA 2017a) (Figure 8):

- Conospermum undulatum;
- Isopogon drummondii;
- Banksia mimica;
- Lasiopetalum glutinosum subsp. glutinosum; and

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Thelymitra magnifica.

Given the above, site specific flora and vegetation surveys will be required to confirm the presence of DRF within the site.

4.7.4 Threatened and Priority Ecological Communities

Desktop searches of the DBCA's Threatened and Priority Ecological Communities dataset identified several TECs or TEC buffers occurring within and surrounding the site. The dataset provided by the DBCA has generic buffers of 200 m or 500 m surrounding the TECs or PECs (DBCA 2017c) (Figure 9):

- Banksia Dominated Woodlands of the Swan Coastal Plain;
- SCP20a Banksia attenuata woodlands over species rich dense shrublands;
- SCP3a -Eucalypt calophylla Kingia australis woodlands on heavy soils, Swan Coastal Plain;
- SCP3b Eucalyptus calophylla eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain;
- Shrublands and woodlands on Muchea Limestone;
- Herb rich shrublands in clay pans;
- SCP10a Shrublands on dry clay flats; and
- Central Granite Shrublands Community.

Given the above, site specific flora and vegetation surveys will be required to identify the presence of TECs or PECs within the site.

4.7.5 Weeds

A desktop search of the EPBC PMST has identified a total of 19 introduced species that may occur within a 5 km radius of the Site (Table 7) (DEE 2017).

Of these 19 weed species, nine are Declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) and 15 are listed as Weeds of National Significance (WONS).

Table 7. Introduced Flora Recorded in the Survey Area.

Taxon	(COMMON NAME)	DECLARED BAM ACT	WONS
*Anredera cordifolia	Madeira Vine	-	Yes
*Asparagus asparagoides	Bridal Creeper	s22(2) C3	Yes
*Brachiaria mutica	Para Grass	-	-
*Cenchrus ciliaris	Buffel-grass	-	-
*Chrysanthemoides monilifera	Bitou Bush	s12 C2	Yes

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TAXON	(COMMON NAME)	DECLARED BAM ACT	WONS
*Chrysanthemoides monilifera	Boneseed	s12 C2	Yes
subsp. monilifera			
*Eichhornia crassipes	Water Hyacinth	s12 C2	Yes
*Genista linifolia	Flax-leaved Broom	-	Yes
*Genista monspessulana	Cape Broom	-	Yes
*Genista sp. X Genista	Broom	-	Yes
monspessulana			
*Lantana camara	White Sage	s22(2) C3	Yes
*Lycium ferocissimum	African Boxthorn	-	Yes
*Olea europaea	Olive	-	-
*Pinus radiata	Pine	-	-
*Rubus fruticosus aggregate	Blackberry	-	Yes
*Sagittaria platyphylla	Slender Arrowhead	s22(2) C3	Yes
*Salix spp. except S. babylonica,	Willows except Weeping	s12 C1	Yes
S.x calodendron & S. x	Willow, Pussy Willow and		
reichardtii	Sterile Pussy Willow		
*Salvinia molesta	Giant Salvinia	s12 C1	Yes
*Tamarix aphylla	Athel Pine	s22(2) C3	Yes

^{*}The (then) Department of Agriculture and Food WA (DAFWA) maintains a list of Declared Plants for Western Australia under the Biosecurity and Agriculture Management Act 2007 (BAM Act). If a plant is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to comply with the relevant species-specific control measures.

Declared pests must satisfy any applicable import requirements when imported, and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia.

Under the BAM Act, all declared pests are placed in one of three categories, namely C1 (exclusion), C2 (eradication) or C3 (management).

C1 category (Exclusion) - Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.

C2 category (Eradication) - Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.

C3 category (Management) – Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest (DAFWA 2017).

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^{*}The DAFWA maintains a list of Declared Plants for Western Australia under the BAM Act. If a plant is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to comply with the relevant species-specific control measures.

¹Declared Pest - s22(2)



4.8 Fauna

4.8.1 Threatened and Priority Fauna

Conservation significant fauna potentially occurring within a 5 km radius of the Site were determined through desktop searches using DEE's PMST, DBCA's NatureMap search tool and DBCA's Threatened and Priority Fauna databases.

A number of species returned in the databases were historical records of locally extinct species (e.g. Malleefowl) and these have been omitted from further discussion.

A likelihood assessment was undertaken to determine the likelihood of these species occurring within the Site based on suitable habitat present and the species known distribution based on the following criteria:

The Likelihood of each species is based on the following criteria:

- Recorded: Recorded during the field survey or site reconnaissance;
- Likely: Suitable habitat is present in the Survey Area and the Survey Area is in the species' known distribution;
- Possible: Limited or no suitable habitat is present in Survey Area, but is nearby. The species has good dispersal abilities and is known from the general area; and
- Unlikely: No suitable habitat is present in Survey Area but is nearby, the species has poor dispersal abilities, but is known from the general area; or suitable habitat is present, however, the Survey Area is outside of the species' known distribution.

Table 8. Likelihood Assessment of Conservation Significant Fauna Occurring Within the Site (DEE 2017) (DBCA 2017a;d)

SPECIES	Conservation Status		LIKELIHOOD OF OCCURRENCE
	DBCA	EPBC	
Australasian Bittern	Threatened	Endangered	Unlikely
(Botaurus poiciloptilus)			
Brush-tailed Bettong	Threatened	Critically Endangered	Unlikely
(Bettongia penicillata ogilbyi)			
Eastern Curlew	Threatened	Critically Endangered	Unlikely
(Numenius madagascariensis)			
Curlew Sandpiper	Threatened	Critically Endangered	Unlikely
(Calidris ferruginea)			
Australian Painted Snipe	Threatened	Endangered	Possible
(Rostratula australis)			
Western Ringtail Possum	Threatened	Vulnerable	Unlikely
(Pseudocheirus occidentalis)			
Quokka	Threatened	Vulnerable	Unlikely
(Setonix brachyurus)			

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SPECIES	Conservation Status		LIKELIHOOD OF OCCURRENCE
	DBCA	EPBC	
Baudin's Cockatoo	Threatened	Vulnerable	Possible
(Calyptorhynchus baudinii)			
Forest Red-tailed Black Cockatoo	Threatened	Vulnerable	Likely
(Calyptorhynchus banksii naso)			
Carnaby's Cockatoo	Threatened	Endangered	Likely
(Calyptorhynchus latirostris)		, and the second	
Chuditch	Threatened	Vulnerable	Unlikely
(Dasyurus geoffroii)			,
Short-tongued Bee	Threatened	Critically Endangered	Unlikely
(Leioproctus douglasiellus)		, ,	
Western Swamp Tortoise	Threatened	Critically Endangered	Unlikely
(Pseudemydura umbrina)		, ,	
South Western Phascogale	Conservation	-	Unknown
(Phascogale tapoatafa wambenger)	Dependent Fauna		
Great Egret	International	Marine	Possible
(Ardea modesta)	Agreement		
Rainbow Bee-eater	International	Marine	Possible
(Merops ornatus)	Agreement	· · · · · · · · · · · · · · · · · · ·	. 555.2.5
Wood Sandpiper	International	Marine/Migratory	Possible
(Tringa glareola)	Agreement	ivianiio, iviigratory	1 0001510
Common Sandpiper	International	Marine/Migratory	Possible
(Tringa hypoleucos)	Agreement	ivialine, iviigratory	1 0001510
Common Greenshank	International	Marine/Migratory	Possible
(Tringa nebularia)	Agreement	ivianiio, iviigratory	1 0001510
Marsh Sandpiper	International	Marine/Migratory	Possible
(Tringa stagnatilis)	Agreement	Marine, Migratory	1 0331616
Peregrine Falcon	Other Specially	-	Unlikely
(Falco peregrinus)	Protected Fauna		Officery
Western Swamp Tortoise	Threatened	-	Unlikely
(Pseudemydura umbrina)	rineatened	-	Offlikely
Scorpionfly	Priority 2	-	Unknown
(Austromerope poultoni)	1 Hority 2		JIMIOWII
A short-tongued bee	Priority 2	_	Unknown
(Leioproctus bilobatus)	1 Hority 2		JIMIOWII
Southern Death Adder	Priority 3	-	Unlikely
(Acanthophis antarcticus)	i fiority 5	-	Offlikely
Black Striped Snake	Priority 3	-	Possible
(Neelaps colonotos)	i fiority 5	-	i Ossible
Water-rat	Priority 4	-	Possible
(Hydromys chrysogaster)	FIIOTILY 4	-	1-022INIG
Southern Brown Bandicoot	Priority A		Likely
(Isoodon obesulus fusciventer)	Priority 4	-	Likely
· · · · · · · · · · · · · · · · · · ·	Duianite : 4		Descible
Western Brush Wallaby	Priority 4	-	Possible
(Macropus irma)	Dui - vite - 4		I I altitud
Blue billed Duck	Priority 4	-	Unlikely

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SPECIES	Conservation Status		LIKELIHOOD OF OCCURRENCE
	DBCA	EPBC	
(Oxyura australis)			

Due to the site being mostly cleared of native vegetation and used for rural purposes, it is not likely that the site would offer large areas of valuable intact habitat. The surrounding environment is also representative of clearing and rural land uses containing limited vegetation to the north, west and south of the site. Large areas of intact vegetation area located to the east of the site and therefore, may provide better fauna habitat than the site itself.

Some fauna species may utilise the minor watercourse that traverses the site which appears to have intact vegetation along the foreshore area and within remaining patches. However, fauna are more likely to utilise surrounding larger areas of intact vegetation to the east.

4.9 Heritage

4.9.1 Aboriginal Heritage

In Western Australia, the *Aboriginal Heritage Act 1972* protects places and objects customarily used by or traditional to the original habitants of Australia or their descendants. A register of such places and objects are maintained under the Act, however, all sites are protected under the Act whether they are registered or not (DPLH 2017).

A desktop search has identified two Registered Aboriginal Heritage Sites and one Lodged Aboriginal Heritage Site intersecting the Site and three Registered sites located within 1 km of the site (Table 9; Figure 10) (DPLH 2017).

Table 9. Aboriginal Heritage Sites Within or in the Vicinity of the Site (DPLH 2017)

Number	SITE NAME	Туре	STATUS	DISTANCE FROM SITE (M)
4343	Brentwood Road Swamp	Artefacts / Scatter	Registered	0
4342	Brentwood Road Quarry	Artefacts / Scatter, Quarry	Registered	0
4341	Brentwood Road NW	Artefacts / Scatter	Lodged	0
3264	White Road, Orange Grove	Artefacts/Scatter, Skeletal Material/Burial	Registered	679

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NUMBER	SITE NAME	Туре	STATUS	DISTANCE FROM SITE (M)
3631	Yule Brook A & B	Artefacts/Scatter	Registered	420
3773	Welshpool Reserve	Camp	Registered	275

4.9.2 European Heritage

A desktop search of the State Heritage Office has identified there are no State Heritage Sites within the Site or within a 2 km radius of the Site (SHO 2017). No World Heritage or National Heritage places are located within a 5 km radius of the Site (DEE 2017).

The Site does contain one Shire of Kalamunda Municipal Heritage place, Mrs Wright's Home (former) located at 150 Crystal Brook Road, Wattle Grove. This site is not registered under State Legislation. However, it is graded as Category 4 which states 'Photographically record prior to major development or demolition. Recognise and interpret the site if possible' (SHO 2017) (Figure 10).

The Site contains one heritage site listed as 'Other Heritage Sites', White's home & store located at 80 Crystal Brook Road, Wattle Grove. The site is currently a single storey residence and there are no other details regarding this Site with the State Heritage Office (SHO 2017) (Figure 10).

4.10 Site History

4.10.1 Historical Aerial Imagery

Review of historical aerial imagery was undertaken to identify and assess land use and development changes within the area over time. The earliest available aerial of the site was taken in 1953 and more recent aerial images (from approximately 10 year intervals up to present) were viewed (Figures 11a-h).

The review of historical aerial imagery has identified substantial clearing of majority of vegetation within the site and surrounding areas occurred prior to 1953 and subdivided for rural land uses including market gardens, agricultural/animal grazing and pastures. Portions in the south-west of the site were identified as wet during this time. Some patches of remnant vegetation remained until prior to 1974. It appears potential sand extraction activities were undertaken in the northern and south-eastern portions of the site and adjacent areas which expanded between 1953 and 1974.

Further clearing of remnant native vegetation occurred by 1974 and some rural residential dwellings were constructed. It appears some vegetation regrowth or planting has occurred prior to 1974. Development and rural land uses replaced the sand extraction areas by 1985. During this time, further rural residential development occurred

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within the site and surrounding areas. Majority of the clearing within the site occurred by 1995 and some regeneration and plantation occurred between 1995 and 2010.

Urban residential developments began between 2010 and 2017 to the north, north-west and north-east of the site boundary.

4.10.2 WIN Groundwater Bore Database Search

A search of the (then) Department of Water (DoW)'s WIN Groundwater bore database has identified 51 bores within the site boundary (Figure 12) (DoW 2017). These operational statuses and current owners of these bores are unknown. Information on each WIN bore's ID, purpose, status, drill depth, drill date and owner are provided in Appendix C.

4.11 Surrounding Land Uses

The Lesmurdie Reserve exists to the east of the site. Pockets of residential developments exist to the north, west, south-west and east of the site beyond the rural areas. The Hartfield Country Club Golf Course is located 236 m to the north. An industrial and commercial precinct is located to the south-west of the site in Kenwick.

4.12 Industrial Separation Distances

Under the EPA's *Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses*, all new industries, infrastructure and estates in the vicinity of proposed/existing sensitive land uses, and vice versa, require a suitable separation distance. Sensitive land uses are defined by the EPA as; residential developments, hospitals, hotels, motels, hostels, caravan parks, schools, nursing homes, child care facilities, institutions, shopping centres (EPA 2005). This Guidance Statement outlines the generic buffer distances between sensitive and industrial land uses in the absence of site-specific technical investigations (EPA 2005).

4.12.1 Kennels

Three kennels exist to the west of the site (Figure 13). The EPA's Guidance Statement No. 3 provides a generic buffer distance of 500 m from sensitive land uses within rural zones and a 1000 m buffer in or nearby urban areas in the absence of site specific investigations (EPA 2005). Kennels have associated odour and noise impacts. It is to be noted that separation distances are not required to other industrial land uses under GS3.

Proposed zoning of the site to Urban will require a generic 1000 m buffer distance between the existing kennels and future residential and sensitive land use developments. A buffer of 1000 m from all three kennels will impinge the western portion of the site (Figure 13). Site specific noise and odour modelling would be required to determine a more appropriate buffer distance in negotiation with the City of Kalamunda.

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Lots 24, 25, 26 and 36 Welshpool Road East, Wattle Grove have been identified as having an additional use under the LPS 3 for dog kennels. Despite provision within the Scheme, it does not appear the lots are currently used for dog kennels. Current uses of these lots include a garden centre and veterinary hospital.

4.12.2 Poultry Farms

One poultry farm exists within the southern portion of the site (Poultry Farm 1) and two poultry farm exists to the south and west of the site (Poultry Farm 2 and 3 respectively) (Figure 13). Under GS3, the generic buffer distance for Poultry Farms ranges from 300 m – 1000 m (EPA 2005). Under the City of Kalamunda's LSP, a 300 m buffer is mapped from Poultry Farm 1 and 3. Under the City of Gosnell's Town Planning Scheme No. 6 (TSP 6) a buffer of 500 m has been applied to Poultry Farm 2 (Figure 13). Buffers of Poultry Farm 1 and 2 impact the developable potential of the site for sensitive land uses, however, industrial development are unaffected by poultry farm buffers.

4.12.3 Turf Farms

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One turf farm is located within the south-western portion of the site (Figure 13). Under GS3, a generic buffer distance of 500 m from turf farm is applicable from sensitive land uses or developments. This buffer distance only impinges the site south of Crystal Brook Road (Figure 13). Industrial development to the south of Crystal Brook Road is unlikely to be affected by the turf farm buffer.

5 Potential Site Environmental Constraints

The potential key environmental issues associated with the existing development include:

- Wetlands and wetland buffers:
- Watercourse and Foreshore Areas;
- Declared Rare Flora:
- Threatened Ecological Communities;
- Water Management; and
- Industrial separation buffers.

5.1 Wetlands and Wetland Buffers

Under the Western Australian Planning Commission's *Guideline for the Determination of Wetland Buffer Requirements* (2005), the consideration of wetlands is required during a change in land use or a proposed development in the immediate vicinity of a wetland where the future land use is likely to conflict with the established wetland management objectives. Under the guidelines, an appropriate buffer distance should be identified to achieve an acceptable planning outcome. Buffer distances determined based on the wetland's category and no development is permitted within buffers (WAPC 2005).

As the site contains and is within the vicinity of wetlands, there is the potential for their associated buffers to impinge on the south-western portion of the site and decrease the developable potential of the site. A minimum buffer distance of 50 m from a CCW and a 30-50 m buffer from REWs is generally applicable. Figure 14 identifies the worst case scenario of the area of land onsite that may be impinged by wetland buffers of 50 m. This would equate to approximately 8.44 ha of land within the site to be sterilised from future development.

However, the REW's located within the site appear to have been historically cleared of most vegetation. Reclassification of the REWs to MUWs may be possible and this would remove this wetland area as a constraint to future development (approximately 8.44 ha). Development within MUWs is generally permissible as they have little remaining ecological wetland attributes and function, provided adequate depth to groundwater is established as part of future development.

A CCW located south of the Tonkin Highway and Welshpool Road East intersection, at worst case, would have a minimum 50 m buffer applicable (see Figure 14). However, as the area within the site and within a potential 50 m buffer has already been cleared, developed and is separated by a road reserve, it is considered unlikely that a buffer would be required.

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5.1.1 Further Investigations and Management Requirements

The vegetation of the mapped wetlands within the site and the applicable buffers is representative of previous land uses and historical clearing. It is likely that these areas would include patches of non-endemic species and plantings. Ground surveys would be required to assess the vegetation within the site to determine the impacts of mapped wetlands and associated buffers to future urban development.

A Wetland and Wetland Buffer Management Plan (WWBMP) will be required for the lots located within or adjacent to wetlands at the local structure planning or subdivision stage.

5.2 Watercourse and Foreshore Areas

The minor non-perennial stream watercourse that traverses the northern portion of the site is likely to require a defined foreshore area due to the vegetation along the watercourse in accordance with DoW's Operational Policy 4.3: *Identifying and establishing waterways foreshore areas* (2012). Development within the foreshore area of a watercourse is generally not permitted and therefore has the potential to reduce the developable potential of the site.

There are no standard foreshore widths and should be determined in discussion with DWER and other relevant agencies. Generally, the foreshore area can be defined as the furthest extent of riparian vegetation and other associated riverine landforms and functions. Figure 14 identifies a potential foreshore area; however, groundtruthing is required through survey work to identify watercourses, and determine foreshore areas and watercourse buffer zones. Watercourses, foreshore areas and watercourse buffer zones require protection through the creation of easements for drainage and water management purposes, specify approved and un-approved land uses and activities within the zones and providing Watercourse and Foreshore Management Plans detailing these.

5.2.1 Further Investigations and Management Requirements

As part of future structure planning, identification of watercourses and foreshore area, will be undertaken as part of a biophysical assessment. The biophysical assessment will be undertaken in accordance with the (then) Department of Water's (DoW's) Operational Policy 4.3: Identifying and establishing waterways foreshore areas (2012) and the (then) Water and Rivers Commission policy Determining Foreshore Reserves (2001).

To ensure these watercourses and their associated foreshore area and buffer zone is appropriately protected and managed, the following will be required as part of future development:

- The creation of easements for the purpose of drainage and water management;
- Specifying approved or unapproved activities within the buffer zone; and

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 Preparation of a Watercourse and Foreshore Management Plan at the local structure planning or subdivision stage.

5.3 Declared Rare Flora

Several occurrences of the Wavy Smoke Bush (*Conospermum undulatum*) and the Summer Honeypot (*Banksia mimica*) have been identified as occurring within the site based on DBCA database searches. These species and the vegetation within 50 m of the DRF are protected under the EPBC Act.

The occurrences of both these DRFs throughout the site are considered a potential constraint to development as the DRF and vegetation within 50 m of the flora are protected under the EPBC Act (Figure 14).

5.3.1 Further Investigations and Management Requirements

It is likely a Flora and Vegetation survey would be required to confirm the presence and locations of these DRF species to inform future rezoning and structure planning. In addition, an EPBC referral would likely be required at structure planning stage to address potential impacts associated with urban development near DRFs.

A Flora and Vegetation Management Plan may be required at the subdivision stage.

5.4 Threatened Ecological Communities

Portions within the site have been mapped by DBCA as the Banksia Woodlands of the Swan Coastal Plain TEC, *Eucalyptus calophylla-Kingia australis* woodlands and Shrublands and Woodlands on Muchea Limestone listed as Endangered under the EPBC Act (Figure 9). However, the DBCA's mapping is based on the Commonwealth's 'likely to occur' areas and represents broad scale vegetation units that are most likely to contain the ecological communities.

5.4.1 Further Investigations and Management Requirements

Site specific flora and vegetation surveys will be required to identify the presence of TECs or PEC, which will inform the structure planning stage. Depending on the potential impacts, the presence of TECs within the site may require the project to be referred to the DEE under the EPBC Act for an assessment of potential impacts associated with urban development within or nearby TECs.

A Flora and Vegetation Management Plan may be required at the subdivision stage for the protection of identified TECs or PECs.

5.5 Water Management

The Site has a few tributaries which traverse the site and there are small portions of CCW and REW along the western boundary of the site. It should be noted that development proposals within 200 m of the boundary of a CCW or REW should be

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referred to DBCA for advice where the quality or volume of water flowing into the wetland may be affected by a development.

5.5.1 Further Investigations and Management Requirements

A District Water Management Strategy (DWMS) will be required to support any future MRS Amendment. The purpose this document will be to provide a coordinating framework that guides the key requirements for water sensitive urban design. It will also demonstrate that Site can support urban and/or industrial development and best practice urban water management.

A groundwater monitoring program will also be required prior to the development of a Local Water Management Strategy at the local structure planning stage.

5.6 Industrial Separation Buffers

The presence of prescribed premises, including poultry farms, kennels and a turf farm, within and adjacent to the site has the potential to impact on the type of future land uses within the site (should these premises remain in operation).

The three surrounding kennels, poultry farms and turf farm buffers impinge on the site. However, the buffers are only applicable for sensitive land uses. Majority of the land use buffers impinge across the southern half of the site (south of Crystal Brook Road) which would identify this portion to be potentially used for future industrial development (Figure 13).

5.6.1 Further Investigations and Management Requirements

The portion of the site to the north of Crystal Brook Road is impinged by fewer buffers and may have a better potential for residential development (Figure 13). However, site specific odour and noise modelling would need to be undertaken to identify opportunities with reduced buffers from surrounding land uses. In addition, management and mitigation measures may be required to support urban residential development in this area.

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6 Summary

6.1 Outcome and Key Findings of Assessment

The site is currently used for rural land uses and has been historically cleared of majority of native vegetation. A desktop review of the environmental aspects of the site has determined the following are relevant:

- Wetlands and Wetland Buffers: As the site is mapped as containing and within the vicinity of geomorphic wetlands, there is the potential for their associated buffers to impinge on the south-western portion of the site. A buffer distance of 30 50 m is generally imposed on REWs and a minimum 50 m buffer is generally imposed on CCWs. However, as the vegetation within the mapped wetlands and the corresponding buffers does not appear to be intact and has been subject to clearing, it is likely that smaller buffer distances from the wetlands could be negotiated. Alternatively, there is a potential opportunity to reclassify the wetlands within and surrounding the site to increase the developable potential of the site. Site specific surveys would be required to assess the vegetation remaining and the condition of the wetlands. A Wetland and Wetland Buffer Management Plan may be required at subdivision.
- Watercourse and Foreshore Area: The minor non-perennial watercourse that traverses through the northern portion of the site would likely require a biophysical assessment to identify the extent of the foreshore area. The extent of the foreshore area would impact on the developable potential of the surrounding area. A Watercourse and Foreshore Management Plan may be required at the structure planning or subdivision stage. Additionally, the creation of easements for the foreshore and buffer area for the purpose of drainage and water management, as well as specifying the approved and unapproved activities within the buffer zone will provide further protection and management.
- Declared Rare Flora: There are several historical occurrences of DRF within the site. The species and the vegetation within 50 m of the occurrence are protected under Federal legislation. Flora and vegetation surveys would be required to confirm the presence or absence of these DRF species which would provide a better indication of the land available for development. A Flora and Vegetation Management Plan may be required at the subdivision stage.
- Threatened Ecological Communities: The site is mapped as having several TECs and associated buffers across the site. These mapped TECs are based on the DEE's likelihood of TEC occurrences and are not based on actual recorded data. These TECs appear to correspond with patches of possible remnant vegetation which is likely to be associated with the Banksia Woodlands TEC, Eucalyptus

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calophylla-Kingia australis woodlands and Shrublands TEC and Woodlands on Muchea Limestone TEC. Flora and vegetation surveys of these patches of vegetation would be required to determine the presence or absence of these TECs. Should these TECs be identified as occurring within the site, clearing or potential impacts to the TECs will require approval from the DEE and the DWER. A Flora and Vegetation Management Plan may be required at the subdivision stage.

- Water Management: There are several tributaries which traverse the site, as well as wetland located along the western boundary of the site. A DWMS will be required as part of any future rezoning under the MRS, as well as groundwater monitoring to inform the LWMS at the local structure planning stage.
- Land Use Buffers: The site is constrained by generic or imposed buffers on prescribed premises (Poultry farms, turf farm and kennels). The opportunities for land development within the site is recommended to be split into two land uses, the area to the south of Crystal Brook Road would be more suitable for continued rural uses or industrial development. While the area to the north of Crystal Brook Road has the potential to be developed to urban residential should the generic buffers be reduced. Site specific studies and modelling would be required to determine appropriate buffers from the surrounding.

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7 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data and analyses ("client's information") provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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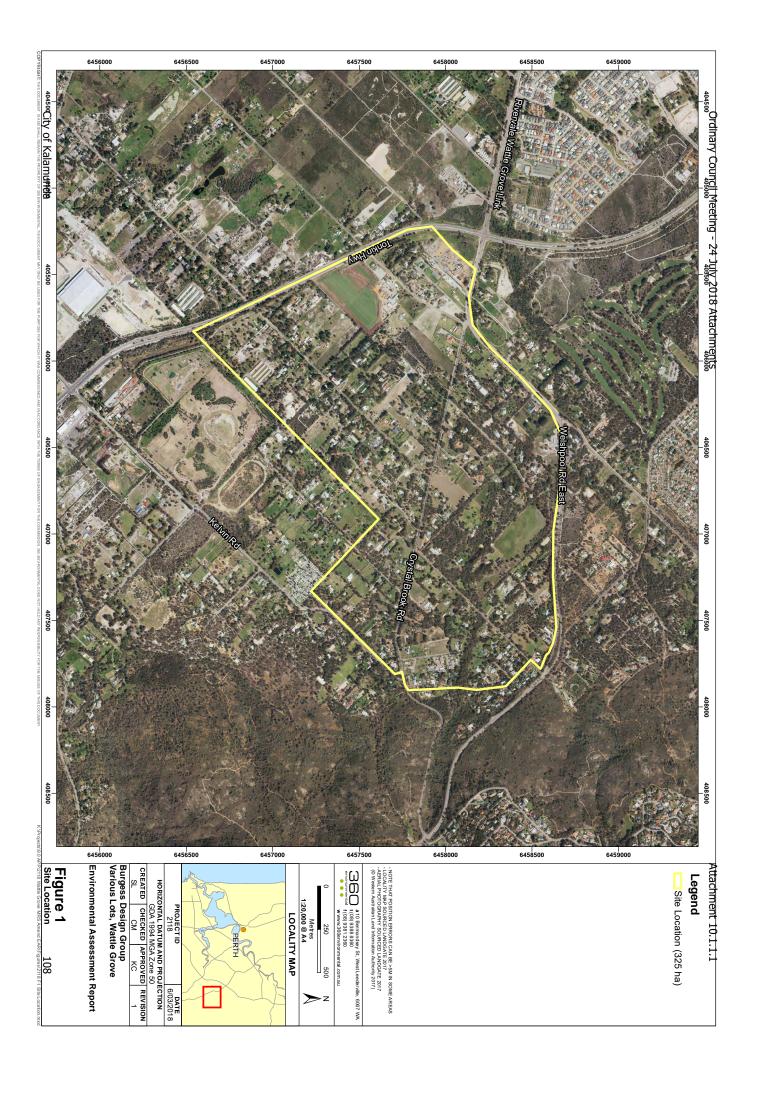
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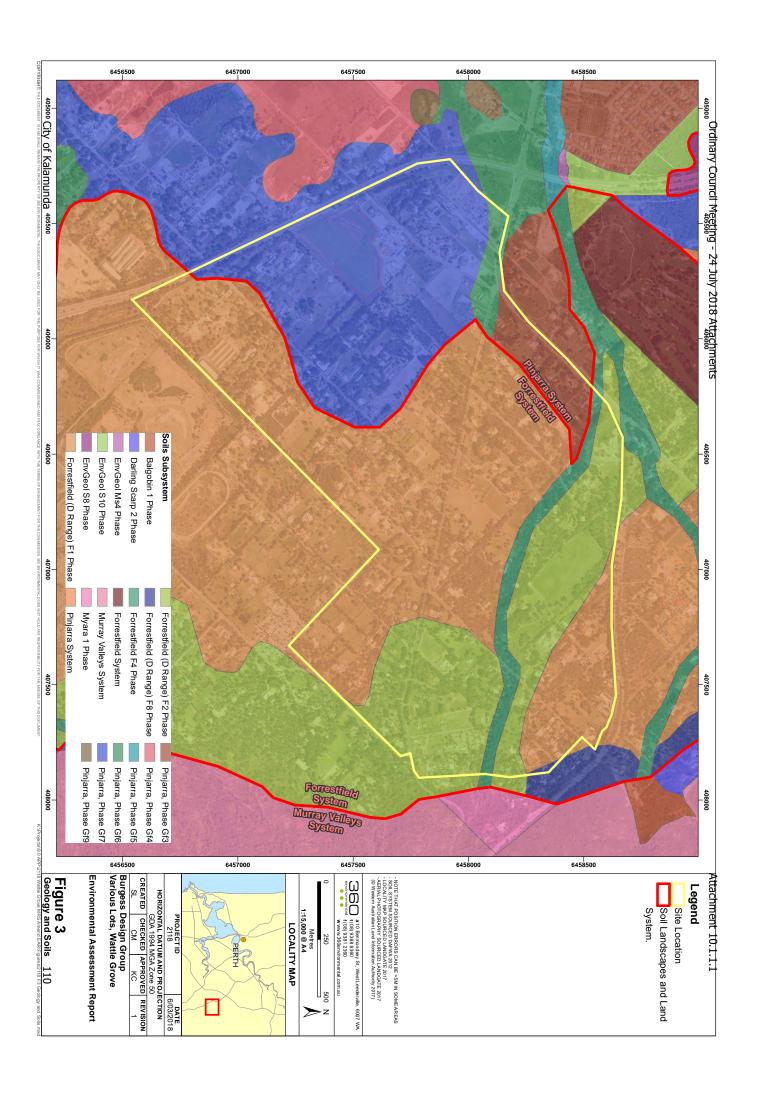


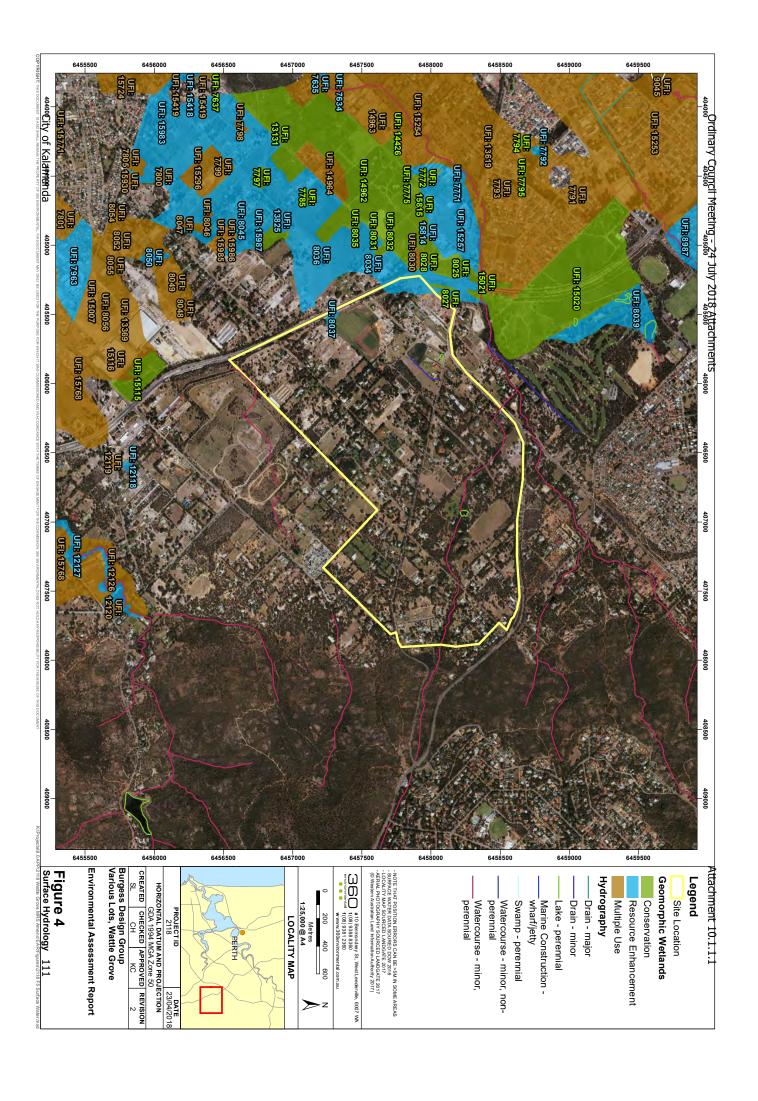
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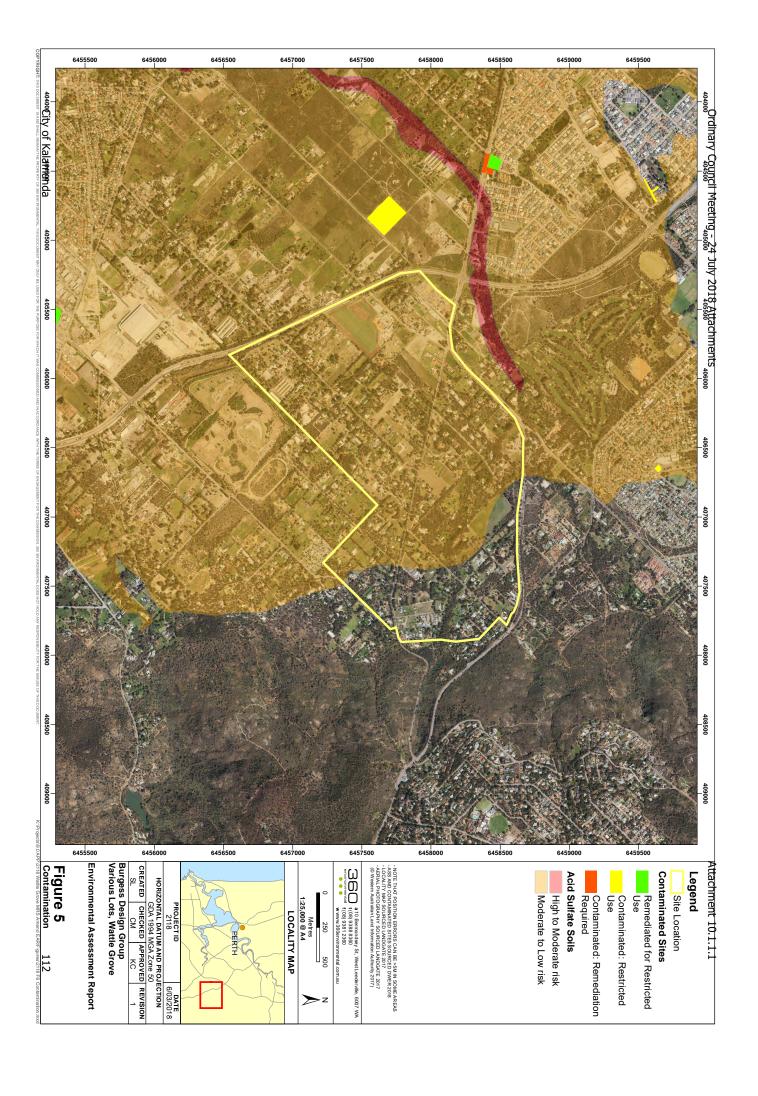
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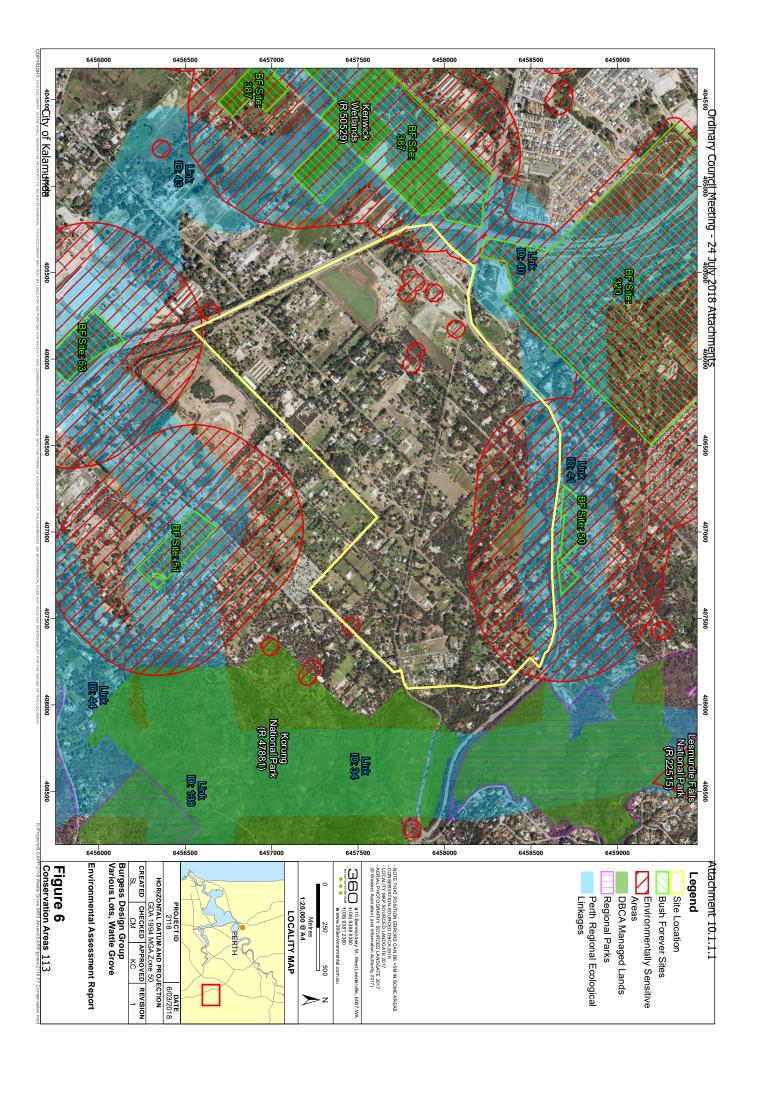


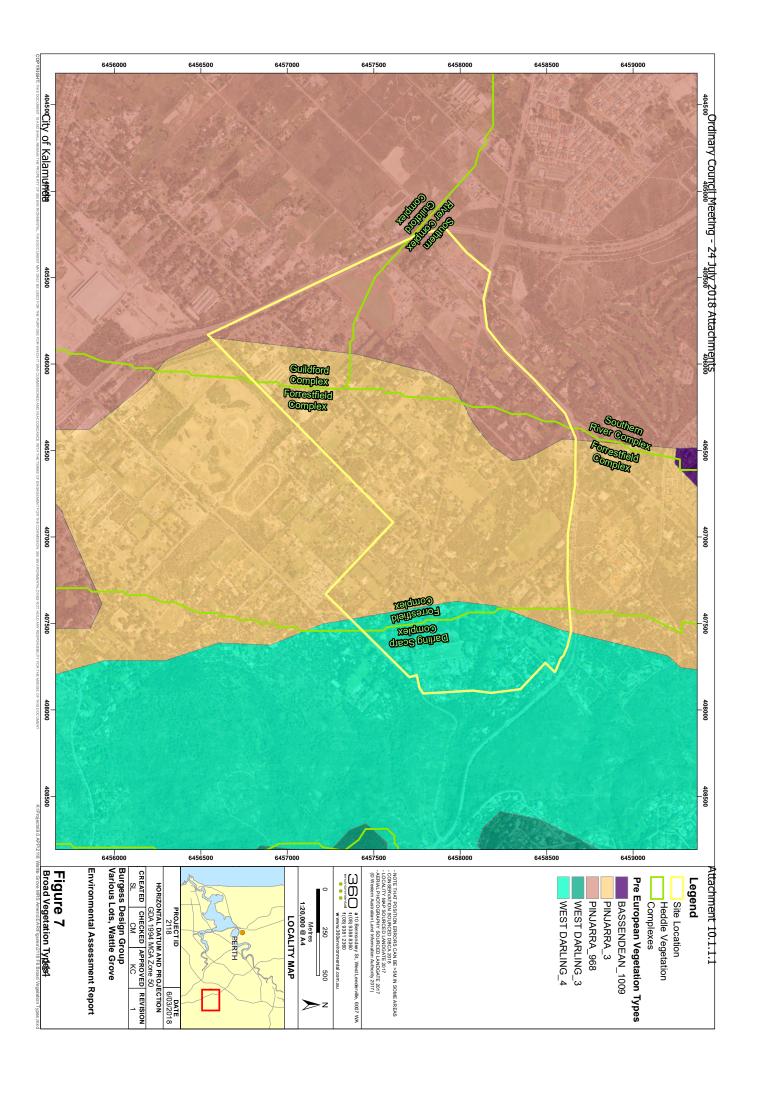


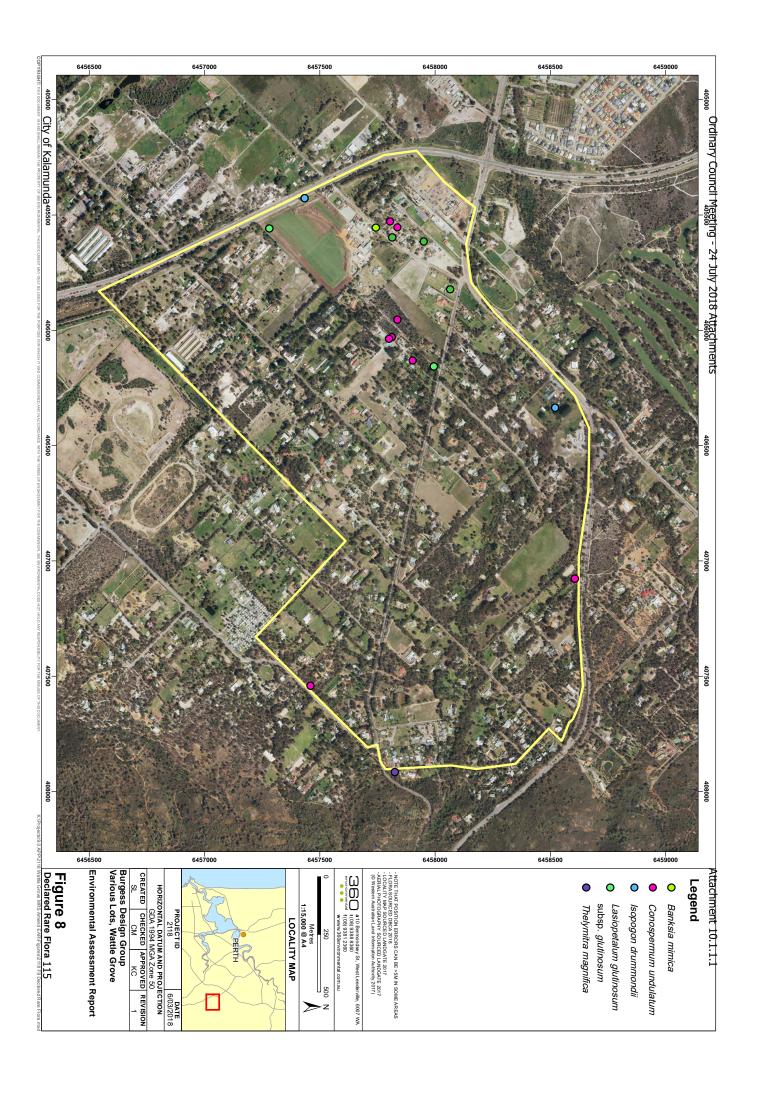


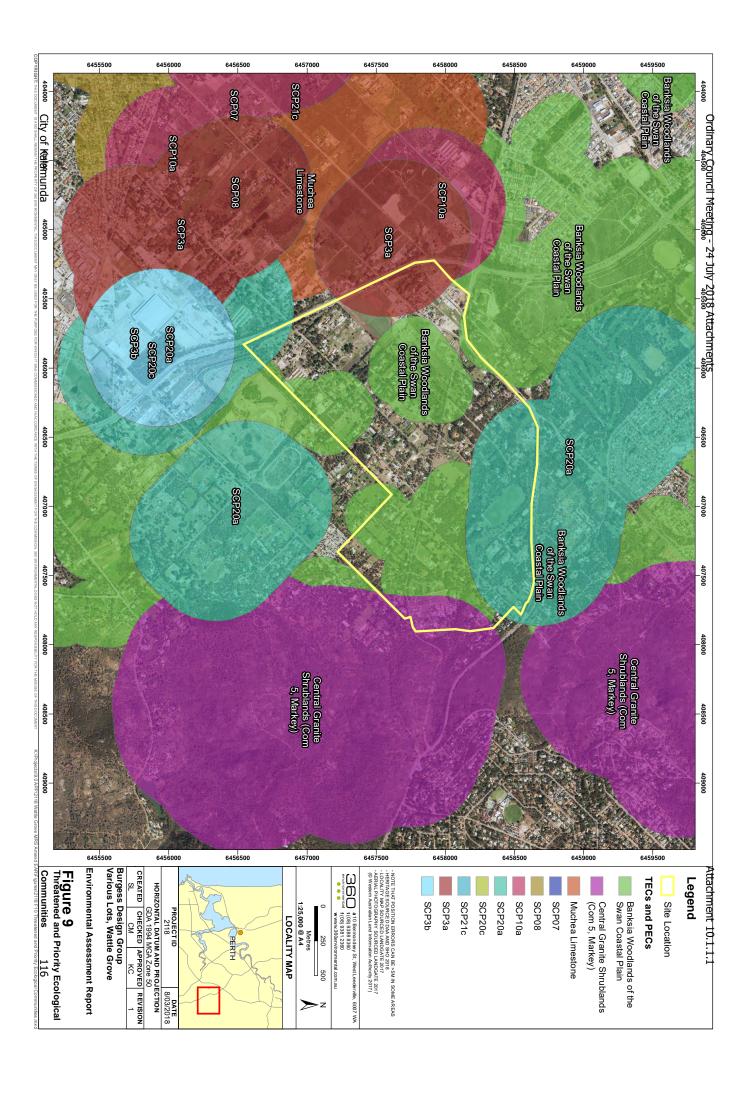


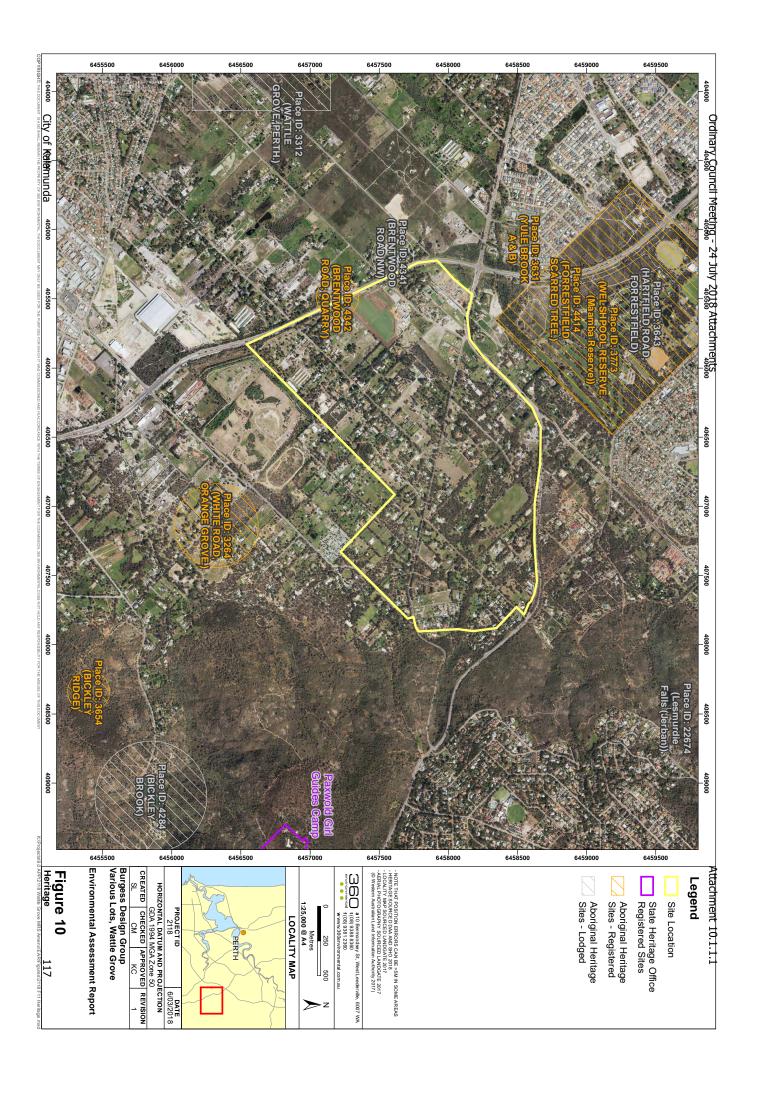


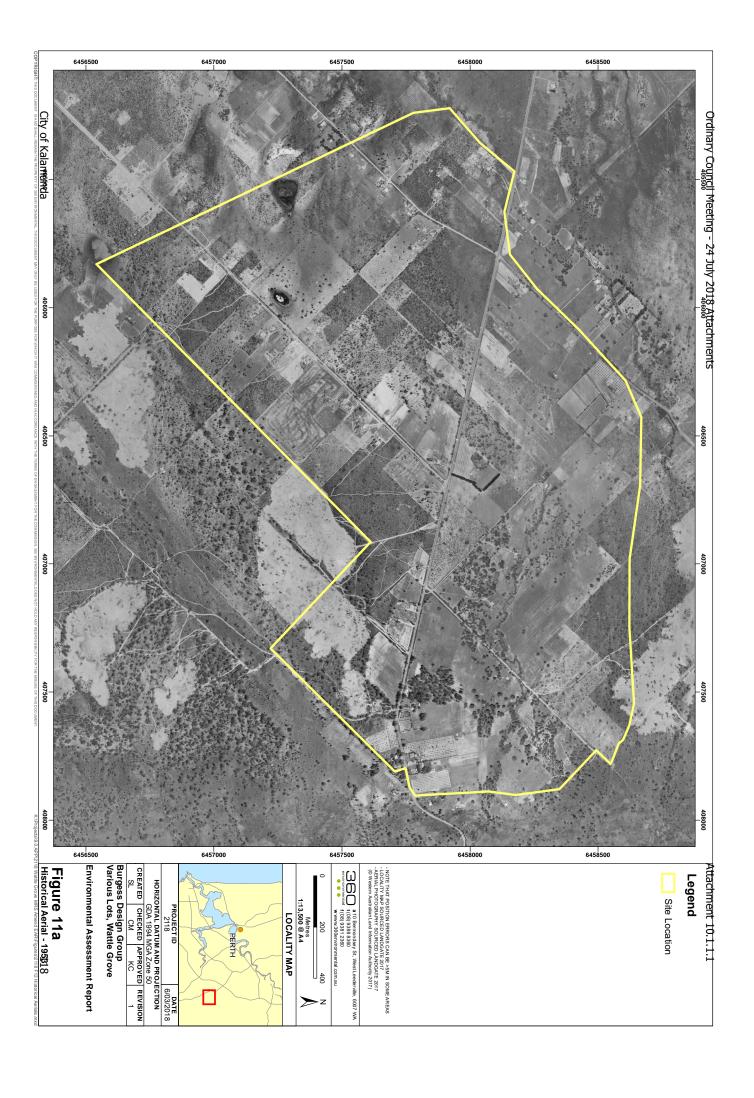


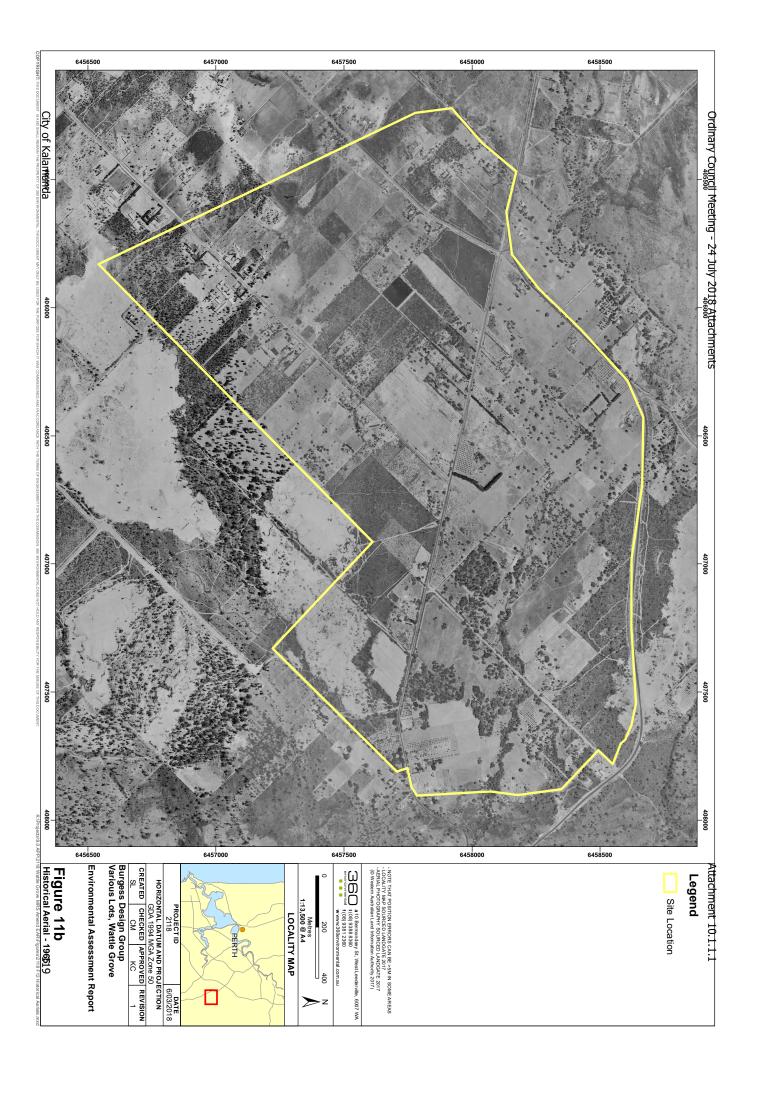


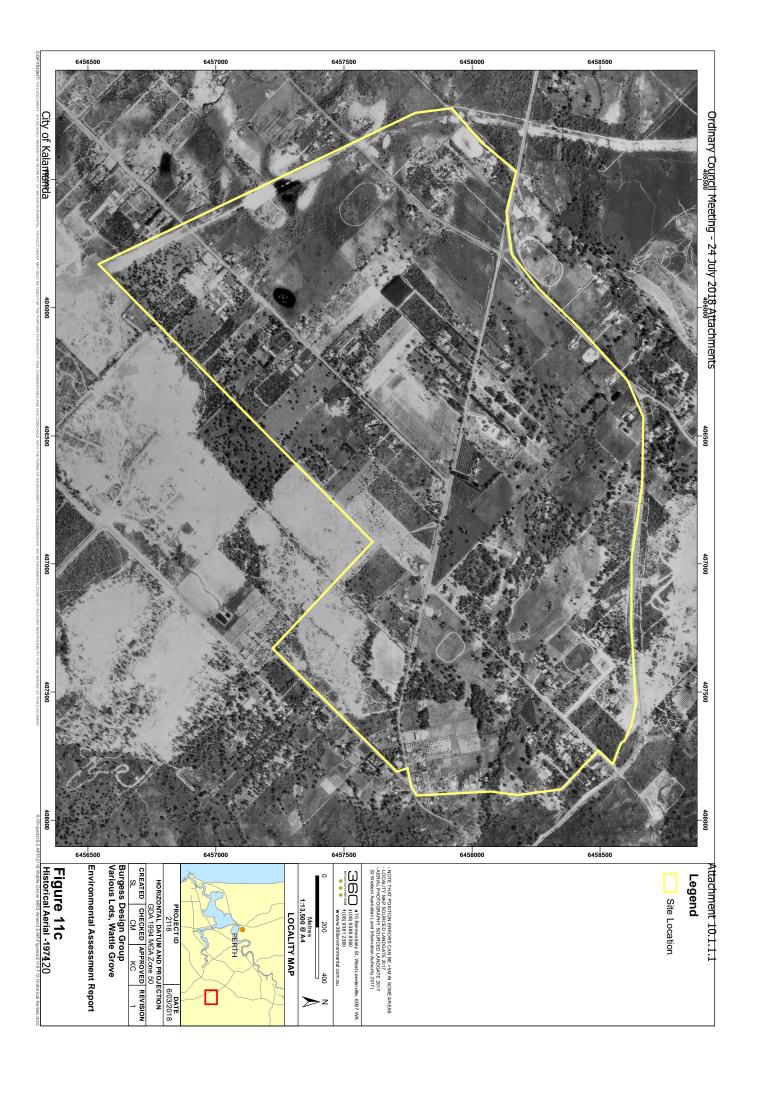


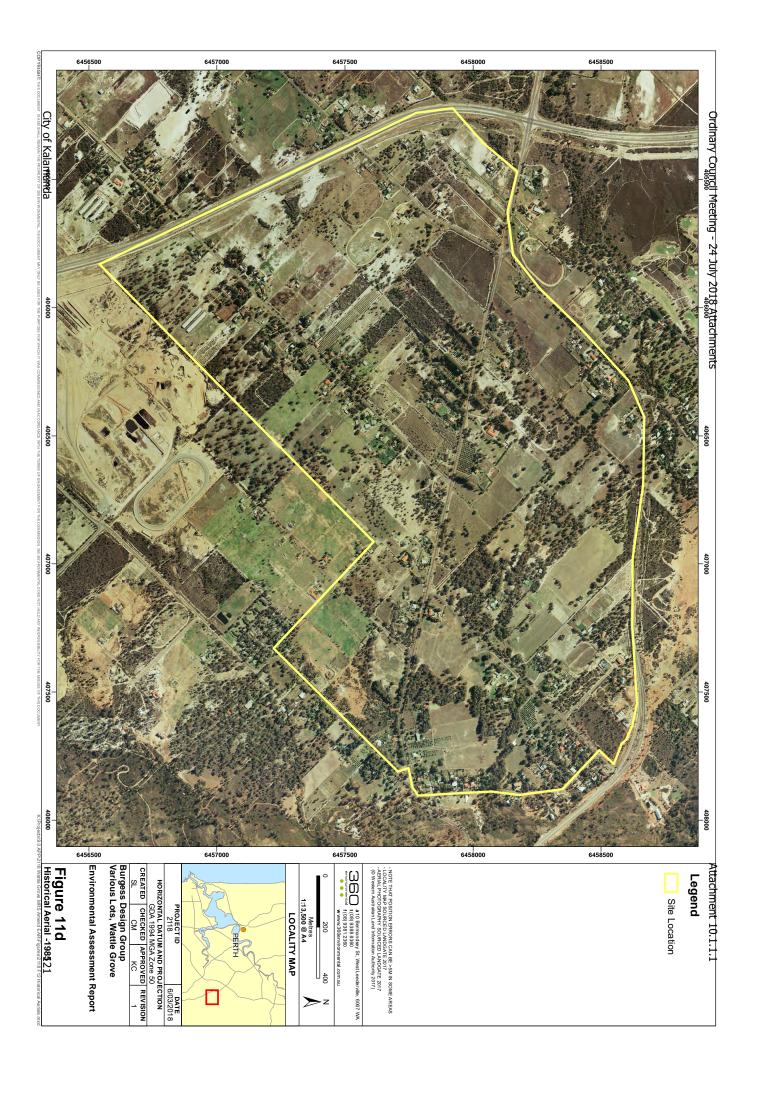


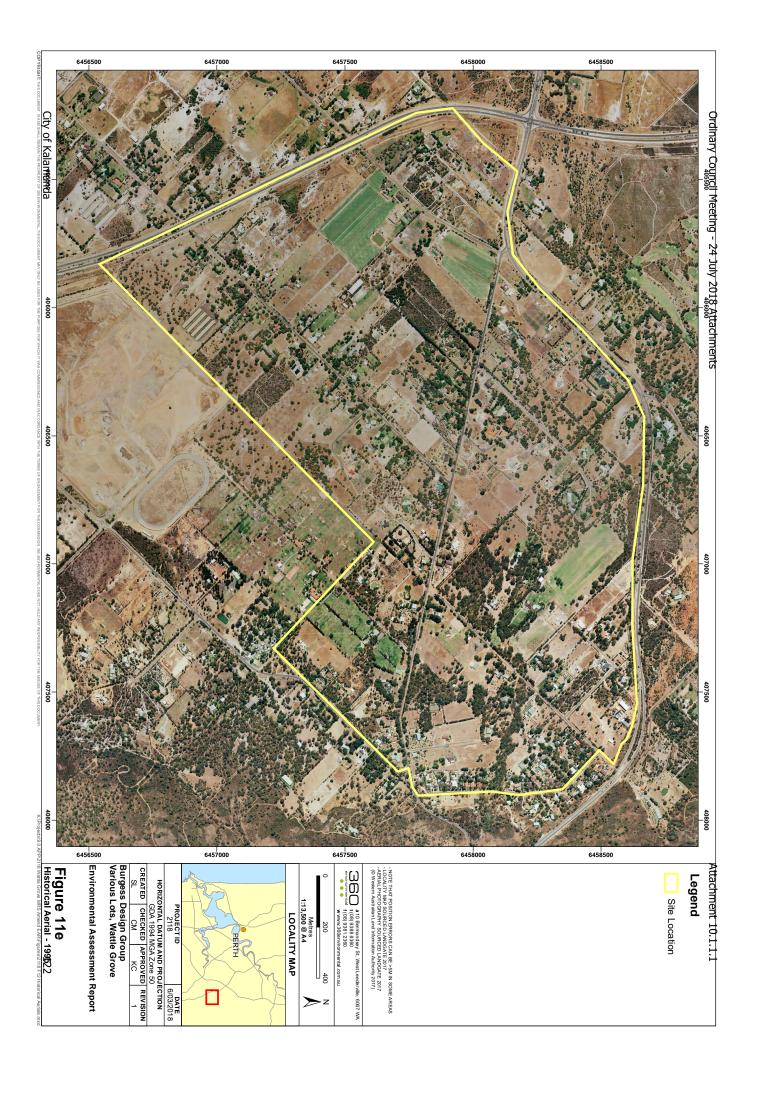


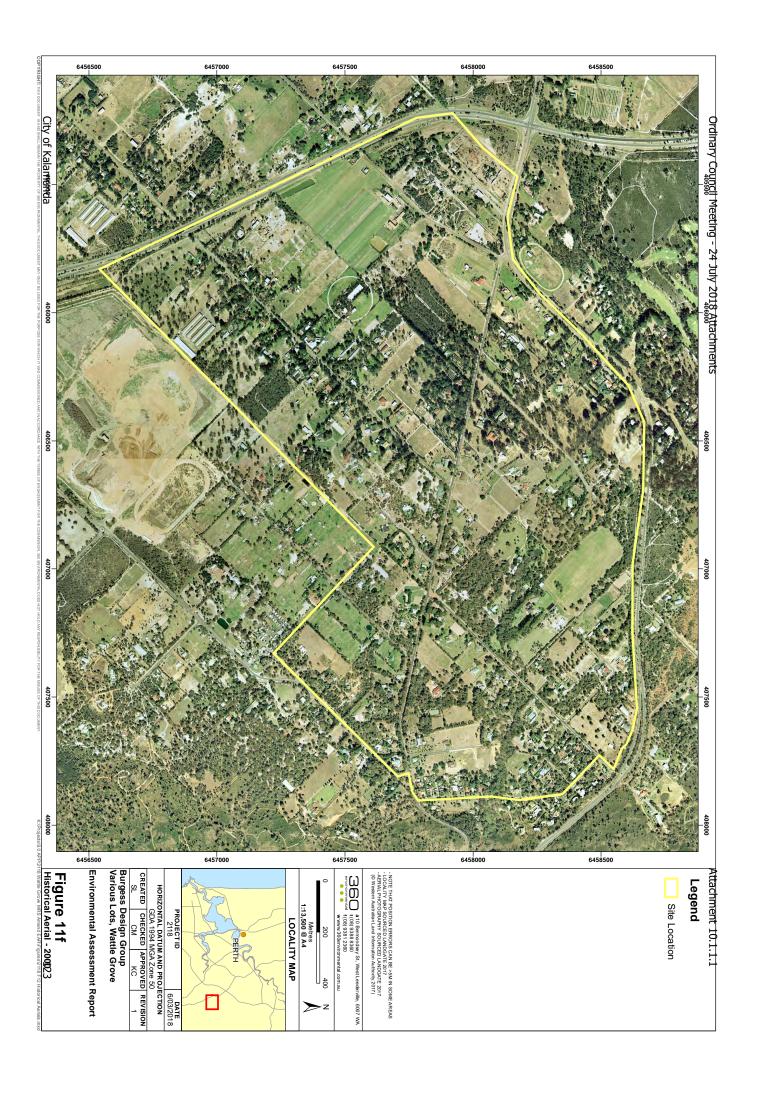


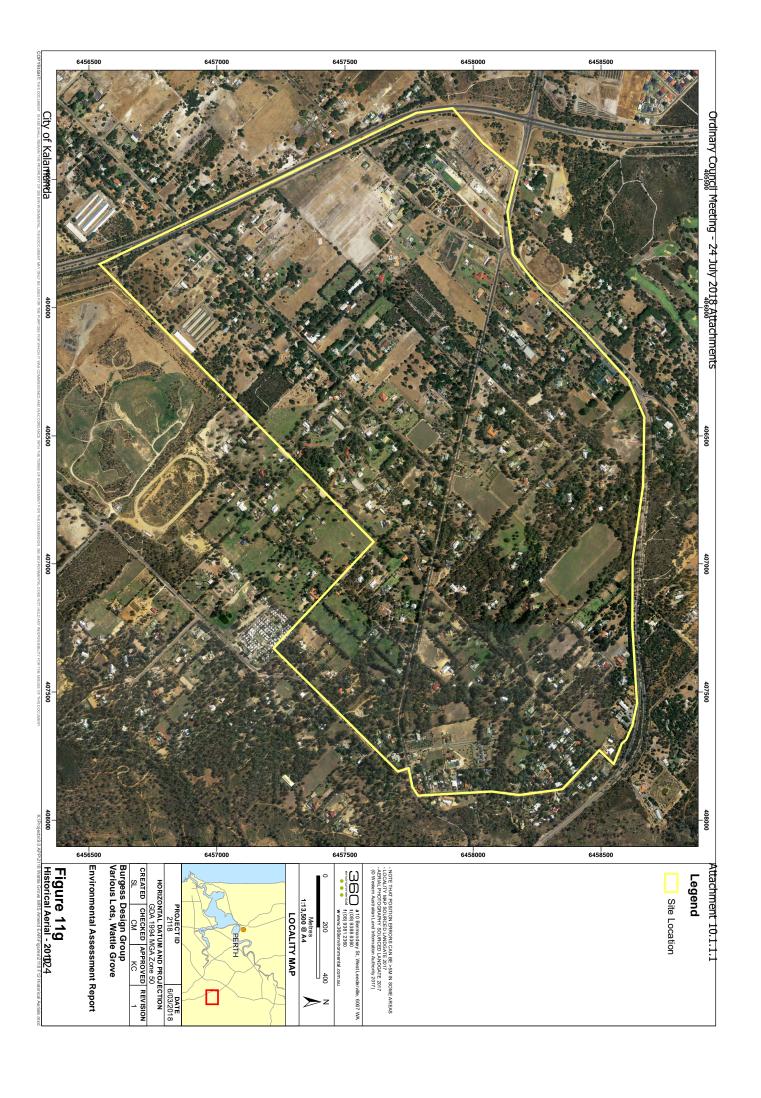


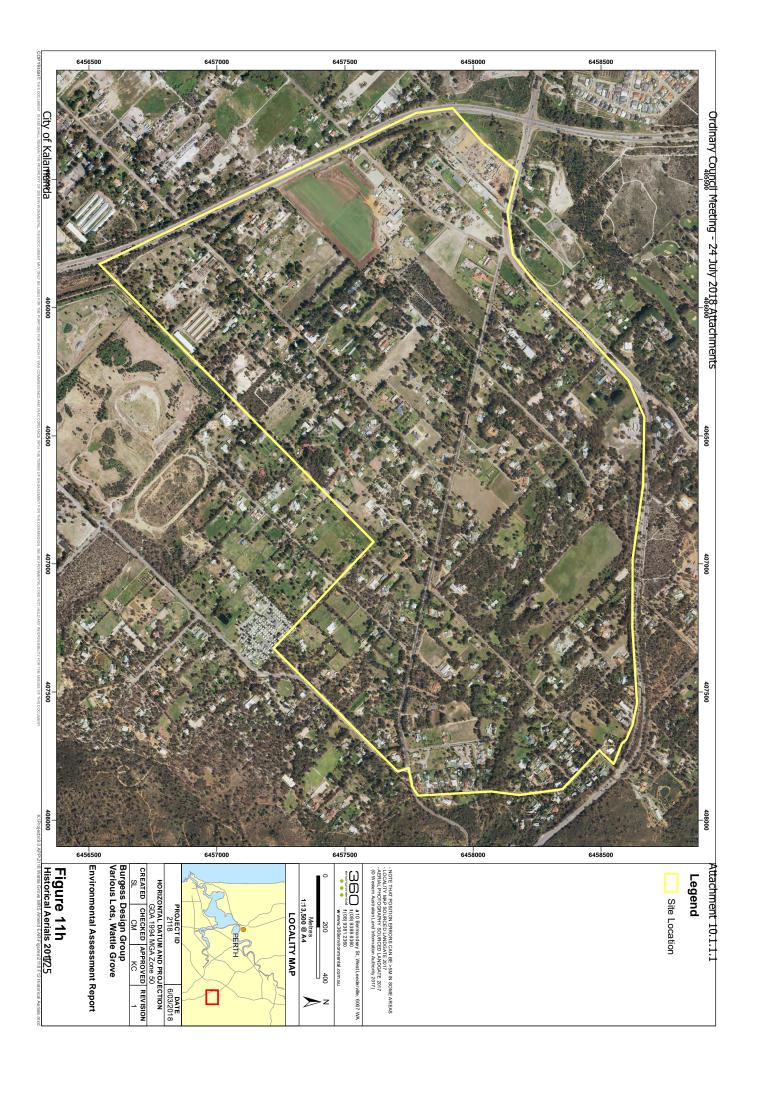


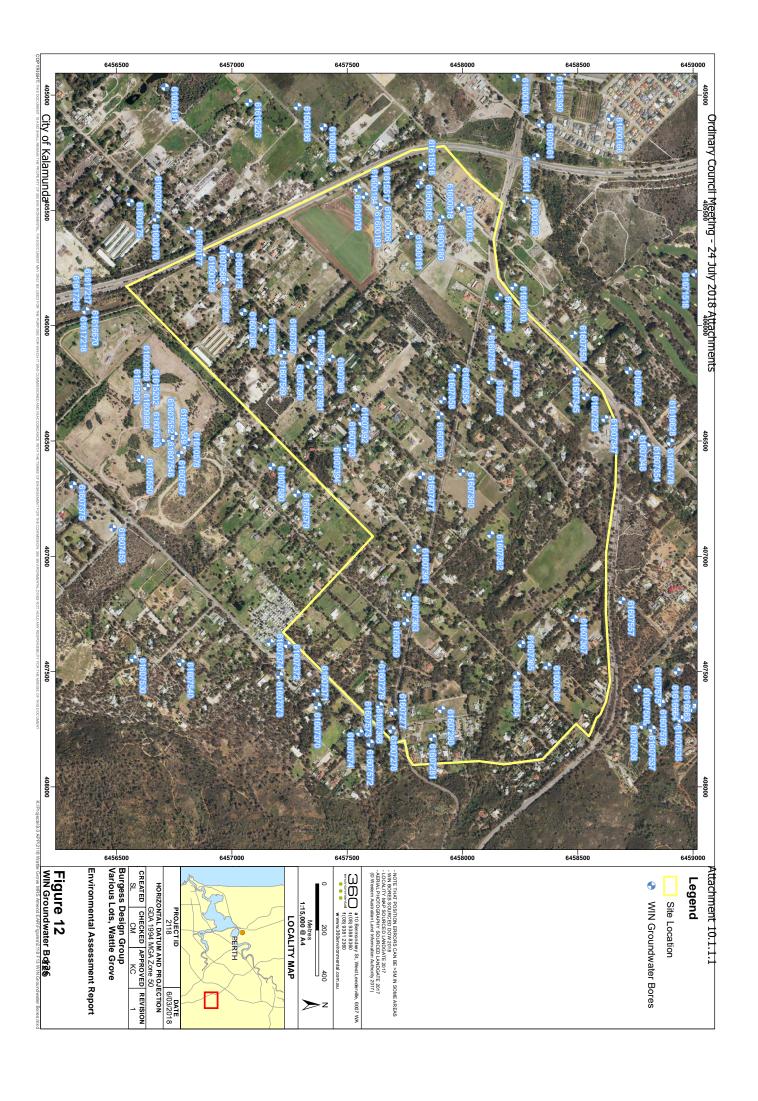


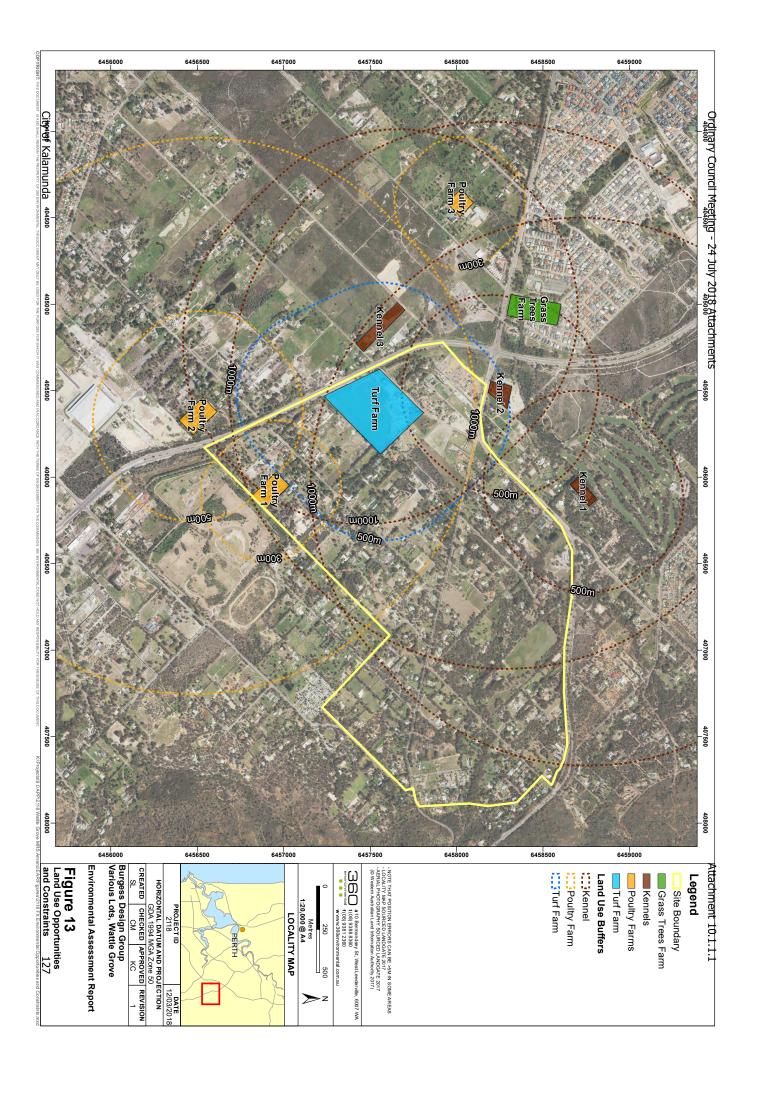


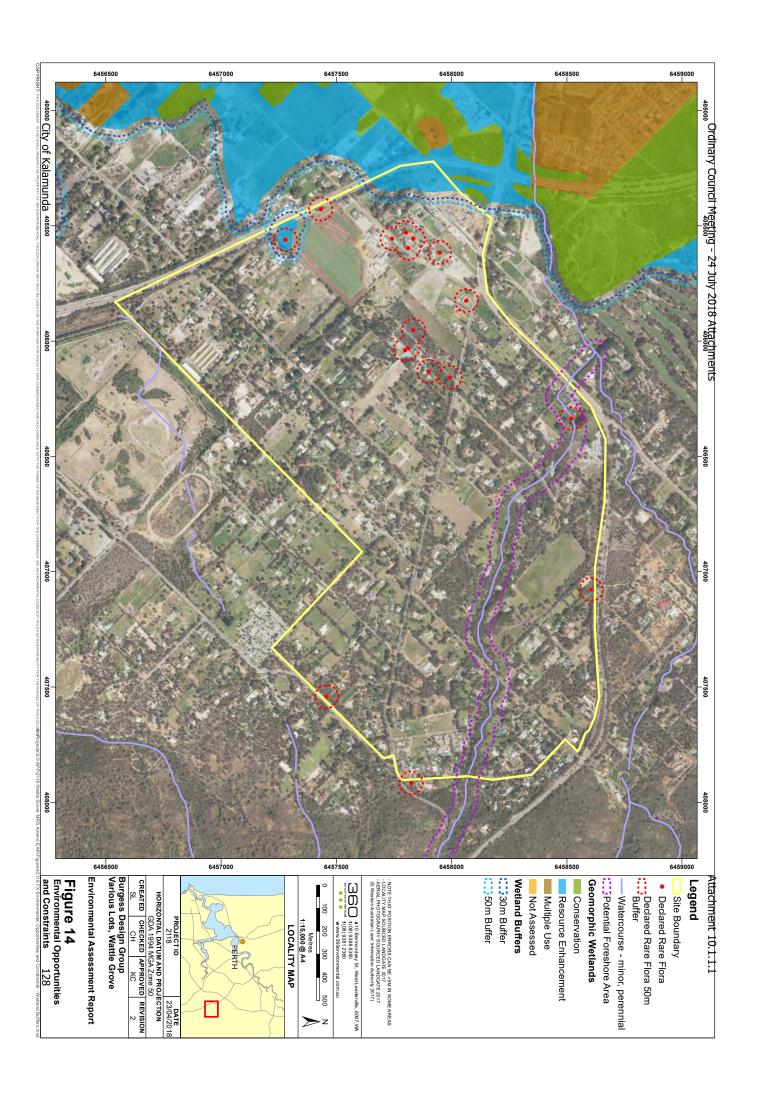












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APPENDIX A

EPBC Protected Matters Report



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 25/10/17 19:14:08

Summary

Details

Matters of NES

Other Matters Protected by the EPBC Act

Extra Information

Caveat

Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	38
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A <u>permit</u> may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	7
Regional Forest Agreements:	1
Invasive Species:	43
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

[Resource Information]

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

Listed Threatened Ecological Communities		[Resource information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain	Endangered	Community likely to occur
ecological community Clay Pans of the Swan Coastal Plain	Critically Endangered	within area Community likely to occur within area
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		•
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii		
Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris		
Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat
Additional antico on pe [77007]	Lindangered	may occur within area
Insects		
Leioproctus douglasiellus		
a short-tongued bee [66756]	Critically Endangered	Species or species habitat known to occur within area
Mammals		

Nam@rdinary Council Meeting - 24 July 2018 Attachments	Status	Type of Pagasance.1.1.1
Bettongia penicillata		
Brush-tailed Bettong, Woylie [213]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
<u>Pseudocheirus occidentalis</u> Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat may occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Acacia anomala		
Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat known to occur within area
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat known to occur within area
Anthocercis gracilis Slender Tailflower [11103]	Vulnerable	Species or species habitat likely to occur within area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat known to occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [88881]	Endangered	Species or species habitat may occur within area
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat likely to occur within area
Darwinia apiculata Scarp Darwinia [8763]	Endangered	Species or species habitat likely to occur within area
<u>Diuris drummondii</u> Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
<u>Diuris purdiei</u> Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area
<u>Drakaea elastica</u> Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
City of Kalamunda		133

Nam@rdinary Council Meeting - 24 July 2018 Attachments	Status	Type of Presence.1.1.1
Eleocharis keigheryi	Giaius	Type of Fateronic Education 1.1.1.1
Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus x balanites		
Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area
Grevillea curviloba subsp. incurva		
Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area
Lasiopetalum pterocarpum		
Wing-fruited Lasiopetalum [64922]	Endangered	Species or species habitat may occur within area
<u>Lepidosperma rostratum</u>		
Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi		
Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Ptilotus pyramidatus		
Pyramid Mulla-mulla [18216]	Critically Endangered	Species or species habitat known to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696)		
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat known to occur within area
Synaphea stenoloba		
Dwellingup Synaphea [66311]	Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum		
Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata		
Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the	ne EPBC Act - Threatened	
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		Chooice or angeles habit-t
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		Oncolon on annual and a late of
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea	Oritically France of	Oncolon on an arise to the training
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name rdinary Council Meeting - 24 July 2018 Attachments	Threatened	Type of Pages and Co. 1.1.1
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

N	а	m	e

Commonwealth Land -

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on t	he EPBC Act - Threatened	Species list.
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat

City of Kalamunda 135

may occur within

Name rdinary Council Meeting - 24 July 2018 Attachments	Threatened	Type of Presence.1.1.1
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Kenwick Wetlands	WA
Korung	WA
Lesmurdie Falls	WA
Unnamed WA23076	WA
Unnamed WA24657	WA
Unnamed WA29815	WA
Unnamed WA37997	WA
Regional Forest Agreements	[Resource Information]
Note that all areas with completed RFAs have been included.	
Name	State
South West WA RFA	Western Australia
Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat
City of Kalamunda		likely to occur

Name rdinary Council Meeting - 24 July 2018 Attachments	Status Type of Page Reg 2.1.1.1
Training Council Recting 21 July 2010 Attachments	within area
Columba livia	
Rock Pigeon, Rock Dove, Domestic Pigeon [803]	Species or species habitat likely to occur within area
Passer domesticus	
House Sparrow [405]	Species or species habitat likely to occur within area
Passer montanus	
Eurasian Tree Sparrow [406]	Species or species habitat likely to occur within area
Streptopelia chinensis	
Spotted Turtle-Dove [780]	Species or species habitat likely to occur within area
Streptopelia senegalensis	
Laughing Turtle-dove, Laughing Dove [781]	Species or species habitat likely to occur within area
Sturnus vulgaris	
Common Starling [389]	Species or species habitat likely to occur within area
Turdus merula	
Common Blackbird, Eurasian Blackbird [596]	Species or species habitat likely to occur within area
Mammals	
Bos taurus	
Domestic Cattle [16]	Species or species habitat likely to occur within area
Canis lupus familiaris	
Domestic Dog [82654]	Species or species habitat likely to occur within area
Capra hircus	
Goat [2]	Species or species habitat likely to occur within area
Felis catus	
Cat, House Cat, Domestic Cat [19]	Species or species habitat likely to occur within area
Feral deer	
Feral deer species in Australia [85733]	Species or species habitat likely to occur within area
Funambulus pennantii	
Northern Palm Squirrel, Five-striped Palm Squirrel [129]	Species or species habitat likely to occur within area
Mus musculus	
House Mouse [120]	Species or species habitat likely to occur within area
Oryctolagus cuniculus	
Rabbit, European Rabbit [128]	Species or species habitat likely to occur within area
Rattus norvegicus	
Brown Rat, Norway Rat [83]	Species or species habitat likely to occur within area
Rattus rattus	
Black Rat, Ship Rat [84]	Species or species habitat likely to occur within area
Sus scrofa	
Pig [6]	Species or species habitat
City of Kalamunda	likely to occur

Name rdinary Council Meeting - 24 July 2018 Attachments	Status	Type of Priesence.1.1.1
Vulpes vulpes		within area
Red Fox, Fox [18]		Species or species habitat
		likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine,		Species or species habitat
Anredera, Gulf Madeiravine, Heartleaf Madeiravine),	likely to occur within area
Potato Vine [2643] Asparagus asparagoides		
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist	S	Species or species habitat
Smilax, Smilax Asparagus [22473]		likely to occur within area
Brachiaria mutica		
Para Grass [5879]		Species or species habitat may occur within area
		may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat
Dunci grass, black bunci grass [20210]		may occur within area
Chrysanthemoides monilifera		
Bitou Bush, Boneseed [18983]		Species or species habitat
		may occur within area
Chrysanthemoides monilifera subsp. monilifera		
Boneseed [16905]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat
, , , , , , , , , , , , , , , , , , ,		likely to occur within area
Genista linifolia		
Flax-leaved Broom, Mediterranean Broom, Flax Br	oom	Species or species habitat
[2800]		likely to occur within area
Genista monspessulana		Consider an arradical habitat
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [2012	6]	Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana		
Broom [67538]		Species or species habitat
		may occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Larg leaf Lantana, Pink Flowered Lantana, Red Flowere	,	Species or species habitat likely to occur within area
Lantana, Red-Flowered Sage, White Sage, Wild Sa		
[10892] Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat
		likely to occur within area
Olea europaea		Crasics or crasics habitat
Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata		
Radiata Pine Monterey Pine, Insignis Pine, Wilding		Species or species habitat
Pine [20780]		may occur within area
Rubus fruticosus aggregate		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Operitoria platinsky W		to ooodi Willim Grou
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead		Species or species habitat
[68483]		likely to occur within area
Salix spp. except S.babylonica, S.x calodendron &	S.x reichardtii	
Willows except Weeping Willow, Pussy Willow and		Species or species 138

Name rdinary Council Meeting - 24 July 2018 Attachments	Status	Type of Patersence.1.1.1
Sterile Pussy Willow [68497]		habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]	ı	Species or species habitat likely to occur within area
Tamarix aphylla		
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk,		Species or species habitat
Athel Tamarix, Desert Tamarisk, Flowering Cypress,		likely to occur within area
Salt Cedar [16018]		
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus		
Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]	9	Species or species habitat likely to occur within area
Nationally Important Wetlands		[Resource Information]
Name		State
Brixton Street Swamps		WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.00957 116.00676

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- -Office of Environment and Heritage, New South Wales
- -Department of Environment and Primary Industries, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment, Water and Natural Resources, South Australia
- -Department of Land and Resource Management, Northern Territory
- -Department of Environmental and Heritage Protection, Queensland
- -Department of Parks and Wildlife, Western Australia
- -Environment and Planning Directorate, ACT
- -Birdlife Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -South Australian Museum
- -Queensland Museum
- -Online Zoological Collections of Australian Museums
- -Queensland Herbarium
- -National Herbarium of NSW
- -Royal Botanic Gardens and National Herbarium of Victoria
- -Tasmanian Herbarium
- -State Herbarium of South Australia
- -Northern Territory Herbarium
- -Western Australian Herbarium
- -Australian National Herbarium, Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- Forestry Corporation, NSW
- -Geoscience Australia
- -CSIRO
- -Australian Tropical Herbarium, Cairns
- -eBird Australia
- <u>-Australian Government Australian Antarctic Data Centre</u>
- -Museum and Art Gallery of the Northern Territory
- -Australian Government National Environmental Science Program
- -Australian Institute of Marine Science
- -Reef Life Survey Australia
- -American Museum of Natural History
- -Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
- -Tasmanian Museum and Art Gallery, Hobart, Tasmania
- -Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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2118AF

Environmental Assessment Report Various Lots, Wattle Grove Burgess Design Group



APPENDIX B

DBCA Naturemap Report

Department of Parks and Wildlife

NatureMap Species Report

Created By Guest user on 26/10/2017

Current Names Only Yes Core Datasets Only Yes

Method 'By Circle'

Centre 116° 00' 26" E,32° 00' 41" S

Buffer 5km Group By Kingdom

Kingdom	Species	Records
Animalia Fungi Plantae Protozoa	395 23 1063 4	9190 45 3808 5
TOTAL	1485	13048

24341 Ardea pacifica (White-necked Heron)

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Quer Area
Animalia					
1.	24260	Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)			
2.	24261	Acanthiza chrysorrhoa (Yellow-rumped Thornbill)			
3.	24262	Acanthiza inornata (Western Thornbill)			
4.	24265	Acanthiza uropygialis (Chestnut-rumped Thornbill)			
5.	25242	Acanthophis antarcticus (Southern Death Adder)		P3	
6.	24560	Acanthorhynchus superciliosus (Western Spinebill)			
7.	25535	Accipiter cirrocephalus (Collared Sparrowhawk)			
8.	25536	Accipiter fasciatus (Brown Goshawk)			
9.	24282	Accipiter fasciatus subsp. fasciatus (Brown Goshawk)			
10.	42368	Acritoscincus trilineatus (Western Three-lined Skink)			
11.	25755	Acrocephalus australis (Australian Reed Warbler)			
12.	41323	Actitis hypoleucos (Common Sandpiper)		IA	
13.		Agraptocorixa parvipunctata			
14.		Ainudrilus nharna			
15.		Alboa worooa			
16.		Allodessus bistrigatus			
17.		Alona affinis			
18.		Alona cf. guttata			
19.		Alona rigidicaudis			
20.		Alona setigera			
21.		Alonella clathratula			
22.		Aname mainae			
23.		Aname tepperi			
24.	24312	Anas gracilis (Grey Teal)			
25.	24313	Anas platyrhynchos (Mallard)			
26.	24315	Anas rhynchotis (Australasian Shoveler)			
27.	24316	Anas superciliosa (Pacific Black Duck)			
28.		Anhinga novaehollandiae (Australasian Darter)			
29.		Anisops thienemanni			
30.		Anopheles annulipes s.l.			
31.		Anser anser			
32.	25241	Antaresia stimsoni subsp. stimsoni (Stimson's Python)			
33.		Anthochaera carunculata (Red Wattlebird)			
34.	24562	Anthochaera lunulata (Western Little Wattlebird)			
35.	24991	Aprasia repens (Sand-plain Worm-lizard)			
36.		Apsectrotanypus nr maculosa			
37.	24285	Aquila audax (Wedge-tailed Eagle)			
38.		Arachnura higginsi			
39.		Araneus cyphoxis			
40.		Araneus eburnus			
41.	41324	Ardea modesta (great egret, white egret)		IA	
42.		Ardea novaehollandiae (White-faced Heron)			

Page 1



	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
44.		Arrenurus (Micruracarus) sp. 1 (SAP)			
45.	25566	Artamus cinereus (Black-faced Woodswallow)			
46.	24353	Artamus cyanopterus (Dusky Woodswallow)			
47.		Artoria linnaei			
48.		Artoriopsis joergi			
49.		Austracantha minax			
50.		Austrolestes analis			
51.	0.404.0	Austrolestes io			
52.	24318	Aythya australis (Hardhead)			
53. 54.		Backobourkia heroine			
55.		Ballarra longipalpus Barnardius zonarius			
56.		Bennelongia sp.			
57.		Berosus approximans			
58.		Berosus australiae			
59.	24162	Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)		Т	
60.		Bezzia sp.			
61.		Bezzia sp. 2 (SAP)			
62.	24319	Biziura lobata (Musk Duck)			
63.		Boeckella bispinosa			
64.		Brachionus quadridentatus			
65.	42381	Brachyurophis semifasciatus (Southern Shovel-nosed Snake)			
66.	25713	Cacatua galerita (Sulphur-crested Cockatoo)			
67.	25714	Cacatua pastinator (Western Long-billed Corella)			
68.	25715	Cacatua roseicapilla (Galah)			
69.	25716	Cacatua sanguinea (Little Corella)			
70.	24729	Cacatua tenuirostris (Eastern Long-billed Corella)	Υ		
71.	25598	Cacomantis flabelliformis (Fan-tailed Cuckoo)			
72.		Cacomantis pallidus (Pallid Cuckoo)			
73.		Calyptorhynchus banksii (Red-tailed Black-Cockatoo)			
74.		Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)		Т	
75.	24733	Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's		Т	
70	0.470.4	Cockatoo)			
76.	24734	Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		Т	
77.	48400	Calyptorhynchus sp. (white-tailed black cockatoo)		Т	
78.	40400	Candonocypris novaezelandiae			
79.		Ceinidae sp.			
80.		Cephalodella gibba			
81.		Ceratopogonidae sp.			
82.		Cercophonius granulosus			
83.		Cercophonius sulcatus			
84.		Ceriodaphnia sp.			
85.	24186	Chalinolobus gouldii (Gould's Wattled Bat)			
86.		Chaoboridae sp.			
87.	43380	Chelodina colliei (South-western Snake-necked Turtle)			
88.	24321	Chenonetta jubata (Australian Wood Duck, Wood Duck)			
89.	33939	Cherax cainii (Marron)			
90.		Cherax destructor			
91.		Cherax quinquecarinatus			
92.		Chironominae sp.			
93.	24980	Christinus marmoratus (Marbled Gecko)			
94.		Chroicocephalus novaehollandiae			
95. 96.	24200	Chydorus sp. Circus approximans (Swamp Harrier)			
97.	24200	Coenagrionidae sp.			
98.	25675	Colluricincla harmonica (Grey Shrike-thrush)			
99.		Columba livia (Domestic Pigeon)	Υ		
100.		Coracina maxima (Ground Cuckoo-shrike)	•		
101.		Coracina novaehollandiae (Black-faced Cuckoo-shrike)			
102.		Coracina novaehollandiae subsp. subpallida (Black-faced Cuckoo-shrike)			
103.		Corixidae sp.			
104.		Cormocephalus aurantiipes			
105.		Cormocephalus rubriceps			
106.		Cormocephalus strigosus			
107.	25592	Corvus coronoides (Australian Raven)			
108.	24417	Corvus coronoides subsp. perplexus (Australian Raven)			
109.		Corynoneura sp. (V49) (SAP)			
110.		Cracticus nigrogularis (Pied Butcherbird)			
111.	25595	Cracticus tibicen (Australian Magpie)			
				(a)	





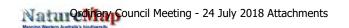


	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
112.	24422	Cracticus tibicen subsp. dorsalis (White-backed Magpie)			
113.	25596	Cracticus torquatus (Grey Butcherbird)			
114.		Cricotopus 'brevicornis'			
115.		Crinia georgiana (Quacking Frog)			
116. 117.		Crinia glauerti (Clicking Frog) Crinia insignifera (Squelching Froglet)			
117.		Crinia insigniliera (Squeicrining Proglet) Crinia pseudinsignifera (Bleating Froglet)			
119.		Cryptoblepharus buchananii			
120.	00000	Cryptochironomus griseidorsum			
121.	24883	Ctenophorus ornatus (Ornate Crevice-Dragon)			
122.	25027	Ctenotus australis			
123.	25039	Ctenotus fallens			
124.		Culex (Culex) annulirostris			
125.		Culicoides sp.			
126.	24322	Cygnus atratus (Black Swan)			
127.		Cypretta sp.			
128. 129.	20001	Cyprinotus cingalensis	Υ		
130.		Dacelo novaeguineae (Laughing Kookaburra) Daphoenositta chrysoptera (Varied Sittella)	r		
131.		Dasyurus geoffroii (Chuditch, Western Quoll)		Т	
132.		Delena cancerides		·	
133.	25766	Delma fraseri (Fraser's Legless Lizard)			
134.	24999	Delma grayii			
135.	25296	Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)			
136.		Diaphanosoma sp.			
137.	25607	Dicaeum hirundinaceum (Mistletoebird)			
138.		Dingosa serrata			
139.	0.4000	Dinocambala ingens			
140. 141.	24939	Diplodactylus polyophthalmus			
142.		Diptera sp. Dolichopodidae sp.			
143.		Dunhevedia crassa			
144.		Dytiscidae sp.			
145.	25096	Egernia kingii (King's Skink)			
146.		Egretta novaehollandiae			
147.		Elanus axillaris			
148.	47937	Elseyornis melanops (Black-fronted Dotterel)			
149.		Eolophus roseicapillus			
150.	24652	Eopsaltria georgiana (White-breasted Robin)			
151. 152.		Ephydridae sp. Eriophora biapicata			
153.	24379	Erythrogonys cinctus (Red-kneed Dotterel)			
154.		Euchlanis sp.			
155.		Eupograpta kottae			
156.		Eylais sp.			
157.	25621	Falco berigora (Brown Falcon)			
158.	25622	Falco cenchroides (Australian Kestrel, Nankeen Kestrel)			
159.		Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)			
160.		Falco longipennis (Australian Hobby)		_	
161.		Falco peregrinus (Peregrine Falcon)	V	S	
162. 163.		Felis catus (Cat) Fulica atra (Eurasian Coot)	Υ		
164.		Fulica atra subsp. australis (Eurasian Coot)			
165.		Funambulus pennanti (Indian Palm Squirrel)	Υ		
166.	34028	Galaxias occidentalis (Western Minnow)			
167.	25729	Gallinula tenebrosa (Dusky Moorhen)			
168.	24763	Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)			
169.		Gallirallus philippensis (Buff-banded Rail)			
170.	24765	Gallirallus philippensis subsp. mellori (Buff-banded Rail)			
171.	05500	Gallus gallus			
172.		Gerygone fusca (Western Gerygone)			
173. 174.	24271	Gerygone fusca subsp. fusca (Western Gerygone) Glacidorbidae sp.			Y
174.	47962	Glacidolibidae sp. Glyciphila melanops (Tawny-crowned Honeyeater)			ľ
176.	502	Glyptophysa sp			
177.	24443	Grallina cyanoleuca (Magpie-lark)			
178.		Gripopterygidae sp.			
179.	24295	Haliastur sphenurus (Whistling Kite)			
180.		Haliplus gibbus			
181.		Hebridae sp.			
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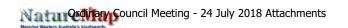
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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
182.	25409	Heleioporus barycragus (Hooting Frog)			
183.	25410	Heleioporus eyrei (Moaning Frog)			
184.		Hemianax papuensis			
185.		Hemicordulia tau			
186.		Hemicorduliidae sp.			
187.	25115	Hemiergis initialis subsp. initialis			
188.	25119	Hemiergis quadrilineata			
189.	24961	Heteronotia binoei (Bynoe's Gecko)			
190.	47965	Hieraaetus morphnoides (Little Eagle)			
191.	25734	Himantopus himantopus (Black-winged Stilt)			
192.	24491	Hirundo neoxena (Welcome Swallow)			
193.		Holasteron perth			
194.	24215	Hydromys chrysogaster (Water-rat, Rakali)		P4	
195.		Hydrophilidae sp.			
196.		Idiommata blackwalli			
197.		llyocryptus sp.			
198.		llyodromus sp.			
199.		Isidorella sp.			
200.		Isoodon obesulus (Southern Brown Bandicoot)		P4	
201.	24153	Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)		P4	
202.		Isopeda leishmanni			
203.		Isopedella cana			
204.		Lacrimicypris "drummondi" n.sp. (SAP)			
205.		Latonopsis brehmi			
206.		Latrodectus hasseltii			
207.		Leberis aenigmatosa			
208.		Leioproctus bilobatus (short-tongued bee)		P2	
209.	33983	Leioproctus douglasiellus (short-tongued bee)		Т	
210.		Leptoceridae sp.			
211.		Lerista distinguenda			
212.		Lerista elegans			
213.	25005	Lialis burtonis			
214.		Libellulidae sp.			
215.		Lichmera indistincta (Brown Honeyeater)			
216.	24582	Lichmera indistincta subsp. indistincta (Brown Honeyeater)			
217.		Limbodessus shuckhardi			
218.		Limnadia sp.			
219.		Limnochares australica			
220.		Limnophyes vestitus (V41)			
221.		Litoria adelaidensis (Slender Tree Frog)			
222.	25388	Litoria moorei (Motorbike Frog)			
223.		Longepi woodman			
224.		Lophoictinia isura			
225.		Lycidas chlorophthalmus			
226.		Lycosa leuckartii			
227.		Lynceus sp.			
228.		Macropus fuliginosus (Western Grey Kangaroo)			
229.	24133	Macropus irma (Western Brush Wallaby)		P4	
230.		Macrothrix sp.			
231.		Malacorhynchus membranaceus (Pink-eared Duck)			
232.		Malurus elegans (Red-winged Fairy-wren)			
233.		Malurus pulcherrimus (Blue-breasted Fairy-wren)			
234.		Malurus splendens (Splendid Fairy-wren)			
235.		Malurus splendens subsp. splendens (Splendid Fairy-wren)			
236.	24583	Manorina flavigula (Yellow-throated Miner)			
237.		Maraura macracantha (formerly Alona macrocantha)			
238.		Masasteron maini			
239.	25758	Megalurus gramineus (Little Grassbird)			
240.		Megaporus sp.			
241.		Melithreptus brevirostris (Brown-headed Honeyeater)			
242.		Melithreptus chloropsis (Western White-naped Honeyeater)			
243.		Menetia greyii			
244.	24598	Merops ornatus (Rainbow Bee-eater)		IA	
245.		Mesocyclops brooksi			
246.		Microcarbo melanoleucos			
247.		Microcyclops varicans			
248.		Microvelia sp.			
249.		Missulena granulosa			
250.		Missulena occatoria			
251.		Mitzoruga insularis			
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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
252.		Monohelea sp. 1 (SAP)			
253.		Monohelea sp. 2 (SAP)			
254.		Morelia spilota subsp. imbricata (Carpet Python)			
255.	24223	Mus musculus (House Mouse)	Y		
256. 257.	25/20	Myandra bicincta Myobatrachus gouldii (Turtle Frog)			
258.	25420	Nannoperca vittata			
259.	25248	Neelaps bimaculatus (Black-naped Snake)			
260.		Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)		P3	
261.		Nematoda sp.			
262.	25686	Neochmia temporalis (Red-browed Finch)	Υ		
263.	24738	Neophema elegans (Elegant Parrot)			
264.	24739	Neophema petrophila (Rock Parrot)			
265.		Nicodamus mainae			
266.		Ninox connivens (Barking Owl)			
267.	25252	Notechis scutatus (Tiger Snake)			
268.		Notiasemus glauerti			
269.	OFF64	Notonectidae sp.			
270. 271.		Nycticorax caledonicus (Rufous Night Heron) Nyctophilus geoffroyi (Lesser Long-eared Bat)			
271.	24134	Occiperipatoides gilesii			
273.	24407	Ocyphaps lophotes (Crested Pigeon)			
274.		Oligochaeta sp.			
275.		Ommatoiulus moreletii			
276.		Onychohydrus sp.			
277.		Oribatida sp.			
278.		Orthocladiinae sp.			
279.		Orthocladiinae sp. C = V44 Gymnometriocnemus (SAP)			
280.		Oxyopes gracilipes			
281.	24328	Oxyura australis (Blue-billed Duck)		P4	
282.		Pachycephala rufiventris (Rufous Whistler)			
283.	24624	Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)			
284.		Palaemonidae sp.			
285.		Paramerina levidensis			
286.	05050	Paramphisopus palustris			
287.		Parasuta gouldii Parasuta punatatua (Spottad Parasista)			
288. 289.		Pardalotus punctatus (Spotted Pardalote) Pardalotus striatus (Striated Pardalote)			
290.		Pardalotus striatus subsp. murchisoni (Striated Pardalote)			
291.		Pelecanus conspicillatus (Australian Pelican)			
292.		Petrochelidon ariel (Fairy Martin)			
293.		Petrochelidon nigricans (Tree Martin)			
294.		Petroica boodang (Scarlet Robin)			
295.		Petroica goodenovii (Red-capped Robin)			
296.	25697	Phalacrocorax carbo (Great Cormorant)			
297.	25698	Phalacrocorax melanoleucos (Little Pied Cormorant)			
298.	24667	Phalacrocorax sulcirostris (Little Black Cormorant)			
299.	25699	Phalacrocorax varius (Pied Cormorant)			
300.		Phaps chalcoptera (Common Bronzewing)			
301.	48070	Phascogale tapoatafa subsp. wambenger (South-western Brush-tailed Phascogale,		Т	
		Wambenger)		,	
302.		Phreatoicidae sp.			
303.	4007	Phryganoporus gausapatus subsp. occidentalis			Υ
304.		Phylidonyris nayoshallandina (New Halland Hanayastar)			
305. 306.	∠4596	Phylidonyris novaehollandiae (New Holland Honeyeater) Physidae sp.			
306.		Planicirclus alticarinatus			
308.		Planorbidae sp.			
309.	24841	Platalea flavipes (Yellow-billed Spoonbill)			
310.		Platalea regia (Royal Spoonbill)			
311.		Platycercus icterotis (Western Rosella)			
312.		Platycercus icterotis subsp. icterotis (Western Rosella)			
313.		Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)			
314.	24751	Platycercus zonarius subsp. zonarius (Port Lincoln Parrot)			
315.	25007	Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)			
316.		Podargus strigoides (Tawny Frogmouth)			
317.		Podargus strigoides subsp. brachypterus (Tawny Frogmouth)			
318.		Pogona minor (Dwarf Bearded Dragon)			
319.		Pogona minor subsp. minor (Dwarf Bearded Dragon)			
320.	24681	Poliocephalus poliocephalus (Hoary-headed Grebe)		_	
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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
321.		Poltys laciniosus			
322.		Polygonarea repanda			Υ
323.	25731	Porphyrio porphyrio (Purple Swamphen)			
324.	24767	Porphyrio porphyrio subsp. bellus (Purple Swamphen)			
325.	24771	Porzana tabuensis (Spotless Crake)			
326.		Procladius paludicola			
327.		Procladius sp. (normal claws)			
328.		Pseudechis australis (Mulga Snake)			
329.		Pseudemydura umbrina (Western Swamp Tortoise, Western Swamp Turtle)		T	
330.		Pseudonaja affinis subsp. affinis (Dugite)			
331. 332.		Pseudophryne guentheri (Crawling Toadlet)			
333.		Pterodroma macroptera (Great-winged Petrel) Pteropus scapulatus (Little Red Flying-fox)			
334.	24173	Purpureicephalus spurius			
335.	24245	Rattus rattus (Black Rat)	Υ		
336.		Raveniella cirrata	•		
337.		Raveniella peckorum			
338.		Rhantus suturalis			
339.	48096	Rhipidura albiscapa (Grey Fantail)			
340.	25614	Rhipidura leucophrys (Willie Wagtail)			
341.	24199	Scotorepens balstoni (Inland Broad-nosed Bat)			
342.	25534	Sericornis frontalis (White-browed Scrubwren)			
343.		Simocephalus elizabethae			
344.		Simuliidae sp.			
345.	30948	Smicrornis brevirostris (Weebill)			
346.		Spencerhydrus sp.			Υ
347.	24645	Stagonopleura oculata (Red-eared Firetail)			
348.		Steatoda grossa			
349.		Sternopriscus sp.			
350.	25655	Stipiturus malachurus (Southern Emu-wren)			
351.	0.4.400	Storena formosa			
352.		Strepera versicolor subsp. plumbea (Grey Currawong)			
353.		Streptopelia chinensis (Spotted Turtle-Dove)	Y		
354. 355.		Streptopelia senegalensis (Laughing Turtle-Dove) Strophurus spinigerus subsp. inornatus	Y		
356.		Strophurus spinigerus subsp. spinigerus			
357.	2.0.2	Supunna funerea			
358.		Tabanidae sp.			
359.	25705	Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)			
360.	24682	Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black- throated Grebe)			
361.	24331	Tadorna tadomoides (Australian Shelduck, Mountain Duck)			
362.		Tanypodinae sp.			
363.		Tanytarsus fuscithorax			
364.	24167	Tarsipes rostratus (Honey Possum, Noolbenger)			
365.		Tasmanicosa leuckartii			
366.		Testudinella patina			
367.		Threskiornis spinicollis (Straw-necked Ibis)			
368.		Tiliqua rugosa			
369.		Tiliqua rugosa subsp. aspera			
370. 371.	25207	Tiliqua rugosa subsp. rugosa Tipulidae sp.			
371.	25549	Todiramphus sanctus (Sacred Kingfisher)			
373.		Todiramphus sanctus (Jacred Virigilsher) Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)			
374.		Tribonyx ventralis (Black-tailed Native-hen)			
375.		Trichocerca similis			
376.	25723	Trichoglossus haematodus (Rainbow Lorikeet)			
377.	24755	Trichoglossus haematodus subsp. moluccanus (Rainbow Lorikeet)	Υ		
378.	24806	Tringa glareola (Wood Sandpiper)		IA	
379.	24808	Tringa nebularia (Common Greenshank, greenshank)		IA	
380.		Triplectides australis			
381.		Turbellaria sp.			
382.		Turnix varius (Painted Button-quail)			
383.		Tyto alba subsp. delicatula (Barn Owl)			
384.	24983	Underwoodisaurus milii (Barking Gecko)			
385.		Urodacus novaehollandiae			
386.	25240	Urodacus planimanus Varanus gouldii (Rungarra or Sand Monitor)			
387. 388.		Varanus gouldii (Bungarra or Sand Monitor) Varanus rosenbergi (Heath Monitor)			
389.		Varanus tristis (Racehorse Monitor)			
	20020				***************************************
				(5% 643 NA)	*****







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
390.		Venator immansueta			
391.		Venatrix arenaris			
392. 393.	24206	Venatrix pullastra Vespadelus regulus (Southern Forest Bat)			
394.		Westralunio carteri (Carter's Freshwater Mussel)		т	
395.		Zosterops lateralis (Grey-breasted White-eye, Silvereye)		'	
Fungi	45044				
396. 397.		Amanita quenda		P1 P3	
398.		Amanita wadjukiorum Amanita xanthocephala		PS	
399.	30101	Boletus sp.			
400.	38774	Cortinarius archeri			
401.		Cortinarius sublargus			Υ
402.		Dermocybe clelandii			
403.	38784	Descomyces albus			
404.	27748	Flavoparmelia rutidota			
405.		Fomitopsis lilacinogilva			
406.		Gymnopilus purpuratus			
407.		Hygrocybe astatogala			Υ
408.	38800	Labyrinthomyces varius			
409. 410.	38804	Lactarius clarkeae Lactarius eucalypti			
411.	30004	Phytophthora cinnamomi			
412.	38825	Pluteus pauperculus			
413.		Russula erumpens			
414.		Scleroderma cepa			
415.		Tubaria rufofulva			
416.	45896	Ustilago bromivora			
417.	45902	Ustilago nuda			
418.	45906	Ustilago tepperi			
Plantae					
419.	19708	Abutilon grandifolium	Υ		
420.	15429	Acacia alata var. alata			
421.	3219	Acacia anomala (Grass Wattle)		T	
422.	3220	Acacia aphylla (Leafless Rock Wattle)		Т	
423.	15466	Acacia applanata			
424.		Acacia barbinervis			
425.		Acacia dentifera			
426. 427.		Acacia drewiana subsp. drewiana		DO.	
427.		Acacia horridula Acacia huegelii		P3	
429.		Acacia incrassata			
430.		Acacia lasiocarpa (Panjang)			
431.		Acacia lasiocarpa var. lasiocarpa			
432.	3454	Acacia nervosa (Rib Wattle)			
433.	3464	Acacia obovata			
434.	14131	Acacia oncinophylla subsp. patulifolia		P4	
435.		Acacia podalyriifolia	Υ		
436.		Acacia pulchella (Prickly Moses)			
437.		Acacia pulchella var. glaberrima			
438.		Acceia pulchella var. pulchella			
439. 440.		Acacia saligna subsp. lindleyi Acacia sessilis			
440.		Acacia sessiiis Acacia stenoptera (Narrow Winged Wattle)			
442.		Acacia teretifolia			
443.		Acacia willdenowiana (Grass Wattle)			
444.		Acanthocarpus canaliculatus			
445.	7811	Acanthospermum hispidum (Starburr)	Υ		
446.	6205	Actinotus leucocephalus (Flannel Flower)			
447.	14970	Adenanthos barbiger			
448.		Adenanthos cygnorum (Common Woollybush)			
449.		Adenanthos cygnorum subsp. cygnorum (Common Woollybush)			
450.		Aeonium haworthii	Υ		
451.		Agave americana (Century Plant)	Υ		
452.		Agonis flexuosa (Peppermint, Wonil)			
453.		Agrostis gigantea (Redtop Bent)	Υ		
	23414	Agrostocrinum hirsutum			
454. 455	1261	Agrostocrinum scabrum (Blue Grass Lilv)			
454. 455. 456.		Agrostocrinum scabrum (Blue Grass Lily) Agrostocrinum scabrum subsp. scabrum			

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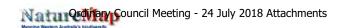




	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
457.	184	Aira caryophyllea (Silvery Hairgrass)	Υ		
458.	185	Aira cupaniana (Silvery Hairgrass)	Υ		
459.	1056	Alexgeorgea nitens			
460.		Allium ampeloprasum	Υ		
461.		Allocasuarina fraseriana (Sheoak, Kondil)			
462.		Allocasuarina humilis (Dwarf Sheoak)			
463.		Allocasuarina microstachya			
464.		Alternanthera denticulata (Lesser Joyweed)			
465.		Ambrosia artemisiifolia (Annual Ragweed, Bitterweed, Hay-feverweed, Hog-weed)	Y		
466.		Ambrosia psilostachya (Perennial Ragweed)	Y		
467.		Amphibromus nervosus			
468.		Amphipogon debilis			
469.		Amphipogon strictus (Greybeard Grass)			
470. 471.		Amphipogon turbinatus			
		Anarthria gracilis			
472. 473.		Anarthria humilis Anarthria laevis			
474.					
474.		Andersonia aristata (Rice Flower) Andersonia gracilis		Т	
475.		Andersonia involucrata		ı	
477.		Andersonia lehmanniana			
477.		Andersonia lehmanniana subsp. lehmanniana			
479.		Andersonia lerimanniana suusp. lerimanniana Angianthus preissianus			
479.		Anigozanthos bicolor (Little Kangaroo Paw)			
481.		Anigozanthos bicolor (Little Rangardo Paw) Anigozanthos bicolor subsp. bicolor			
482.		Anigozanthos humilis (Catspaw)			
483.		Anigozanthos humilis subsp. humilis			
484.		Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)			
485.		Anigozanthos manglesii subsp. manglesii			
486.		Anigozanthos viridis (Green Kangaroo Paw, Kurulbardang)			
487.		Anigozanthos viridis subsp. viridis			
488.		Anthocercis gracilis (Slender Tailflower)		Т	
489.		Anthotium junciforme			
490.		Anthoxanthum odoratum (Sweet Vernal Grass)	Υ		
491.		Aotus cordifolia			
492.		Aphelia brizula			
493.		Aphelia cyperoides			
494.		Aphelia drummondii			
495.		Aphelia sp. Albany (B.G. Briggs 596)			
496.		Aponogeton hexatepalus (Stalked Water Ribbons)		P4	
497.		Archidium rehmannii			
498.	7838	Arctotheca calendula (Cape Weed, African Marigold)	Υ		
499.	1264	Arnocrinum preissii			
500.	28288	Artemisia arborescens (Silver Wormwood)	Υ		
501.		Asphodelus fistulosus (Onion Weed)	Υ		
502.	20350	Astartea affinis (West-coast Astartea)			
503.	20283	Astartea scoparia (Common Astartea)			
504.		Asterella drummondii			
505.	6323	Astroloma ciliatum (Candle Cranberry)			
506.		Astroloma foliosum (Candle Cranberry)			
507.		Astroloma pallidum (Kick Bush)			
508.		Astroloma stomarrhena (Red Swamp Cranberry)			
509.		Austrostipa bronwenae		Т	
510.		Austrostipa campylachne			
511.	17234	Austrostipa compressa			
512.	17241	Austrostipa hemipogon			
513.	17245	Austrostipa mollis			
514.	17254	Austrostipa tenuifolia			
515.	17257	Austrostipa variabilis			
516.	231	Avellinia michelii	Υ		
517.	233	Avena barbata (Bearded Oat)	Υ		
518.	20013	Axonopus fissifolius	Υ		
519.	18279	Babiana angustifolia	Υ		
520.	36441	Babingtonia camphorosmae (Camphor Myrtle)			
521.	45403	Babingtonia pelloeae (Pelloe's Babingtonia)			
522.	45402	Babingtonia urbana (Coastal Plain Babingtonia)		P3	
322.	1382	Baeometra uniflora	Υ		
523.					
		Banksia armata var. armata			
523.	32682	Banksia armata var. armata Banksia attenuata (Slender Banksia, Piara)			







	n Code ¹ Endemic To Area
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1834 Banksia mirraniae (Firmwoord Banksia)	
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1855 Bankisa victoriae (Worldy Orange Banksia)	
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146. 747 Baumen Jubighnosa	
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595. 35816 Calothamnus quadrifidus subsp. quadrifidus	
596 5428 Calothamnus runestris (Mouse Fars)	
64.5 Galothamina raposino (inicase Early)	







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
597.	5431	Calothamnus torulosus			
598.	5437	Calytrix acutifolia			
599.	5439	Calytrix angulata (Yellow Starflower)			
600.	5441	Calytrix aurea			
601.	13653	Calytrix breviseta subsp. breviseta		T	
602.		Calytrix flavescens (Summer Starflower)			
603.		Calytrix fraseri (Pink Summer Calytrix)			
604.		Calytrix glutinosa			
605.		Calytrix variabilis			
606.		Campsis radicans	Y		
607. 608.		Campylopus bicolor var. bicolor Campylopus introflexus	Y		
609.		Cassytha aurea var. hirta	r		
610.		Cassytha flava (Dodder Laurel)			
611.		Cassytha glabella (Tangled Dodder Laurel)			
612.		Cassytha glabella forma casuarinae			
613.	2956	Cassytha pomiformis (Dodder Laurel)			
614.	2957	Cassytha racemosa (Dodder Laurel)			
615.	11242	Cassytha racemosa forma pilosa			
616.	11799	Cassytha racemosa forma racemosa			
617.	760	Caustis dioica			
618.		Centaurium erythraea (Common Centaury)	Υ		
619.	7918	Centipeda cunninghamii (Common Sneezewood, Gukwonderuk, Old Man Weed)			
620.	4404	Centralherum punctatum Centralaria aristata (Paintad Centralaria)			
621. 622.		Centrolepis aristata (Pointed Centrolepis)		P4	
623.		Centrolepis caespitosa Centrolepis drummondiana		P4	
624.		Centrolepis glabra (Smooth Centrolepis)			
625.		Centrolepis inconspicua			
626.		Centrolepis sp. Kalannie (B.J. Lepschi et al. BJL 3517)			
627.	17685	Chaetanthus aristatus			
628.	1280	Chamaescilla corymbosa (Blue Squill)			
629.	11299	Chamaescilla corymbosa var. corymbosa			
630.	19338	Chamaescilla gibsonii		P3	
631.		Chamaescilla versicolor			
632.		Chasmanthe floribunda (African Cornflag)	Y		
633.		Chairmathes austrotenuifolia			
634. 635.		Cheiranthera preissiana Chordifex sinuosus			
636.		Chorizandra enodis (Black Bristlerush)			
637.		Chorizandra multiarticulata			
638.	3753	Chorizema dicksonii (Yellow-eyed Flame Pea)			
639.	11900	Chrysanthemoides monilifera subsp. monilifera	Υ		
640.	6543	Cicendia filiformis (Slender Cicendia)	Υ		
641.	7370	Citrullus Ianatus (Pie Melon)	Υ		
642.	2929	Clematis pubescens (Common Clematis)			
643.		Colocasia esculenta var. esculenta	Υ		
644.		Comesperma calymega (Blue-spike Milkwort)			
645.		Comesperma ciliatum		DO.	
646. 647.		Comesperma griffinii Comesperma rhadinocarnum (Slander-fruited Comesperma)		P2 P2	
647. 648.		Comesperma rhadinocarpum (Slender-fruited Comesperma) Comesperma virgatum (Milkwort)		P2	
649.		Commersonia cygnorum			
650.		Conospermum acerosum subsp. acerosum			
651.		Conospermum canaliculatum			
652.		Conospermum capitatum subsp. glabratum			
653.	1875	Conospermum huegelii (Slender Smokebush)			
654.	1882	Conospermum stoechadis (Common Smokebush)			
655.		Conospermum triplinervium (Tree Smokebush)			
656.		Conospermum undulatum		Т	
657.		Conostephium minus (Pink-tipped Pearl flower)			
658.		Conostephium pendulum (Pearl Flower)			
659.		Conostephium preissii			
660.		Conostylis aculeata subsp. aculeata			
661. 662.		Conostylis aculeata subsp. preissii Conostylis androstemma (Trumpets)			
663.		Conostylis arrea (Golden Conostylis)			
664.		Conostylis caricina			
665.		Conostylis caricina subsp. caricina			
666.	1434	Conostylis festucacea			
				Departmen	







687		Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1497 Consequés terms P4	667.	11695	Conostylis festucacea subsp. festucacea			
970. 11385 Consopies processor (Army Continues)	668.	1436	Conostylis juncea			
1-11	669.	1437	Conostylis latens			
1972	670.	11388	Conostylis pauciflora subsp. euryrhipis		P4	
Fig. 1486 Convention and (White Contendency)	671.	1454	Conostylis setigera (Bristly Cottonhead)			
1674. 5507 Constituence streams and parameters (174 and 167	672.	11597	Conostylis setigera subsp. setigera			
675. 20074 Corpute categories (Armonic Companies of Armonic Companies (Armonic Companies	673.	1455	Conostylis setosa (White Cottonhead)			
678.	674.	5502	Conothamnus trinervis			
677. 1710. Cognitive calesphyla (Maria) 770. 7354. Cognitive Compositive (Mariandomon) 7 770. 7354. Cognitive Compositive (Mariandomon) 7 770. Cossiste colorise (Mariandomon) 7 770. Cossiste colorise (Mariandomon) 7 7 7 7 7 7 7 7 7	675.	20074	Conyza sumatrensis	Υ		
670. 1746 Colubia Consequibita (Patientantems) Y 670. 17701 Consiste doctories 681. 17701 Consiste doctories 681. 17701 Consiste doctories 682. 11853 Consiste doctories (Patienta Stonecopo) 682. 11853 Consiste doctories (Patienta Stonecopo) 683. 3137 Consiste doctories (Patienta Stonecopo) 684. 3142 Consiste doctories (Patienta Stonecopo) 685. 1837 Consiste doctories (Patienta Stonecopo) 686. 1837 Consiste doctories (Patienta Stonecopo) 687. 31830 Consiste doctories (Patienta Stonecopo) 688. 18470 Corporation antisofficories antisofficories 689. 18470 Corporation antisofficories antisofficories 680. 18470 Corporation antisofficories antisofficories 680. 18470 Corporation antisofficories antisofficories 681. 18470 Corporation antisofficories 682. 18570 Consiste patientino 683. 18570 Corporation antisofficories 684. 786 Corporation antisofficories 685. 786 Corporation antisofficories 686. 18780 Corporation antisofficories 687. 4860 Corporation antisofficories 688. 1880 Corporation antisofficories 689. 288 Corporation antisofficories 689. 288 Corporation antisofficories 680. 288 Corporation antisofficories 680. 288 Corporation antisofficories 680. 288 Corporation antisofficories 681. 2810 Corporation antisofficories 682. 283 Corporation antisofficories 683. 283 Corporation antisofficories 684. 2810 Corporation antisofficories 685. 7830 Corporation antisofficories 686. 2810 Corporation antisofficories 687. 4810 Corporation antisofficories 688. 2810 Corporation antisofficories 689. 2810 Corpora	676.	48259	Cortaderia selloana subsp. selloana	Υ		
879. 1838-6 Caspackia variabilis 879.	677.	17104	Corymbia calophylla (Marri)			
17701 Crassiule cicitativa Stomeorea)				Υ		
881. 3197 Orsacula colorania (Central Stormorcy)	679.	13354	Craspedia variabilis			
682. 11560 Crassular control was control of the con						
883. 3138 Orsasule decumbens (Influes Storeocop)						
884. 3142 Crassals interiors autop, rotiusta Y						
686. 1937 Crasule tempone subp. refeated						
686. 20014 Cruple Indetide subsp. Notice						
887. 3858 Cristonia biolos subupo. Nichos						
688. 13470 Cyspandra arbufflora var. arbufflora (689. 4900 Cyspandra purgens 690. 11012 Cascuta plantflora 691. 15114 Cyanicula geninale 692. 15444 Cyanicula sericua 693. 51 Cyathoda coopen 694. 766 Cyathodae arvanaicua 695. 766 Cyathodae arvanaicua 695. 767 Cyathodae arvanaicua 695. 768 Cyathodae arvanaicua 696. 17618 Cyathodae arvanaicua 697. 40661 Cycrogeno ilinare 698. 288 Cynosurus echrinantas (Rough Dogstair) 790. 783 Cyperus congresus (Pares Brita-argun) 791. 18198 Cyperus pagyrus 791. 18198 Cyperus pagyrus 792. 815 Cyperus renultura (Scaly Sedge) 793. 816 Cyperus inerultura (Scaly Sedge) 794. 17692 Cytogonifura (patocapopides 795. 7420 Dumpieru cocronai (Wedge-leaved Campiara) 796. 7422 Dumpieru alate (Wedge-leaved Campiara) 797. 7424 Dumpieru accornai (Wedge-leaved Campiara) 798. 7462 Dumpieru geoluta (Scaly Sedge) 799. 5505 Dumvinia geoluta (Scaly Campiara) 710. 5506 Dumvinia geoluta (Scaly Campiara) 711. 18193 Dumvinia geoluta (Scaly Sedge) 712. 1216 Despopen obliguitatilius 714. 6218 Dumpieru peduruculata 715. 3399 Durvinia arquitata 716. 3399 Durvinia arquitata 717. 1218 Despopen hormaticilius (Fineapope Bush) 715. 3399 Devisia arquitata 716. 3399 Devisia arquitata 717. 330 Devisia decurrans (Pickoly Bitter-pea) 718. 1817 Devisia decurrans subsp. decurrans 719. 3822 Devisia decurrans subsp. decurrans 719. 3824 Devisia industros 722. 3835 Devisia industros 723. 3835 Devisia industros 724. 3836 Devisia industros 725. 3845 Devisia industros 726. 1783 Devisia decurrans subsp. decurrans 727. 1786 Devisia decurrans subsp. decurrans 728. 1783 Devisia decurrans subsp. decurrans 729. 1828 Devisia industros 720. 1828 Devisia industros 721. 1828 Devisia industros 722. 3845 Devisia industros 723. 3845 Devisia industros 724. 3850 Devisia industros 725. 3845 Devisia industros 726. 1878 Devisia industros 7278. 1878 Devisia industros 728. 1878 Devisia industros 729. 1878 Devisia industros 730. 1878 Devisia industros 731. 32045 Delymodae ausartaliasiae 732. 3850 Devisia industros 733. 3851 Devisia industros 734. 3				Y		
689. 4400 Crystandra purspans						
690. 15114 Cyanicus planiflora Y						
681. 15114. Cyanicula germania 682. 1510. Qualtuccius acricea 683. 151. Qualtuccius acricea 684. 788. Cyathochaeta avenacea 685. 786. Cyathochaeta ciardestria 686. 17618. Cyathochaeta ciardestria 686. 17618. Cyathochaeta ciardestria 687. 40661. Cycnogon lineare 688. 283. Cyrodon desclyin (Couch) 700. 783. Cyperus congestus (Dense Flar-sedge) 701. 18198. Cyperus celinatius (Roscy) Degatati) 702. 815. Cyperus tennillus (Tray Flatsedge) 703. 816. Cyperus tennillus (Tray Flatsedge) 704. 17622. Cyperus tennillus (Tray Flatsedge) 705. 7420. Dempiera alata (Winged-stem Dempiera) 706. 7426. Dempiera alata (Winged-stem Dempiera) 707. 7464. Dempiera contai (Wedge-lewerd Dempiera) 708. 7474. Dempiera inseanti (Common Dempiera) 709. 5505. Deriveria apiculatus (Scarp Demviria) 710. 18193. Questo contait (Wedge-lewerd Dempiera) 711. 18193. Deriveria inseanti (Common Dempiera) 712. 1218. Dempiera demenia (Common Dempiera) 713. 1220. Desproprio monellolius (Pineagele Bushi) 714. 0218. Despreno normali (Medge-centered Derivinia) 715. 3799. Deviceia contata (Roschaeta) 716. 3799. Deviceia contata (Roschaeta) 717. 3799. Deviceia contata (Roschaeta) 718. 1914 Deviceia decumera (Prickly Bitter-pea) 719. 1818 Deviceia horrick (Pinckly Bitter-pea) 721. 3830. Deviceia contata (Roschaeta) 722. 3832. Deviceia informatica subsp. decumera 723. 3834. Deviceia informatica subsp. decumera 724. 3835. Deviceia informatica subsp. decumera 725. 3845. Deviceia informatica subsp. decumera 726. 1738. Deviceia contata (Roschaeta) 727. 1768 Democrate decumera (Prickly Bitter-pea) 738. 1769. Deviceia contata (Roschaeta) 739. 1818 Deviceia mondifora 730. 1818 Deviceia mondifora 731. 3345 Deviceia mondifora 732. 1878 Deviceia mondifora 733. 3345 Deviceia propono callinas 734. 316 Deptiera celoris (Summer Grass) 735. 300 Deptiera servanica (Vanicata) 736. 3179 Deptiera celoris (Summer Grass) 7375. 300 Deptiera servanica (Vanicata) 7386. 3180 Deptiera celoris (Summer Grass) 739. 3190 Deptiera celoris (Summer Grass) 730. 3110 Deptiera celoris (Summer Grass						
692. 15414 Cyanticula seriona				Y		
693. 51 Cyathoc acoper 9 9 9 9 9 9 9 9 9						
694. 768 Cyathochaela vanacae						
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734. 316 Digitaria longiflora 735. 320 Digitaria sanguinalis (Crab Grass) Y						
734. 316 Digitaria longiflora 735. 320 Digitaria sanguinalis (Crab Grass) Y			·	Υ		
	734.					
736. 1509 Dioscorea hastifolia (Warrine, Wararn)	735.	320	Digitaria sanguinalis (Crab Grass)	Υ		
	736.	1509	Dioscorea hastifolia (Warrine, Wararn)			







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
737.	18589	Diplopeltis huegelii subsp. lehmannii			
738.	3867	Dipogon lignosus (Dolichos Pea)	Υ		
739.		Disa bracteata	Υ		
740.		Ditrichum difficile			
741.		Dittrichia graveolens (Stinkwort)	Υ		
742.		Diuris brumalis			
743.		Diuris corymbosa			
744.		Diuris laxiflora (Bee Orchid)		_	
745.		Diuris purdiei (Purdie's Donkey Orchid)		Т	
746.		Dodonaea ceratocarpa Drakeaa granilia			
747. 748.		Drakaea gracilis Drosera erythrorhiza (Red Ink Sundew)			
749.		Drosera erythrorhiza subsp. collina			
750.		Drosera gigantea (Giant Sundew)			
751.		Drosera gigantea subsp. gigantea			
752.		Drosera glanduligera (Pimpernel Sundew)			
753.		Drosera helodes			
754.		Drosera heterophylla (Swamp Rainbow)			
755.		Drosera hyperostigma			
756.		Drosera macrantha (Bridal Rainbow)			
757.		Drosera macrantha subsp. macrantha			
758.		Drosera menziesii (Pink Rainbow)			
759.		Drosera menziesii subsp. menziesii			
760.	13216	Drosera menziesii subsp. penicillaris			
761.	3110	Drosera microphylla (Golden Rainbow)			
762.	3115	Drosera occidentalis (Western Sundew)			
763.	13191	Drosera occidentalis subsp. occidentalis		P4	
764.	3118	Drosera pallida (Pale Rainbow)			
765.	3123	Drosera platystigma (Black-eyed Sundew)			
766.	3125	Drosera pycnoblasta (Pearly Sundew)			
767.	8911	Drosera rosulata			
768.		Drosera stolonifera (Leafy Sundew)			
769.		Drosera zonaria (Painted Sundew)			
770.		Dysphania ambrosioides (Mexican Tea)	Υ		
771.		Ecballium elaterium (Squirting Cucumber)	Υ		
772.		Eccremidium pulchellum			
773.		Echinochloa colona (Awnless Barnyard Grass)	Y		
774.		Echinochloa crus-galli	Y		
775. 776.		Echinochloa crus-pavonis (South American Barnyard Grass) Echinochloa esculenta	Y		
770.		Eclipta prostrata	Y		
778.		Ehrharta calycina (Perennial Veldt Grass)	Y		
779.		Ehrharta longiflora (Annual Veldt Grass)	Y		
780.		Elatine gratioloides (Waterwort)	•		
781.		Eleocharis acuta (Common Spikerush)			
782.		Eleocharis keigheryi		Т	
783.		Eleusine coracan (Indian Millet)	Υ		
784.		Eleusine indica (Crowsfoot Grass)	Y		
785.		Elythranthera emarginata (Pink Enamel Orchid)			
786.		Entosthodon apophysatus			
787.		Entosthodon productus			
788.		Eragrostis cilianensis (Stinkgrass)	Υ		
789.	376	Eragrostis curvula (African Lovegrass)	Υ		
790.	379	Eragrostis elongata (Clustered Lovegrass)			
791.		Eragrostis sp.			
792.	5540	Eremaea fimbriata			
793.		Eremaea pauciflora			
794.	14103	Eremaea pauciflora var. calyptra			
795.		Eremaea pauciflora var. pauciflora			
796.		Eremophila glabra subsp. chlorella		Т	
797.		Eriochilus helonomos			
798.		Eryngium pinnatifidum (Blue Devils)			
799.		Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)		P3	
800.		Eryngium pinnatifidum subsp. pinnatifidum		B	
801.		Eryngium sp. Subdecumbens (G.J. Keighery 5390)		P3	
802.		Erythrina x sykesii	Υ		
803.		Eucalyptus camaldulensis (River Gum, Yabalinyba)			
804.		Eucalyptus marginata (Jarrah, Djara)			
205	1334/	Eucalyptus marginata subsp. marginata (Jarrah)			
805. 806.		Eucalyptus marginata subsp. thalassica (Blue-leaved Jarrah)			



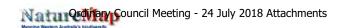




	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
807.	5763	Eucalyptus rudis (Flooded Gum, Kulurda)			
808.	5797	Eucalyptus wandoo (Wandoo, Wondu)			
809.	12906	Eucalyptus wandoo subsp. wandoo			
810.	3872	Euchilopsis linearis (Swamp Pea)			
811.	3880	Eutaxia virgata			
812.	32367	Fissidens megalotis			
813.	32368	Fissidens taylorii			
814.	32469	Fissidens taylorii var. taylorii			
815.		Fossombronia altilamellosa			
816.		Fumaria capreolata (Whiteflower Fumitory)	Υ		
817.	31532	Fumaria muralis subsp. muralis	Υ		
818.		Fumaria sp.			
819.		Funaria hygrometrica			
820.		Gahnia aristata			
821.		Gahnia trifida (Coast Saw-sedge)			
822.		Galium divaricatum	Υ		
823.	3887	Gastrolobium acutum			
824.		Gastrolobium capitatum			
825.		Gastrolobium linearifolium			
826.		Gastrolobium oxylobioides (Champion Bay Poison)			
827.		Gastrolobium spathulatum (Poison Bush)			
828.		Gazania linearis	Υ		
829.		Gemmabryum cheelii			
830.		Gemmabryum chrysoneuron			
831.		Gemmabryum inaequale			
832.		Gemmabryum pachythecum			
833.		Gemmabryum preissianum			
834.		Gemmabryum sullivanii			
835.		Genista linifolia (Flaxleaf Broom)	Υ		
836.		Gigaspermum repens			
837.		Gladiolus carneus	Υ		
838.		Gladiolus caryophyllaceus (Wild Gladiolus)	Υ		
839.		Glischrocaryon aureum (Common Popflower)			
840.		Gomphocarpus fruticosus (Narrowleaf Cottonbush)	Υ		
841.		Gomphocarpus physocarpus	Υ		
842.		Gompholobium confertum			
843.		Gompholobium knightianum			
844.		Gompholobium marginatum			
845.		Gompholobium polymorphum			
846.		Gompholobium preissii			
847.		Gompholobium shuttleworthii			
848.		Gompholobium tomentosum (Hairy Yellow Pea)			
849.		Gonocarpus cordiger			
850.		Gonocarpus nodulosus			
851.		Gonocarpus paniculatus			
852.		Gonocarpus pithyoides			
853.		Goodenia coerulea			
854.		Goodenia fasciculata			
855.		Goodenia incana (Hoary Goodenia)			
856. 957		Goodenia micrantha			
857. 858.		Goodenia pulchella Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)			
858. 859.		Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)			
		Goodenia pulcriena subsp. Coastai Plain B (L.W. Sage 2336) Gratiola pubescens			
860. 861.		Gratioia pubescens Grevillea bipinnatifida (Fuchsia Grevillea)			
		Grevillea bipinnatifida subsp. bipinnatifida			
862. 863.		Grevillea endlicheriana (Spindly Grevillea)			
864.		Grevillea manglesii subsp. manglesii			
865.		Grevillea pilulifera (Woolly-flowered Grevillea)			
866.		Grevillea preissii subsp. preissii			
867.		Grevillea quercifolia (Oak-leaf Grevillea)			
868.		Grevillea synapheae (Catkin Grevillea)			
869.		Grevillea thelemanniana (Spider Net Grevillea)			
870.		Grevillea wilsonii (Native Fuchsia)			
870. 871.		Haemodorum discolor			
872.		Haemodorum laxum			
873.		Haemodorum Ioratum		P3	
874.		Haemodorum simplex		FJ	
875.		Haemodorum sparsiflorum			
876.		Hakea amplexicaulis (Prickly Hakea)			
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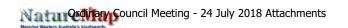




	Name ID	Species Name	Naturalised	Conservation Code	Endemic To Q Area
877.	2136	Hakea candolleana			
878.	2137	Hakea ceratophylla (Horned Leaf Hakea)			
879.	2143	Hakea conchifolia (Shell-leaved Hakea)			
880.	2152	Hakea cyclocarpa (Ramshorn)			
881.	2158	Hakea erinacea (Hedge-hog Hakea)			
882.	2166	Hakea incrassata (Marble Hakea)			
883.	2175	Hakea lissocarpha (Honey Bush)			
884.	2185	Hakea myrtoides (Myrtle Hakea)			
885.		Hakea prostrata (Harsh Hakea)			
886.		Hakea ruscifolia (Candle Hakea)			
887.		Hakea sp. Eastern coastal plain (G.J. Keighery 8014)			
888.		Hakea stenocarpa (Narrow-fruited Hakea)			
889.		Hakea sulcata (Furrowed Hakea)			
890.		Hakea trifurcata (Two-leaf Hakea)			
891.		Hakea undulata (Wavy-leaved Hakea)			
892.		Hakea varia (Variable-leaved Hakea)			
893.		Hardenbergia comptoniana (Native Wisteria)			
			Υ		
894.		Heliophila pusilla	Y		
895.		Hemiandra linearis (Speckled Snakebush)			
896.		Hemiandra pungens (Snakebush)			
897.		Hemigenia incana (Silky Hemigenia)			
898.		Hemiphora bartlingii (Woolly Dragon)			
899.		Hesperantha falcata	Υ		
900.		Hibbertia acerosa (Needle Leaved Guinea Flower)			
901.		Hibbertia aurea			
902.		Hibbertia commutata			
903.		Hibbertia glomerata subsp. darlingensis			
904.	5134	Hibbertia huegelii			
905.	5135	Hibbertia hypericoides (Yellow Buttercups)			
906.	45534	Hibbertia hypericoides subsp. hypericoides			
907.	5146	Hibbertia montana		P4	
908.	5148	Hibbertia mylnei			
909.	5152	Hibbertia ovata			
910.	5155	Hibbertia pilosa (Hairy Guinea Flower)			
911.	5162	Hibbertia racemosa (Stalked Guinea Flower)			
912.	5169	Hibbertia serrata (Serrate Leaved Guinea Flower)			
913.		Hibbertia sp.			
914.	5171	Hibbertia spicata			
915.	11481	Hibbertia spicata subsp. spicata			
916.	48381	Hibbertia striata			
917.	444	Holcus lanatus (Yorkshire Fog)	Υ		
918.	6222	Homalosciadium homalocarpum			
919.		Hordeum vulgare (Barley)	Υ		
920.		Hovea chorizemifolia (Holly-leaved Hovea)			
921.		Hovea pungens (Devil's Pins, Puyenak)			
922.		Hovea trisperma (Common Hovea)			
923.		Hovea trisperma var. trisperma			
923.		Humulus lupulus	Υ		
			ī		
925.		Hylanthus calveinus (Mild Violet)			
926.		Hybanthus calycinus (Wild Violet)			
927.		Hydrocotyle alata			
928.		Hydrocotyle callicarpa (Small Pennywort)			
929.		Hydrocotyle diantha			
930.		Hydrocotyle lemnoides (Aquatic Pennywort)		P4	
931.		Hyparrhenia hirta (Tambookie Grass)	Υ		
932.		Hypocalymma angustifolium (White Myrtle, Kudjid)			
933.		Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)			
934.		Hypocalymma robustum (Swan River Myrtle)			
935.		Hypochaeris glabra (Smooth Catsear)	Υ		
936.		Hypolaena exsulca			
937.		Hypolaena pubescens			
938.		Isolepis cernua (Nodding Club-rush)			
939.	20199	Isolepis cernua var. cernua			
940.	20200	Isolepis cernua var. setiformis			
340.	912	Isolepis cyperoides			
941.	44540	Isolepis hystrix	Υ		
	14540				
941.		Isolepis marginata (Coarse Club-rush)			
941. 942.	917	Isolepis marginata (Coarse Club-rush) Isolepis oldfieldiana			
941. 942. 943.	917 919				







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
947.	2229	Isopogon dubius (Pincushion Coneflower)			
948.	2237	Isopogon sphaerocephalus (Drumstick Isopogon)			
949.		Isotoma hypocrateriformis (Woodbridge Poison)			
950.		Isotoma pusilla (Small Isotome)			
951.		Isotropis cuneifolia (Granny Bonnets)			
952.		Isotropis cuneifolia subsp. glabra	.,	P2	
953.		Ixia paniculata	Y		
954.		Ixia polystachya (Variable Ixia)	Y		
955. 956.		Jacksonia alata Jacksonia angulata			
957.		Jacksonia floribunda (Holly Pea)			
958.		Jacksonia furcellata (Grey Stinkwood)			
959.		Jacksonia lehmannii			
960.		Jacksonia restioides			
961.	4029	Jacksonia sternbergiana (Stinkwood, Kapur)			
962.	1298	Johnsonia pubescens (Pipe Lily)			
963.	19632	Johnsonia pubescens subsp. pubescens			
964.	1177	Juncus articulatus (Jointed Rush)	Υ		
965.	1180	Juncus capitatus (Capitate Rush)	Υ		
966.	1188	Juncus pallidus (Pale Rush)			
967.	4037	Kennedia coccinea (Coral Vine)			
968.	4044	Kennedia prostrata (Scarlet Runner)			
969.		Kennedia stirlingii (Bushy Kennedia)			
970.		Kingia australis (Kingia, Pulonok)			
971.		Kunzea ericifolia (Spearwood, Pondil)			
972.		Kunzea glabrescens (Spearwood)			
973.		Kunzea micrantha			
974.		Kunzea micrantha subsp. micrantha			
975. 976.		Labichea punctata (Lance-leaved Cassia) Lachnagrostis filiformis			
970.		Lachnagrostis plebeia			
977.		Lactura serriola forma serriola	Υ		
979.		Lambertia multiflora (Many-flowered Honeysuckle)	'		
980.		Lambertia multiflora var. darlingensis			
981.		Landoltia punctata (Thin Duckweed)			
982.		Lasiopetalum bracteatum (Helena Velvet Bush)		P4	
983.		Lasiopetalum glutinosum subsp. glutinosum		P3	
984.	4047	Lathyrus tingitanus (Tangier Pea)	Υ		
985.	4959	Lawrencia squamata			
986.	1307	Laxmannia ramosa (Branching Lily)			
987.	11911	Laxmannia ramosa subsp. ramosa			
988.		Laxmannia sessiliflora subsp. australis			
989.		Laxmannia squarrosa			
990.		Lechenaultia biloba (Blue Leschenaultia)			
991.		Lemna disperma (Duckweed)			
992.		Lepidosperma angustatum			
993. 994.		Lepidosperma apricola Lepidosperma leptostachyum			
995.		Lepidosperma lepiosiacriyam Lepidosperma longitudinale (Pithy Sword-sedge)			
996.		Lepidosperma pubisquameum			
997.		Lepidosperma rostratum		Т	
998.		Lepidosperma scabrum			
999.		Lepidosperma sp.			
1000.	29150	Lepidosperma sp. Margaret River (B.J. Lepschi 1841)			
1001.	16284	Lepidosperma sp. P1 small head (M.D. Tindale 166A)			
1002.	949	Lepidosperma tuberculatum			
1003.	118	Lepilaena australis (Austral Water Mat)			
1004.	1653	Leporella fimbriata (Hare Orchid)			
1005.		Leptocarpus canus (Hoary Twine-rush)			
1006.		Leptocarpus coangustatus			
1007.		Leptocarpus decipiens			
1008.		Leptocarpus scariosus			
1009.		Leptomeria cunninghamii			
1010.		Leptospermum laevigatum (Coast Teatree)	Υ	P.O.	
1011. 1012.		Lepyrodia curvescens Lepyrodia glauca		P2	
1012.		Lepyrodia macra (Large Scale Rush)			
1013.		Lepyrodia muirii Lepyrodia muirii			
1015.		Leucopogon capitellatus			
1016.		Leucopogon conostephioides			
				(Figure 1)	************
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		Species Name	Naturalised	Conservation Code	Endemic To Que
1017.		Leucopogon glaucifolius			
1018. 1019.		Leucopogon parviflorus (Coast Beard-heath)			
1019.		Leucopogon polymorphus Leucopogon propinquus			
1020.		Leucopogon pulchellus (Beard-heath)			
1022.		Leucopogon sp. Coujinup (M.A. Burgman 1085)			
1023.		Leucopogon sprengelioides			
1024.		Leucopogon squarrosus			
1025.	40803	Leucopogon squarrosus subsp. squarrosus			
1026.	6447	Leucopogon strictus			
1027.	7676	Levenhookia pusilla (Midget Stylewort)			
1028.	7677	Levenhookia stipitata (Common Stylewort)			
1029.	4363	Linum trigynum (French Flax)	Υ		
1030.		Liparophyllum capitatum			
1031.		Lobelia rhombifolia (Tufted Lobelia)			
1032.		Lobelia rhytidosperma (Wrinkled-seeded Lobelia)			
1033.		Lolium multiflorum (Italian Ryegrass)	Y		
1034.		Lolium x hybridum	Y		
1035.		Lomandra caespitosa (Tufted Mat Rush)			
1036. 1037.		Lomandra hermaphrodita			
1037.		Lomandra integra			
1036.		Lomandra micrantha (Small-flower Mat-rush) Lomandra micrantha subsp. micrantha			
1039.		Lomandra nigricans			
1041.		Lomandra odora (Tiered Matrush)			
1042.		Lomandra preissii			
1043.		Lomandra purpurea (Purple Mat Rush)			
1044.		Lomandra sericea (Silky Mat Rush)			
1045.		Lomandra spartea			
1046.	1246	Lomandra suaveolens			
1047.	7365	Lonicera japonica (Japanese Honeysuckle)	Υ		
1048.	8564	Lotus subbiflorus	Υ		
1049.	4063	Lotus uliginosus (Greater Lotus)	Υ		
1050.	4067	Lupinus luteus (Yellow Lupin)	Υ		
1051.	1097	Lyginia barbata			
1052.		Lyginia imberbis			
1053.		Lysimachia arvensis (Pimpernel)	Y		
1054.		Lysimachia minima	Y		
1055. 1056.		Lysinema ciliatum (Curry Flower) Lysinema pentapetalum			
1050.		Lythrum hyssopifolia (Lesser Loosestrife)	Υ		
1057.		Macarthuria australis			
1059.		Macarthuria keigheryi		Т	
1060.		Macrozamia riedlei (Zamia, Djiridji)		•	
1061.		Marianthus coeruleopunctatus (Blue-spotted Marianthus)			
1062.		Medicago polymorpha (Burr Medic)	Υ		
1063.		Medicago sativa (Alfalfa)	Υ		
1064.	33638	Meionectes tenuifolia		P3	
1065.	37580	Melaleuca acutifolia			
1066.	36296	Melaleuca armillaris subsp. armillaris	Υ		
1067.	5881	Melaleuca brevifolia			
1068.	13273	Melaleuca incana subsp. incana			
1069.	5926	Melaleuca lateritia (Robin Redbreast Bush)			
1070.		Melaleuca leucadendra			
1071.		Melaleuca osullivanii			
1072.		Melaleuca parviceps			
1073.		Melaleuca radula (Graceful Honeymyrtle)			
1074.		Melaleuca rhaphiophylla (Swamp Paperbark)			
1075.		Melaleuca scabra (Rough Honeymyrtle, Wurru Bush) Melaleuca trichophylla			
		Melaleuca viminalis		P2	
1076.		Melaleuca viminea (Mohan)		۳۷	
1076. 1077.	5027	Melia azedarach (White Cedar)			
1076. 1077. 1078.					
1076. 1077. 1078. 1079.	4516	Melinis repens	Y		
1076. 1077. 1078. 1079.	4516 14985	Melinis repens Mesomelaena graciliceps	Y		
1076. 1077. 1078. 1079.	4516 14985 953	Mesomelaena graciliceps	Y		
1076. 1077. 1078. 1079. 1080. 1081. 1082.	4516 14985 953 955	Mesomelaena graciliceps Mesomelaena pseudostygia	Y		
1076. 1077. 1078. 1079. 1080.	4516 14985 953 955 957	Mesomelaena graciliceps	Y		
1076. 1077. 1078. 1079. 1080. 1081. 1082. 1083.	4516 14985 953 955 957 485	Mesomelaena graciliceps Mesomelaena pseudostygia Mesomelaena tetragona (Semaphore Sedge)	Y		







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1087.	14344	Millotia tenuifolia var. tenuifolia (Soft Millotia)			
1088.	4097	Mirbelia ramulosa			
1089.	4100	Mirbelia spinosa			
1090.		Monopsis debilis	Υ		
1091.		Monopsis debilis var. depressa	Y		
1092.		Monotaxis grandiflora (Diamond of the Desert)			
1093.		Monotaxis grandiflora var. grandiflora			
1094.		Moraea flaccida (One-leaf Cape Tulip)	Υ		
1095.		Moraea lewisiae	Y		
1096.		Moraea ochroleuca	Y		
1097.		Myriocephalus occidentalis			
1098.		Myriophyllum crispatum			
1099.		Myriophyllum echinatum	V	P3	
1100. 1101.		Narcissus tazetta subsp. italicus	Υ		
		Neurachne alopecuroidea (Foxtail Mulga Grass)	Υ		
1102. 1103.		Nothoscordum gracile	Y		
1104.		Nuytsia floribunda (Christmas Tree, Mudja)	V		
1104.		Oenothera drummondii (Beach Evening Primrose) Oenothera jamesii	Y		
1105.		Oenothera laciniata	Y		
1107.		Oenothera mollissima	Y		
1107.		Oenothera stricta subsp. stricta	Y		
1109.		Olax benthamiana	'		
11109.		Olax scalariformis			
1111.		Olearia axillaris (Coastal Daisybush)			
1112.		Olearia paucidentata (Autumn Scrub Daisy)			
1113.		Opercularia apiciflora			
1114.		Opercularia vaginata (Dog Weed)			
1115.		Opuntia stricta (Common Prickly Pear)	Υ		
1116.		Opuntia tomentosa	Y		
1117.		Ornduffia submersa		P4	
1118.		Ornithopus compressus (Yellow Serradella)	Υ	14	
1119.		Orobanche minor (Lesser Broomrape)	Y		
1120.		Orthrosanthus laxus var. laxus (Morning Iris)	·		
1121.		Ottelia ovalifolia (Swamp Lily)			
1122.		Ottelia ovalifolia subsp. ovalifolia			
1123.		Oxalis caprina	Υ		
1124.		Oxalis corniculata (Yellow Wood Sorrel)	Y		
1125.		Oxalis glabra	Y		
1126.		Oxalis perennans			
1127.		Oxalis pes-caprae (Soursob)	Υ		
1128.		Oxalis purpurea (Largeflower Wood Sorrel)	Y		
1129.		Paragonis grandiflora	·		
1130.		Parentucellia latifolia (Common Bartsia)	Y		
1131.		Parentucellia viscosa (Sticky Bartsia)	Y		
1132.		Paspalum dilatatum	Υ Υ		
1133.		Paspalum distichum (Water Couch)	Y		
1134.		Passiflora filamentosa	Y		
1135.		Patersonia babianoides			
1136.		Patersonia juncea (Rush Leaved Patersonia)			
1137.		Patersonia occidentalis (Purple Flag, Koma)			
1138.		Patersonia pygmaea (Pygmy Patersonia)			
1139.		Pauridia glabella var. glabella			
1140.		Pauridia occidentalis var. occidentalis			
1141.		Pauridia occidentalis var. quadriloba			
1142.		Pavonia hastata	Υ		
1143.	40424	Pentameris airoides subsp. airoides	Υ		
1144.		Pentameris pallida	Y		
1145.		Pentapeltis peltigera			
1146.		Pericalymma ellipticum var. ellipticum			
1147.	16478	Pericalymma ellipticum var. floridum			
1148.	13911	Persicaria decipiens			
1149.		Persoonia angustiflora			
1150.		Persoonia elliptica (Spreading Snottygobble)			
1151.		Persoonia saccata (Snottygobble)			
1152.		Petrophile biloba (Granite Petrophile)			
1153.		Petrophile juncifolia			
1154.		Petrophile linearis (Pixie Mops)			
1155.	2301	Petrophile macrostachya			
1156.	2308	Petrophile seminuda			
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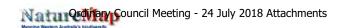




	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1157.	2312	Petrophile striata			
1158.	19825	Petrorhagia dubia	Y		
1159.		Phalaris angusta	Υ		
1160.		Phalaris minor (Lesser Canary Grass)	Y		
1161.		Phalaris paradoxa (Paradoxa Grass)	Υ		
1162.		Pheladenia deformis			
1163. 1164.		Philonotis australiensis Philotheca spicata (Pepper and Salt)			
1165.		Philydrella drummondii			
1166.		Philydrella pygmaea (Butterfly Flowers)			
1167.		Philydrella pygmaea subsp. pygmaea			
1168.	1478	Phlebocarya ciliata			
1169.	1479	Phlebocarya filifolia			
1170.	16825	Phyllangium divergens			
1171.	4675	Phyllanthus calycinus (False Boronia)			
1172.		Phyllanthus tenellus	Y		
1173.		Phylloglossum drummondii (Pigmy Clubmoss)			
1174.		Physalis peruviana (Cape Gooseberry)	Y		
1175.		Pilostyles hamiltonii			
1176.		Pilularia novae-hollandiae (Austral Pillwort)			
1177. 1178.		Pimelea angustifolia (Narrow-leaved Pimelea) Pimelea ciliata (White Raniina)			
1176.		Pimelea ciliata (White Banjine) Pimelea ciliata subsp. ciliata			
1179.		Pimelea imbricata var. major			
1181.		Pimelea imbricata var. piligera			
1182.		Pimelea rara (Summer Pimelea)		P4	
1183.		Pimelea suaveolens subsp. suaveolens			
1184.	5268	Pimelea sulphurea (Yellow Banjine)			
1185.	8163	Pithocarpa corymbulosa (Corymbose Pithocarpa)		P3	
1186.	8165	Pithocarpa pulchella (Beautiful Pithocarpa)			
1187.	18352	Pithocarpa pulchella var. melanostigma			
1188.		Plantago lanceolata (Ribwort Plantain)	Y		
1189.		Platysace filiformis			
1190.		Platysace juncea			
1191.		Platysace ramosissima		P3	
1192. 1193.		Pleuridium nervosum var. nervosum Poa annua (Winter Grass)	Υ		
1194.		Poa drummondiana (Knotted Poa)	'		
1195.		Podolepis gracilis (Slender Podolepis)			
1196.		Podolepis lessonii			
1197.		Podotheca angustifolia (Sticky Longheads)			
1198.	8183	Podotheca chrysantha (Yellow Podotheca)			
1199.	8188	Pogonolepis stricta			
1200.	8395	Polygala myrtifolia (Myrtleleaf Milkwort)	Υ		
1201.	4578	Polygala virgata	Υ		
1202.		Polygonum arenastrum (Sand Wireweed)	Υ		
1203.		Polygonum aviculare (Wireweed)	Υ		
1204.		Polypogon monspeliensis (Annual Beardgrass)	Y		
1205.		Polypogon tenellus Porosthoro microphylla (Small Porosthoro)			
1206.		Poranthera microphylla (Small Poranthera)			
1207. 1208		Portulaca oleracea (Purslane, Wakati) Prasophyllum drummondii (Swamp Leek Orchid)			
1208. 1209.		Prasophyllum fimbria (Fringed Leek Orchid) Prasophyllum fimbria (Fringed Leek Orchid)			
1209.		Prasophyllum giganteum (Bronze Leek Orchid)			
1210.		Prasophyllum gracile			
1211.		Prasophyllum parvifolium (Autumn Leek Orchid)			
1213.		Prasophyllum plumiforme			
1214.		Prunus cerasifera	Υ		
1215.	4155	Psoralea pinnata (African Scurfpea)	Υ		
1216.	13255	Pterochaeta paniculata			
1217.		Pterostylis barbata (Bird Orchid)			
1218.		Pterostylis sanguinea			
1219.		Pterostylis vittata (Banded Greenhood)			
1220.		Ptilotus declinatus (Curved Mulla Mulla)			
1221.		Ptilotus esquamatus			
1222.		Ptilotus manglesii (Pom Poms, Mulamula)		-	
1223.		Pultones originals		Т	Υ
1224.		Pultenaea ericifolia Purorchis nigricans (Pad heaks, Elephants ears)			
1225.		Pyrorchis nigricans (Red beaks, Elephants ears) Quinetia urvillei			
1226.	XIUA				







	raine ID	Species Name	Naturalised Cor	nservation Code	Area
1227.	13312	Rhodanthe pyrethrum			
1228.		Riccia multifida			
1229.		Rinzia crassifolia (Darling Range Rinzia)			
1230.	17020	Robinia pseudoacacia	Υ		
1231.	14485	Romulea flava var. minor	Υ		
1232.	1556	Romulea rosea (Guildford Grass)	Υ		
1233.	11151	Rostraria pumila	Υ		
1234.	44608	Rosulabryum billarderii			
1235.	20506	Rubus anglocandicans	Υ		
1236.	2432	Rumex conglomeratus (Clustered Dock)	Υ		
1237.	40431	Rytidosperma acerosum			
1238.	40425	Rytidosperma caespitosum			
1239.	79	Salvinia molesta (Salvinia)	Υ		
1240.	6483	Samolus junceus			
1241.	2356	Santalum acuminatum (Quandong, Warnga)			
1242.	7368	Scabiosa atropurpurea (Purple Pincushion)	Υ		
1243.		Scaevola calliptera			
1244.		Scaevola glandulifera (Viscid Hand-flower)			
1245.		Scaevola lanceolata (Long-leaved Scaevola)			
1246.		Scaevola pilosa (Hairy Fan-flower)			
1240.		Scaevola platyphylla (Broad-leaved Fanflower)			
1247.		Scaevola piatypriyila (Broad-leaved Farinower) Scaevola repens var. repens			
1249.		Schoopplana iunga			
1250.		Schoenolaena juncea			
1251.		Schoenus andrewsii		D-	
1252.		Schoenus benthamii		P3	
1253.		Schoenus bifidus			
1254.		Schoenus brevisetis			
1255.		Schoenus caespititius			
1256.	980	Schoenus capillifolius		P3	
1257.	984	Schoenus curvifolius			
1258.	985	Schoenus discifer			
1259.	986	Schoenus efoliatus			
1260.	987	Schoenus elegans			
1261.	991	Schoenus grammatophyllus			
1262.	994	Schoenus humilis			
1263.	996	Schoenus laevigatus			
1264.	998	Schoenus latitans			
1265.	999	Schoenus Ioliaceus		P2	
1266.	1002	Schoenus nanus (Tiny Bog Rush)			
1267.		Schoenus natans (Floating Bog-rush)		P4	
1268.		Schoenus odontocarpus			
1269.		Schoenus pedicellatus			
1270.		Schoenus pennisetis		P3	
1270.				Po	
		Schoenus pleiostemoneus			
1272.		Schoenus plumosus			
1273.		Schoenus rigens			
1274.		Schoenus sculptus (Gimlet Bog-rush)			
1275.		Schoenus sp. Beaufort (G.J. Keighery 6291)		P1	
1276.		Schoenus sp. Waroona (G.J. Keighery 12235)		P3	
1277.		Schoenus subbulbosus			
1278.		Schoenus subfascicularis			
1279.	1019	Schoenus subflavus (Yellow Bog-rush)			
1280.	1026	Schoenus unispiculatus			
1281.	17409	Schoenus variicellae			
1282.	6033	Scholtzia involucrata (Spiked Scholtzia)			
1283.	6	Selaginella gracillima (Tiny Clubmoss)			
1284.	32433	Sematophyllum homomallum			
1285.		Senecio diaschides			
1286.		Senecio leucoglossus		P4	
1287.		Senecio multicaulis subsp. multicaulis			
1288.		Setaria palmifolia (Palm Grass)	Y		
1289.		Setaria parviflora	Y		
1290.		Silene gallica (French Catchfly)	Y		
1290.		Siloxerus humifusus (Procumbent Siloxerus)	ı		
1291.		Siloxerus nutriflorus			
1404.			V		
1202		Sonchus oleraceus (Common Sowthistle)	Y		
		Sorghum halepense (Johnson Grass)	Υ		
1294.		Consider a levitle of (Domite T. 1)			
1293. 1294. 1295. 1296.	1312	Sowerbaea laxiflora (Purple Tassels) Sparaxis bulbifera	Υ		

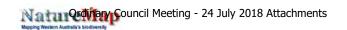
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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1297.	4205	Sphaerolobium linophyllum			
1298.	4206	Sphaerolobium macranthum			
1299.	4207	Sphaerolobium medium			
1300.		Sporobolus virginicus (Marine Couch)			
1301.		Stachystemon vermicularis			
1302.		Stackhousia monogyna			
1303.		Stackhousia pubescens (Downy Stackhousia)			
1304.		Stenanthemum humile			
1305. 1306.		Stenopetalum gracile Stirlingia latifolia (Blueboy)			
1307.		Stirlingia simplex			
1308.		Stylidium aceratum		P3	
1309.		Stylidium affine (Queen Triggerplant)			
1310.		Stylidium amoenum (Lovely Triggerplant)			
1311.	30278	Stylidium androsaceum			
1312.	25831	Stylidium araeophyllum (Stilt Walker)			
1313.	7692	Stylidium breviscapum (Boomerang Triggerplant)			
1314.	7693	Stylidium brunonianum (Pink Fountain Triggerplant)			
1315.		Stylidium bulbiferum (Circus Triggerplant)			
1316.		Stylidium calcaratum (Book Triggerplant)			
1317.		Stylidium caricifolium (Milkmaids)			
1318.		Stylidium ciliatum (Golden Triggerplant)			
1319.		Stylidium despectum (Dwarf Triggerplant)			
1320. 1321.		Stylidium dichotomum (Pins-and-needles)			
1321.		Stylidium diuroides (Donkey Triggerplant) Stylidium divaricatum (Daddy-long-legs)			
1323.		Stylidium emarginatum (Biddy-four-legs)			
1324.		Stylidium eriopodum			
1325.		Stylidium guttatum (Dotted Triggerplant)			
1326.		Stylidium hispidum (White Butterfly Triggerplant)			
1327.	7742	Stylidium inundatum (Hundreds and Thousands)			
1328.	7745	Stylidium junceum (Reed Triggerplant)			
1329.	7756	Stylidium longitubum (Jumping Jacks)		P4	
1330.	7768	Stylidium obtusatum (Pinafore Triggerplant)			
1331.	7771	Stylidium periscelianthum (Pantaloon Triggerplant)		P3	
1332.		Stylidium perpusillum (Tiny Triggerplant)			
1333.		Stylidium petiolare (Horn Triggerplant)			
1334.		Stylidium piliferum (Common Butterfly Triggerplant)			
1335.		Stylidium pulchellum (Thumbelina Triggerplant)			
1336. 1337.		Stylidium pycnostachyum (Downy Triggerplant) Stylidium recurvum			
1338.		Stylidium repens (Matted Triggerplant)			
1339.		Stylidium roseoalatum (Pink-wing Triggerplant)			
1340.		Stylidium scariosum			
1341.		Stylidium schoenoides (Cow Kicks)			
1342.	7803	Stylidium striatum (Fan-leaved Triggerplant)		P4	
1343.	45594	Stylidium tenue subsp. majusculum (Showy Fountain Triggerplant)			
1344.	23511	Stylidium thesioides (Delicate Triggerplant)			
1345.	7806	Stylidium utricularioides (Pink Fan Triggerplant)			
1346.		Stylidium xanthellum			
1347.		Stypandra glauca (Blind Grass)			
1348.		Styphelia filifolia		P3	
1349. 1350.		Styphelia tenuiflora (Common Pinheath) Synaphea acutiloba (Granite Synaphea)			
1351.		Synaphea gracillima			
1352.		Synaphea getiolaris (Synaphea)			
1353.		Synaphea petiolaris subsp. petiolaris			
1354.		Synaphea pinnata (Helena Synaphea)			
1355.		Synaphea sp. Fairbridge Farm (D. Papenfus 696)		Т	
1356.	2329	Synaphea spinulosa			
1357.	15532	Synaphea spinulosa subsp. spinulosa			
1358.		Syntrichia pagorum			
1359.		Taxandria linearifolia			
1360.		Templetonia drummondii			
1361.		Templetonia retusa (Cockies Tongues)			
1362.		Tetrapterum cylindricum Tetrapia capillaria (Hair Sadra)			
1363. 1364.		Tetraria capillaris (Hair Sedge) Tetraria octandra			
1365.		Tetrarrhena laevis (Forest Ricegrass)			
1366.		Tetratheca hirsuta (Black Eyed Susan)			
		,		(Carellana)	***************************************
				Departmen	t of







	Name ID	Species Name	Naturalised (Conservation Code	Endemic To Q Area
1367.	48342	Tetratheca hirsuta subsp. hirsuta			
1368.	4537	Tetratheca nuda			
1369.	4544	Tetratheca setigera			
1370.	1701	Thelymitra antennifera (Vanilla Orchid)			
1371.	10856	Thelymitra benthamiana (Leopard Orchid)			
1372.	1705	Thelymitra crinita (Blue Lady Orchid)			
1373.	1707	Thelymitra flexuosa (Twisted Sun Orchid)			
1374.		Thelymitra macrophylla			
1375.		Thelymitra magnifica (Crystal Brook Star Orchid)		P1	
1376.		Thelymitra spiralis (Curlylocks)			
1377.		Thelymitra stellata (Star Orchid)		т	
1378.		Thelymitra villosa (Custard Orchid)			
1379.		Thelymitra vulgaris			
1380.		Themeda triandra			
1381.		Thomasia foliosa			
1382.		Thomasia grandiflora (Large Flowered Thomasia)			
1383.		Thomasia macrocarpa (Large Fruited Thomasia)			
1384.		Thysanotus anceps		P3	
1385.		Thysanotus arbuscula		10	
1386.		Thysanotus arenarius			
1387.		Thysanotus dichotomus (Branching Fringe Lily)			
1388.		Thysanotus manglesianus (Fringed Lily) Thysanotus manglesianus (Fringed Lily)			
1389.					
1389.		Thysanotus multiflorus (Many-flowered Fringe Lily) Thysanotus natersonii			
1390.		Thysanotus patersonii Thysanotus sp. Coastal plain (N.H. Brittan 66/63)			
1391.		Thysanotus sp. Coastal plain (N.H. Brittan 66/63)			
		Thysanotus sparteus			
1393.		Thysanotus tenellus			
1394.		Thysanotus thyrsoideus			
1395.		Thysanotus triandrus			
1396.	8248	Tolpis barbata (Yellow Hawkweed)	Y		
1397.		Tortula recurvata			
1398.		Trachymene pilosa (Native Parsnip)			
1399.		Tremulina tremula			
1400.		Tribolium uniolae	Y		
1401.		Tribonanthes australis			
1402.		Tribonanthes brachypetala			
1403.		Tribonanthes longipetala			
1404.		Tribonanthes violacea			
1405.		Tribulus terrestris (Caltrop)	Y		
1406.		Trichocline spathulata (Native Gerbera)			
1407.		Tricoryne elatior (Yellow Autumn Lily)			
1408.		Tricoryne humilis			
1409.		Tricoryne tenella			
1410.		Tricostularia exsul			
1411.	17145	Trifolium angustifolium var. angustifolium	Υ		
1412.	4291	Trifolium arvense (Hare's Foot Clover)	Υ		
1413.	17542	Trifolium arvense var. arvense	Υ		
1414.	4292	Trifolium campestre (Hop Clover)	Y		
1415.	4295	Trifolium dubium (Suckling Clover)	Y		
1416.	4298	Trifolium hirtum (Rose Clover)	Y		
417.	17788	Trifolium pratense var. sativum	Υ		
418.	15509	Trifolium tomentosum var. tomentosum	Υ		
1419.	33676	Triglochin calcitrapa			
1420.	146	Triglochin minutissima			
1421.	147	Triglochin mucronata			
1422.	148	Triglochin muelleri			
1423.	18587	Triglochin nana			
424.	150	Triglochin stowardii			
425.	151	Triglochin striata			
1426.	4737	Tripterococcus brunonis (Winged Stackhousia)			
427.	1139	Trithuria bibracteata			
428.	1141	Trithuria submersa			
1429.	38401	Tritonia gladiolaris (Lined Tritonia)	Υ		
1430.		Trymalium ledifolium var. rosmarinifolium			
1431.		Trymalium odoratissimum subsp. odoratissimum			
1432.		Ursinia anthemoides (Ursinia)	Y		
1433.		Ursinia anthemoides subsp. anthemoides	Y		
1434.		Utricularia inaequalis			
		Utricularia multifida			
435.					

NatureMap is a collaborative project of the Department of Parks and Wildlife and the Western Australian Museum.







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1437.	17868	Vallisneria nana			
1438.	7665	Velleia trinervis			
1439.	8257	Vellereophyton dealbatum (White Cudweed)	Υ		
1440.	6070	Verticordia acerosa			
1441.	15431	Verticordia acerosa var. acerosa			
1442.	12388	Verticordia acerosa var. preissii			
1443.	6076	Verticordia densiflora (Compacted Featherflower)			
1444.	15432	Verticordia densiflora var. densiflora			
1445.	6088	Verticordia huegelii (Variegated Featherflower)			
1446.	15433	Verticordia huegelii var. huegelii			
1447.	15434	Verticordia insignis subsp. insignis			
1448.	14714	Verticordia lindleyi subsp. lindleyi		P4	
1449.	6107	Verticordia pennigera			
1450.	6110	Verticordia plumosa (Plumed Featherflower)			
1451.	12449	Verticordia plumosa var. brachyphylla			
1452.	15618	Verticordia plumosa var. plumosa			
1453.	4322	Vicia sativa (Common Vetch)	Υ		
1454.	12070	Vicia sativa subsp. sativa	Υ		
1455.	4325	Viminaria juncea (Swishbush, Koweda)			
1456.	6575	Vinca major (Blue Periwinkle)	Υ		
1457.	17042	Vitis vinifera	Υ		
1458.	722	Vulpia bromoides (Squirrel Tail Fescue)	Υ		
1459.	11018	Vulpia muralis	Υ		
1460.	724	Vulpia myuros (Rat's Tail Fescue)	Υ		
1461.	7384	Wahlenbergia capensis (Cape Bluebell)	Υ		
1462.	7389	Wahlenbergia preissii			
1463.	13103	Watsonia borbonica	Υ		
1464.	1566	Watsonia marginata	Υ		
1465.	18108	Watsonia meriana var. bulbillifera	Υ		
1466.	18118	Watsonia meriana var. meriana	Υ		
1467.	1569	Watsonia versfeldii	Υ		
1468.	32456	Weissia rutilans			
1469.	12072	Wurmbea dioica subsp. alba			
1470.	1401	Wurmbea pygmaea			
1471.	1249	Xanthorrhoea acanthostachya			
1472.	1251	Xanthorrhoea brunonis			
1473.	14544	Xanthorrhoea brunonis subsp. brunonis			
1474.	1252	Xanthorrhoea drummondii			
1475.	1253	Xanthorrhoea gracilis (Graceful Grass Tree, Mimidi)			
1476.	1256	Xanthorrhoea preissii (Grass tree, Palga)			
1477.	6283	Xanthosia atkinsoniana			
1478.	6284	Xanthosia candida			
1479.	6289	Xanthosia huegelii			
1480.	44861	Xerochrysum macranthum			
1481.	2331	Xylomelum occidentale (Woody Pear, Djandin)			
Protozoa					
1482.	38969	Arcyria minuta			
1483.	38976	Badhamia foliicola			
1484.	39030	Enerthenema papillatum			
1485.	39097	Trichia decipiens			

City of Kalamunda

Department of Parks and Wildlife



Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
S - Other specially protected fauna
S - Other specially protected fauna
1 - Protection
2 - Priority
3 - Priority
4 - Priority
5 - Priority
5 - Priority
5 - Priority
5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

2118AB

Environmental Assessment Report Various Lots, Wattle Grove Burgess Design Group



APPENDIX C

WIN Groundwater Bores

City of Kalamunda 165

Ordinary Council Meeting - 24 July 2018 Attachments

gess De	Lots, Wa	ssessm	At
rgess Design Group	s Lots, Wattle Grove	\ssessment Report	Attachment 10.1.1.
		envisonmental .	

WIN BORE ID	OWNER	CURRENT PURPOSE	STATUS	DRILL DATE	DRILL DEPTH (M BELOW GROUND LEVEL)
61600006	No Current Owner	-	Unknown	01-01-1900 - Unknown	9.14
61600018	No Current Owner	1	Unknown	01-01-1900 - Unknown	9.75
61600163	No Current Owner	1	Unknown	01-01-1900 - Unknown	3.35
61600178	No Current Owner		Unknown	01-01-1900 - Unknown	2.74
61600179	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	4.57
61600180	No Current Owner		Unknown	01-01-1900 - Unknown	5.18
61600181	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	4.88
61600182	No Current Owner	Livestock; Garden Irrigation	Unknown	30-06-1958 - Known year	8.23
61600183	No Current Owner	Garden Irrigation; Livestock	Unknown	01-01-1900 - Unknown	24.38
61600184	No Current Owner	•	Unknown	01-01-1900 - Unknown	2.74
61601079	No Current Owner	Irrigation	Unknown	19-06-1998 - Known day	63.00
61607277	No Current Owner		Unknown	01-01-1900 - Unknown	10.67
61607278	No Current Owner		Unknown	30-06-1950 - Known year	31.09
61607279	No Current Owner	Domestic/Household	Unknown	30-06-1955 - Known year	34.14
61607280	No Current Owner	•	Unknown	30-06-1962 - Known year	40.23
61607281	No Current Owner	•	Unknown	30-06-1962 - Known year	31.09
61607344	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	8.84
61607345	No Current Owner	•	Unknown	01-01-1900 - Unknown	11.58
61607347	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	8.53
61607355	No Current Owner	•	Unknown	01-01-1900 - Unknown	12.50
61607356	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	13.72
61607357	No Current Owner		Unknown	01-01-1900 - Unknown	6.10
61607358	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	11.58
61607359	No Current Owner		Unknown	30-06-1961 - Known year	27.13

Ordinary Council Meeting - 24 July 2018 Attachments

Attachment 10.1.1.1.360
Environmental Assessment Report
Various Lots, Wattle Grove

Burgess	Various Lots,
Design	Wattle
Group	Grove

			7	7 - - - - - -	DRILL DEPTH
VYEV DOTE	(2 2 2 2 2	CORRENT TORTOGE	OIAICO	CHIEF CAIR	(M BELOW GROUND LEVEL)
61607360	No Current Owner	•	Unknown	30-06-1961 - Known year	22.25
61607361	No Current Owner	Domestic/Household; Garden Irrigation	Unknown	01-01-1900 - Unknown	25.91
61607362	No Current Owner	Domestic/Household; Garden Irrigation	Unknown	01-01-1900 - Unknown	
61607363	No Current Owner	Livestock; Garden Irrigation	Unknown	30-06-1962 - Known year	33.83
61607364	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	36.58
61607365	No Current Owner	Garden Irrigation	Unknown	30-06-1962 - Known year	34.75
61607366	No Current Owner	Orchard	Unknown	30-06-1958 - Known year	33.53
61607367	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	36.58
61607385	No Current Owner		Unknown	01-01-1900 - Unknown	3.05
61607386	No Current Owner		Unknown	30-06-1970 - Known year	30.48
61607387	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	7.92
61607388	No Current Owner	Garden Irrigation	Unknown	30-06-1962 - Known year	13.41
61607389	No Current Owner	Orchard	Unknown	30-06-1971 - Known year	22.86
61607390	No Current Owner	Garden Irrigation	Unknown	30-06-1950 - Known year	6.10
61607391	No Current Owner	Garden Irrigation; Livestock	Unknown	01-01-1900 - Unknown	
61607392	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	
61607393	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	15.24
61607394	No Current Owner	-	Unknown	30-06-1962 - Known year	28.04
61607477	No Current Owner		Unknown	15-12-1977 - Known day	30.48
61607522	No Current Owner	Irrigation	Unknown	15-02-1978 - Known day	21.03
61607523	No Current Owner		Unknown	30-01-1979 - Known day	25.00
61607559	No Current Owner	-	Unknown	04-05-1989 - Known day	26.00
61607568	No Current Owner	Garden Irrigation	Unknown	01-01-1900 - Unknown	6.00
61607569	No Current Owner	Garden Irrigation	Unknown	30-06-1990 - Known year	24.38

Ordinary Council Meeting - 24 July 2018 Attachments



		C I BBENT D I BBOOK	SHATIS	DBII - D>15	DRILL DEPTH
	(Connent Fondos	3	ר בייני בייני בייני	(M BELOW GROUND LEVEL)
61615517	No Current Owner	•	Unknown	08-11-1991 - Known day	
61615518	No Current Owner	-	Unknown	08-11-1991 - Known day	
61671956	No Current Owner	•	Unknown	Unknown	



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o people o planet o professional

City of Kalamunda



Appendix B AECOM (2020) Wattle Grove South Ecological Surveys Report.

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Wattle Grove South Ecological Surveys



Wattle Grove South Ecological Surveys

Client: City of Kalamunda

ABN: 60 741 095 678

Prepared by

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28-Feb-2020

Job No.: 60611889

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Quality Information

Document Wattle Grove South Ecological Surveys

Ref 60527304

Date 28-Feb-2020

Prepared by Floora de Wit & Jared Leigh

Reviewed by Linda Kirchner

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Rev	Revision Date	Details	Author	ised
Kev	Revision Date	Details	Name/Position	Signature
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1	21-Feb-2020	Final Submission (additional Client comments)	Linda Kirchner Associate Director - Environment	
2	28-Feb-2020	Final Submission	Linda Kirchner Associate Director - Environment	Dil

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Executive Summary

AECOM Australia Pty Ltd (AECOM) was engaged by City of Kalamunda (the City) to conduct ecological assessments for the Wattle Grove South Project. The ecological assessments included a detailed flora and vegetation assessment, a level 1 fauna assessment and a Black Cockatoo assessment.

The desktop assessment was completed to identify the flora, fauna and communities of conservation significance that may occur in the Wattle Grove South area. The results identified 14 communities, 51 flora species and 26 fauna species of conservation significance that may occur in the survey area. The high number of communities and flora species reflects the unique landforms of the eastern Swan Coastal Plain including claypan wetlands, gravel substrates and influences from the Darling Scarp.

Field surveys commenced following stakeholder consultation (led by the City) to obtain permission to access private properties. Properties where access was granted were defined as the survey area within the Wattle Grove South area. The field surveys were conducted across six days and included all roadside/public access areas and 94 private properties. Most properties supported a mix of native and planted trees and landscaped gardens. These properties were represented by observation points and black cockatoo breeding and foraging assessments. Areas of native vegetation were traversed on foot and subject to detailed surveys including flora quadrats, targeted flora surveys, fauna habitat surveys and black cockatoo assessments.

Key outcomes of the ecological surveys are presented below:

- Banksia Woodlands of the Swan Coastal Plain (Environment Protection and Biodiversity
 Conservation Act 1999 [EPBC Act] Endangered) was mapped in three patches extending across
 2.41 ha within the survey area.
- Three WA Threatened Ecological Communities (TECs) and one WA Priority Ecological
 Community (PEC) were identified across 4.55 ha, including WA TEC *B. attenuata* over species
 rich dense shrublands (SCP20a); WA TEC *B. attenuata* and/or *E. marginata* woodlands of the
 Eastern SCP (SCP20b); WA TEC *Corymbia calophylla Eucalyptus marginata* woodlands on
 sandy clay soils of the southern SCP (SCP3b); and WA PEC Banksia dominated woodlands of
 the SCP.
- Conospermum undulatum (EPBC Act Vulnerable, WA Vulnerable) was recorded on two
 properties comprising 95 individuals. Isopogon drummondii (WA P3) populations were recorded
 at the same two locations comprising 160 individuals.
- Three fauna species of conservation significance were recorded including the Forest Red-tailed Black Cockatoo Calyptorhynchus banksii (EPBC Act and BC Act Vulnerable), Carnaby's Cockatoo Calyptorhynchus latirostris (EPBC Act and BC Act Endangered) and the Quenda Isoodon fusciventer (WA P4).
- A total of 730 breeding and potential breeding trees were recorded including 17 trees with one or more hollows considered suitable for breeding black cockatoos (27 hollows in total).
- Foraging habitat quality was mapped for Carnaby's Cockatoo, Baudin's Cockatoo
 Calyptorhynchus baudinii and the Forest Red-tailed Black Cockatoo. This included 41.14 ha of
 Very High and High Quality foraging habitat for Carnaby's Cockatoo and Baudin's Cockatoo, and
 33.52 ha of Very High and High Quality foraging habitat for the Forest Red-tailed Black Cockatoo.

The ecological assessments were successfully completed for the Wattle Grove South Project. Obtaining access to all private properties was a significant limitation with 94 properties accessible from approximately 262 properties. It is likely that the other properties that were not surveyed have significant environmental value.

Revision 2 – 28-Feb-2020 Prepared for – City of Kalamunda – ABN: 60 741 095 678

1.0 Introduction

1.1 Background

The Western Australian Planning Commission (WAPC) adopted the North-East Sub-Regional Planning Framework (the Framework) in March 2018. This plan identifies Wattle Grove South as Urban Expansion, with an eastern portion identified as Urban Investigation. The City of Kalamunda's (the City) 2010 Local Planning Strategy identified the whole area as an investigation area. The City is preparing Concept Plans for the area to investigate the most appropriate land use and development outcomes for the area. The Council may decide to proceed with further detailed planning in order to support the preferred development approach determined during concept planning.

In September 2017, the City appointed consultants to undertake the Wattle Grove South Feasibility Study. This study investigated the potential opportunities and constraints of Wattle Grove South, which outlined the key considerations for future planning and recommended appropriate future land uses. During this process the environmental desktop review identified a number of Threatened flora, fauna habitat and Environmentally Sensitive Areas (ESAs) within and/or adjacent to Wattle Grove South.

In order to finalise the concept plans and to support any future detailed planning, detailed information regarding the environmental values within the area is required. This will ensure that any conservation significant factors are accounted for and environmental assets are understood and managed appropriately. AECOM Australia Pty Ltd (AECOM) was engaged by the City to conduct ecological assessments for Wattle Grove South.

1.2 Location

Wattle Grove South is located within the south-eastern portion of the suburb Wattle Grove in Western Australia. It is bounded by Welshpool Road East (north), Tonkin Highway (west) and Kelvin Road, Judith Road, Fontano Road and the City's border with the City of Gosnells (east), shown in Figure 1. Wattle Grove South incorporates 340 ha of land comprising private and council land with 262 properties defined by cadastral boundaries.

1.3 Objectives

The objective of the ecological assessments was to define the environmental values within the survey area to inform Concept Plans and future detailed planning for Wattle Grove South. Specifically, the Project included:

- a desktop assessment to identify significant flora, vegetation and fauna that potentially occur in the
 area
- a detailed flora and vegetation assessment in accordance with relevant standards and technical guides, including targeted flora and vegetation community surveys
- a Level 1 fauna assessment in accordance with relevant standards and technical guides
- a targeted black cockatoo assessment.
- a Environmental Area Assessment

This technical report presents the methods, results and retention area assessment.



2.0 Existing Environment

2.1 Climate

The climate of the Perth Metropolitan Region is described as Warm Mediterranean (Mitchell et al 2002). A Mediterranean climate is characterised by warm to hot dry summers and mild to cool wet winters. The Mediterranean climate in Australia is a result of the Indian Ocean High, a high pressure cell that shifts towards the poles in summer and the equator in winter, playing a major role in the formation of the deserts of Western Australia, and the Mediterranean climate of southwest and south-central Australia. Precipitation occurs during winter months, with the possibility of some summer storms.

The closest meteorological station to the survey area with comprehensive data is Perth Airport (Station 009021), which is located 6 km northwest of the survey area. Perth Airport meteorological station is maintained by the Bureau of Meteorology (BoM) and commenced recording in 1944.

Perth Airport has experienced an average annual rainfall of 762 mm, with the majority of rainfall occurring between May and September. In the twelve months preceding the survey rainfall was below average for most months, except for June which was slightly above average (Figure 2). The months with the greatest decline (<40mm) include May, July and September with an overall reduction in annual rainfall. No significant evidence of this was noted in the field, however some orchid species and other ephemeral species may have been missing due to lower rainfall. Furthermore, an earlier start to the Spring season in 2019 may have influenced the presence of ephemeral species.

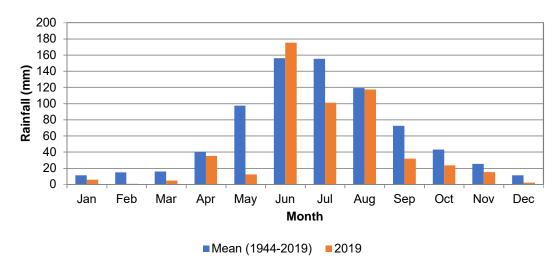


Figure 2 Rainfall Data From Perth Airport Weather Station (9021) (BOM, 2019)

2.1 IBRA Regions

The survey area is located on the Swan Coastal Plain bioregion described in CALM (2002), including Perth and the outer suburbs (excluding the Hills suburbs). The Swan Coastal Plain consists of the Dandaragan Plateau and the Perth Coastal Plain and is comprised of a narrow belt less than 30 km wide of Aeolian, alluvial and colluvial deposits of Holocene or Pleistocene age incorporating a complex series of seasonal fresh water wetlands, alluvial river flats, coastal limestone and several offshore islands. Younger sandy areas and limestone are dominated by heath and/or Tuart woodlands, while Banksia and Jarrah-Banksia woodlands are found on the older dune systems.

The Swan Coastal Plain subregion, described by Mitchell *et al.* (2002), is a low-lying coastal plain covered with woodlands dominated by *Banksia* or Tuart on sandy soils, *Casuarina obesa* on outwash plains, and paperbark in swampy areas. The area includes a complex series of seasonal wetlands and includes Rottnest, Carnac and Garden Islands. Land use is predominantly cultivation, conservation, urban and rural residential. The area contains a number of rare features including Holocene dunes and wetlands and a large number of threatened species and ecological communities.

2.2 Vegetation

There are three Beard (1981) vegetation associations mapped within the survey area comprising of Jarrah, Marri and/or Wandoo woodlands (Table 1). Of these Association 968 is below the applicable 10% threshold as set by EPA (2015).

Table 1 Pre-European vegetation associations of the survey area (Beard, 1979) and percent remaining (Govt. of WA, 2018)

Association	Description	Percent Remaining
3	Medium Jarrah and Marri forest	18.13
4	Medium woodland; Marri and Wandoo	18.89
968	Medium woodland; Jarrah, Marri and Wandoo	6.56

Heddle *et al.* (1980) completed vegetation complex mapping which used to assess the extent of pre-European vegetation. The survey area is situated on the border of three vegetation complexes, including the Forrestfield, Southern River, and Guildford complex. These complexes align with three major landforms, Foothills (Ridge Hill Shelf) in the east of the survey area, the Pinjarra Plain, and a combination of Bassendean Dunes and Pinjarra Plain. The Guildford Complex is currently below the 10% threshold. These three are described in Table 2.

Table 2 Vegetation complexes of the survey area (Heddle *et al.* 1980) and percent remaining in the Perth-Peel region (EPA, 2015)

Complex	Description	Percent Remaining
Forrestfield complex	Vegetation ranges from open forest of <i>Corymbia calophylla</i> – <i>Eucalyptus wandoo</i> – <i>E. marginata</i> to open forest of <i>E. marginata</i> – <i>C. calophylla</i> – <i>A. fraseriana</i> – <i>Banksia</i> spp. With fringing woodland of <i>E. rudis</i> in the gullies that dissect this landform	10.3
Southern River	Open woodland of Marri-Jarrah-banksia on the elevated areas and a fringing woodland of Eucalyptus rudis-Melaleuca rhaphiophylla along the streams.	16.8
Guildford complex	A mixture of open forest to tall open forest of <i>C. calophylla – E. wandoo – E. marginata</i> and woodland of <i>E. wandoo</i> (with rare occurrences of <i>E. lane-poolei</i>). Minor components include <i>E. rudis – M. rhaphiophylla</i> .	5.87

2.3 Environmentally Sensitive Areas and Conservation Estates

Environmentally Sensitive Areas (ESAs) are areas that have been identified for protection due to their environmental significance as outlined in the Western Australian Environmental Protection (Environmentally Sensitive Areas) Notice 2005, which was gazetted on 8 April 2005.

Exceptions offered for clearing under Regulation 5 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 do not apply within ESAs. ESAs are gazetted due to supporting environmental values of State or Commonwealth importance and, in this situation, include:

- Declared World Heritage properties (EPBC Act)
- areas included on the Register of the National Estate
- defined wetlands and associated buffers
- vegetation within 50 m of rare flora
- TECs.

Several ESAs occur within Wattle Grove South. One of these represents a TEC listed under the EPBC Act which is also captured in Bush Forever site 51. This bush block is located outside the survey area. The others are likely to represent locations (current and old) of Threatened flora populations and TECs. There are no Bush Forever sites within Wattle Grove South and no conservation estates within or directly adjacent to the survey area.

2.4 Wetlands

The locations of wetlands have been determined using the Geomorphic Wetlands of the Swan Coastal Plain dataset adapted from *Hill et al* (1996). The dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands of the Swan Coastal Plain.

Two unnamed resource enhancement wetlands are located within the survey area including sumpland UFI 8037 and palusplain UFI 15257. Both wetlands have been almost entirely or entirely cleared.

3.0 Legislative Framework

3.1 Overview

Table 3 summarises the key legislation governing the protection and management of Western Australia's conservation significant species and communities, which are further discussed below.

Table 3 Relevant legislation, regulations and guidance

Legislation	Purpose
Commonwealth of Australia	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides for the protection of the environment and the conservation of biodiversity.
EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species.	To assist in determining whether an action needs to be referred to the Australian Government. Also provides guidance on black cockatoo survey methodology.
EPBC Act Draft Referral Guidelines, 2017	These draft guidelines are intended to assist proponents in determining whether an action needs to be referred to the Australian Government. Definitions of habitat are provided as are criteria used to judge significant impact for these black cockatoo species.
Western Australia	
Biodiversity Conservation Act 2016 (BC Act)	Provides for the conservation and protection of Western Australia's biodiversity and biodiversity components.
Environmental Protection Act 1986 (EP Act)	Preventing, controlling and abating environmental harm and conserving, preserving, protecting, enhancing and managing the environment.
Biosecurity and Agriculture Management Act 2007 (BAM Act)	Provides for the management, control and prevention of certain plants and animals, and for the protection of agriculture and related resources generally.
EPA Technical Guidance – Terrestrial Fauna Surveys, 2016	Provides guidance on the standard of survey required to assist in collecting the appropriate data for decision-making associated with the protection of Western Australia's terrestrial fauna.
EPA Technical Guidance – flora and vegetation Surveys for Environmental Impact Assessment, 2016	Provides guidance to ensure adequate flora and vegetation data of an appropriate standard are obtained and used in EIA.

3.2 Environment Protection and Biodiversity Conservation Act 1999

3.2.1 Matters of National Environmental Significance

Matters of national environmental significance include:

- · listed threatened species and ecological communities
- migratory species protected under international agreements
- · Ramsar wetlands of international importance
- the Commonwealth marine environment
- world Heritage properties
- · national Heritage places
- Great Barrier Reef Marine Park
- a water resource, in relation to coal seam gas development and large coal mining development
- · nuclear actions.

If an action is likely to have a significant impact on a MNES this action must be referred to the Minister for the Environment for a decision on whether assessment and approval is required under the EPBC Act.

3.2.2 Flora and fauna

The EPBC Act is the main piece of Federal legislation protecting biodiversity in Australia. Species at risk of extinction are recognised at a Commonwealth level and are categorised in one of six categories as outlined in Table 4, with an additional category for other specially protected fauna.

Table 4 Categories of species listed under Schedule 179 of the EPBC Act

Code	Conservation Category
Ex	Extinct Taxa
ExW	Extinct in the Wild
CE	Critically Endangered
E	Endangered
V	Vulnerable
CD	Conservation Dependent
OS	Other specially protected fauna

3.2.3 Vegetation Communities

Communities can be classified as Threatened Ecological Communities (TECs) under the EPBC Act. The EPBC Act protects Australia's ecological communities by providing for:

- · identification and listing of ecological communities as threatened
- · development of conservation advice and recovery plans for listed ecological communities
- recognition of key threatening processes
- reduction of the impact of these processes through threat abatement plans.

Categories of federally listed TECs are described in Table 5.

Table 5 Categories of TECs that are listed under the EPBC Act

Code	Conservation Category
CE	Critically Endangered If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
E	Endangered If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
V	Vulnerable If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

3.3 Western Australian Legislation

3.3.1 Flora and Fauna

Threatened flora are plants which have been assessed as being at risk of extinction (DPaW, 2019). Under the BC Act, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection (WAH, 1998).

Plants and animals that are considered Threatened and need to be specially protected because they are under identifiable threat of extinction are listed under the BC Act. These categories are defined in Table 6.

Table 6 Conservation codes for flora and fauna listed under the Biodiversity Conservation Act 2016 (Jan 2019)

Code	Conservation Category
CR	Critically Endangered Species Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future.
EN	Endangered Species Threatened species considered to be facing a very high risk of extinction in the wild in the near future.
VU	Vulnerable Species Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future.
EX	Extinct Species Species where there is no reasonable doubt that the last member of species has died.
MI	Migratory species Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth. Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.
CD	Species of special conservation interest (conservation dependent fauna) Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
os	Other specially protected species Fauna otherwise in need of special protection to ensure their conservation.

Species that have not yet been adequately surveyed to warrant being listed under the BC Act, or are otherwise data deficient, are added to a Priority Lists under Priorities 1, 2 or 3 by the State Minister for Environment. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. Categories and definitions of Priority Flora and Fauna species are provided in Table 7.

Table 7 Conservation codes for WA flora and fauna listed by DBCA and endorsed by the Minister for Environment

Code	Conservation Category
P1	Priority One – Poorly Known Species Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2	Priority Two – Poorly Known Species Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3	Priority Three – Poorly Known Species Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4	 Priority Four – Rare, Near Threatened and other species in need of monitoring a. Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. b. Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

3.3.2 Vegetation Communities

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat and that may be subject to processes that threaten to destroy or significantly modify the assemblage across its range. TECs are listed by both state and commonwealth legislation.

Vegetation communities in Western Australia are described as TECs if they have been endorsed by the Western Australian Minister for Environment following recommendations made by the Threatened Species Scientific Committee. Categories of TECs are defined in Table 8.

Department of Biodiversity, Conservation and Attractions (DBCA) maintains a database of state listed TECs which is available for online searches via their website. Possible TECs that do not meet survey criteria or are not adequately defined are listed as Priority Ecological Communities (PECs) under Priorities 1, 2 and 3. Ecological communities that are adequately known and are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. Conservation dependent communities are classified as Priority 5. PECs are endorsed by the Minister for Environment and are described in Table 9.

DBCA requires that all Priority and Threatened ecological communities are considered during environmental impact assessments and clearing permit applications.

There is currently no formal protection afforded to TECs or PECs listed at the state level.

Table 8 Conservation codes for State listed ecological communities

Conservation Code	Category
PD	Presumed Totally Destroyed
CR	Critically Endangered
EN	Endangered
VU	Vulnerable

Table 9 Conservation categories for Priority Ecological Communities

Code	Conservation Category
P1	Priority One: poorly-known ecological communities
P2	Priority Two: poorly-known ecological communities
P3	Priority Three: poorly known ecological communities
P4	Priority Four: ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list.
P5	Priority Five: conservation dependent ecological communities

3.3.3 Biosecurity and Agriculture Management Act 2007

Biosecurity is the management of the risk of animal and plant pests and diseases entering, emerging, establishing or spreading in WA to protect the economy, environment and community. Biosecurity is managed under the BAM Act which came into effect 1 May 2013. Exotic animals and plants can become an invasive species if they can establish in new areas where local conditions are favourable for their growth. Each organism listed under the BAM Act comes with certain legal / import requirements:

- Declared Pest, Prohibited s12. Prohibited organisms are declared pests by virtue of section 22(1), and may only be imported and kept subject to permits.
- Permitted s11. Permitted organisms may be subject to an import permit if they are potential carriers of high-risk organisms.
- Declared Pest s22(2). Declared pests may be subject to an import permit if they are potential
 carriers of high-risk organisms, and may also be subject to control and keeping requirements
 once within Western Australia.
- Permitted, Requires Permit r73. Regulation 73 permitted organisms may only be imported subject to an import permit.

Declared pests can be assigned to a C1, C2 or C3 control category under the Biosecurity and Agriculture Management Regulations 2013:

- C1 Exclusion Organisms which should be excluded from part or all of Western Australia.
- C2 Eradication Organisms which should be eradicated from part or all of Western Australia.
- C3 Management Organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
- Unassigned Declared pests that are recognised as having a harmful impact under certain circumstances, where their subsequent control requirements are determined by a Plan or other legislative arrangements under the BAM Act.

3.3.4 Environmental Protection Act 1986 (and Clearing Regulations)

Section 38 (Part IV) of the EP Act provides that any person may refer a significant proposal (one that is likely to have a significant effect on the environment) to the EPA. The EP Act also states that where the environmental impact of a proposal can be adequately assessed and managed through other legislative mechanisms the proposal is unlikely to require formal environmental impact assessment.

If a proposal is not formally assessed by the EPA under Part IV of the EP Act, a Part V native Vegetation Clearing Permit may be required. Under Section 51C of the EP Act, clearing of native vegetation without a Native Vegetation Clearing Permit is an offence unless an exemption applies. Exemptions offered for clearing under Regulation 5 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* do not apply within Environmentally Sensitive Areas (ESA).

4.0 Methodology

4.1 Desktop Assessment

The desktop assessment involved gathering background information for the local area. Desktop database searches were requested from the following government databases (including a 10 km buffer from the survey area boundary):

- Department of Biodiversity Conservation and Attractions (DBCA) threatened and priority flora, fauna and communities database
- WA Herbarium (WAH) records
- Atlas of Living Australia (AoLA)
- NatureMap
- EPBC Act Protected Matters search.

All flora, fauna and communities of conservation significance identified in the desktop assessment were assessed for their likelihood of occurrence within the survey area (Table 10). Available literature was consulted to describe the existing environment and define broad vegetation types. References included Beard (1981) vegetation mapping, the Biodiversity Audit of Western Australia (CALM 2002), and Heddle *et al.* (1980) vegetation complex mapping.

Table 10 Categories of likelihood of occurrence for species and communities

Likelihood	Flora	Fauna	Communities
Likely to occur	Habitat is present in the Survey area and the species has been recorded in close proximity to the survey area.	Survey area is within the known distribution of the species, habitat is present in the survey area and the species has been recorded in close proximity to the survey area.	Known occurrences of the community in close proximity to the survey area. Vegetation looks the same within the known occurrence and Survey area based on aerial imagery. Geographic location is similar to the survey area.
May occur	Habitat may be present and/or the species has been recorded in close proximity to the survey area.	Survey area is within the known distribution of the species, marginal habitat may be present and/or the species has been recorded in close proximity to the survey area.	Known occurrence of the community in the local area, and/or vegetation looks the same within known occurrence and Survey area based on aerial imagery. Geographic location is similar to the survey area.
Unlikely to occur	No suitable habitat is present and the species has not been recorded in close proximity to the survey area.	Survey area is outside the known distribution for the species, or no suitable habitat is present and the species has not been recorded in close proximity to the survey area.	Known occurrence of the community in close proximity to the survey area however geographic location does not occur in survey area.

4.2 Flora and Vegetation Assessment

A detailed flora and vegetation survey was undertaken by Floora de Wit (collection permit FB62000137). Floora de Wit has 13 years' experience undertaking flora and vegetation assessments on the Swan Coastal Plain. Floora completed a Bachelor of Science in Environmental Biology (Environmental Restoration) and completed a Postgraduate Diploma in Environmental Management and Impact Assessment.

A field survey was undertaken on 1 to 4, 8, 18 and 21 October 2019 and included all properties where access was allowed (see Figure 3). Floristic data was collected from 12 non-permanent quadrats and 8 relevés. Quadrats were used in native vegetation in Good or better condition while degraded patches were recorded as relevés.

Quadrats were 10x10 metres (m) defined by a measuring tape. Data collected from quadrats included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment, and presence/absence of disturbance. Each Site was given a unique site number, and the following parameters recorded:

- date
- location using hand-held GPS (accuracy of 5 m)
- sample site type (quadrat/relevé and size)
- photograph (northwest corner)
- soil details (type, colour, moisture)
- landform
- vegetation condition using the Keighery (1994) scale and description of disturbance
- fire history
- comprehensive species list
- estimated height
- estimated percentage cover (for trees both percentage within quadrat and within community was recorded to enable better description of vegetation community).

Any species unable to be identified in the field were collected for identification in AECOM's in-house herbarium and the specimens and taxonomic references and keys at the Western Australian Herbarium (WAH). Naming of species followed the convention of the WAH.

4.2.1 Vegetation mapping

Vegetation communities were described and mapped based on changes in dominant species composition and landform. Quadrat data was analysed using cluster analysis to determine their floristic similarity and support vegetation community delineation. Vegetation community descriptions were based on the National Vegetation Information System (NVIS) framework (Commonwealth of Australia, 2003).

Vegetation condition was determined using the Keighery (1994) condition scale (Table 11). The scale is based on disturbance (e.g. grazing, erosion), degree of alteration to community and habitat structure and site ecology.

Table 11 Bushland condition ratings (Keighery, 1994)

Descriptor	Explanation
Pristine	Pristine or nearly so, no obvious signs of disturbance
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing
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 grazing
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 grazing
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

4.2.2 Floristic Community Type Analysis

The Keighery (2012) SCP dataset was used for the FCT analysis. The survey data was reconciled with this dataset and all species coded using the three first letters of the genus and species, reducing infra-specific names. All nomenclature of species followed the WA Plant Census.

The program PC Ord was used to undertake the Bray Curtis distance measure. The Bray Curtis dissimilarity measure was used to quantify the compositional dissimilarity between the quadrats based on presence absence data. Subtracting the results from 1 gives the similarity index, also known as the Bray Curtis index. This method is easily interpretable and provides meaningful results. A sense check was completed incorporating appropriate geology, soils, landscape and the description provided in the Gibson *et al.* (1994) reference material and Bush Forever (Government of WA, 2000).

4.2.3 Banksia Woodlands TEC Verification

All patches of native vegetation were assessed to determine the presence of the Banksia Woodlands TEC. Patches are defined as a discreet and mostly continuous area of the ecological community. All native vegetation in Good or better condition were considered for an assessment against the key diagnostic criteria for the TEC.

A preliminary review of Banksia species present was undertaken. Patches that were clearly not associated with Banksia Woodlands, e.g. had no Banksia overstorey species were excluded for further consideration. This is in line with the Approved Conservation Advice key diagnostic criteria which defines the requirement of at least one of the following Banksia species: *B. attenuata, B. menziesii B. prionotes* or *B. ilicifolia*. Their omission was further supported by a review of vegetation condition and FCT analysis results.

The native vegetation has been separated into five patches:

- Patch 1 = quadrats 4 and 6
- Patch 2 = quadrats 12 and 13
- Patch 3 = quadrats 18 and 19
- Patch 4 = relevé 08 and quadrat 09
- Patch 5 = relevé 14.

For each patch the key diagnostic characteristics, condition, size and relevant contextual information was considered. The key diagnostic characteristics summarise the main features that characterise the Banksia Woodland. The condition categories are applied to identify the varying quality of patches, usually as a result of degradation, and ensure that patches of high quality are considered a Matter of National Significance (MNES). The condition of the patch was informed by species richness of quadrat data compared to available datasets, most notably the Keighery *et al.* (2012) SCP dataset and weed cover. The condition of the patch and size thresholds are then used to determine whether the quality of the patch is suitable to meet MNES standards.

4.3 Level 1 Fauna Survey

A Level 1 fauna survey was conducted in accordance with Technical Guidance – Terrestrial Fauna Surveys (EPA, 2016b) and Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (EPA, 2016c). The fauna survey was conducted by Ecologist Jared Leigh, in conjunction with the detailed flora and vegetation survey. Conducting the two surveys concurrently enabled consistent and clear mapping of the fauna habitats and vegetation communities.

The Level 1 fauna survey primarily focused on mapping of fauna habitat and assessing this habitat for potential utilisation by conservation significant fauna species. Fauna habitats were assessed for specific habitat components, including consideration of structural diversity and refuge opportunities for fauna. The fauna habitat assessments included:

- Location
- · General habitat description
- Habitat condition and disturbance types
- · Dominant / characteristic flora species and vegetation layers
- Presence and abundance of:
 - large mature trees
 - small and large hollows
 - varying sizes of fallen logs
 - course and fine litter
 - decorticating bark
 - bare ground
 - grass
 - varying sizes of stones and boulders
 - rock crevices
 - soil cracks
 - cryptogramic crust
 - vines
 - dense shrubs
 - water bodies etc.
- Presence of fauna and secondary signs (e.g. scats, digging, tracks, burrows, egg shell, bones, feathers etc.)
- · Connectivity of habitat.

In addition to the habitat mapping, records of all observed fauna and birds identified from distinctive calls, details of indirect evidence such as scats, tracks and diggings were documented. Particular attention was given to searching for conservation significant species identified in the desktop assessment as having the potential to occur in the area. All observations were made between daylight hours of 0700 and 1700.

The taxonomy and nomenclature of all vertebrate species is consistent with the Western Australian Museum's (2019) Checklist of Vertebrates of Western Australia.

4.4 Targeted Black Cockatoo Survey

A targeted black cockatoo survey was conducted in conjunction with the Level 1 fauna survey and detailed flora and vegetation survey by Ecologists Jared Leigh and Cassandra House, and Botanist Floora de Wit. This survey was conducted over multiple mobilisations due to site accessibility, including 9 and 10 September 2019; 1 to 4, 8 October 2019; 18 and 21 November.

The targeted black cockatoo survey was conducted to identify potential breeding, roosting and foraging habitat for the three threatened black cockatoo species that occur in WA, as all three species have the potential to utilise the habitats of the survey area. These are Carnaby's Cockatoo *Calyptorhynchus latirostris* (Endangered under the EPBC Act and under the BC Act), Baudin's Cockatoo *Calyptorhynchus baudinii* (Endangered under the EPBC Act and under the BC Act) and the Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* (Vulnerable under the EPBC Act and under the BC Act). Refer to Section 5.2.2 for further information on these species. The survey was undertaken in accordance with the DSEWPaC (2012), also utilising the draft DotEE (2017) Referral Guidelines.

4.4.1.1 Breeding Habitat

The black cockatoo breeding habitat assessment focussed on quantifying breeding and potential breeding trees within the survey area. "Potential breeding trees" are generally considered to be hollow-forming eucalypt trees with a Diameter at Breast Height (DBH) >500 mm with "breeding trees" containing potentially suitable hollows. Details collected for each tree included:

- location
- · tree species
- DBH
- number of potentially suitable hollows.
- hollow details including dimensions, height from ground, direction, type of hollow, evidence of use etc.

4.4.1.2 Roosting Habitat

Carnaby's and Baudin's Cockatoos roost in or near riparian environments or near other permanent water sources, generally within any tall trees, but particularly Flat-topped Yate, Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced eucalypts and introduced pines. The Forest Red-tailed Black Cockatoo prefers the edges of forests for roosting, within any tall trees, but particularly tall Jarrah, Marri, Blackbutt, Tuart and introduced eucalypt trees (DotEE, 2017). Potential roosting trees were searched for and assessed during the field survey.

4.4.1.3 Foraging Habitat

The quality of foraging habitat not only reflects the availability of food sources, but also the proximity to reliable water sources, connectivity to other suitable habitat, presence of breeding habita, and proximity to confirmed roost and breeding sites (amongst others). These parameters were utilised by the DotEE (2017) to produce a draft quality of foraging habitat scoring system (Table 13). This scoring system was amended slightly to incorporate additional habitats and utilised to assess potential foraging habitat throughout the survey area.

The scoring tool is used by initially defining the quality of the overall habitat present (i.e. Very High Quality, High Quality, Quality and Low Quality) and then adding or subtracting points from this depending on the ecological values of the habitat (i.e. proximity to water, proximity to a known roost site, evidence of foraging material etc.). This determines an overall quantitative rating. These scores were then used as representative scores for that unit.

Table 12 defines the levels of foraging habitat quality used during the assessment.

Table 12 Black cockatoo foraging assessment scoring

Score	Foraging Quality
1 – 3	Low Quality
4 – 6	Quality
7 – 8	High Quality
>8	Very High Quality

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Table 13 Foraging habitat quality scoring tool for the three Western Australian black Cockatoo species

† † †			+3 C	+3 ls	Additio		5 Pi	7 Na Dy Das	10 Fo	C	
Contains trees with potential to be used for breeding (DBH ≥500 mm or ≥300 mm for Salmon Gum and Wandoo)		Primarily comprises Marri	Contains trees with suitable nest hollows	ls within the Swan Coastal Plain	Additions: Context adjustor – attributes improving habitat quality	Individual foraging plants or small stand of foraging plants (≤2 ha)	Pine plantation, introduced eucalypts and areas of native vegetation that are not dominated by foraging species but contain more than the occasional plant	Native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as <i>Banksia</i> species (including <i>Dryandra</i> species) <i>Hakea</i> species and <i>Grevillea</i> species as well as eucalypt woodland and forest that contains foraging species. Does not include orchards, canola, or areas under RFA	Foraging habitat that is being managed for black cockatoos, including successful rehabilitation and/or has some level of protection from clearing.	Carnaby's Cockatoo	
າm or ≥300 mm tor Salmon Gum and vvan		Primarily contains Marri		Is within known foraging area		Individual foraging plants or small stand of foraging plants (<2 ha)	Pine plantation, introduced eucalypts and areas of native vegetation that are not dominated by foraging species but contain more than the occasional plant	Eucalyptus woodlands and forest of suitable foraging species and proteaceous woodland and heath, particularly Marri. Does not include orchards or areas under RFA	Foraging habitat that is being managed for black cockatoos, including successful rehabilitation and/or has some level of protection from clearing.	Baudin's Cockatoo	
(100)	4\	Primarily contains Marri and/or Jarrah		Jarrah and/or Marri shows good recruitment		Individual foraging plants or small stand of foraging plants (≤2 ha)	Introduced eucalypts as well as the introduced Cape lilac (<i>Melia acedarach</i>), an areas of native vegetation that are not dominated by foraging species but contain more than the occasional plant	Jarrah and Marri woodlands and forest, and edges of Karri forests, including Wandoo and Blackbutt, within the range of the subspecies. Does not include areas under RFA.	Foraging habitat that is being managed for black cockatoos, including successful rehabilitation and/or has some level of protection from clearing.	Forest Red-tailed Black Cockatoo	

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	Carnaby's Cockatoo	Baudin's Cockatoo	Forest Red-tailed Black Cockatoo
Suk	Subtractions: Context adjustor – attributes reducing habitat quality	,	
-2	-2 No clear evidence of foraging debris		
-2	-2 No other foraging habitat within 6 km		
<u> </u>	ls >12 km from known breeding location		
7	ls >12 km from known roosting location		
7	ls >2 km from watering point		
7	Disease present (e.g. <i>Phytophthora cinnamomi</i> or Marri canker)		

Notes: Scoring tool sourced from DotEE (2017) and amended slightly by AECOM

4.5 Environmental Values Assessment

The Environmental Values Assessment (EVA) included consideration of the Ecology survey outcomes and the inclusion of areas outside the ecology survey boundary for which a series of assumptions were made. The three categories used for the EVA are defined in Table 14.

Table 14 Categories for the environmental values assessment

Category	Values
High	 Good connectivity and/or suitable size for maintaining ecological integrity BC foraging and/or breeding trees All populations of <i>C. undulatum</i> that were recorded during the survey Incorporates all TECs with the exception of two patches that are <0.2 ha which are captured as Medium Includes 90% of areas mapped as "native vegetation" with exception of areas <0.2 ha with poor connectivity.
Medium	 Connects high value areas to adjacent high value areas or as 'stepping stone' Includes BC foraging and/or breeding May include native vegetation (understorey) species
Low	 Mostly cleared open areas or stands of trees over grassland Includes planted gardens and hardscape

A significant limitation of the assessment is the proportion of areas not able to be assessed during the field survey. Assumptions for these areas were made based on aerial imagery and some on-ground observations. It is possible that areas not surveyed include 'high' value areas that were not captured in the EVA.

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4.6 Survey Limitations

Limitations of the Flora and Vegetation, Level 1 fauna and targeted black cockatoo surveys are discussed in Table 15.

Wattle Grove South includes 262 private properties. Of these, 94 landowners granted access permission to facilitate the field surveys. The ecological surveys are therefore restricted to public access areas and these 94 properties.

Table 15 Limitations of the Ecological Surveys

Limitation	Flora and Vegetation Survey	Targeted Black Cockatoo Survey	Level 1 Fauna Survey
Availability of contextual information on the	Nil Sufficient resources for the Swan Coastal Plain	Minor Sufficient contextual information is generally	Nil Sufficient contextual information is available on
region	(SCP) were available to provide contextual information including Beard (1981), Heddle <i>et al.</i> (1980) vegetation mapping, Perth @ 3.5 million (Government of WA, 2015) and the Gibson <i>et al.</i> (1904) and Weichers et al. (2015) were possible.	available on the SCP and survey area. Some of the resources utilised to inform the black cockatoo survey include the DBCA database, DotEE (2017), Birdlife (2018) and DSEWPaC (2014), though not all long within those	the SCP and survey area. Some of the resources utilised to inform the level 1 fauna survey include the DBCA database, Naturemap, EPBC Act PMST, AoLA, as well as several field guides and
	(1994) and Keighery <i>et al.</i> (2012) swan coastal plain datasets.	(2012), though not all layers within these resources are updated regularly.	other publications.
Competency/experience of consultant conducting	NiI The flora and vegetation assessment was led by	Nil Floora has more than 10 years of experience with	Nil Jared is an ecologist with over 16 years'
survey	Floora de Wit who has more than 10 years'	ecological surveys, and over six years'	experience in the environmental industry who has
	experience conducting surveys of similar scope.	experience conducting targeted black cockatoo surveys.	conducted multiple Level 1 fauna surveys on the SCP.
		Jared is an ecologist with over 16 years'	
		over three years' experience conducting targeted	
		black cockatoo surveys.	

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Limitation	Flora and Vegetation Survey	Targeted Black Cockatoo Survey	Level 1 Fauna Survey
Proportion of flora/fauna identified, recorded and/or collected (based on sampling, timing and intensity)	Moderate The survey area comprised of mostly landscaped gardens, houses/development, and paddocks with remnant native trees (stand-alone and in patches). Native tree crowns were not readily identified using aerial imagery so vegetation mapping relied on field observations. Best effort was made to accurately identify and map all stands of native trees. The vegetation map was done to a scale where all crowns of native trees were captured.	Minor The objective of the targeted black cockatoo survey is not necessarily to record black cockatoos within the survey area, but to map the habitat present. However, both Carnaby's Cockatoo and the Forest Red-tailed Black Cockatoo were recorded through either direct sightings or indirect (foraging) evidence. Foraging evidence can be searched for at any time of year, and can remain on the ground for up to two years (DotEE, 2017). Tree hollow presence and suitability for utilisation by black cockatoos cannot always be assessed adequately at ground level, and hence the Precautionary Principle is utilised where appropriate.	Information gained for a Level 1 fauna survey was sufficient for those areas surveyed. Fauna were observed (through direct or indirect evidence) during daylight hours (0700 and 1700hrs) and all habitats were assessed. Nocturnal species were only predominantly observed through indirect evidence.
Completion (is further work needed)	Moderate to High Flora and vegetation values were adequately assessed on properties where access was granted. These properties are considered 'complete' for the survey. However, surveying the remainder of the survey area is required to gain a full understanding of the environmental values present.	Moderate to High Potentially suitable hollows could be assessed further by utilising elevated work platforms (EWPs) or specialist tree climbers, however this is probably not required at this stage and the objectives of the targeted black cockatoo survey were met. Black cockatoo values were adequately assessed on properties where access was granted. These properties are considered 'complete' for the survey. However, surveying the remainder of the survey area is required to gain a full understanding of the environmental values present.	Moderate to High The objectives of the level 1 fauna survey were met and no further work is required for those properties that are considered 'complete.' However, surveying the remainder of the survey area is required to gain a full understanding of the environmental values present.

Limitation	Flora and Vegetation Survey	Targeted Black Cockatoo Survey	Level 1 Fauna Survey
Remoteness and/or access problems	High Property access was denied for approximately 50% of the survey area (see Figure 3). This report presents the results of properties visited and no access limitations are associated with these properties. This data gap represents a significant limitation for informing the Retention Area Assessment as several properties were noted to support large areas of native vegetation.	High The owners of numerous properties have denied access for the survey and as such these properties have been removed from the assessment. The lack of data for these properties may however pose a limitation to the overall understanding of environmental values within the survey area outlined by the City. The objectives of the targeted black cockatoo survey were met for areas that were accessed.	High The owners of numerous properties have denied access for the survey and as such these properties have been removed from the assessment. The lack of data for these properties may however pose a limitation to the overall understanding of environmental values within the survey area outlined by the City. The objectives of the level 1 fauna assessment were met for areas that were accessed.
Timing, weather, season, cycle	Nii Rainfall was below average in the months preceding the survey. No significant limitations were identified relating to timing, weather, season or cycle.	Nil No limitations were identified relating to timing, weather, season or cycle. Foraging evidence can be searched for at any time of year and can remain on the ground for up to two years (DotEE, 2017).	Nii The survey was conducted during a period of reasonable weather in Spring. Although it was limited to one seasonal survey period during one year, and predominantly during daylight hours, this does not significantly impact a Level 1 fauna survey.
Disturbances (e.g. fire flood, accidental human intervention) which affected results of the survey	Nii The survey area represents a fragmented near- rural landscape that includes maintained gardens, grazed paddocks, hardscape, and native vegetation. Best effort was made to access all patches of native vegetation all of which were subject to degrading processes (edge effects, weeds, drying climate).	Nii The targeted black cockatoo survey was not disrupted or impacted.	Nil The Level 1 fauna survey was not disrupted or impacted.



5.0 Desktop Assessment Results

5.1 Threatened and Priority Ecological Communities

The database searches identified 14 conservation significant communities that may occur in the survey area. These results include six TECs that are listed under the EPBC Act. At the State-level TECs and PECs are determined by Floristic Community Type (FCTs) therefore some federally listed TECs represent one or more TEC/PEC at a State level.

The number of TECs and PECs identified reflect the unique landforms in a highly fragmented environment that occur at the base of the Darling Scarp. This area is influenced by the Scarp and the Swan Coastal Plain and supports a mix of Banksia and Eucalypt woodlands, Heath shrublands and wetlands.

The 14 significant communities are described in Table 16 including their State and Federal conservation status and the relationship of State listed communities to Federal listings. TECs and PECs are mapped in Figure 4.

Table 16 Threatened Ecological Communities identified in the desktop assessment

Company Name and Description	Cons. Status	atus	ikalikaad
Community Name and Description	State	EPBC	LINEIIIIOOG
Banksia Woodlands of the Swan Coastal Plain	Various	E	Known/buffer
The Banksia Woodlands TEC (TSSC, 2017) incorporates woodland of <i>Banksia</i> species with scattered Eucalypts and other tree species over a species rich mix of sclerophyllous shrubs, graminoids, and forbs. The community shows high endemism and considerable local variation in species composition across its range. It is restricted to the southwest of WA on the Swan Coastal Plain. It occurs mainly on deep Bassendean and Spearwood sands or occasionally on Quindalup sands. The TEC is identified using the key diagnostic features, condition thresholds and consideration of other environmental factors as described in the approved conservation advice. The community is associated with several State-listed TECs and PECs. Those relevant for this project include:			overlaps
 Banksia attenuata woodlands over species rich dense shrublands (FCT20a) 	m Z		Known/buffer overlaps
 Banksia attenuata and/or Eucalypt marginata woodlands of the eastern side of the Swan Coastal Plain (SCP20b) 	EN		Likely
Low lying Banksia attenuata woodlands or shrublands (SCP21c)	P3		May
Banksia dominated woodlands of the Swan Coastal Plain	P3		Likely
SCP20c Shrublands and Woodlands of the Eastern Swan Coastal Plain (FCT20c)	CR	Ш	Likely
Described in the approved conservation advice (DotEE, 2017b), this TEC is restricted to the eastern side of the SCP in the foothills of the Darling Scarp. It reflects the transitional landform and soil zone between the Scarp and SCP. It is known from approximately 130 ha at Talbot Road Bushland, Bushmead Rifle Range, Great Eastern Highway bypass/Roe Highway intersection, Farrall Road, and Clifford St/Tonkin Highway intersection. Critical habitat for this TEC includes:			
 Known occurrences Areas within 200 m of known occurrences on sandy to gravelly soils on eastern SCP and foothills of Darling Scarp Remnant vegetation that surrounds or links several occurrences. This TEC is identified through FCT analysis. It is recommended that outcomes would be verified by DBCA experts. 			

Community Name and Description State Cons. Status CE **EPBC** Known/buffer ∟ikelihood

rainfall to fill in winter and dry in summer (DSEWPaC, 2012b). The community is a shrubland (sometimes a low open woodland) over geophytes, herbs and sedges in the wetter parts of the site. The TEC is associated with several Ramsar hydrological functions. identification of this TEC relies on FCT analysis and a consideration of characteristics unique to this TEC including sites including Brixton Street Wetlands, Ellen Brook Swamps System and Forrestdale Lake Nature Reserve. The Clay Pans of the Swan Coastal Plain This TEC occurs where clay soils form an impermeable layer close to the surface where wetlands form that rely solely on

overlaps

Associated State-listed TECs include:

Herb rich saline shrublands in clay pans (SCP07)

 \leq

Unlikely

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Known/buffer

overlaps

Unlikely

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Known/buffer overlaps

- Herb rich shrublands in clay pans (SCP08)
- Shrublands on dry clay flats. (SCP10a)

SCP 3a Corymbia calophylla - Kingia australis Woodlands on Heavy Soils of the Swan Coastal Plain (FCT3a)

ecological community are habitat areas critical to its survival (i.e. no condition thresholds apply) communities, and the catchment for this groundwater and surface water. All areas meeting the description of the natural ground surface therefore communities are likely to be heavily reliant on groundwater. Critical habitat for this TEC between Ruabon and Guildford. The floristic composition varies with water regime which is typically within 3 m of the includes heavy soils, fresh superficial groundwater, and/or surface water that helps sustain flora species in these wetland Described in DotEE (2017a) approved conservation advice, this TEC is located on heavy soils of the eastern SCP

SCP3b Corymbia calophylla - Eucalyptus marginata Woodlands on Sandy Clay Soils of the southern Swan Coastal Plain (FCT3b) \leq

May

vegetation dominated by both C. calophylla and E. marginata (Gibson et al., 1994). Common understorey species Occurs on alluvial soils near the Peel-Harvey estuary and on better drained sites on the eastern side of the plain with include Bossiaea eriocarpa and Conostylis juncea.

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Likely	т	CR	SCP3c Corymbia calophylla – Xanthorrhoea preissii Woodlands and Shrublands, Swan Coastal Plain (FCT3c)
	EPBC	State	Community Name and Description
	atus	Cons. St	Company Name and Description

alopecuroidea. include C. calophylla, E. wandoo and shrubs Xanthorrhoea preissii, Acacia pulchella, Banksia dallanneyi, Gompholobium Located on heavy soils of the eastern side of the Swan Coastal Plain between Bullsbrook and Capel. Dominant trees marginatum and Hypocalymma angustifolium and herbs Burchardia congesta, Cyathochaeta avenacea and Neurachne

Central Northern Darling Scarp Granite Shrubland Community

Ρ4

Unlikely

proteaceous and myrtaceous shrubs, namely Melaleuca aff. scabra, Baeckea camphorosmae and to a lesser extent, the species typically consist of the taller shrubs Xanthorrhoea acanthostachya and Allocasuarina humilis over smaller proteaceous shrubs Dryandra armata, Hakea incrassata and Hakea undulata . Located in central region of the Northern This PEC is described as shrublands and heath on deeper loams and red earths on fragmented granite/quartzite. Heath

SCP02 Southern Wet Shrublands, Swan Coastal Plain (FCT02)

Darling Scarp near Perth.

Airport. The community occurs on seasonally inundated sandy clay soils that support diverse shrubs including Kingia Shrublands or open low woodlands identified by Gibson in the Busselton area but is now also known to occur at Perth australis, Eutaxia virgata and Calothamnus lateralis.

Muchea Limestone – Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain

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Unlikely

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Unlikely

type of limestone substrate. of landforms. Its presence is defined by limestone-influenced substrates. Soils and flora species are influenced by the Occurs on heavy soils on eastern side of the plain. Occurrences include wetland and well-drained habitats and a variety

5.2 Conservation Significant Flora

A total of 51 flora species of conservation significance were identified in the desktop study. This included 32 species listed as threatened under the EPBC Act and 19 species listed by DBCA as Priority species. It should be noted that 22 of the 32 threatened species were identified in the Protected Matters Search with no known records from the vicinity of the survey area. The majority of these were considered unlikely to occur.

Four flora species are known to occur within the survey area, including two threatened species Banksia mimica and Conospermum undulatum and two Priority species Isopogon drummondii (Priority 3) and Lasiopetalum glutinosum subsp. glutinosum (Priority 3).

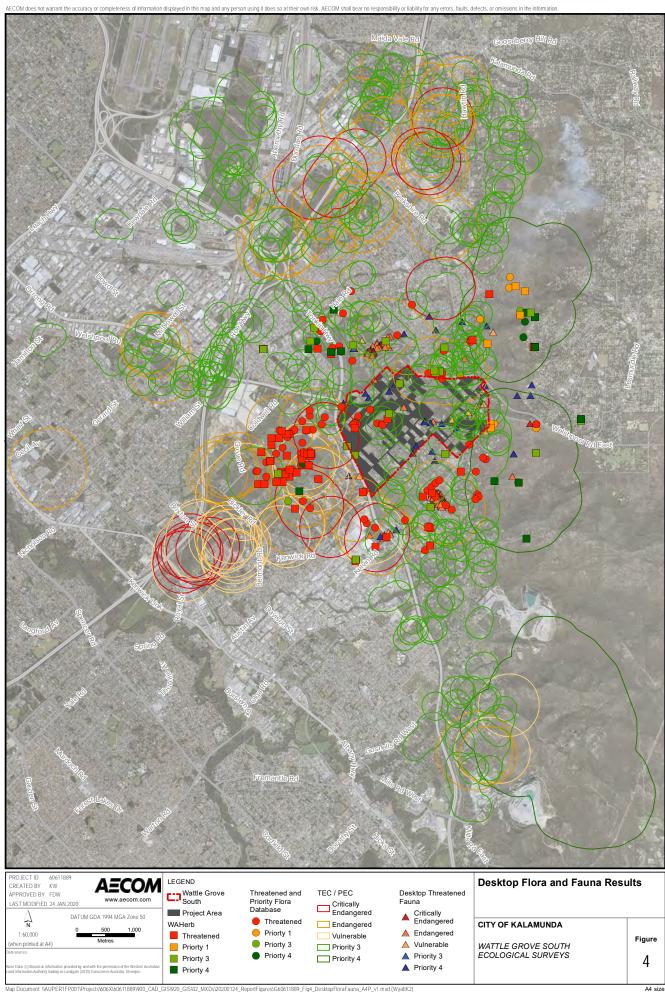
Further investigation determined that *L. glutinosum* subsp. *glutinosum* is unlikely to occur in the survey area as it is associated with lateritic outcrops on the Darling Scarp.

Two flora species are considered likely to occur including *Haemodorum loratum* (Priority 3) and *Verticordia lindleyi* subsp. *lindleyi* (Priority 4). An additional 12 species may occur based on habitat and proximity of known records. The fragmented and mostly cleared private residences within the survey area and lack of wetland habitat as led to the exclusion of many species as being likely to occur.

Table 17 Threatened and Priority Flora that are likely to, or known to occur within the survey area

	Cons. Code ¹	ode ¹		Count	
opedes	EPBC	WA	nabitat	Date	
Banksia mimica	т	\leq	Flat to gentle slopes on grey sand in open woodlands. DBCA population 3 occurs within the survey area where it occurs in mixed low heath with a Banksia attenuata/B. menziesii open-low woodland overstorey. It is associated with species such as Adenanthos cygnorum, Eucalyptus todtiana, Nuytsia floribunda, Jacksonia floribunda, Xanthorrhoea preissii, Banksia chamaephyton, Hakea conchifolia and Stirlingia latifolia	2000	Known. DBCA population 3 recorded in 2000 on properties southeast of Crystal Brook Road and Brentwood Road.
Conospermum undulatum	<	\leq	Grows on sand and sandy clay soils, often over laterite, on flat or gently sloping sites between the Swan and Canning Rivers. The species is known from <i>Banksia</i> and jarrah/marri woodland, with a few records from slightly swampy habitat	2011	Known. Population no. 11 occurs within the survey area.
Haemodorum Ioratum		P3	Grey or yellow sand and gravel.	2004	Likely. Suitable habitat and record in close proximity to survey area.
Isopogon drummondii		P3	No information available on WAH (1998-). Database results describe flats on grey brown sand with or without gravel in Banksia woodlands.	2013	Known. Numerous records in vicinity of survey area.
Lasiopetalum glutinosum subsp. glutinosum		P3	No information available on WAH (1998-). One record nearby recorded on sandplain with Darling Scarp outwash in Banksia/Jarrah woodland.	2008	Known. No suitable habitat in survey area. Records on Darling Scarp.
Verticordia lindleyi subsp. lindleyi		P4	Grows in white to grey and yellow sand, often with or over clay and gravel, usually low-lying and winter-wet (George, 2002). Frequently in association with a few other verticordias in heath, shrubland and open woodland (George, 2002). Records from 1990 and 1994.		Likely. Suitable habitat present, several records in close proximity.

Conservation codes are outlined in Section 3.0
 Sourced from Florabase (WAH, 1998-) and DotEE (2019) unless otherwise referenced



5.3 Conservation Significant Fauna

The NatureMap search identified a total of 192 vertebrate and invertebrate fauna species that have been recorded within the survey and surrounding area. This included seven amphibian, 108 bird, one fish, 31 invertebrate, 14 mammal and 31 reptile species. A review of species habitat was undertaken at which time 26 conservation significant fauna species may occur within the survey area. The likelihood assessment concluded that:

- three species are 'likely to occur'
- two species 'may occur'
- 21 species are 'unlikely to occur'.

The five species considered as 'likely to occur' and 'may occur' in the survey area include three bird, one invertebrate and one mammal species. Table 18 identifies these species and provides relevant ecological information. The conservation significant categories as defined by DBCA, the BC Act and the EPBC Act are defined in Section 3. The comprehensive desktop results are presented in Appendix A.

The EPBC Protected Matters Search identified five fauna species listed as Marine under the EPBC Act. These were omitted as they only pertain to Commonwealth Land.

Table 18 Conservation significant fauna species that are Likely to Occur or May Occur in the survey area

Scientific	Common	Sta	Conservation Status	
Name	Name	WA	EPBC Act	Ecology
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	VU	<	Requires tree hollows to nest and breed, occurs in forests of Karri <i>Eucalyptus diversicolor</i> , Jarrah <i>E. marginata</i> and Marri <i>Corymbia calophylla</i> , with flocks moving out onto the Swan Coastal Plain in search of food from exotic trees such as White Cedar (Johnstone <i>et al.</i> , 2010). Foraging habitat for the species consists of Jarrah and Marri woodlands and forest throughout its range. Has become more common in the Metropolitan area in the past few years.
Calyptorhynchus baudinii	Baudin's Cockatoo	m	т	Habitat critical to the survival of this species includes forests of Karri, Jarrah and Marri, in areas of 600 mm average rainfall per year. Individuals typically move north through the Perth region from March to May and south through the Perth region from August to October. This species ranges north to Gidgegannup and Hoddy Well and west to the Eastern Strip of the Swan Coastal Plain including West Midland in the north, heading south through Armadale, Byford and south and towards the coast until Lake Clifton where it continues to hug the coastline to east of Albany (Johnstone <i>et al.</i> , 2010). Breeding has been recorded to the south-west of the area bounded by Leschenault, Collie and Albany (DSEWPaC, 2012), with the most northerly record at Lowden, near Donnybrook (Johnstone & Storr, 1998). Breeding has also been recorded at Serpentine (hills area), and east to Kojonup and near Albany (Johnstone & Kirkby, 2008).
Calyptorhynchus latirostris	Carnaby's Cockatoo	m Z	т	The species nests in hollows in eucalypts, particularly Salmon Gum <i>Eucalyptus salmonophloia</i> and Wandoo <i>E. Wandoo</i> , but nests have been found in other eucalypts including York Gum <i>E. loxophleba</i> , Flooded Gum <i>E. rudis</i> , Tuart <i>E. gomphocephala</i> and Marri <i>Corymbia calophylla</i> (Johnstone <i>et al.</i> , 2010). Breeding success is largely dependent on suitable feeding habitat adjacent to the nest site to provide the necessary food for the survival of the chick (Johnstone <i>et al.</i> , 2010). Diet consists of an array of Proteaceous and <i>Eucalyptus</i> species.
Isoodon fusciventer	Quenda	P4	ı	The Quenda exists only in a fragmented distribution to its former range in southern south western and eastern Australia. It is found in forest, woodland, heath and shrub communities in these regions. Preferred habitat usually consists of a combination of sandy soils and dense heathy vegetation (Van Dyck & Strahan, 2008).
Westralunio carteri	Carter's Freshwater Mussel	S	<	The only reasonably large bivalve in freshwaters of south-west Western Australia. Occurs in greatest abundance in slower flowing waters with stable sediments that are soft enough for burrowing. Salinity tolerance is quite low (>3 g /L is lethal) (TSSC, 2018).

6.0 Field Survey Results and Discussion

6.1 Vegetation

6.1.1 Floristic Community Type Analysis

A total of 11 quadrats were subject to the statistical analysis to infer the FCT for these quadrats and associated vegetation patches. Five FCTs were inferred, including:

- FCT3b C. calophylla-E. marginata woodlands on sandy clay soils (WA TEC)
- FCT20a B. attenuata over species rich dense shrublands (EPBC TEC, WA TEC)
- FCT20b eastern B. attenuata and/or E. marginata woodlands (partial EPBC TEC, WA TEC)
- FCT21a central B. attenuata-E. marginata woodlands (partial EPBC TEC)
- FCT23a central B. attenuata-B. menziesii woodlands (partial EPBC TEC)

The FCT analysis results were used to inform the TEC and PEC assessment discussed in the following Section. Details for each quadrat, the top three to four similar SCP quadrats, and inferred FCT conclusions are presented in Table 19.

The survey area extends across three major landforms; the Foothills (Ridge Hill Shelf) (east), the Pinjarra Plain, and a combination of Bassendean Dunes and Pinjarra Plain. Because of this, some of the inferred FCTs remain slightly cryptic as it is unclear what landform they would represent at this scale. Furthermore, low similarity was observed across all quadrats analysed, suggesting poor comparability to the SCP data. A number of factors would influence this, such as:

- position of survey area along the base of the Darling Scarp. It crosses three major landforms and species present may not be typical of that landform due to the proximity of the scarp.
- · single quadrat sampling event
- drying climate
- isolation native vegetation patches and existing disturbances.

Table 19 Inferred FCT for Wattle Grove quadrats

Quadrat	Quadrat, % similarity, FCT	Inferred FCT
01	ACTON-1, 31%, 1a Hart01, 31%, 20a Sams01 31%, 28	None of these FCTs align with quadrat data. FCT cannot be inferred.
04	Rush 02, 46%, 20b Hart01, 43%, 20a APBF-2, 40%, 20a	FCT20a <i>B. attenuata</i> over species rich dense shrublands is a good fit. High diversity with 61 species/quadrat.
06	Activ03, 47%, 20a Bushm01, 45%, 20a Hart01, 45%, 20a Talb8, 45%, 20a	FCT20a <i>B. attenuata</i> over species rich dense shrublands is a good fit. High diversity with 46 species/quadrat. Some edge effects have degraded condition.
07	BURNRD02, 26%, 3b 5C01, 23%, S18 Serp04, 23%, 3b Yarl03, 23%, 3b	FCT3b <i>C. calophylla-E. marginata</i> woodlands on sandy clay soils is a good fit. TEC description suggests 'southern SCP' only however Gibson <i>et al.</i> (1994) includes better drained sites on eastern side of plain.
09	Kens01, 44%, 23a Perth04, 43%, 23a Perth08, 43%, 23a Tele01, 43%, 23a	FCT23a central <i>B. attenuata-B. menziesii</i> woodlands is a good fit.

Quadrat	Quadrat, % similarity, FCT	Inferred FCT
10	Yarl03, 39%, 3b BURNRD02, 37%, 3b KOOLJ-5, 32%, 3b Sunday02, 32%, 21a	FCT3b <i>C. calophylla-E. marginata</i> woodlands on sandy clay soils is a good fit. TEC description suggests 'southern SCP' only however Gibson <i>et al.</i> (1994) includes better drained sites on eastern side of plain.
11	AMBRAL-1, 38%, 1b Yarl01, 37%, 3c BURNRD02, 35%, 3b R116703, 35%, 1b Waro 02, 35%, 3b	FCT3b <i>C. calophylla-E. marginata</i> woodlands on sandy clay soils is a good fit. FCT1b is restricted to southern SCP.
13	Activ03, 44%, 20a BNR18, 41%, S09 Card2, 41%, 20b ELE28, 41%, 23b KOON-1, 41%, 20a KOON-2, 41%, 20a	Does not meet description of FCT20a or 23b. Could be S09 Banksia attenuata woodlands over dense low shrubs however its geographical location aligns better with FCT20b eastern B. attenuata and/or E. marginata woodlands may also be accurate.
15	KING-2, 30%, 28 Cavs11, 30%, 21a Star01, 29%, 24 WOODV-2, 29%, 28	Poor alignment with FCT28 and 24 as they pertain to Spearwood dunes dominated by <i>Banksia</i> overstorey. Vegetation represented by Q15 is representative of <i>E. marginata</i> woodland therefore may be aligned with FCT21a central <i>B. attenuata-E. marginata</i> woodlands.
18	Perth08, 42%, 23a Wire01, 42%, 28 Activ03, 40%, 20a	Similar to Q19, likely to represent FCT20b as it aligns with geographical location, key species, and species richness.
19	Activ03, 42%, 20a Rush02, 42%, 20b KING-2, 38%, 28 Tele01, 38%, 23a	Could represent FCT20a or 20b with presence of key species and correct landform (Ridge Hill Shelf). The lower species richness indicates FCT20b eastern <i>B. attenuata</i> and/or <i>E. marginata</i> woodlands.
20	Activ03, 37%, 20a Perth04, 36%, 23a	Does not align with 20a or 23a. Is a better fit with FCT20b eastern <i>B. attenuata</i> and/or <i>E. marginata</i> woodlands. Confirmation from DBCA would be required however as a precaution we have determined this area to be the State listed TEC.

6.1.2 Threatened and Priority Ecological Communities

Native vegetation was mapped for 7.41 ha within the 168 ha survey area. Of this area, 4.55 ha is considered a TEC or PEC. This reflects the condition of vegetation and the size of the patch.

Four conservation significant communities were recorded and mapped, all of which are either wholly or partially under one federally listed TEC:

- EPBC TEC Banksia Woodlands of the SCP
- WA TEC FCT20a B. attenuata over species rich dense shrublands (SCP20a)
- WA TEC FCT20b B. attenuata and/or E. marginata woodlands of the Eastern SCP (SCP20b)
- WA TEC Corymbia calophylla Eucalyptus marginata woodlands on sandy clay soils of the southern SCP (SCP3b)
- WA PEC Banksia dominated woodlands of the SCP.

These communities are described in detail below.

Banksia Woodlands of the Swan Coastal Plain - EPBC Endangered

The presence of the EPBC Act-listed Banksia Woodlands of the Swan Coastal Plain has been confirmed. Native vegetation within the survey area was grouped into patches as defined in the Approved Conservation Advice. Each patch was assessed separately.

Five patches were defined:

- Patch 1 = quadrats 4 and 6
- Patch 2 = quadrats 12 and 13
- Patch 3 = quadrats 18 and 19
- Patch 4 = relevé 08 and quadrat 09
- Patch 5 = relevé 14

Of these, patches 1, 2 and 3 met all criteria to be considered the EPBC TEC Banksia Woodlands of the SCP. The vegetation within these patches was often co-dominated by a mix of *Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana* and *Eucalyptus marginata* subsp. *marginata*. The vegetation varied from 'Good' to 'Excellent' condition. Patch 1 and 2 also support EPBC threatened flora species *Conospermum undulatum*.

The three patches of Banksia Woodlands TEC represent three State listed communities, discussed separately. The total area of native vegetation representing this TEC is 2.41 ha. A detailed assessment of each of these patches is provided in Appendix B.

FCT20a B. attenuata over species rich dense shrublands (SCP20a) - WA TEC Endangered

The identification of this TEC was supported by FCT analysis of two quadrats (04 and 06). This area was notably species rich with an average of 53.5 species/quadrat. This TEC is isolated to one location, represented by vegetation community BaEpPf extending for 0.94 ha.

This TEC was identified in the desktop assessment as known to occur in Wattle Grove and coincides with Patch 1 of the Banksia Woodlands TEC.



Plate 1 Photograph representative of FCT20a

FCT20b *B. attenuata* and/or *E. marginata* woodlands of the Eastern SCP (SCP20b) – WA TEC Endangered

This TEC has been tentatively mapped at two locations that correspond with Patch 2 and 3 of the Banksia Woodlands TEC. The low confidence mapping is a result of poor clarity from the FCT analysis (low similarity). Verification from DBCA is advisable.

This TEC is represented by three vegetation communities in the survey area including EmMpLp, BaEpPf and BmXpEc and is mapped across 1.80 ha.

Corymbia calophylla – Eucalyptus marginata woodlands on sandy clay soils of the southern SCP (SCP3b) – WA TEC Vulnerable

This TEC was identified following FCT analysis for three quadrats (07, 10 and 11). Further confirmation from DBCA would be required to verify the presence of this TEC. FCT3b is more commonly known from the Peel-Harvey estuary further south, but has been recorded on 'better drained sites on the eastern side of the plain' (Gibson *et al.*, 1994). This TEC is represented by vegetation communities EmPcAh and EmLpFa extending for 1.71 ha.

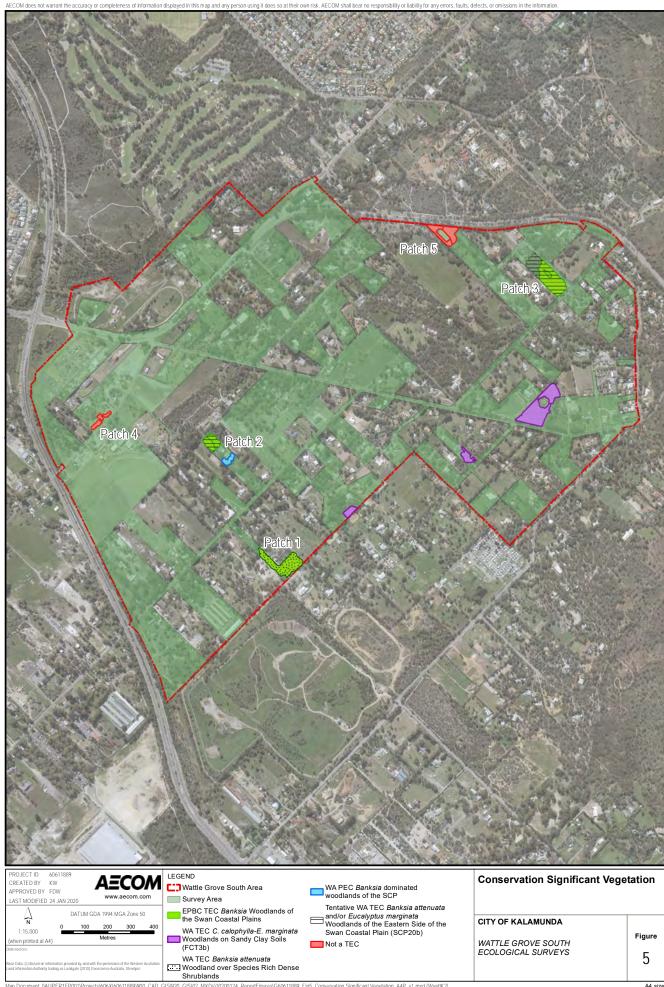
A precautionary approach has been adopted, where liaison with DBCA may help facilitate a better understanding of the TECs present as this TEC is generally associated with areas further south.

Banksia dominated woodlands of the SCP - WA P3 PEC

This PEC was recorded at one location which coincides with Patch 2 of the EPBC TEC Banksia Woodlands of the SCP. This TEC is not associated with a specific FCT therefore has been assumed to refer to all occurrences of the federal TEC listing. This PEC extends for 0.15 ha.

Tuart Woodlands of the SCP - EPBC TEC, WA P3 PEC

E. gomphocephala trees were observed in the survey area, however all trees were recorded in Completely Degraded areas devoid of native understorey species. For this reason, these patches were excluded for consideration as the EPBC TEC Tuart Woodlands of the SCP.



6.1.3 Vegetation Communities

Six native vegetation communities were described and mapped. These communities fall into three broad categories including Banksia Woodlands, Eucalypt Woodlands and Riparian Vegetation.

Vegetation descriptions are presented in Table 20 and mapped in Figure 7.

The delineation of vegetation communities was supported by cluster analysis of floristic data. The cluster outcomes are presented below.

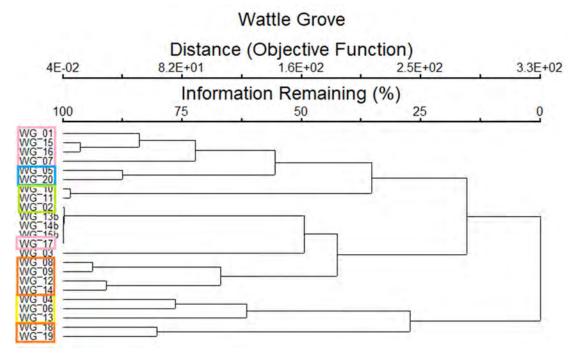


Figure 6 Dendrogram Showing Community Groups in Colours (pink = EmCaFa, blue = EmMpLp, green = EmPcAh, orange = BmXpEc, yellow = BaEpPf)

Table 20 Vegetation community descriptions including mapping code and photographs

Community Description	Additional Details	Photograph
EmCaFa <i>E. marginata</i> Woodland	Survey effort: Q01, Q07, Q15, R16	
Eucalyptus marginata subsp. marginata and Allocasuarina fraseriana low woodland over Cyathochaeta avenacea, Mesomelaena tetragona and Daviesia	Species richness: 76 native and 12	
decurrens subsp. decurrens mixed sedge and shrubland over * Freesia alba x leichtlinii, Lomandra preissii and Stylidium brunonianum low forbland.	weed species	が、子はなるとことである。
Numerous strata present in understorev including forbs, sedges, rushes and	Area: 0.78 ha	
shrubs. Other dominant species include <i>Tripterococcus brunonis</i> , <i>Neurachne alopecuroidea</i> , <i>Xanthorrhoea preissii</i> , <i>Labichea punctata</i> and <i>Hakea undulata</i> .		
Represents WA TEC <i>C. calophylla-E. marginata</i> woodlands on sandy clay soils.		
EmMpLp <i>E. marginata</i> Woodland	Survey effort: R05, Q20	
Eucalyptus marginata subsp. marginata and Allocasuarina fraseriana mid open forest over Mesomelaena pseudostygia and Tetraria octandra low sedgeland with Lomandra preissii, Tricoryne elatior and Dampiera linearis low open forbland.	Species richness: 42 native and 9 weed species	
Larger patch of this community represents WA TEC <i>B. attenuata</i> and/or <i>E. marginata</i> woodlands of the eastern SCP (SCP20b).	Area: 0.48 ha	

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Community Description	Additional Details	Photograph
EmPcAh <i>E. marginata</i> Woodland	Survey effort: R02, Q10, Q11	
Eucalyptus marginata subsp. marginata and Corymbia calophylla mid open forest over Phyllanthus calycinus Xanthorrhoea preissii and Xanthorrhoea gracilis low	Species richness:	
shrubland with Agrostocrinum hirsutum, Lomandra sonderi and Thysanotus patersonii low open forbland.	weed species	
Represents WA TEC C calonhylla-E marrinata woodlands on sandy clay soils	Area: 1.61 ha	
CcHaEc	Survey effort: 03	
Riparian Vegetation	Species richness:	
Corymbia calophylla mid open woodland over Spyridium globulosum, Hypocalymma angustifolium and Acacia pulchella var. pulchella tall to low shribland over *Ehrharta caliccina *Avana barbata and *Briza minor low	12 native and 5 weed species	
grassland.	Area: 0.23 ha	The second secon
Represents riparian vegetation associated with a minor water course.		

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Community Description	Additional Details	Photograph
BaEpPf	Survey effort: Q04,	
Banksia Woodland	Q06, Q13	
Banksia attenuata, Banksia menziesii and Eucalyptus todtiana low open woodland	Species richness:	
humilis low shrubland over <i>Phlebocarya filifolia, Mesomelaena pseudostygia</i> and	weed species	
Lepidosperma leptostachyum low sedgeland.	Area: 1.55 ha	
Represents EPBC TEC Banksia Woodlands of the SCP. One patch also represents the WA TEC Banksia attenuata woodlands over species rich dense		
shrublands (SCP20a).		
Supports the Threatened Conospermum undulatum and Priority 3 Isopogon		
	1	
Banksia Woodland	Q09, R12, R14, Q18, Q19	
Banksia menziesii, Allocasuarina fraseriana and Eucalyptus todtiana low open	Species richness:	
Stirlingia latifolia low open shrubland over *Ehrharta calycina, Dasypogon bromeliifolius and Anigozanthos manglesii subsp. manglesii mixed grass and	80 native and 12 weed species	
TOPDIATIO.	Area: 1.92 ha	
Represents EPBC TEC Banksia Woodlands of the SCP and WA TEC eastern <i>B. attenuata</i> and/or <i>E. marginata</i> woodlands (SCP20b).		
Significantly Altered	Area: 56.56 ha	
Includes planted, gardens, scattered trees (both native and introduced). Condition considered Completely Degraded.		

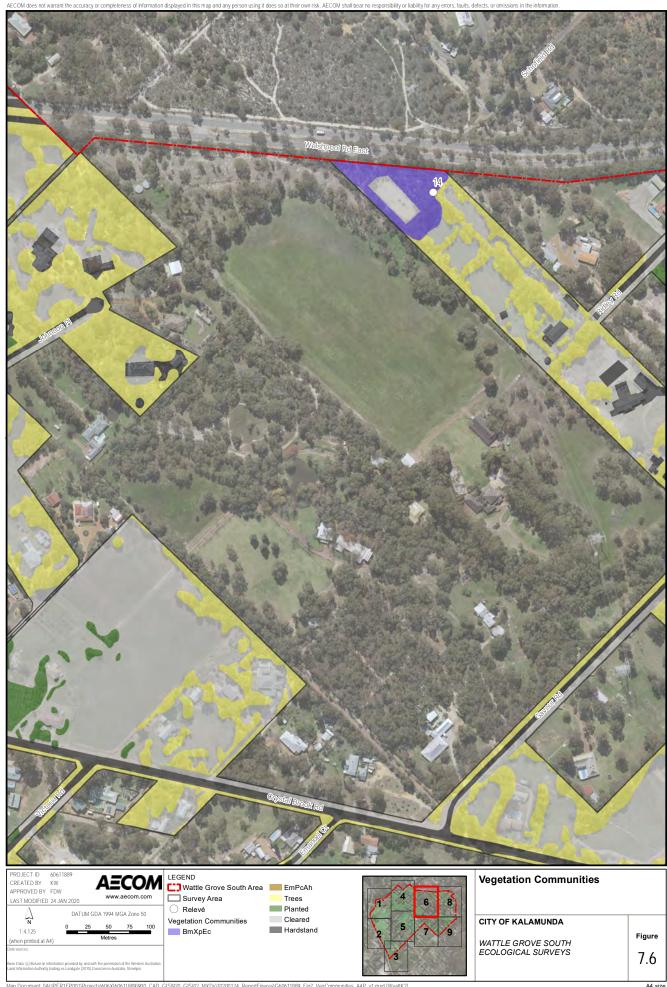


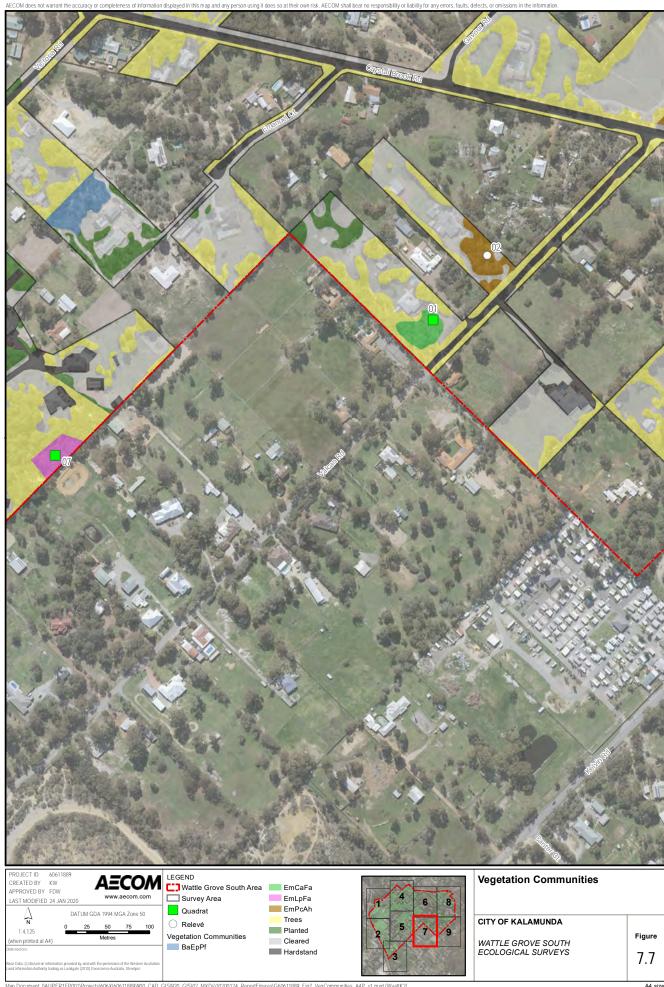
















6.1.4 Vegetation Condition

Vegetation condition within the Survey area varied from 'Excellent' to 'Completely Degraded', shown in Figure 8. The condition map reflects the current land use (private estate). Majority of residences comprise cleared grasslands (lawn) and maintained gardens. Condition extent is presented in Table 21

Table 21 Vegetation condition

Condition Rating	Area (ha)	Percentage of Survey area (%)
Excellent	2.24	20
Very Good	2.22	76
Good	1.45	1
Degraded	1.59	1
Completely Degraded	127.39	1
Cleared	33.07	1
Total	167.97	100

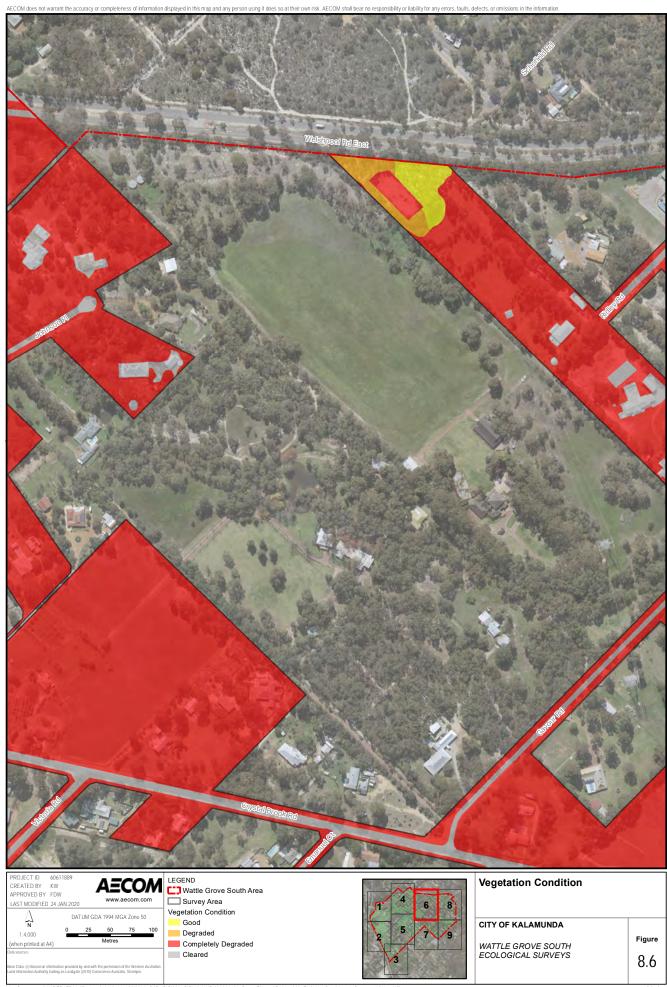


















6.2 Flora

6.2.1 Threatened and Priority Flora

Conospermum undulatum (T)

One Threatened species listed under the EPBC Act and BC Act was recorded within the survey area. *Conospermum undulatum* (EPBC Vulnerable, BC Vulnerable) has been previously recorded in the survey area. This was verified during the field survey where two populations were recorded comprising 95 individuals (see Table 22 and Figure 9). No photograph was taken of this species in the survey area.

DBCA population 11 is located within the survey area. This population is located on land where no access was granted for this field survey.

Populations of C. undulatum recorded during this survey are not represented in the DBCA dataset.

Table 22 C. undulatum population information within and in vicinity of survey area

Doromotor	AEC	OM ¹	DBC	CA ²
Parameter	Populations	Individuals	Populations	Individuals
Within survey area	2	95	3	528
In vicinity			10	3694

^{1.} Restricted to properties for which access was granted

Isopogon drummondii

One Priority 3 species, *Isopogon drummondii*, was recorded in the survey area. These two populations correspond with the *C. undulatum* populations. There is one known record of this species in the survey area from 1990 (see Table 23 and Figure 9). This species is regionally restricted but locally common.

Parameter	AEC	OM ¹		DBCA ²
Parameter	Populations	Individuals	Populations	Individuals
Within survey area	2	160	1	Not available
In vicinity			9	Described as 'locally abundant'

^{1.} Restricted to properties for which access was granted

^{2.} applicable to wider Wattle Grove survey area.

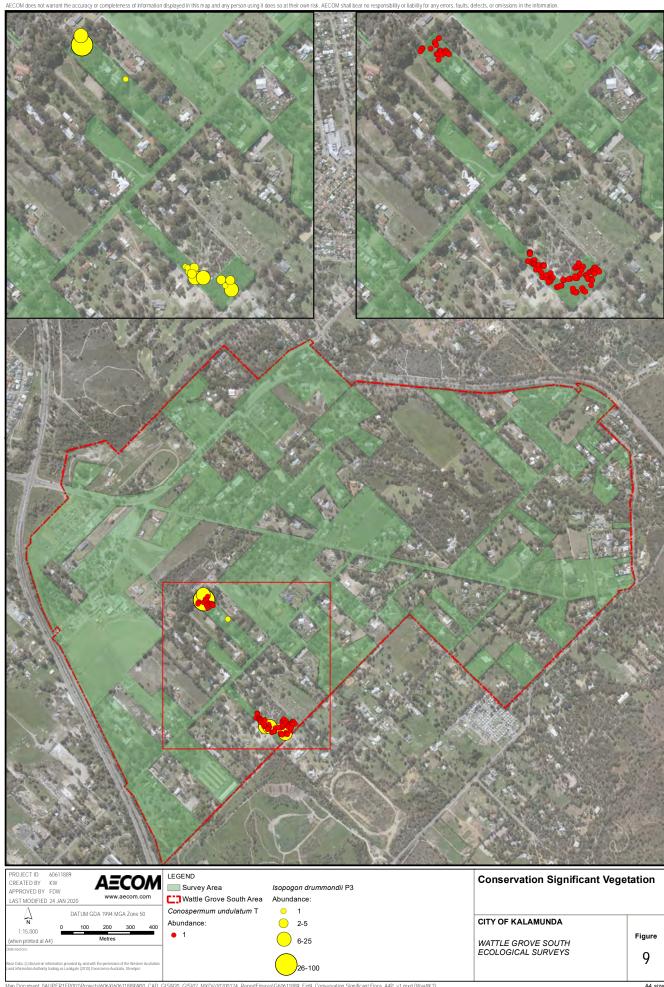
^{2.} applicable to wider Wattle Grove survey area.



Plate 2 Isopogon drummondii recorded in the survey area

Banksia mimica

The *B. mimica* population (DBCA population 3) was previously recorded south east of the Crystal Brook Road and Brentwood Road junction. All properties in this vicinity have been cleared for development and no native vegetation remains. *B. mimica* was not recorded during the field survey.



6.2.2 Inventory of Flora Species

A total of 165 native species from 95 genera and 38 families were recorded during the field survey. Families with the highest representation are Proteaceae (25 native taxa), Fabaceae (23 native taxa) and Myrtaceae (17 native taxa).

The full list of vascular flora species recorded and representative communities in which they occur in are presented in Appendix C. Qualitative data recorded from individual quadrats is presented in Appendix D.

In total, 21 introduced species were recorded. Of these, one is listed as a Declared Pest under the BAM Act. *Asparagus asparagoides*, Bridal Creeper (Declared Pest – S22(2) is listed as Exempt therefore no permit or conditions are applicable.

Rubus ulmifolius (Declared Pest - s22(2), also known as Blackberry, was observed along a drainage channel where access was restricted due to fencing (despite the area being zoned as Reserve). This species is listed as C3 - Management / Exempt where some form of management should be applied to alleviate the harmful impacts of this species.

6.3 Fauna

6.3.1 Level 1 Fauna Survey

6.3.1.1 Fauna Inventory

Fifty-one vertebrate fauna species were recorded within the survey area during the field survey. This comprised three reptile, one amphibian, 11 mammal and 36 bird species. The observed species are presented in Table 24.

6.3.1.2 Conservation Significant Fauna Species

Seven of the 51 recorded vertebrate fauna species were of conservation significance, including six birds and one mammal. These include:

- Forest Red-Tailed Black Cockatoo *Calyptorhynchus banksii* (listed as Vulnerable under the EPBC Act and the BC Act). Refer to 6.3.3 for further details.
- Carnaby's Cockatoo Calyptorhynchus latirostris (listed as Endangered under the EPBC Act and the BC Act). Refer to 6.3.3 for further details.
- Quenda Isoodon fusciventer (listed as Priority 4 by DBCA). Refer to Plate 3 for photographs of Quenda diggings and scat recorded within the survey area.
- Fan-Tailed Cuckoo Cacomantis flabelliformis, Horsfield's Bronze Cuckoo Chrysococcyx basalis,
 Magpie Lark Grallina cyanoleuca and Rainbow Bee-Eater Merops ornatus (listed as Marine under
 the EPBC Act). Species listed as Marine under the EPBC Act are only considered significant in
 Commonwealth land and as the survey area does not contain Commonwealth land these species
 will not be further discussed within the report.

Based on the desktop assessment and the field survey, the following additional conservation significant fauna species are considered to have the potential to utilise the habitats within the survey area:

- Baudin's Cockatoo Calyptorhynchus baudinii listed as Vulnerable under the BC Act and the EPBC Act
- Carter's Freshwater Mussel Westralunio carteri listed as Vulnerable under the BC Act and the EPBC Act.

Refer to Table 25 and Appendix A for further detail on these conservation significant species.









Plate 3 Quenda observations within the survey area

Table 24 Vertebrate fauna species recorded within the survey area

Species	Vernacular	Status	Observations
Birds			
Anas superciliosa	Pacific Black Duck	Native	Observed in artificial ponds
Anthochaera carunculata	Red Wattlebird	Native	Commonly seen and heard throughout survey area
Cacatua roseicapilla roseicapilla	Galah	Native	Observed multiple times during survey
Cacatua sanguinea	Western Corella	Native	Small flock observed in trees
Cacomantis flabelliformis	Fan-tailed Cuckoo	Native	Heard in trees in paddock
Calyptorhynchus banksii	Forest Red-tailed Black Cockatoo	Native	Two birds observed foraging in Marri tree, multiple birds seen flying over area, multiple observations of foraging evidence
Calyptorhynchus latirostris	Carnaby's Cockatoo	Native	Foraging evidence observed
Chenonetta jubata	Australia Wood Duck	Native	Observed multiple times during survey

Species	Vernacular	Status	Observations
Birds	vornaoara.	Otarao	
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	Native	Heard multiple times
Colluricincla harmonica	Grey Shrikethrush	Native	Heard in Flooded Gums adjacent drainage line
Corvus coronoides	Australian Raven	Native	Commonly seen and heard throughout survey
Cracticus tibicen	Australian Magpie	Native	Commonly seen and heard throughout survey
Cracticus torquatus	Grey Butcherbird	Native	Observed flying through maintained gardens
Dacelo novaeguineae	Laughing Kookaburra	Naturalised exotic	Commonly seen and heard throughout survey area
Dromaius novaehollandiae	Emu	Native	Individual observed in an enclosure
Petrochelidon nigricans	Tree Martin	Native	Flock of approx. 10 birds observed flying in survey area
Gerygone fusca	Western Gerygone	Native	Seen in survey area
Grallina cyanoleuca	Magpie Lark	Native	Commonly seen and heard throughout Survey
Gavicalis virescens	Singing Honeyeater	Native	Common throughout survey area
Malurus splendens	Splendid Fairywren	Native	Seen and heard twice in survey area
Merops ornatus	Rainbow Bee-Eater	Native	Multiple observations recorded throughout survey area
Ocyphaps Lophotes	Crested Pigeon	Native	Observed several times
Pardalotus striatus	Striated Pardalote	Native	Commonly seen and heard throughout survey area
Pavo cristatus	Common Peafowl	Introduced	Heard several times
Phaps chalcoptera	Common Bronzewing	Native	Observed several times in survey area
Phylidonyris niger	White-cheeked Honeyeater	Native	Observed multiple times in survey area
Phylidonyris novaehollandiae	New Holland Honeyeater	Native	Commonly seen and heard throughout survey
Platycercus spurius	Red-capped Parrot	Native	Observed individuals and foraging evidence multiple times
Platycercus zonarius	Australian Ringneck	Native	Commonly seen and heard throughout survey area
Rhipidura leucophrys	Willie Wagtail	Native	Commonly seen and heard throughout survey area
Spilopelia senegalensis senegalensis	Laughing Turtle Dove	Introduced	Seen and heard multiple times in trees and flying over survey area
Taeniopygia guttata	Zebra Finch	Native	Two finches observed in Jarrah tree
Threskiornis moluccus	Australian White Ibis	Native	Observed multiple times during survey

Species	Vernacular	Status	Observations
Birds			
Todiramphus sanctus	Sacred Kingfisher	Native	Individual in tree in maintained garden
Trichoglossus moluccanus	Rainbow Lorikeet	Introduced	Seen and heard multiple times within survey area
Zosterops lateralis	Silver Eye	Native	Observed twice in survey area, flying through trees and in banksia woodland
Mammals			
Canis familiaris	Dog	Introduced	Common throughout survey area
Capra hircus	Goat	Introduced	Observed in paddock
Equus asinus	Donkey	Introduced	Observed in field
Equus caballus	Horse	Introduced	Horses observed in multiple paddocks in survey area
Felis catus	Cat	Introduced	Seen once during survey
Isoodon fusciventer	Quenda	Native	Observed directly and indirectly (conical digging and scat) several times in survey area
Lama glama	Llama	Introduced	Observed in field
Macropus fuliginosus	Western Grey Kangaroo	Native	Observed directly and indirectly several times in survey area
Oryctolagus cuniculus	Rabbit	Introduced	Observed directly and indirectly several times in survey area
Ovis aries	Sheep	Introduced	Observed in paddock
Vulpes vulpes	Red Fox	Introduced	Multiple scats recorded
Amphibians			
Crinia glauerti	Clicking Froglet	Native	Heard calling multiple times in drainage lines
Reptiles			
Cryptoblepharus buchananii	Buchanan's Snake- Eyed Skink	Native	Seen multiple times on trees throughout survey area
Pogona minor minor	Western Bearded Dragon	Native	Observed in survey area
Tiliqua rugosa rugosa	Bobtail	Native	Observed twice during survey

6.3.1.3 Introduced Species

Thirteen introduced and naturalised exotic species were recorded during the field survey. The species and their legal status under the BAM Act are listed below:

- Cat Felis catus Permitted s11
- Common Peafowl Pavo cristatus Permitted s11 (Exempt)
- Domestic Dog Canis familiaris Permitted s11
- Donkey Equus asinu Permitted s11
- Horse Equus caballus Permitted s11
- European Wild Rabbit Oryctolagus cuniculus Declared Pest s22(2) (C3 Prohibited)
- Goat Capra hircus Permitted s11
- Laughing Kookaburra Dacelo novaeguineae Permitted s11
- Laughing Turtle-Dove Streptopelia senegalensis Permitted s11.
- Llama Lama glama Permitted s11
- Rainbow Lorikeet Trichoglossus haematodus Declared Pest s22(2) (C3 Exempt)
- Red Fox Vulpes vulpes Declared Pest s22(2) (C3 Prohibited)
- Sheep Ovis aries Permitted s11.

The European Wild Rabbit, Red Fox and Rainbow Lorikeet are listed as Declared Pests under the BAM Act. Generally, these species were recorded sporadically throughout the survey area and were observed directly, or identified by tracks, scats and burrows.

Refer to Section 3.0 for explanations of BAM Act categories.

6.3.2 Fauna Habitat

Six broadly defined fauna habitats have been mapped within the survey area (Table 25 and Figure 10). Other than cleared areas, the most common fauna habitat is Scattered Trees. This habitat is highly variable and highly modified, and includes a mix of native and non-native eucalypts and other tree species over predominantly cleared ground. This habitat occupies 48.78 ha (28.5%) of the survey area. This habitat may be utilised as breeding, roosting and foraging habitat by the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*), Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and Baudin's Cockatoo (*Calyptorhynchus baudinii*), depending on the tree species present. This habitat is also likely to be utilised by many of the common avian species in the area.

Table 25 describes these fauna habitats, includes the area and percentage these cover within the survey area, and the conservation significant fauna species likely to utilise these habitats.

6.3.3 Fauna Habitat Linkages

Habitat linkages are typically areas or corridors of vegetation that link (larger) areas of fauna habitat. Linkages are important as they enable fauna to move freely between remnant bushland patches, therefore increasing gene-flow between populations. A study conducted by Gilbert *et al.* (1998) found that corridors and/or linkages do maintain species richness in the fragmented landscapes.

The survey area is located on the edge of a metropolitan area with significant amounts of cleared and highly modified land. Although the survey area probably does not contain any significant habitat linkages, predominantly due to clearing, habitat fragmentation and arterial roads bisecting the area, it does contain degraded drainage lines that may enable some fauna taxa to move through the area. It also sits near the Kenwick Wetlands and habitat adjacent the Hartfield Golf Club, and the survey area may provide for movement of fauna into and out of these areas. In saying the above, avian fauna species are more likely to utilise the survey area as a stepping stone from the larger areas of fauna habitat on the darling scarp, to the fragmented habitats of the Swan Coastal Plain.

Wattle Grove South Ecological Surveys

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AECOM

Table 25 Fauna habitats recorded within the survey area

Fauna Habitat	Description	Conservation Significant Species with Potential to Utilise Habitat	Area (ha)	% of Survey Area	Photo
Banksia Woodland	This habitat generally comprised a low open woodland of Banksia and Eucalyptus over a low open shrubland on loamy, sandy brown soil. The habitat is generally considered high quality due to presence of Banksia, its complexity and limited disturbance levels. Habitat quality is be reduced where areas are significantly degraded due to impacts from clearing and edge effects. Significant habitat characteristics include: dense understorey common logs of various sizes are common fine and course leaf litter common to abundant bare ground occasionally present absence of stones and boulders Large mature trees in rare	Generally good quality foraging habitat for Carnaby's Cockatoo and Baudin's Cockatoo Moderate to low quality foraging habitat for the Forest Red-tailed Black Cockatoo Contains occasional breeding tree for black cockatoos Habitat for Quenda.	3.52	2.06	
	common.				

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AECOM

				Darling scarp contained pea gravel.	
				soils of areas at base of	
				common	
				present, small hollows	
				 large hollows occasionally 	
				boulders	
				 absence of stones and 	
				present	
				 bare ground occasionally 	
				common	
				 fine and course leaf litter 	
				variable abundance	
				 logs of various sizes in 	
				occasionally present	
				dense understorey	
				eucalypts	
				presence of large mature	
				iliciude.	
				Significant habitat characteristics	
				disturbance levels.	
				structural complexity and	
				degradation) quality due to the	
				moderate (depending on degree of	
			Habitat for Quenda	This habitat is considered high to	
			- Baudin's Cockatoo		
			- Carnaby's Cockatoo	over sandy brown soils.	
			Cockatoo	open forest over a low shrubland	
			- Forest Red-tailed Black	contains a <i>Eucalyptus</i> woodland /	
			habitat for:	the survey area though generally	Woodland
	2.31	3.94	 Foraging, breeding and roosting 	This habitat is variable throughout	Eucalyptus
Photo	Survey Area	(ha)	Potential to Utilise Habitat	Description	Fauna Habitat
	% of	Δτορ	Conservation Significant Species with		

73

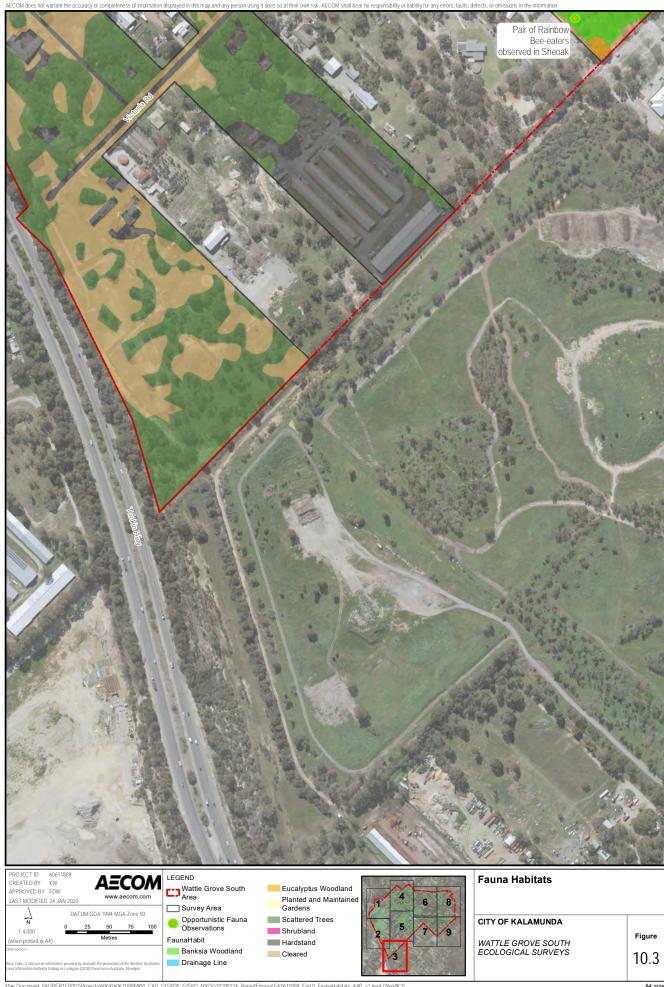
	28.54	48.78	 Foraging, breeding and roosting habitat for: Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Baudin's Cockatoo Marginal habitat for Quenda. 	This habitat is varied and contains large mature native and non-native eucalypt trees, as well as other introduced species such as Cape Lilac and Jacaranda. Trees were generally recorded over cleared areas. The significant fauna habitat characteristics include: Presence of large mature trees Absence of dense understorey Small hollows are common,	Scattered Trees
	4.24	7.25	 Predominantly foraging habitat, but also occasionally breeding and roosting habitat for: Forest Red-tailed Black Cockatoo Carnaby's Cockatoo Baudin's Cockatoo Habitat for Quenda. 	Highly variable habitat including areas of planted and maintained native and introduced vegetation. The habitat is considered low to moderate quality due to disturbance levels and limited habitat complexity. Significant habitat characteristics include: mature trees rare variability of understorey, with areas of dense understorey generally absent general lack of hollows bare sandy ground abundant absence of stones, boulders and rock crevices.	Planted and Maintained Gardens
Photo	% of Survey Area	Area (ha)	Conservation Significant Species with Potential to Utilise Habitat	Description	Fauna Habitat

Fauna Habitat	large hollows are rare Logs of all sizes are rare to occasionally present Course and fine litter are present but generally only under trees. Bare sandy ground abundant Absence of stones, boulders and rock crevices.	Conservation Significant Species with Potential to Utilise Habitat	Area (ha)	% of Survey Area	Photo
	large hollows are rare Logs of all sizes are rare to occasionally present Course and fine litter are present but generally only under trees. Bare sandy ground abundant Absence of stones, boulders and rock crevices.				

Note: Areas of hardstand (e.g. buildings, roads etc) were also mapped, however these provide little in the way of fauna habitat.



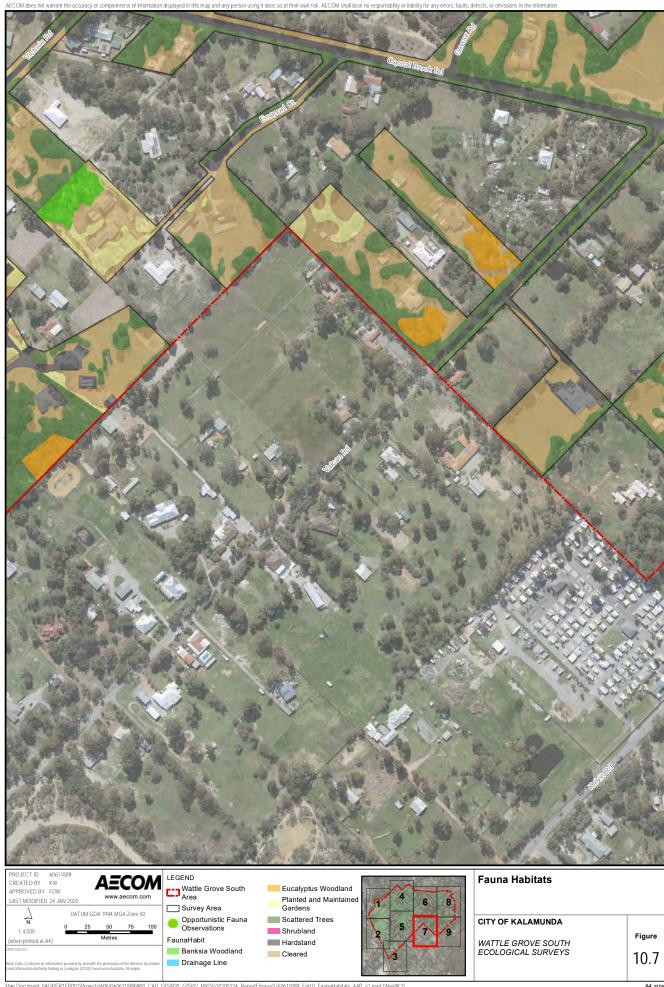




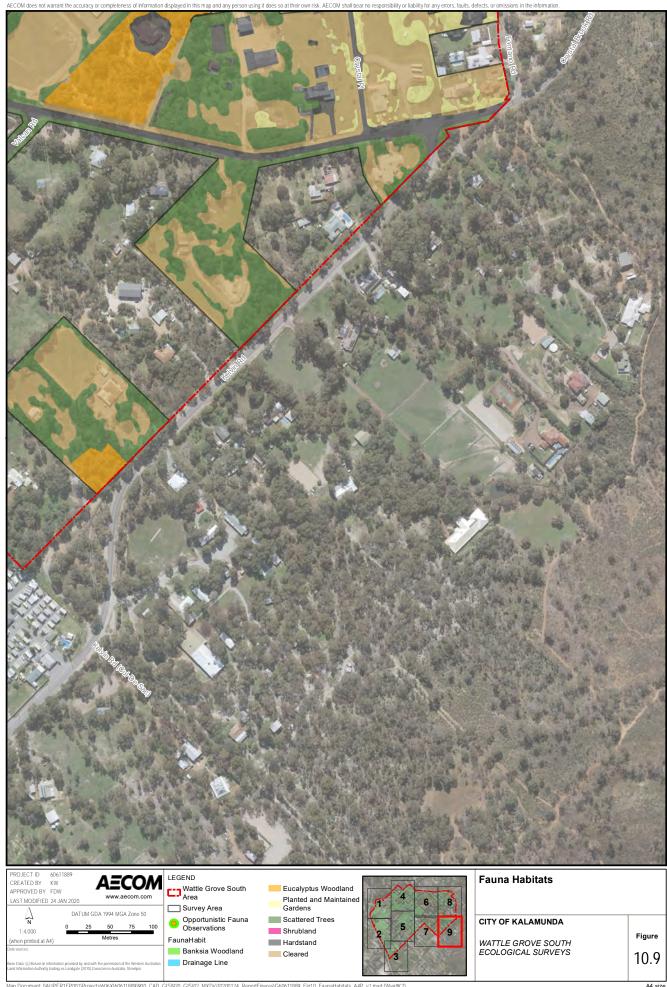












6.4 Black Cockatoos

6.4.1 Ecology

6.4.1.1 Carnaby's Cockatoo

Carnaby's Cockatoo *Calyptorhynchus latirostris* is endemic to the southwest of Western Australia, extending from the Murchison River to Esperance, and inland to Coorow, Kellerberrin and Lake Cronin. This black cockatoo has a white patch on its cheek, white bands on its tail, and a strong curved bill. Carnaby's Cockatoo is a seasonal visitor to the Swan Coastal Plain, which provides important foraging and roosting habitat during the non-breeding season.

Carnaby's Cockatoo feeds on seeds, nuts and flowers of a variety of native and exotic plants. Feed plants include the various proteaceous species (e.g. *Banksia*, *Grevillea* and *Hakea*), Marri *Corymbia calophylla*, Jarrah *Eucalyptus marginata*, and seeds from the cones of Pine *Pinus* sp. trees. Cockatoo flocks follow vegetation corridors and actively avoid cleared and open areas when moving between roosting, water and food resources. Habitat fragmentation increases the distances cockatoos need to travel between resources. Proximity of foraging habitat and water has been demonstrated to be critical to support roosting and breeding sites (Le Roux, 2017).

Carnaby's Cockatoo displays strong pair bonds and nest in the hollows of live or dead mature eucalypts including Salmon Gum *Eucalyptus salmonophloia*, York *Gum E. loxophleba* subsp. *loxophleba*, Flooded Gum *E. rudis*, Karri *E. diversicolor*, Wandoo *E. wandoo* and Tuart *E. gomphocephala* and Marri *Corymbia calophylla*, (DSEWPaC, 2012). Nest hollows generally range from 2.5-12 m above ground, size of entrance from 23-30 cm and depth of hollows from 1-2.5 m (Johnstone and Storr, 1998).

Carnaby's Cockatoo has undergone a dramatic decline of approximately 50 percent in the past 45 years, with the main contributing factors the clearing of core breeding habitat in the Wheatbelt, the deterioration of nesting hollows, and clearing of foraging habitat.

Breeding habitat for this species occurs in the Wheatbelt, Jarrah Forest and South Coast regions, and the species is expanding its current breeding range with small patches of breeding habitat now being utilised across the SCP. After breeding, Carnaby's Cockatoo disperse to the higher rainfall coastal areas of the south-west of Western Australia to feed in late December to July. Breeding has been recorded from early July to mid-December.

Carnaby's Cockatoos were not directly observed during the field survey, however probable foraging evidence was recorded on three occasions.

6.4.1.2 Forest Red-tailed Black Cockatoo

The Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* is endemic to the south-west humid and semi-humid zones of Western Australia, where it inhabits dense Jarrah, Karri and Marri forests which receive more than 600 mm average annual rainfall (DSEWPaC, 2012). It has a pair of black central tail feathers and a bright red, orange or yellow barring on the tail.

This species predominantly feeds in eucalypt forests, preferring Marri *Corymbia calophylla* and Jarrah *Eucalyptus marginat*a seeds, but also feeding on Blackbutt *E. patens*, Albany Blackbutt *E. staeri*, Karri *E. diversicolor*, Sheoak *Allocasuarina sp.* and Snottygobble *Persoonia longifolia* (Johnstone, 2016 pers. comm.).

Forest Red-tailed Black Cockatoo are monogamous and pairs nest in tree hollows from 6.5 to 33 m above ground. Most nests are in very large and very old, mature Marri (Johnstone, Kirkby & Sarti, 2013), though they will nest in other eucalypts such as Tuart (Johnstone, 2016 pers. comm.). Breeding habitat for this species occurs in the eastern margins of the Jarrah forests of the Wheatbelt, and within the Jarrah Forest regions, and the Forest Red-tailed Black Cockatoo is expanding its current breeding range with small patches of breeding habitat now being utilised across the SCP.

Two individuals of the Forest Red-tailed Black Cockatoo were observed foraging in a Marri tree, multiple birds were seen and heard flying over the survey area, and multiple observations of old and recent foraging evidence (Table 24) was recorded during the field survey.

6.4.1.3 Baudin's Cockatoo

Baudin's Cockatoo *Calyptorhynchus baudinii* is distributed throughout the south-western humid and subhumid zones, from the northern Darling Range and adjacent far east of the SCP (south of the Swan River), south to Bunbury and across to Albany (Johnstone & Storr, 1998). It is a large black cockatoo with rectangular white patches in the tail. Males have a pink eye ring, the female a dark eye ring.

Baudin's Cockatoo forages primarily in eucalypt forest, where it feeds on seeds, flowers, nectar and buds from Marri *Corymbia calophylla*, and seeds of *Eucalyptus* and proteaceous species (e.g. *Banksia* and *Hakea*), as well as orchard fruits and Pines *Pinus* sp. It also takes insect larvae and insects (including beetle, wasp and moth larvae) from under bark and in wood of live and dead trees, from galls and from flower spikes of *Xanthorrhoea* and the pith of *Anigozanthos flavidus* (Johnstone & Kirkby, 2008).

This black cockatoo primarily nests in tree hollows in live or dead Karri *Eucalyptus diversicolor*, Marri *Corymbia calophylla*, Wandoo *Eucalyptus wandoo* and Tuart *Eucalyptus gomphocephala* (DSEWPaC, 2012b). Baudin's Cockatoo nests in spring in the deep southwest of Western Australia.

No Baudin's Cockatoos or foraging evidence were observed in or adjacent the survey area.

6.4.2 Breeding

Hollow formation in Eucalypt trees is a result of a number of processes including fungal attack, termites and fire, and the propensity for hollow formation varies between species (Whitford, 2002). In order to be suitable for black cockatoos, hollow entrances need to be at least 100 mm in diameter.

A total of 730 hollow-forming (generally native) breeding habitat trees were identified within the survey area. Just over 56% of these were Marri and 27% were Jarrah, with the remaining Tuart, stags, Flooded Gums, Wandoo and *Eucalyptus todtiana*. Hollows in Jarrah tend to be smaller than those found in Marri, consequently, black cockatoos, particularly Forest Red-tailed Black Cockatoos breed predominantly in Marri in the Jarrah-Marri forest of the south west (Whitford, 2002; Johnstone *et al.*, 2013). On the Swan Coastal Plain most black cockatoo breeding records, particularly for Carnaby's Cockatoo are in Tuart (Johnstone & Kirkby, 2011), which were just over 6% of the total number of breeding habitat trees within the survey area.

Seventeen of the 730 trees contain a total of 26 potentially suitable hollows for breeding black cockatoos. All were considered to be large enough at their entrances with potentially sufficient floor and chamber space (when observed from the ground). However, hollows could not generally be fully inspected from the ground to determine if the hollows were deep enough for nesting to occur.

Refer to Appendix E for the details of the 17 trees with potentially suitable hollows, Figure 11 for locations of these trees and Appendix F full details of all 730 breeding habitat trees.

6.4.3 Roosting

Carnaby's and Baudin's Cockatoos roost in or near riparian environments or near other permanent water sources, generally within any tall trees, but particularly Flat-topped Yate, Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced eucalypts and introduced pines. The Forest Red-tailed Black Cockatoo prefers the edges of forests for roosting, within any tall trees, but particularly tall Jarrah, Marri, Blackbutt, Tuart and introduced eucalypt trees (DotEE, 2017). The Birdlife (2018) black cockatoo roosting data contains a confirmed Forest Red-tailed Black Cockatoo roosting site in the survey area at 35 Gayour Road, with one unconfirmed roost site located at 121 Crystal Brooke Road.

No additional roosting sites were confirmed during the field survey.

6.4.4 Foraging habitat

6.4.4.1 Carnaby's Cockatoo

The survey area contains a total of 69.39 ha of foraging habitat for Carnaby's Cockatoo. This includes 41.14 ha of Very High and High Quality foraging habitat. This generally consisted of habitats contiaing scattered mature eucalypts (potential breeding trees). Foraging habitat is presented in Figure 12, and total areas for each foraging quality are presented in Table 26. The foraging quality assessments are presented in Appendix E.

Carnaby's Cockatoo foraging evidence was recorded at three locations within the survey area (refer to Table 27).

Table 26 Carnaby's Cockatoo foraging habitat areas

Foraging Quality	Area (ha)
Low Quality (1-3)	10.33
Quality (4-6)	17.91
High Quality (7-8)	4.52
Very High Quality (>8)	36.62
TOTAL	69.39

Table 27 Potential Carnaby's Cockatoo foraging evidence

ID	Coordinates	Plate
16	116.0177, -32.0122	
46	116.004, -32.0048	

ID	Coordinates	Plate
107	116.0022, -32.0219	

6.4.4.2 Forest Red-tailed Black Cockatoo

The survey area contains a total of 59.53 ha of foraging habitat for the Forest Red-tailed Black Cockatoo. This includes 33.52 ha of Very High and High Quality foraging habitat, which generally consists of scattered mature Jarrah and Marri trees (potential breeding trees). Foraging habitat is presented spatially in Figure 13, and the total areas for each foraging quality are presented in Table 28. The foraging quality assessments are presented in Appendix E.

Potential foraging evidence from the Forest Red-tailed Black Cockatoo were recorded commonly throughout the survey area (Table 30).

Table 28 Forest Red-tailed Black Cockatoo foraging habitat areas

Foraging Quality	Area (ha)
Low Quality (1-3)	22.10
Quality (4-6)	3.92
High Quality (7-8)	0.00
Very High Quality (>8)	33.52
TOTAL	59.53

6.4.4.3 Baudin's Cockatoo

The survey area contains a total of 69.39 ha of foraging habitat for the Baudin's Cockatoo. This includes 41.14 ha of High Quality and Very High Quality foraging habitat, which generally consists of scattered eucalypts (potential breeding trees). Foraging habitat is presented spatially in Figure 14, and the total areas for each foraging quality are presented in Table 29. The foraging quality assessments are presented in Appendix E.

No foraging evidence from the Baudin's Cockatoo was recorded within the survey area.

Table 29 Baudin's Cockatoo foraging habitat areas

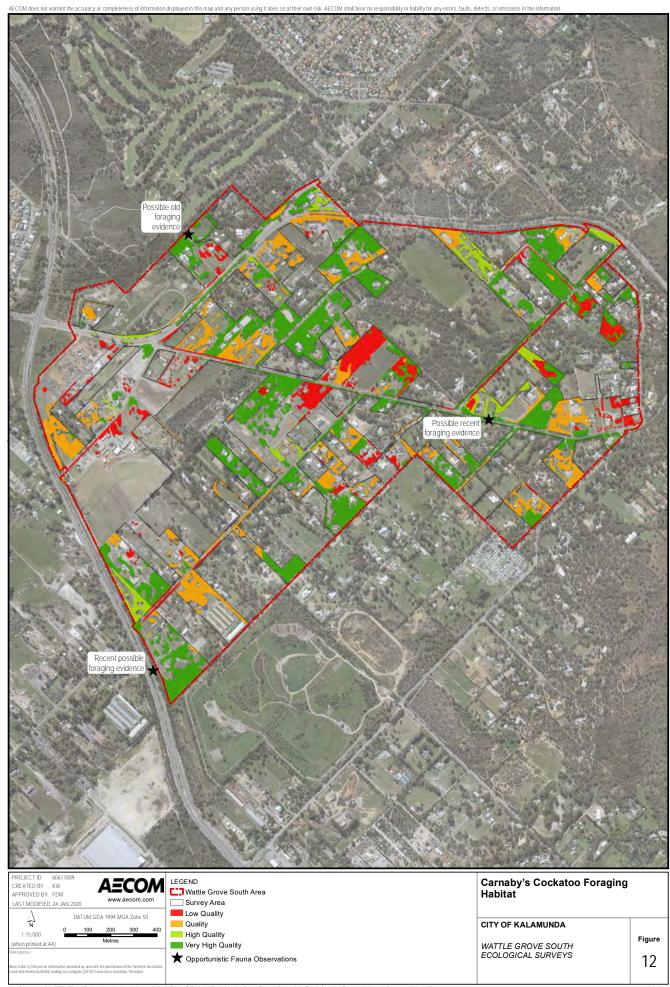
Foraging Quality	Area (ha)
Low Quality (1-3)	13.73
Quality (4-6)	14.51
High Quality (7-8)	4.52
Very High Quality (>8)	36.62
TOTAL	69.39

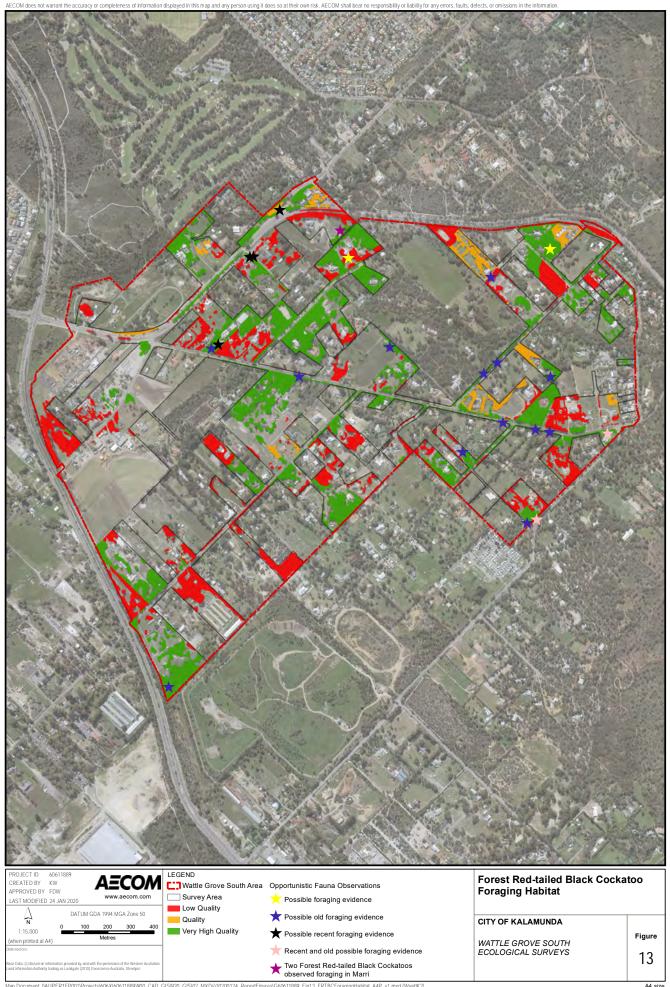
Table 30 Potential Forest Red-tailed Black Cockatoo foraging evidence

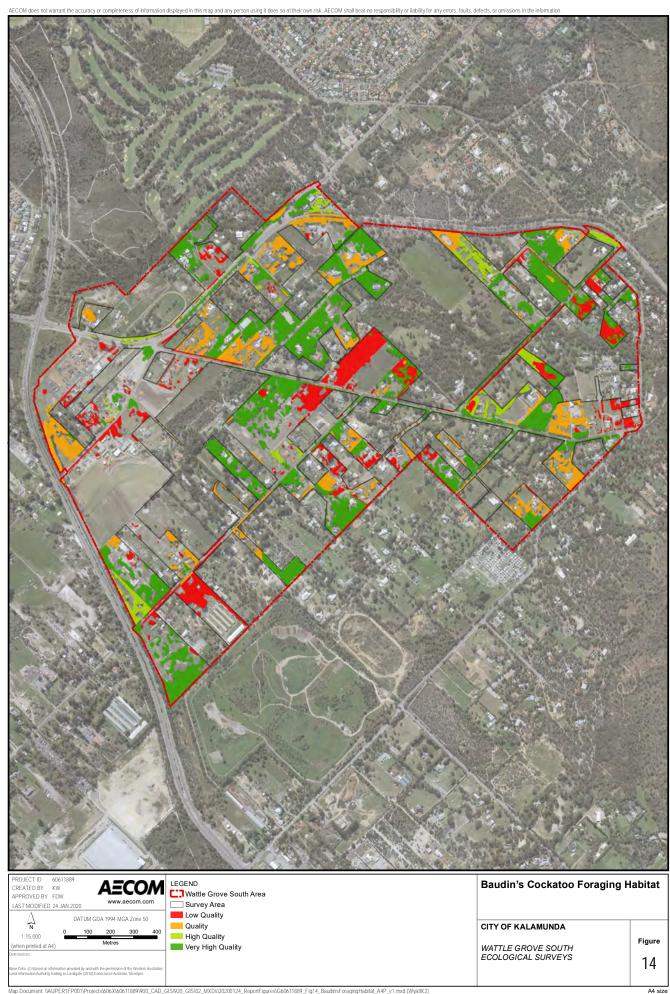
ID	Coordinates	Plate	ID	Coordinates	Plate
5	116.0183, -32.0100	le.	48	116.0067, -32.0058	
7	116.0177, -32.0105		59	116.0133, -32.0094	
10	116.0207, -32.0128		72	116.0207, -32.0106	
11	116.02, -32.01267		83	116.018, -32.0070	
12	116.0185, -32.01241		85	116.0208, -32.0056	
27	116.0084, -32.0040	60	87	116.0196, -32.0163	

ID	Coordinates	Plate	ID	Coordinates	Plate
30	116.0051, -32.00934		89	116.02, -32.0162	
31	116.0055, -32.0092		90	116.0233, -32.0129	
39	116.0166, -32.0135		94	116.0071, -32.0058	
42	116.0115, -32.0059		106	116.003, -32.0227	









6.5 Environmental Values Assessment

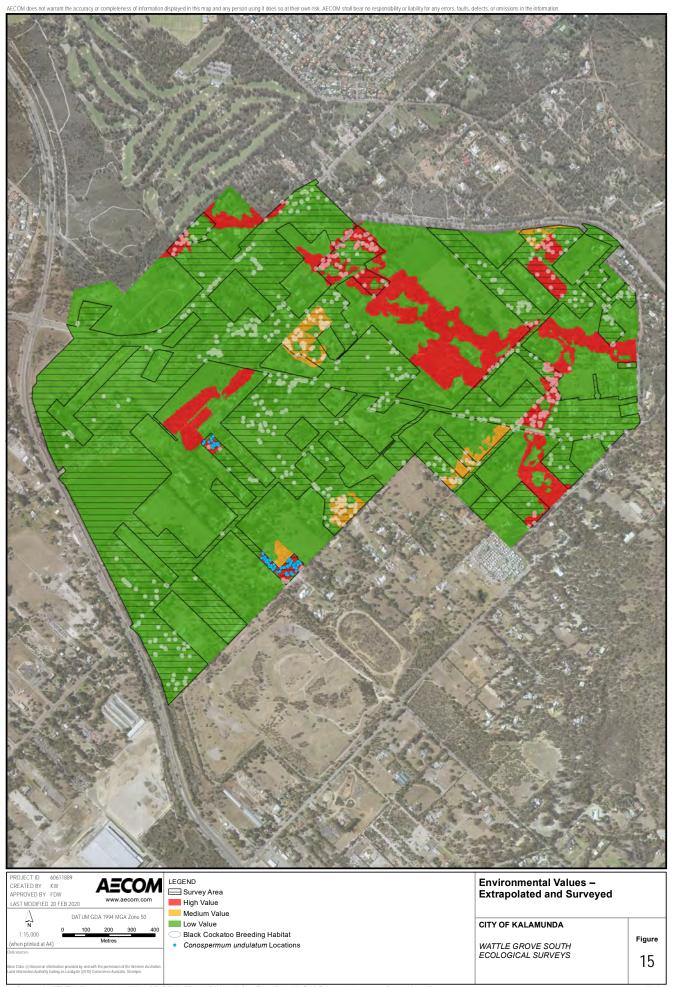
The EVA was undertaken for the entire Wattle Grove South survey area (Figure 15). This Figure shows the high, medium and low value areas. Evaluation for areas that were not surveyed was based on observations taken from outside the property and review of aerial photographs. The Environmental Values assessment for areas surveyed is presented in Figure 16.

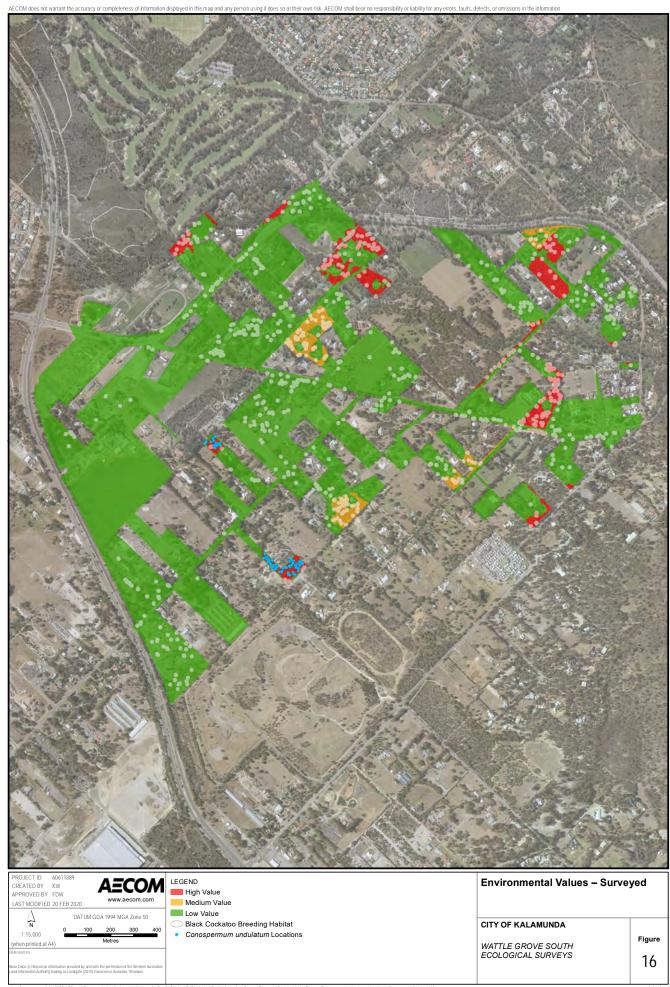
The resultant values assessment map also depicts black cockatoo habitat trees (with a 10 m buffer) to ensure these valuable assets are captured. These buffer areas are not included as part of the EVA unless they form part of a dense collection or support remnant understorey as such because they reflect point data. It is recommended that all trees are retained wherever possible. Mature trees take decades to establish and as such should be considered high value throughout. It is likely that areas not surveyed would also support black cockatoo breeding habitat trees that are as yet undefined in the EVA.

The extent of areas captured in high, medium and low are presented in Table 31.

Table 31 Categories for the environmental values assessment

Category	Values	Area
High	 Good connectivity and/or suitable size for maintaining ecological integrity BC foraging and/or breeding trees All populations of <i>C. undulatum</i> that were recorded during the survey Incorporates all TECs with the exception of two patches that are <0.2 ha which are captured as Medium Includes 90% of areas mapped as "native vegetation" with exception of areas <0.2 ha with poor connectivity. 	35.13 ha
Medium	 Connects high value areas to adjacent high value areas or as 'stepping stone' Includes BC foraging and/or breeding May include native vegetation (understorey) species 	6.88 ha
Low	 Mostly cleared open areas or stands of trees over grassland Includes planted gardens and hardscape 	301.36 ha





7.0 Conclusions

The significant ecological findings from the assessment of the survey area are outlined below:

- The EPBC TEC Banksia Woodlands of the SCP occurs in three patches, extending 2.41 ha.
- Three TECs and one PEC listed by DBCA were identified including;
 - WA TEC *C. calophylla-E. marginata* woodlands on sandy clay soils (SCP3b) requires verification from DBCA, extending 1.71 ha across two patches
 - WA TEC B. attenuata and/or E. marginata woodlands of the eastern side of the SCP (SCP20b) – requires verification from DBCA extending 1.80 across three patches
 - WA TEC *Banksia attenuata* woodland over species rich dense shrublands (SCP20a) extending 0.94 ha at one location
 - WA PEC Banksia dominated woodlands of the SCP extending for 0.15 ha at one location.
- One Threatened flora species, Conospermum undulatum (Wavy-leaved Smokebush) was recorded on two properties comprising 95 individuals. These locations are not represented in the DBCA database records.
- Three conservation significant fauna species were recorded including the Forest Red-tailed Black Cockatoo Calyptorhynchus banksii (listed as Vulnerable under the EPBC Act and the BC Act), Carnaby's Cockatoo Calyptorhynchus latirostris (listed as Endangered under the EPBC Act and the BC Act) and the Quenda Isoodon fusciventer (listed as Priority 4 by DBCA).
- Six fauna habitats were mapped. The most common fauna habitat is the Scattered Trees habitat
 which may be utilised by conservation significant species including the Forest Red-tailed Black
 Cockatoo Calyptorhynchus banksii naso, Carnaby's Cockatoo Calyptorhynchus latirostris and
 Baudin's Cockatoo Calyptorhynchus baudinii, as well as by many of the common bird species in
 the area.
- The presence of 730 hollow-forming (generally native) breeding and potential breeding trees including 410 (56%) Marri Corymbia calophylla, 195 (27%) Jarrah Eucalyptus marginata, and 125 mixed Flooded Gum *E. grandis, Tuart E. gomphocephala, E. todtiana, E. wandoo, introduced species and stags (dead unidentifiable trees). Seventeen of the 730 trees contain a total of 26 potentially suitable hollows for breeding black cockatoos.
- A total of 69.39 ha of foraging habitat for Carnaby's Cockatoo. This includes 41.14 ha of Very High and High Quality foraging habitat which generally consisted of eucalypt and Banksia woodland and scattered mature eucalypts.
- A total of 59.53 ha of foraging habitat for the Forest Red-tailed Black Cockatoo. This includes 33.52 ha of Very High Quality foraging habitat which generally consists of eucalypt woodland containing breeding and potential breeding trees.
- A total of 69.39 ha of foraging habitat for Baudin's Cockatoo. This includes 41.14 ha of Very High
 and High Quality foraging habitat which generally consisted of eucalypt and Banksia woodland
 and scattered mature eucalypts.

The ecological assessments for the Wattle Grove project included significant access and completeness limitations. This report presents the results for a selection of private properties and public land where access was granted by private land owners. It is not a comprehensive assessment of ecological values of the Wattle Grove area with approximately 50% of landowners denying access.

8.0 References

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Appendix C Quadrat and relevé data sheets

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Quadrat and relevé data sheets

Site: 6	Location: 116.00805 -32.01803		Date: 02-10-2019	
Type: Quadrat	Size: 10x10		Community: BaEpPf	
Topography: flat	Soils: sand		Colour: Grey	
Bare Ground: 20% litter		Fire: 10+		
Vegetation significance: EPBC TEC Banksia Woodlands of the SCP; WA TEC B. attenuata over species rich dense shrublands				
Condition: excellent weed encroachment				
Photo				



*	Taxon	Height cm	Foliage %
	Burchardia congesta	20	0.1
	Conostylis setigera	10	0.1
	Dasypogon bromeliifolius	10	0.1
	Hemiphora bartlingii	40	0.1
*	Hypochaeris glabra	1	0.1
	Lomandra hermaphrodita	20	0.1
	Lomandra sonderi	30	0.1
	Melaleuca trichophylla	30	0.1

*	Taxon	Height cm	Foliage %
	Mesomelaena tetragona	30	0.1
	Persoonia angustiflora	10	0.1
	Stirlingia latifolia	30	0.1
	Stylidium amoenum	3	0.1
	Thysanotus patersonii		0.1
	Thysanotus thyrsoideus	10	0.1
	Trachymene pilosa	5	0.1
	Banksia dallanneyi	10	0.2
	Cassytha glabella		0.2
	Conospermum undulatum	80	0.2
	Hibbertia huegellii	20	0.2
	Philotheca spicata	80	0.2

*	Ursinia anthemoides	10	0.2
*	Gladiolus caryophyllaceus	60	0.3
	Isopogon autumnalis	40	0.3
*	Briza maxima	30	0.5
	Drosera porrecta	10	0.5
*	Ehrharta calycina	80	0.5
	Hovea trisperma	30	0.5
	Lomandra preissii	40	0.5
	Alexgeorgea nitens	10	1
	Hakea prostrata	80	1
	Scaevola repens var. repens	5	1
	Phlebocarya filifolia	10	1
	Schoenus pedicellatus	40	1
	Tetraria octandra	20	1
	Banksia armata var. armata	70	2
	Eremaea pauciflora var. pauciflora	30	2
	Hemiandra pungens	10	2
	Lambertia multiflora var. darlingensis	100	2
	Lyginia imberbis	40	2
	Xanthorrhoea preissii	100	2
	Patersonia occidentalis	30	3
	Tricoryne elatior	20	4
	Banksia attenuata	600	5
	Allocasuarina humilis	150	8
	Mesomelaena pseudostygia	30	8

*	Taxon	Height cm	Foliage %
	Hibbertia hypericoides	50	10
	Banksia menziesii	600	
	Gompholobium confertum		
	Lepidosperma leptostachyum		
	Nuytsia floribunda		
	Petrophile linearis		
	Stylidium schoenoides		

Note: * depicts an introduced (weed) species

Site: 9	Location: 116.00003 -32.01200	Date: 03-10-2019

Type: Quadrat	Size: 10x10		Community: BmXpEc	
Topography: flat	Soils: sand		Colour: Grey	
Bare Ground: 20% litter		Fire: 10+		
Vegetation significance: None				
Condition: very good				



*	Taxon	Height cm	Foliage %
*	Avena barbata	30	0.1
	Burchardia congesta	20	0.1
	Conostylis aculeata	5	0.1
	Dampiera alata	10	0.1
	Dampiera linearis	20	0.1
*	Gladiolus caryophyllaceus	40	0.1
	Hovea trisperma	20	0.1
*	Hypochaeris glabra	1	0.1
	Thysanotus patersonii		0.1
	Trachymene Pilosa	5	0.1
	Calectasia narragara	20	0.2
	Cyathochaeta avenacea	40	0.2
	Jacksonia floribunda	20	0.2
	Lyginia imberbis	30	0.2
	Dasypogon bromeliifolius	10	0.5
	Hemiandra pungens	5	0.5
	Mesomelaena tetragona	30	0.5
	Stirlingia latifolia	40	0.5
	Agonis flexuosa	800	1
	Allocasuarina fraseriana	200	1
	Allocasuarina humilis	100	1
	Austrostipa compressa	40	1

*	Briza maxima	20	1	
	Hemiandra pungens	10	1	
	Mesomelaena pseudostygia	30	1	
	Patersonia occidentalis	20	1	
	Scaevola repens var. repens	5	1	
	Lambertia multiflora var. darlingensis	100	1.5	
	Alexgeorgea nitens	5	2	
*	Ursinia anthemoides	10	2	
	Xanthorrhoea preissii	80	2	
	Adenanthos cygnorum subsp. cygnorum	300	3	
	Hibbertia hypericoides	30	3	
	Banksia menziesii	600	5	
*	Ehrharta calycina	70	5	
	Eremaea pauciflora var. pauciflora	30	10	
	Lomandra micrantha			
	Melaleuca systena			

Note: * depicts an introduced (weed) species

Site: 13	Location: 116.00524 -32.01307		Date: 03-10-2019		
Type: Quadrat	Size: 10x10		Size: 10x10		Community: BaEpPf
Topography: Flat	Soils: Sand		Colour: Grey		
Bare Ground: 20% litter		Fire: 10+			
Vegetation significance: EPBC TEC Banksia Woodlands of the SCP; WA TEC eastern <i>B. attenuata</i> and/or <i>E. marginata</i> woodlands					
Condition: excellent					



*	Taxon	Height cm	Foliage %
	?Lobelia anceps	20	0.1
	Burchardia congesta	40	0.1
	Conostylis aurea	10	0.1
	Conostylis setigera	15	0.1
	Drosera porrecta	15	0.1
*	Gladiolus caryophyllaceus	60	0.1
	Gompholobium confertum	20	0.1
	Haemodorum laxum	100	0.1

*	Taxon	Height cm	Foliage %
*	Hypochaeris glabra	1	0.1
	Monotaxis grandiflora var. grandiflora	20	0.1
	Pericalymma ellipticum	40	0.1
	Petrophile linearis	30	0.1
	Tetraria octandra	30	0.1
	Trachymene pilosa	2	0.1
	Tricoryne elatior	30	0.1
	Agrostocrinum hirsutum	50	0.2
	Dampiera linearis	20	0.2
	Desmocladus fasciculatus	10	0.2

Hovea trisperma	20	0.2
Patersonia occidentalis	30	0.2
Tetrarrhena laevis	30	0.2
* Ursinia anthemoides	10	0.2
Bossiaea eriocarpa	30	0.5
* Briza maxima	30	0.5
Conospermum undulatum	130	0.5
Drosera erythrorhiza	1	0.5
Lomandra sonderi	30	0.5
Stirlingia latifolia	40	0.5
Acanthocarpus preissii	40	1
Lomandra drummondii	30	1
Philotheca spicata	60	1
Schoenus pedicellatus	50	1
Banksia dallanneyi	10	2
Melaleuca trichophylla	50	2
Banksia attenuata	300	3
Lepidosperma leptostachyum	50	3
Lomandra micrantha	20	3
Petrophile macrostachya	80	3
Xanthorrhoea preissii	100	3
Isopogon autumnalis	60	6
Hibbertia hypericoides	40	8
Eremaea pauciflora var. pauciflora	50	12
Banksia menziesii	600	15
Mesomelaena pseudostygia	40	15
Eucalyptus todtiana		

*	Taxon	Height cm	Foliage %
	Adenanthos cygnorum subsp. cygnorum		
	Caladenia flava		
	Daviesia nudiflora subsp. nudiflora		
*	Eragrostis curvula		
	Hakea prostrata		
	Hemiphora bartlingii		
	Hybanthus calycinus		
	Jacksonia lehmannii		
	Lysinema pentapetalum		
	Petrophile seminuda		
	Scaevola repens var. repens		
	Thelymitra graminea		

Note: * depicts an introduced (weed) species

JBS&G QUADRAT

Site: Q01	Location: 116.003695, -32.012625		Date: 24-01-2022
Type: Quadrat	Size: 10x10		Community: BaEpPf
Topography: flat	Soils: sand, sandy loam.		Soil Colour: Light brown gray
Bare Ground: 5% Litter 10%		Fire: 10+ years	
Vegetation significance: EPBC TEC Banksia Woodlands of the SCP; WA TEC eastern <i>B. attenuata</i> and/or <i>E. marginata</i> woodlands			
Condition: Excellent			



Scientific Name	Height	Cover
Banksia menziesii	500	15
Banksia attenuata	800	10
Xanthorrhoea preissii	120	3
Xanthorrhoea gracilis	110	3
Stirlingia latifolia	60	0.01
Dasypogon bromeliifolius	30	5
Bossiaea eriocarpa	50	0.001
Melaleuca trichophylla	55	0.01
Mesomelaena pseudostygia	50	2
Petrophile macrostachya	60	0.02
Hibbertia hypericoides	30	0.5
Hemiophora bartlingii	30	0.001
Monotaxis grandiflora subsp. grandiflora	25	0.001
Lomandra sonderi	30	0.001
Isopogon autumnalis	50	0.03
Pimelia sulphurea	45	0.005
Patersonia occidentalis	40	0.01
Banksia dallanneyi subsp. dallanneyi ?var. mellicula	25	0.025
Lyginia imberbis	60	0.001
Trachymene pilosa	10	0.001
Hypochaeris glabra	10	0.001

Scientific Name Height Cover Burchardia congesta 65 0.005 Hakea lissocarpha 150 0.005 Desmoclodus fasciculatus 15 0.1 Conostylis setigera subsp. setigera 20 0.001 Gladiolus caryophyllaceus 100 0.001 Allocasuarina humillis 60 0.25 Lomandra nigricans 45 0.001 Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelli 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.01 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifoliu			
Hakea lissocarpha 150 0.005 Desmocladus fasciculatus 15 0.1 Conostylis setigera subsp. setigera 20 0.001 Gladiolus caryophyllaceus 100 0.001 Allocasuarina humilis 60 0.25 Lomandra nigricans 45 0.001 Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma lepto	Scientific Name	Height	Cover
Desmocladus fasciculatus 15 0.1 Conostylis setigera subsp. setigera 20 0.001 Gladiolus caryophyllaceus 100 0.001 Allocasuarina humilis 60 0.25 Lomandra nigricans 45 0.001 Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dempiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma lepto	Burchardia congesta	65	0.005
Conostylis setigera subsp. setigera 20 0.001 Gladiolus caryophyllaceus 100 0.001 Allocasuarina humilis 60 0.25 Lomandra nigricans 45 0.001 Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.01 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 <	Hakea lissocarpha	150	0.005
Gladiolus caryophyllaceus 100 0.001 Allocasuarina humillis 60 0.25 Lomandra nigricans 45 0.001 Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora c	Desmocladus fasciculatus	15	0.1
Allocasuarina humillis 60 0.25 Lomandra nigricans 45 0.001 Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis <	Conostylis setigera subsp. setigera	20	0.001
Lomandra nigricans 45 0.001 Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.01 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicula	Gladiolus caryophyllaceus	100	0.001
Petrophile rigida 60 0.2 Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca tric	Allocasuarina humilis	60	0.25
Tetraria octandra 80 5 Hemiandra linearis 30 1 Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca trichophylla 30 0.001 Hovea t	Lomandra nigricans	45	0.001
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Philotheca spicata 60 0.01 Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca trichophylla 30 0.01 Hovea trisperma var. trisperma 40 0.001	Tetraria octandra	80	5
Conospermum undulatum 120 0.5 Eremaea pauciflora var. pauciflora 35 2 Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca trichophylla 30 0.01 Hovea trisperma var. trisperma 40 0.001	Hemiandra linearis	30	1
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Haemodorum laxum 35 0.001 Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca trichophylla 30 0.01 Hovea trisperma var. trisperma 40 0.001	Conospermum undulatum	120	0.5
Xanthosia huegelii 15 0.001 Isopogon autumnalis 50 1 Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca trichophylla 30 0.01 Hovea trisperma var. trisperma 40 0.001	Eremaea pauciflora var. pauciflora	35	2
Isopogon autumnalis Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca trichophylla 30 0.01 Hovea trisperma var. trisperma 40 0.001	Haemodorum laxum	35	0.001
Drosera erythrorrhiza 0 0.001 Petrophile linearis 60 0.01 Scaevola repens var. repens 20 0.2 Gastrolobium linearifolium 35 0.01 Dampiera linearis 25 0.001 Desmocladus flexuosus 20 0.001 Lepidosperma leptostachyum 45 0.001 Conostylis setigera subsp. setigera 20 0.001 Stylidium carnosum 5 0.001 Chaetospora curvifolia 20 0.001 Stachystemon vermicularis 80 0.001 Melaleuca trichophylla 30 0.01 Hovea trisperma var. trisperma 40 0.001	Xanthosia huegelii	15	0.001
Petrophile linearis600.01Scaevola repens var. repens200.2Gastrolobium linearifolium350.01Dampiera linearis250.001Desmocladus flexuosus200.001Lepidosperma leptostachyum450.001Conostylis setigera subsp. setigera200.001Stylidium carnosum50.001Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Isopogon autumnalis	50	1
Scaevola repens var. repens200.2Gastrolobium linearifolium350.01Dampiera linearis250.001Desmocladus flexuosus200.001Lepidosperma leptostachyum450.001Conostylis setigera subsp. setigera200.001Stylidium carnosum50.001Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Drosera erythrorrhiza	0	0.001
Gastrolobium linearifolium350.01Dampiera linearis250.001Desmocladus flexuosus200.001Lepidosperma leptostachyum450.001Conostylis setigera subsp. setigera200.001Stylidium carnosum50.001Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Petrophile linearis	60	0.01
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Desmocladus flexuosus200.001Lepidosperma leptostachyum450.001Conostylis setigera subsp. setigera200.001Stylidium carnosum50.001Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Gastrolobium linearifolium	35	0.01
Lepidosperma leptostachyum450.001Conostylis setigera subsp. setigera200.001Stylidium carnosum50.001Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Dampiera linearis	25	0.001
Conostylis setigera subsp. setigera200.001Stylidium carnosum50.001Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Desmocladus flexuosus	20	0.001
Stylidium carnosum50.001Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Lepidosperma leptostachyum	45	0.001
Chaetospora curvifolia200.001Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Conostylis setigera subsp. setigera	20	0.001
Stachystemon vermicularis800.001Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Stylidium carnosum	5	0.001
Melaleuca trichophylla300.01Hovea trisperma var. trisperma400.001	Chaetospora curvifolia	20	0.001
Hovea trisperma var. trisperma 40 0.001	Stachystemon vermicularis	80	0.001
	Melaleuca trichophylla	30	0.01
Stylidium androsaceum 10 0.001	Hovea trisperma var. trisperma	40	0.001
	Stylidium androsaceum	10	0.001

Scientific Name	Height	Cover
Drosera ?macrantha	60	0.001
Caladenia ?flava	5	0.001
Nuytsia floribunda	1200	5
Pinus pinaster	1800	5
Corymbia calophylla	800	3
Adenanthos cygnorum subsp. cygnorum	300	5
Xanthorrhoea preissii	130	1.5
Ehrharta calycina	100	15
Briza maxima*	25	10
Ursinia anthemoides	20	0.5
Hypochaeris glabra	20	5
Gladiolus caryophyllaceus*	60	0.001
Erodium botrys	20	0.001
Acacia saligna	170	0.5
Briza minor*	20	0.001
Eragrostis curvula*	80	0.001

JBS&G OBSERVATION POINT NOTES

Relevé Number: S1 Project: Wattle Grove

Lot/Plan: 804 / P059946 **Location:** 116.004815, -32.01172

Photo:



Site Description:

Area is cleared and contained *Pinus pinaster, Corymbia calophylla (marri) and Nuytsia floribunda (Western Australian Christmas tree) over Adenanthos cygnorum, Xanthorrhea preissii, Acacia saligna and weeds.

	
Species noted	
Scientific Name	Common Name
*Pinus pinaster	Pine
Corymbia calophylla	Marri
Adenanthos cygorum	Common Woolybush
Xanthorrhea preissii	Grass Tree
Acacia saligna	Orange Wattle

Relevé Number: S2 Project: Wattle Grove

Lot/Plan: 804 / P059946 **Location:** 116.003652, -32.012589

Photo:



Site Description:

Predominantly cleared area., with scattered remnant tree and shrub species.

Species noted	
Scientific Name	Common Name
Allocasuarina sp.	She-oak
Corymbia calophylla	Marri
Adenanthos cygorum	Common Woolybush
Xanthorrhea preissii	Grass Tree
Acacia saligna	Orange Wattle
5 L (A) L 00	

Relevé Number: S3	Project: Wattle Grove
Lot/Plan: 804 / P059946	Location: 116.004838, -32.011721
Photo:	



Vegetation in Excellent condition consisting of Banksia woodland over a species rich native shrubland. The threatened plant *Conospermum undulatum* was observed in this community.

Species noted	
Scientific Name	Common Name
Banksia menziesii	
Xanthorrhea preissii	Grass tree
Conospermum undulatum	

Relevé Number: S4	Project: Wattle Grove
Lot/Plan: 107 / D85261	Location: 116.000499, -32.016746
Photo:	



Site Description:	
Area completely degraded and has recently been partially cleared.	
Species noted	
Scientific Name	Common Name
Eucalyptus marginata	Jarrah
Leptospermum laevigatum*	Victorian tea tree

Relevé Number: S5	Project: Wattle Grove
Lot/Plan: 81 / D085279	Location: 116.006996, -32.013683
Photo:	



Site Description:

Site was cleared and grassed, with planted *Eucalyptus camaldulensis* (River red Gum) along the fence lines. The condition was Completely Degraded (Keighery, 1994).

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Species noted	
Scientific Name	Common Name
Eucalyptus camaldulensis	River Red Gum

Relevé Number: S6	Project: Wattle Grove
Lot/Plan: 12 / Do69292	Location: 115.998016, -32.012823

Photo:



Site Description:

East of the easement is cleared with patches of *Melaleuca preissiana* (moonah) with an understory of *Zantedeschia aethiopica (arum lily) and mixed grasses. The remainder of the lot is parkland cleared with occasional *Xanthorrrhoea preissii* and planted Eucalypts, including the eastern states *E. robusta. Condition is completely degraded.

Species noted	
Scientific Name	Common Name
Melaleuca preissiana	Moonah
*Zantedeschia aethiopica	Arum Lily
Xanthorrrhoea preissii	Grass Tree
*E. robusta	Swmap Mahogany

Relevé Number: S7	Project: Wattle Grove
Lot/Plan: 12/ D069292	Location: 115.99786, -32.013487
Photo:	



The western side of Lot 12 is an easement for a gas pipeline. Planted *Eucalyptus camaldulensis* line the lot boundary with a walkway beneath them. The remainder of the easement contains weeds and weedy grasses

Species noted	
Scientific Name	Common Name
Eucalyptus camaldulensis	River Red Gum

Relevé Number: S8	Project: Wattle Grove
Lot/Plan: 12 / D069292	Location: 1155.998315, -32.013406
Photo:	



East of the easement is cleared with patches of *Melaleuca preissiana* (moonah) with an understory of **Zantedeschia aethiopica* (arum lily) and mixed grasses. The remainder of the lot is parkland cleared with occasional *Xanthorrrhoea preissii* and planted Eucalypts, including the eastern states **E. robusta*. Condition is completely degraded.

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Species noted	
Scientific Name	Common Name
Melaleuca preissiana	Moonah
*Zantedeschia aethiopica	Arum Lily
Xanthorrrhoea preissii	Grass Tree
*E. robusta	Swmap Mahogany

Relevé Number: S9	Project: Wattle Grove
Lot/Plan: 13 / D069293	Location: 115.997889, -32.011637





Lot 13 was parkland cleared and contained numerous introduced trees, including *Melia azedarach (Cape lilac), *Erythrina ×sykesii (coral tree), *Leptospermum laevigatum (Victorian tea tree) and Eastern states ironbarks (*Eucalyptus sp.). One mature Eucalyptus todtiana was also present.

Species noted	
Scientific Name	Common Name
*Melia azedarach	Cape lilac
*Erythrina ×sykesii	coral tree
*Leptospermum laevigatum	Victorian tea tree
*Eucalyptus sp.	Ironbark (Eastern States)
Eucalyptus todtiana	Pricklybark

Relevé Number: S10 Project: Wattle Grove

Lot/Plan: 12 / Do69292 **Location:** 115.998276, -32.013358

Photo:



Site Description:

Area is completely degraded and has recently had trees removed.

Species noted	
Scientific Name	Common Name

Relevé Number: S11 Project: Wattle Grove

Lot/Plan: 107 / D85261 **Location:** 116.000315, -32.01701

Photo:



Site Description:

Area completely degraded. Scattered native vegetation present. Recent clearing has taken place.

The completely degraded. Scattered native vegetation present: Recent cleaning has taken place.		
Species noted		
Scientific Name	Common Name	
Melaleuca preissiana	Moonah	
Eucalyptus camaldulensis	River Red Gum	
Corymbia calophylla	Marri	

Relevé Number: S12 Project: Wattle Grove

Lot/Plan: 13 / D069293 **Location:** 115.998806, -32.011927

Photo:



Site Description:

Area was parkland cleared and contained numerous introduced trees and one mature *Eucalyptus todtiana* was also present. Area completely degraded.

tourism that also present the description of the de		
Species noted		
Scientific Name	Common Name	
*Melia azedarach	Cape lilac	
*Erythrina ×sykesii	coral tree	
*Leptospermum laevigatum	Victorian tea tree	
*Eucalyptus sp.	Eastern states ironbarks	
Eucalyptus todtiana	Pricklybark	

Relevé Number: S13 **Project:** Wattle Grove

Lot/Plan: 12 / D069292 Location: 115.997607, -32.012858

Photo:



Site Description:

The western side of Lot 12 is an easement for a gas pipeline. Planted line of Eucalyptus camaldulensis occurs along the lot boundary with a walkway beneath them. The remainder of the easement contains weeds and weedy grasses. East of the easement is cleared with patches of Melaleuca preissiana with an understory of arum lily and grass. The remainder of the lot is parkland cleared with occasional Xanthorrrhoea preissii and planted Eucalypt species, including the eastern states *E. robusta.

Species noted	
Scientific Name	Common Name
Eucalyptus camaldulensis	River Red Gum
Melaleuca preissiana	
Xanthorrrhoea preissii	Grass Tree
*E. robusta	Swamp Mahogany

Relevé Number: NO1Project: Wattle GroveLot/Plan: 210 / P003380Location: 804 / P059946

Photo:



Site Description:

Lot 210 was observed through the fence from Lot 804. The vegetation was consistent with Lot 804's Banksia woodland, condition appeared Excellent and *Conospermum undulatum* (T) was visible through the fence.

Species noted	
Scientific Name	Common Name
Conospermum undulatum	
Adenanthos cygnorum subsp. cygnorum	
Eremaea pauciflora var. pauciflora	
Anigozanthos manglesii subsp. manglesii	
Hibbertia hypericoides	
Isopogon autumnalis	
Eucalyptus marginata	
Banksia attenuata	
Allocasuarina fraseriana	
Gompholobium tomentosum	
Bossiaea eriocarpa	
Mesomelaena pseudostygia	
Ehrharta calycina	
Gastrolobium capitatum	
Scholtzia involucrate	
Ursinia anthemoides	
Wahlenbergia capensis	

Briza maxima	
Leptospermum laevigatum	
Acacia saligna	
Tetraria octandra	
Allocasuarina humilis	
Styphelia sp.	
Gladiolus caryophyllaceus	
Scaevola sp.	
Dasypogon bromeliifolius	
Petrophile seminuda	
Xanthorrhoea preissii	
Jacksonia floribunda	

Relevé Number: NO2 Project: Wattle Grove

Location: 116.0043678, -32.0119128

Photo:



Site Description:

Open woodland of *Banksia menziesii*, *B attenuata*, *Euc todtiana* and *Allocasuarina fraseriana* over *Xanthorrhoea preissi*, *Allocasuarina humilis* and *Jacksonia* sp. Area is in excellent condition.

Species noted	
Scientific Name	Common Name
Conospermum undulatum	
Adenanthos cygnorum subsp. cygnorum	
Eremaea pauciflora var. pauciflora	
Anigozanthos manglesii subsp. manglesii	
Hibbertia hypericoides	
Isopogon autumnalis	
Eucalyptus marginata	
Banksia attenuata	
Allocasuarina fraseriana	
Gompholobium tomentosum	
Bossiaea eriocarpa	
Mesomelaena pseudostygia	
Ehrharta calycina	
Gastrolobium capitatum	
Scholtzia involucrate	
Ursinia anthemoides	
Wahlenbergia capensis	

Briza maxima
Leptospermum laevigatum
Acacia saligna
Tetraria octandra
Allocasuarina humilis
Styphelia sp.
Gladiolus caryophyllaceus
Scaevola sp.
Dasypogon bromeliifolius
Petrophile seminuda
Xanthorrhoea preissii
Jacksonia floribunda

Relevé Number: NO3	Project: Wattle Grove
Lot/Plan: 804 / P059946	Location: 116.0051977, -32.0112041

Photo:

Site Description:

Open woodland of *Banksia menziesii*, *B attenuata*, *Euc todtiana* and *Allocasuarina fraseriana* over *Xanthorrhoea preissi*, *Allocasuarina humilis* and *Jacksonia* sp. Area is in excellent condition.

Species noted	
Scientific Name	Common Name
Conospermum undulatum	
Adenanthos cygnorum subsp. cygnorum	
Eremaea pauciflora var. pauciflora	
Anigozanthos manglesii subsp. manglesii	

Hibbertia hypericoides Isopogon autumnalis Eucalyptus marginata Banksia attenuata Allocasuarina fraseriana Gompholobium tomentosum Bossiaea eriocarpa Mesomelaena pseudostygia Ehrharta calycina Gastrolobium capitatum Scholtzia involucrate Ursinia anthemoides Wahlenbergia capensis Briza maxima Leptospermum laevigatum Acacia saligna Tetraria octandra Allocasuarina humilis Styphelia sp. Gladiolus caryophyllaceus Scaevola sp. Dasypogon bromeliifolius Petrophile seminuda Xanthorrhoea preissii Jacksonia floribunda

Relevé Number: NO4	Project: Wattle Grove
Lot/Plan: 804 / P059946	Location: 116.0051, -32.0115
Photo:	



Site Description:

Degraded Banksia woodland with some foraging value. *Leptospermum laevigatum* (Victorian tea tree) common.

Species noted	
Scientific Name	Common Name
Conospermum undulatum	
Adenanthos cygnorum subsp. cygnorum	
Eremaea pauciflora var. pauciflora	
Anigozanthos manglesii subsp. manglesii	
Hibbertia hypericoides	
Isopogon autumnalis	
Eucalyptus marginata	
Banksia attenuata	
Allocasuarina fraseriana	
Gompholobium tomentosum	
Bossiaea eriocarpa	
Mesomelaena pseudostygia	
Ehrharta calycina	
Gastrolobium capitatum	
Scholtzia involucrate	
Ursinia anthemoides	
Wahlenbergia capensis	
Briza maxima	
Leptospermum laevigatum	
Acacia saligna	
Tetraria octandra	
Allocasuarina humilis	

Styphelia sp.
Gladiolus caryophyllaceus
Scaevola sp.
Dasypogon bromeliifolius
Petrophile seminuda
Xanthorrhoea preissii
Jacksonia floribunda

Relevé Number: NO5	Project: Wattle Grove
Lot/Plan: 801 / P059946	Location: 116.0053466, -32.0117235

Photo:

Site Description:

Degraded Banksia woodland with some foraging value. The introduced species *Leptospermum laevigatum* was found to be common in this area.

Species noted	
Scientific Name	Common Name
Leptospermum laevigatum	
Banksia menziesii	
B attenuata	
Euc todtiana	

Relevé Number: NO6 **Project:** Wattle Grove

Location: 116.0056487, -32.0117065 Lot/Plan: 802 /P059946





Site Description:

Area is completely degraded

Area is completely degraded	
Species noted	
Scientific Name	Common Name
Xanthorrhoea preissi	Grass Tree
Corymbia calophylla	Marri

Relevé Number: NO7	Project: Wattle Grove
Lot/Plan: 802 / P059946	Location: 116.0061534, -32.0114913

Photo:



Site Description:
Landscaping around a dwelling. Area is completely degraded.

Landscaping around a dwelling. Area is completely degraded.	
Species noted	
Scientific Name	Common Name

Relevé Number: NO8 Project: Wattle Grove

Lot/Plan: 802 / P059946 **Location:** 116.0072796, -32.0105869

Photo:



Site Description:

This site has been extensively cleared of vegetation. Completely degraded but with scattered tree species.

Species noted	
Scientific Name	Common Name
Xanthorrhoea preissi	Grass Tree
Corymbia calophylla	Marri

 Relevé Number: NO9
 Project: Wattle Grove

 Lot/Plan: 801 / P059946
 Location: 116.0062489, -32.0107514

Photo:



Site Description:

Completely degraded. Area has been historically landscaped and mown. This property is a significant source of weeds invading remnant vegetation on adjacent Lot 210. Lot 801 contained bamboo, Victorian tea tree, common fig, eastern states bottle brush species, Brazilian pepper tree, Flinders Range wattle, Cootamundra wattle and pines. Two old growth Jarrah were present, with a DBH of approximately 1000 mm.

Species noted	
Scientific Name	Common Name
*Poa sp.	Bamboo
*Leptospermum laevigatum	Victorian Teatree
*Acacia iteaphylla	Flinders Ranges Wattle
*Acacia baileyana	Cootamundra Wattle
*Pinus sp.	Pine

Relevé Number: NO10 Project: Wattle Grove

Lot/Plan: 801 / P059946 Location: 116.0062489, -32.0107514

Photo:



Site Description:

Completely degraded. Area has been historically landscaped and mown.

Species noted	
Scientific Name	Common Name
*Poa sp.	Bamboo
*Leptospermum laevigatum	Victorian Teatree
*Acacia iteaphylla	Flinders Ranges Wattle
*Acacia baileyana	Cootamundra Wattle
*Pinus sp.	Pine

Relevé Number: ATT01	Project: Wattle Grove
Lot Plan: 12 / D069292	Location: 115.998155, -32.013885



Site Description:

This property has been substantially cleared and has been maintained for residential/garden purposes. Scattered trees are present.

Species noted	
Scientific Name	Common Name
Eucalyptus marginata	Jarrah





Site Description:

Disturbed area with scattered Eucalypt trees remaining. Area appears to be sporadically maintained and affected by the dumping of rubbish.

	, , ,	
Species i	noted	
Scientific	: Name	Common Name
Eucalypt	us marginata	Jarrah



 Relevé Number: ATT05
 Project: Wattle Grove

 Lot/Plan: 21 / D080126
 Location: 116.11642, -32.011233

Photo:



Site Description:

This property has been extensively cleared. Scattered Eucalyptus trees are present. Access to this property could not be obtained. Lot 21 did not contain any native vegetation other than one large tuart (*Eucalyptus gomphocephala*). Several eastern states Eucalypts (**Eucalyptus grandis* and **E. botryoides*) on the property would have roosting or foraging value for black cockatoos and were of greater than 500 mm DBH.

Species	
Scientific Name	Common Name
Eucalyptus gomphocephala	Tuart
*Eucalyptus grandis	Flooded Gum (Eastern States Species)
*E. botryoides	Bangalay (Eastern States Species)

Relevé Number:6	Project: Wattle Grove
Property Lot/Plan: 4 / P061512	Location: 116.009968, -32.012962

Photo:



Site Description:

Lot 4 did not contain any native vegetation other than one large jarrah (*Eucalyptus marginata*) of approximately 400 mm DBH. One lemon scented gum (**Corymbia citriodora*) would have roosting or foraging value for black cockatoos and was of greater than 500 mm DBH.

Species noted	
Scientific Name	Common Name
*Corymbia citriodora	Lemon Scented Gum (Eastern States Species)
Eucalyptus marginata	Jarrah

Relevé Number: ATT07	Project: Wattle Grove
Lot/Plan: 54 / D075466	Location: 116.00453, -32.017372
Photo:	



Site Description:Completely degraded site, used for horse grazing. Scattered trees present.

Species noted	
Scientific Name	Common Name

Relevé Number: ATT08	Project: Wattle Grove
Lot/Plan: 55 / D075466	Location: 116.002873, -32.015337
Photo:	

Site Description:

Area is completely degraded and has been used for the grazing of livestock.

Species noted	
Scientific Name	Common Name

6 Oct 2022 9:46:42 am 32.015337S 116.002873E **Relevé Number:** ATT9 **Project:** Wattle Grove

Location: 116.002167, -32.009819

Photo:



Site Description:

Area of Banksia woodland in excellent condition.

Species noted		
Scientific Name	Common Name	
Leptospermum laevigatum	Victorian tea tree	
Banksia menziesii	Firewood banksia	
B. attenuata	Candlestick banksia	
Euc. todtiana	Pricklybark	
	, ,	

Relevé Number: ATT10 Project: Wattle Grove

Lot/Plan: 2 / D020390 **Location:** 116.008209, -32.016949

Photo:



Site Description:

Section of property has been disturbed with mowing activities. This has degraded the condition of this area of vegetation.

•	
Species noted	
Scientific Name	Common Name
Banksia menziesii	Firewood banksia
B attenuata	Candlestick banksia
Xanthorrea pressei	Grass tree



Relevé Number: ATT12	Project: Wattle Grove
Lot/Plan: 3 / D024545	Location: 116.006407, -32.012785

Photo:



Site Description:

Area completely degraded. Area dominated by mown lawns and scattered landscaping trees.

Species noted	. 5
Scientific Name	Common Name



Photo:



Site Description:

Completely degraded area, mown and maintained as clear. Photo looking west toward wetland area.

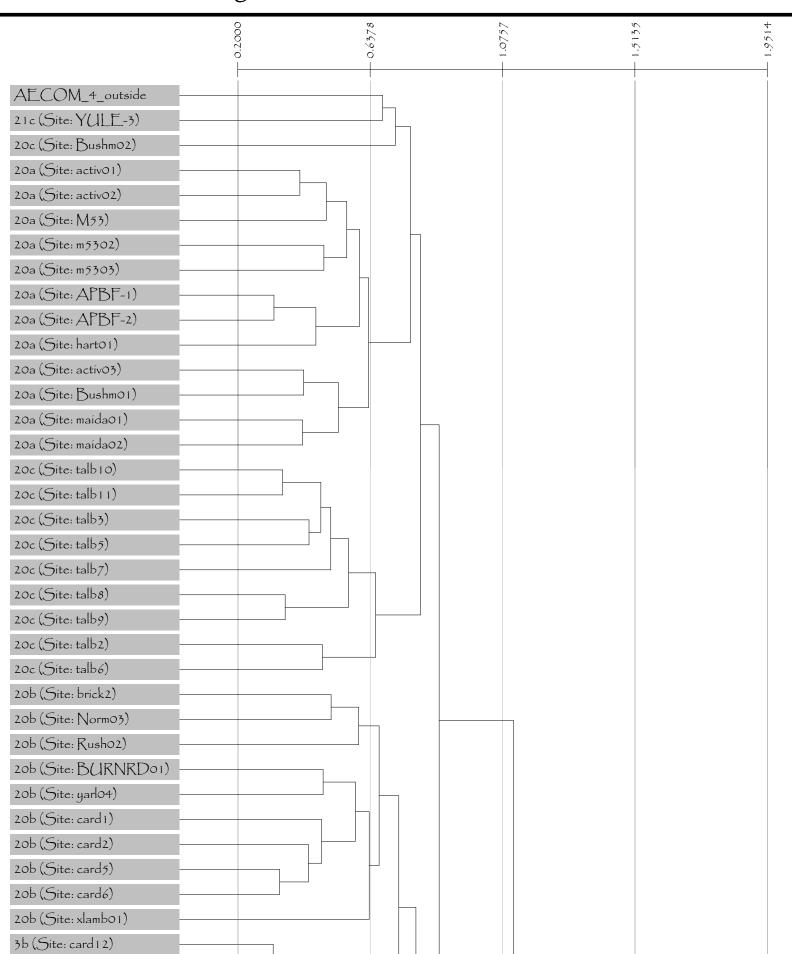
Species noted	
Scientific Name	Common Name
Poa sp.	Various Grasses



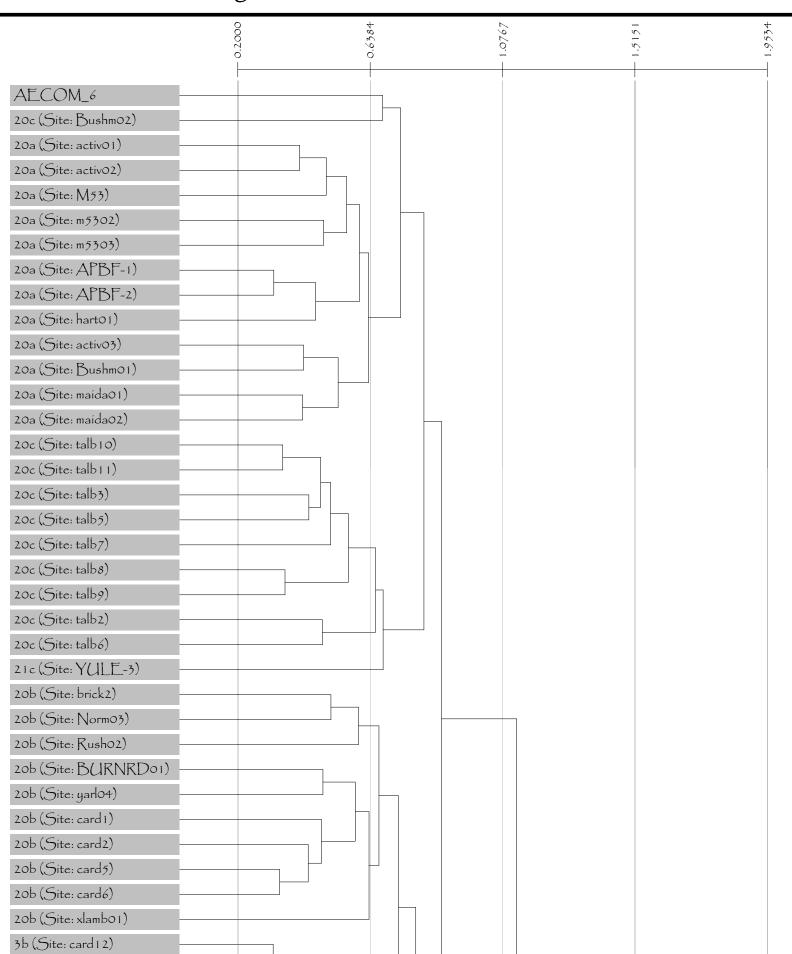
Appendix D Floristic Community Type Analysis 2023 (PATN results)

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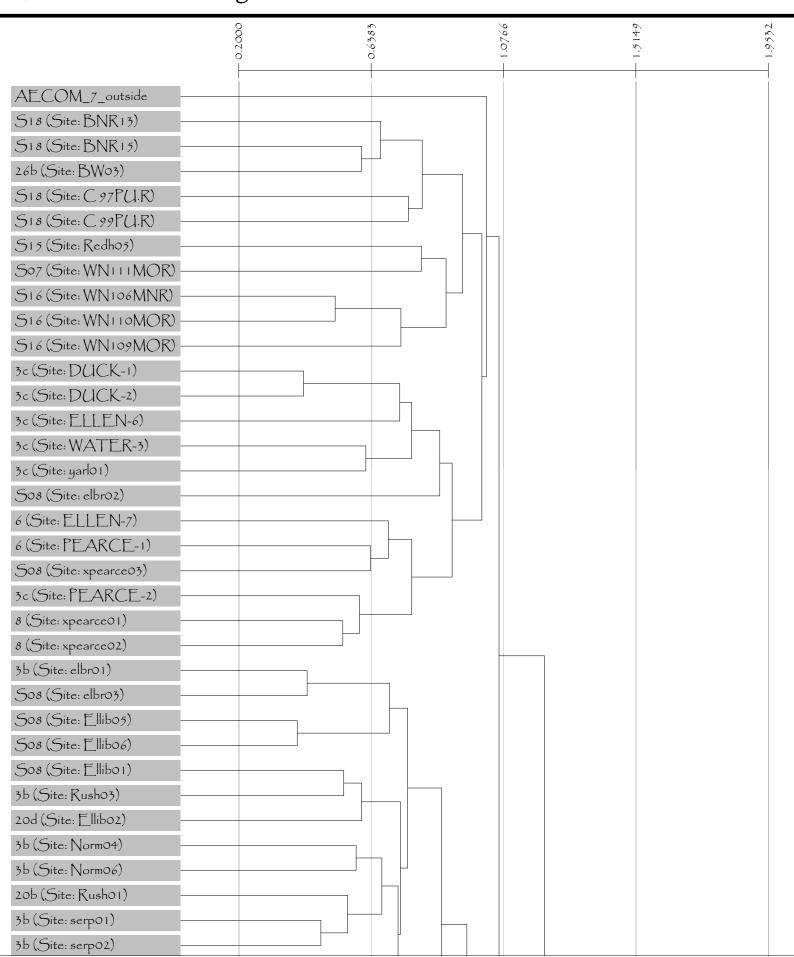
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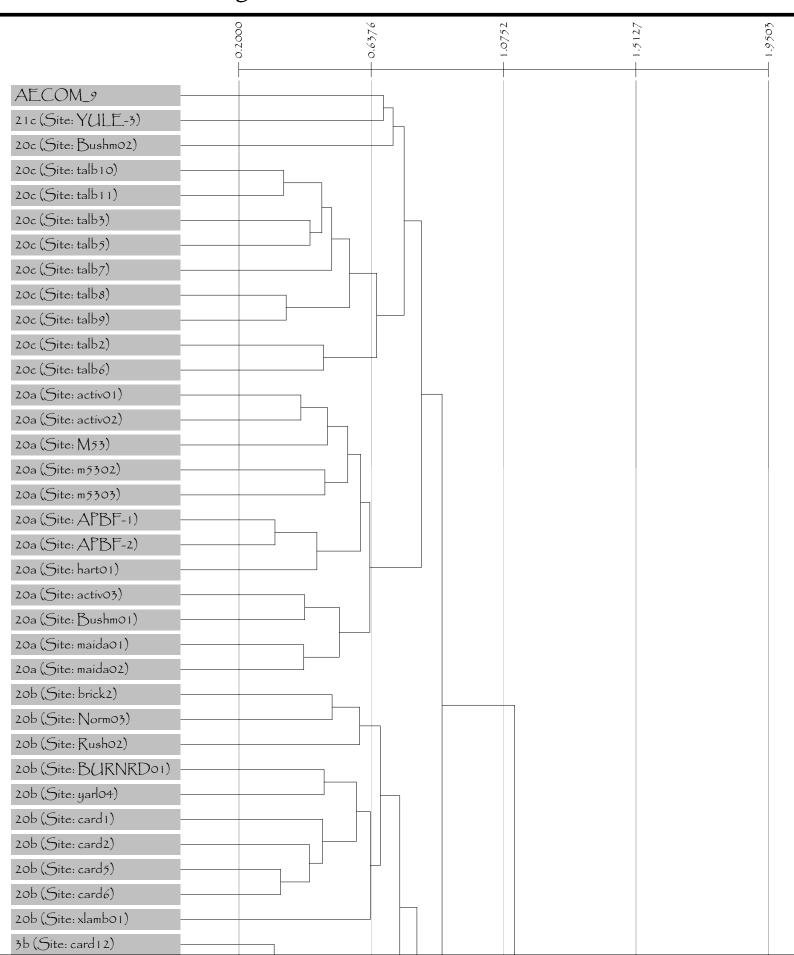
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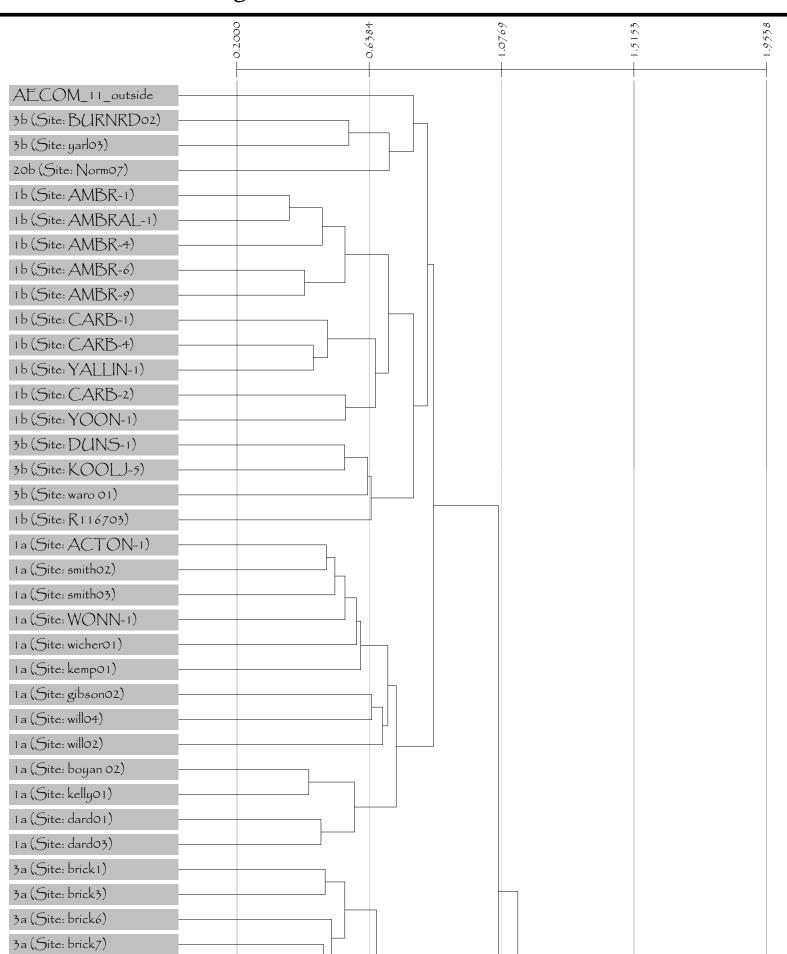
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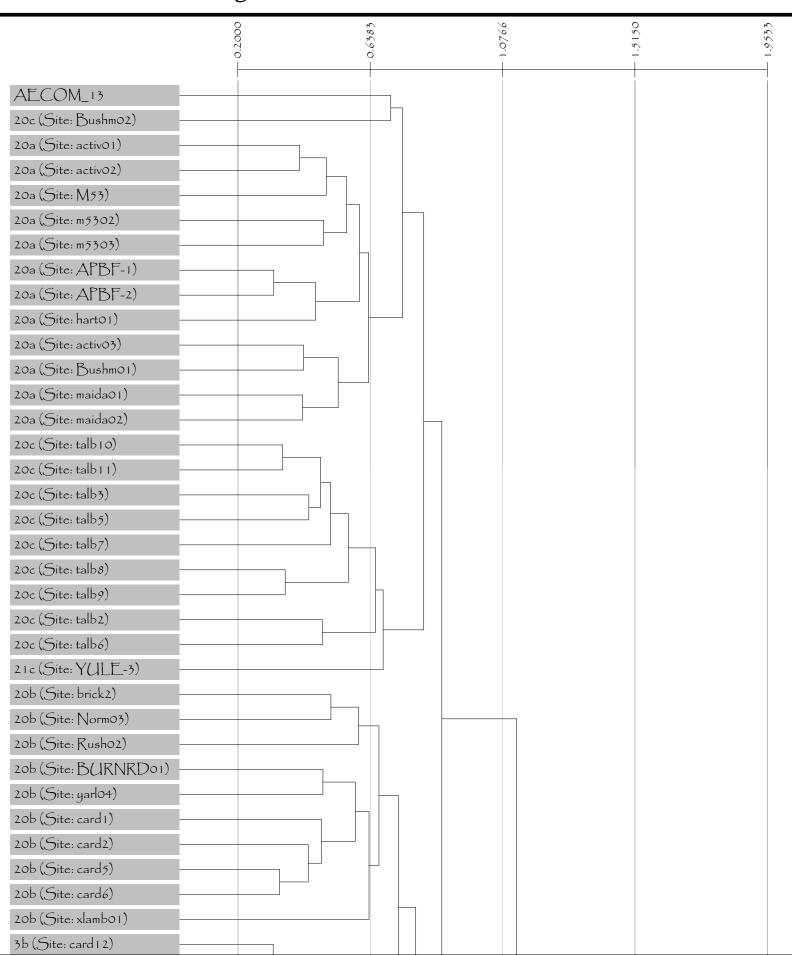
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Groups First Object Second Object New Object Level Stress Diff
0 S13 (Site: SW02) (852) + S13 (Site: SW02) (852) =GP(852)- 0.200 0.200
1 29b (Site: |VV||_{-1}) (682) + 29b (Site: |VV||_{-1}) (682) = GP(682)- 0.205 0.005
2 23b (Site: MILT-7) (554) + 23b (Site: MILT-7) (554) = GP(554)- 0.232 0.027
3 S11 (Site: M|04) (527) + S11 (Site: M|04) (527) =GP(527)- 0.234 0.002
4 S14 (Site: M15) (538) + S14 (Site: M15) (538) =GP(538)- 0.238 0.004
5 23a (Site: YULE-1) (1079) + 23a (Site: YULE-1) (1079) =GP(1079)- 0.246 0.008
6 27 (Site: YALG-4) (1034) + 27 (Site: YALG-4) (1034) =GP(1034)- 0.262 0.016
7 23b (Site: MNP01) (560) + 23b (Site: MNP01) (560) =GP(560) - 0.264 0.002
8 S11 (Site: SW08) (858) + S11 (Site: SW08) (858) = GP(858)- 0.269 0.005
9 23b (Site: ELE08) (279) + 23b (Site: ELE08) (279) = GP(279)- 0.277 0.008
10 23b (Site: MP04) (584) + 23b (Site: MP04) (584) = GP(584)- 0.277 0.000
11 27 (Site: YALC1-3) (1033) + 27 (Site: YALC1-3) (1033) = GP(1033)- 0.282 0.005
12 4 (Site: MP03) (583) + 4 (Site: MP03) (583) = GP(583)- 0.286 0.004
13 20a (Site: KOON-1) (450) + 20a (Site: KOON-1) (450) = GP(450)- 0.287 0.001
14 So9 (Site: MOOR 01) (569) + So9 (Site: MOOR 01) (569) =GP(569)- 0.289 0.003
15 23a (Site: gosno2) (366) + 23a (Site: gosno2) (366) = GP (366)- 0.295 0.006
16 23a (Site: Lighto 1) (465) + 23a (Site: Lighto 1) (465) = GP(465)- 0.296 0.001
17 S13 (Site: MIII) (534) + S13 (Site: MIII) (534) =GP(534)~ 0.300 0.004
19 23a (Site: WARB-1) (919) + 23a (Site: WARB-1) (919) = GP(919)- 0.301 0.000
20 5 (Site: low09a) (475) + 5 (Site: low09a) (475) = \Box P(475)- 0.304 0.003
21 23a (Site: kailiso2) (430) + 23a (Site: kailiso2) (430) = GP(430)- 0.305 0.001
22 23b (Site: [[01] (272) + 23b (Site: [[01] (272) =GP(272)- 0.305 0.000
23 23b (Site: MELA-6) (509) + 23b (Site: MELA-6) (509) =GP(509)- 0.309 0.004
24 21b (Site: MANEA-3) (498) + 21b (Site: MANEA-3) (498) = GP(498)- 0.309 0.000
25 S11 (Site: SW08) (858) + S11 (Site: SW08) (858) =GP(858)- 0.315 0.006
26 3b (Site: card 12) (201) + 3b (Site: card 12) (201) = GP(201)- 0.317 0.002
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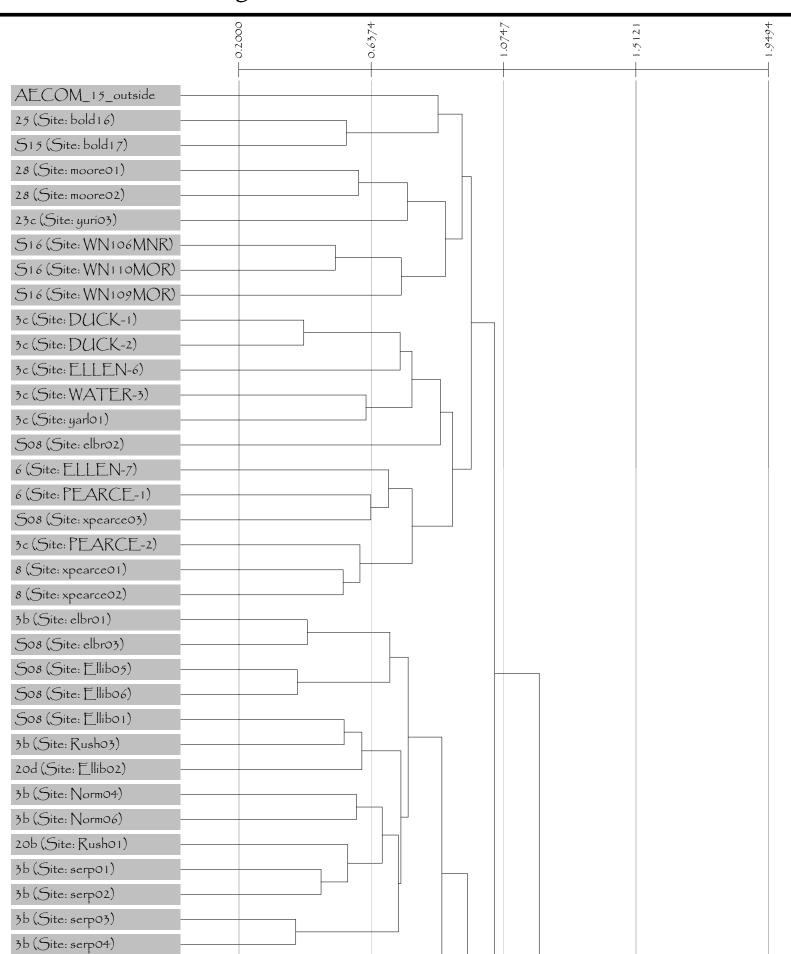
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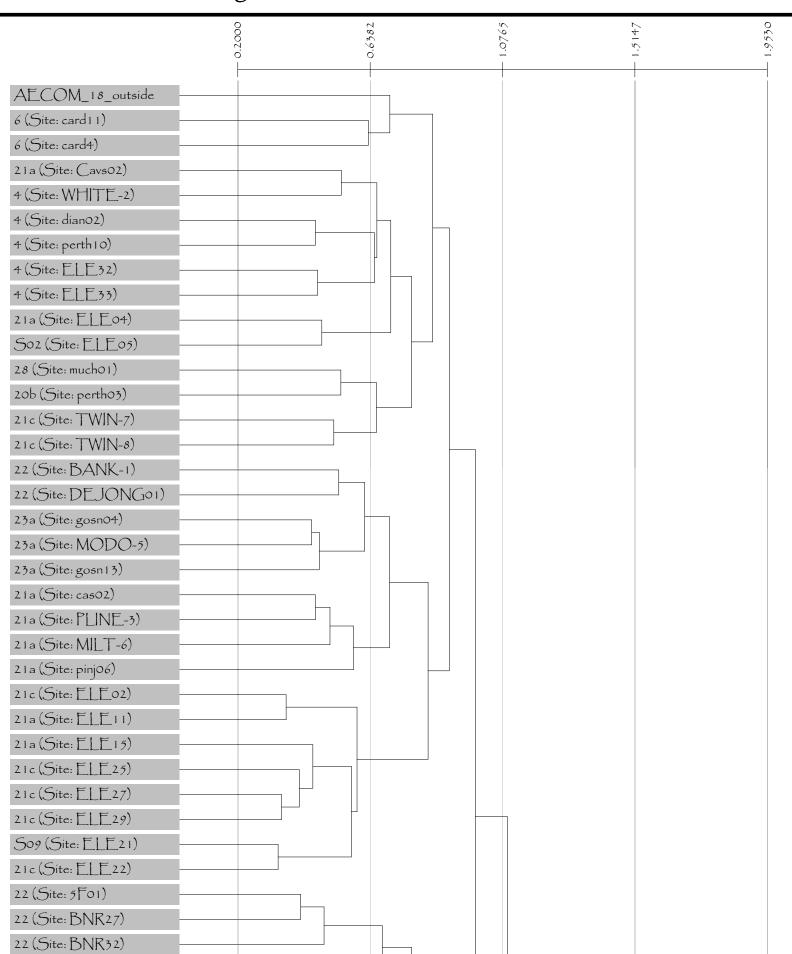
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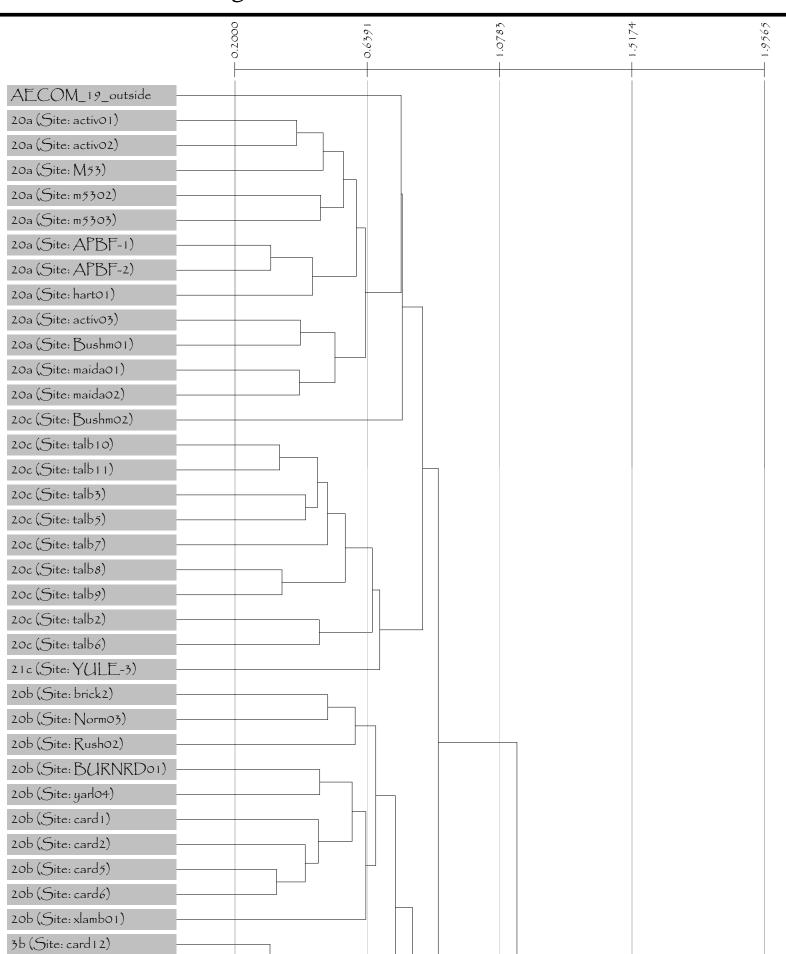
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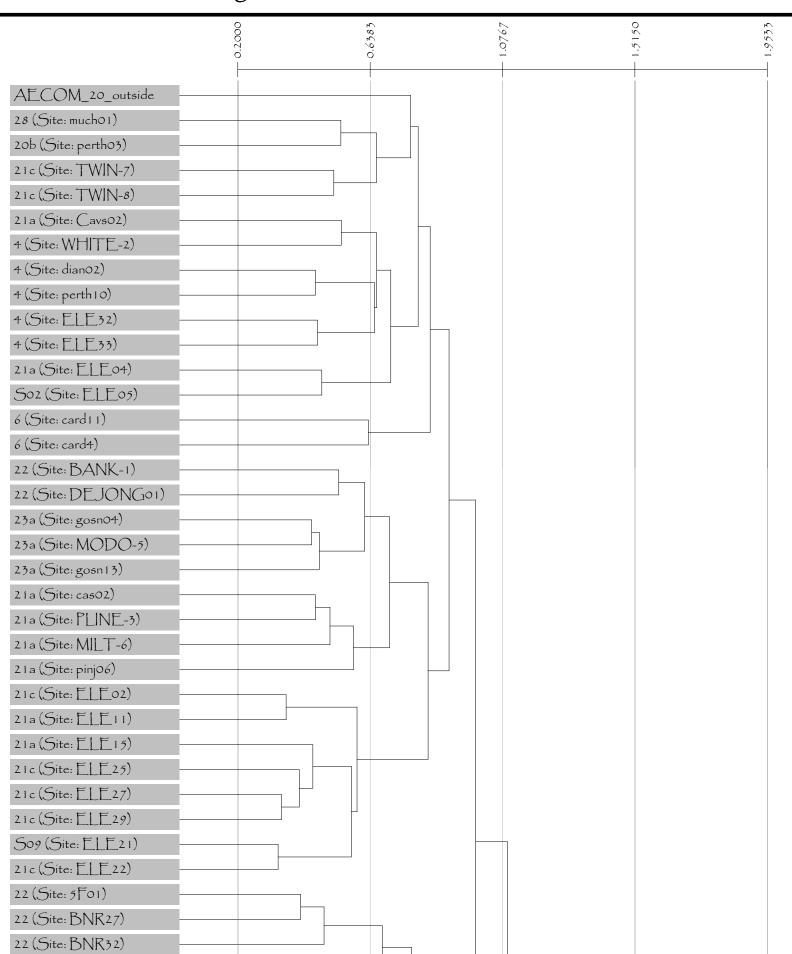
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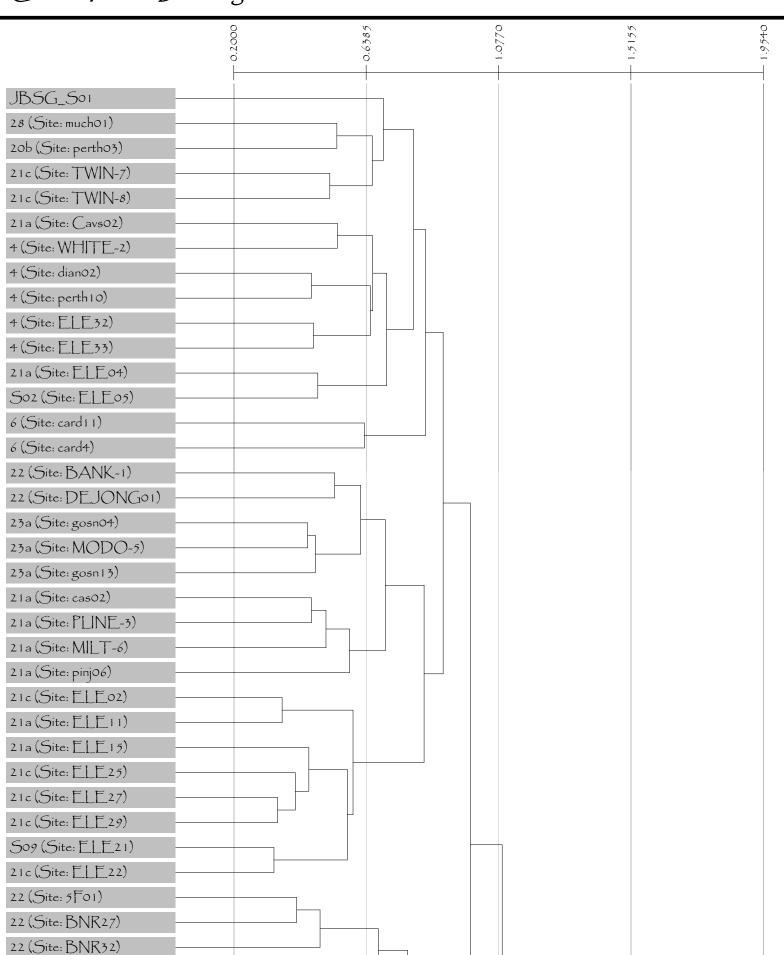


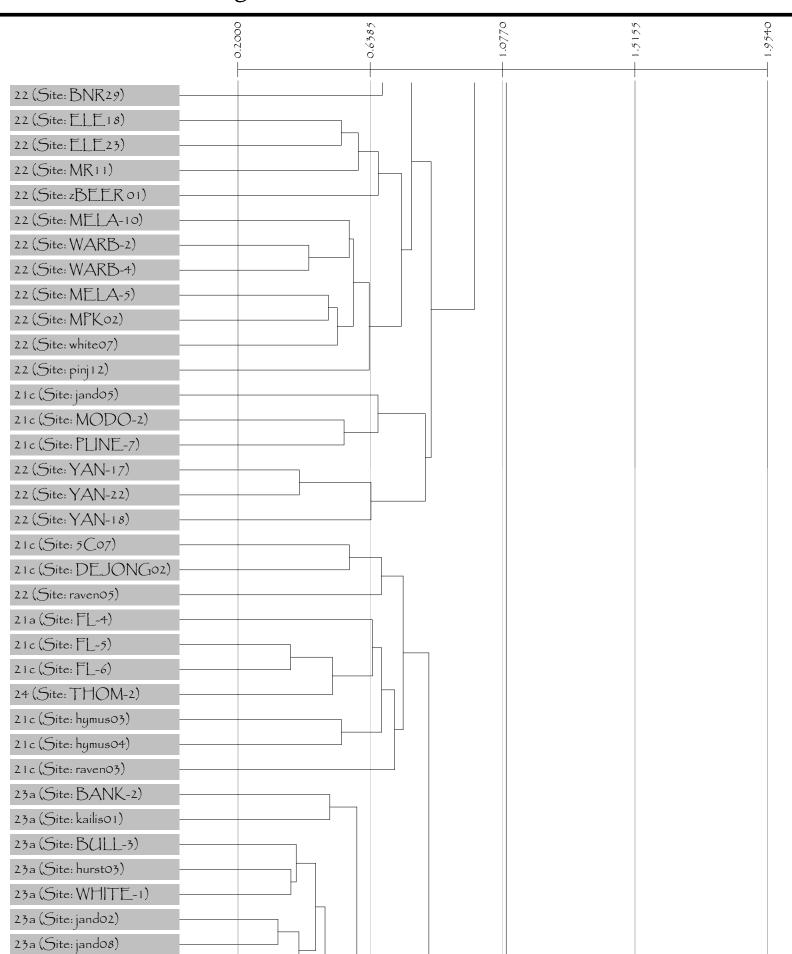
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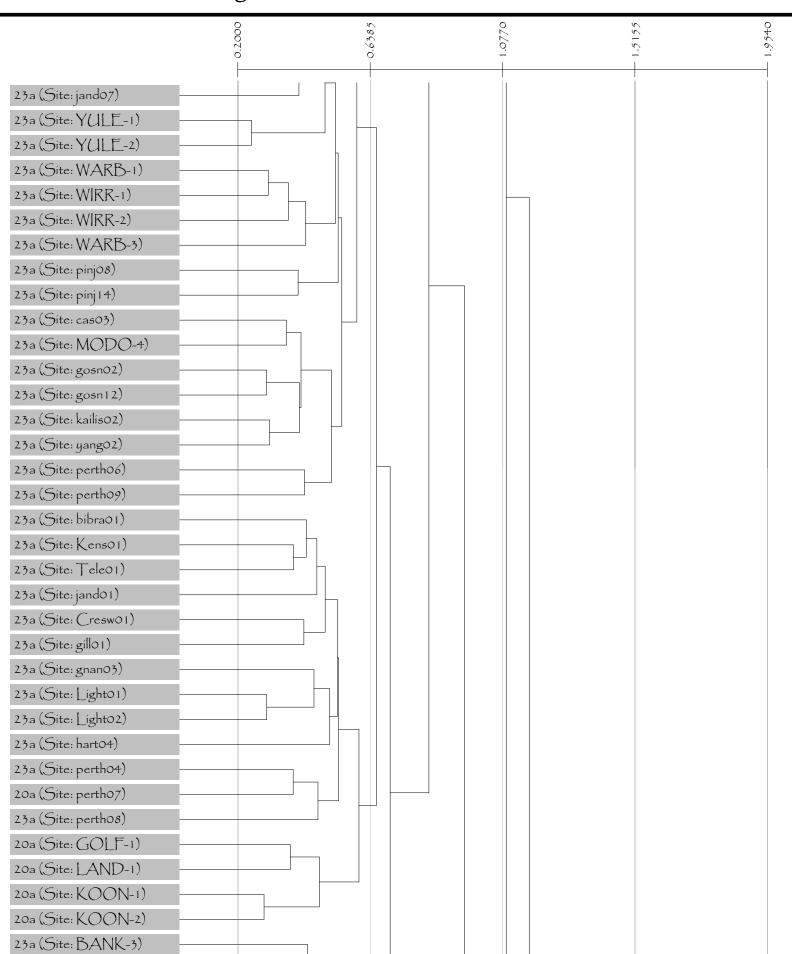


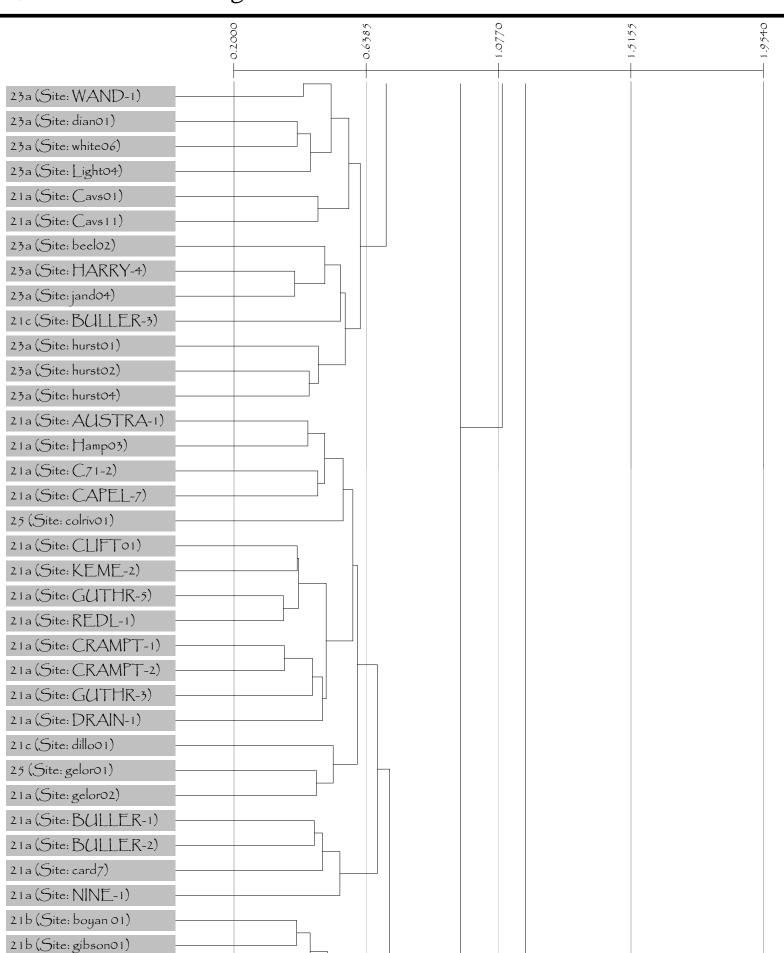
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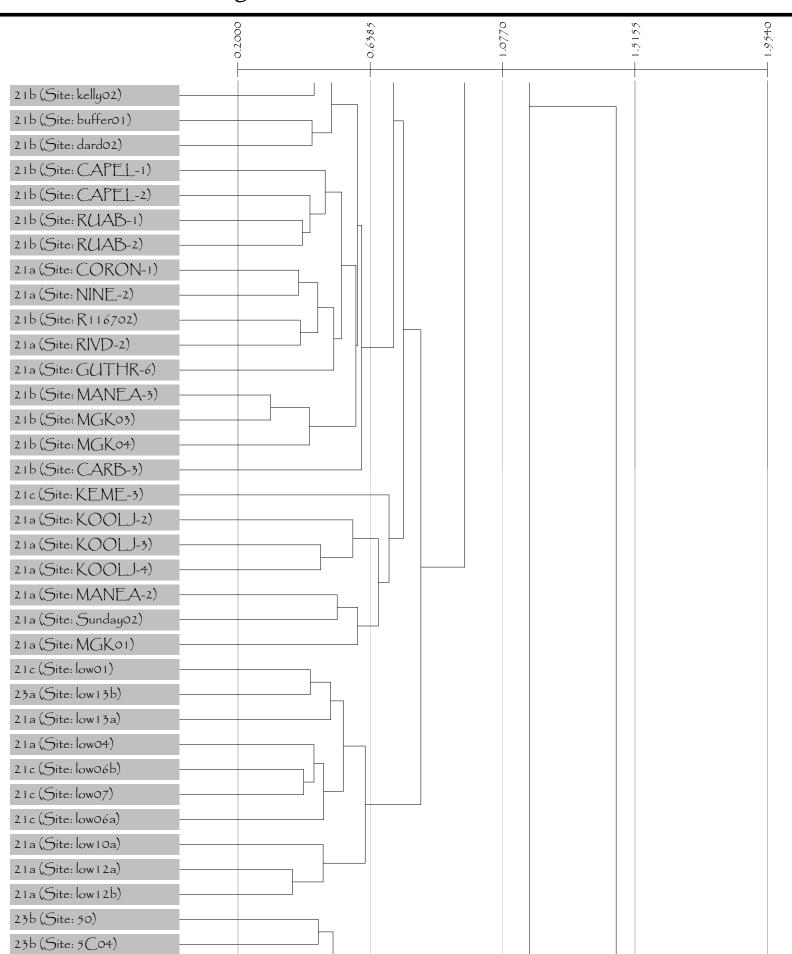


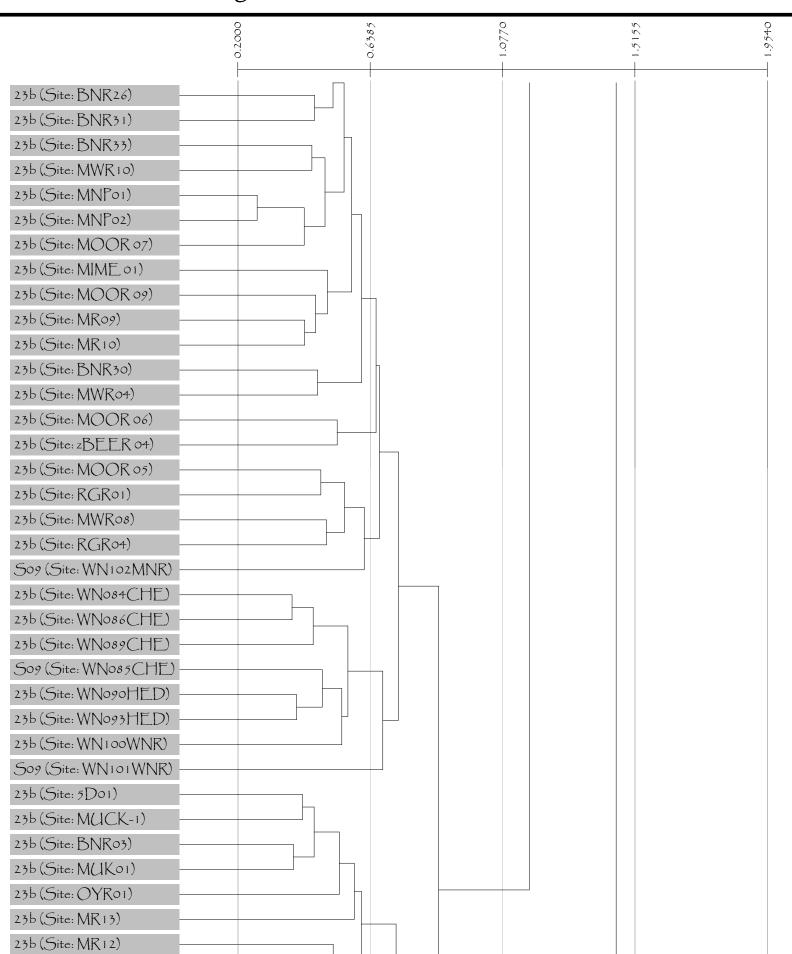


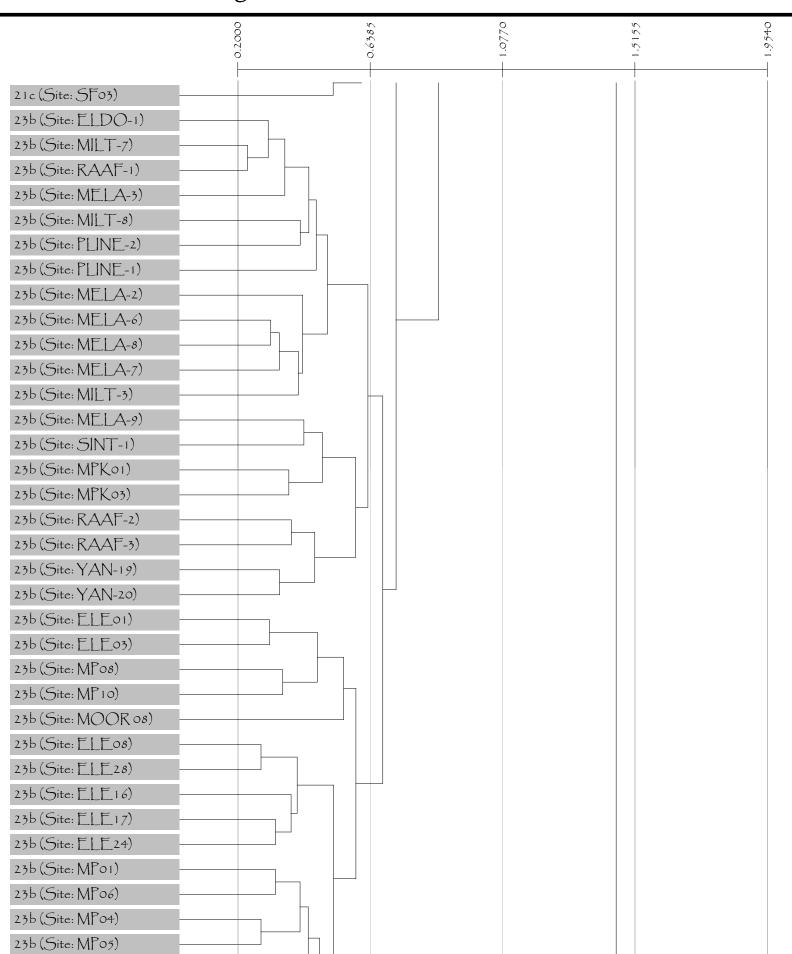


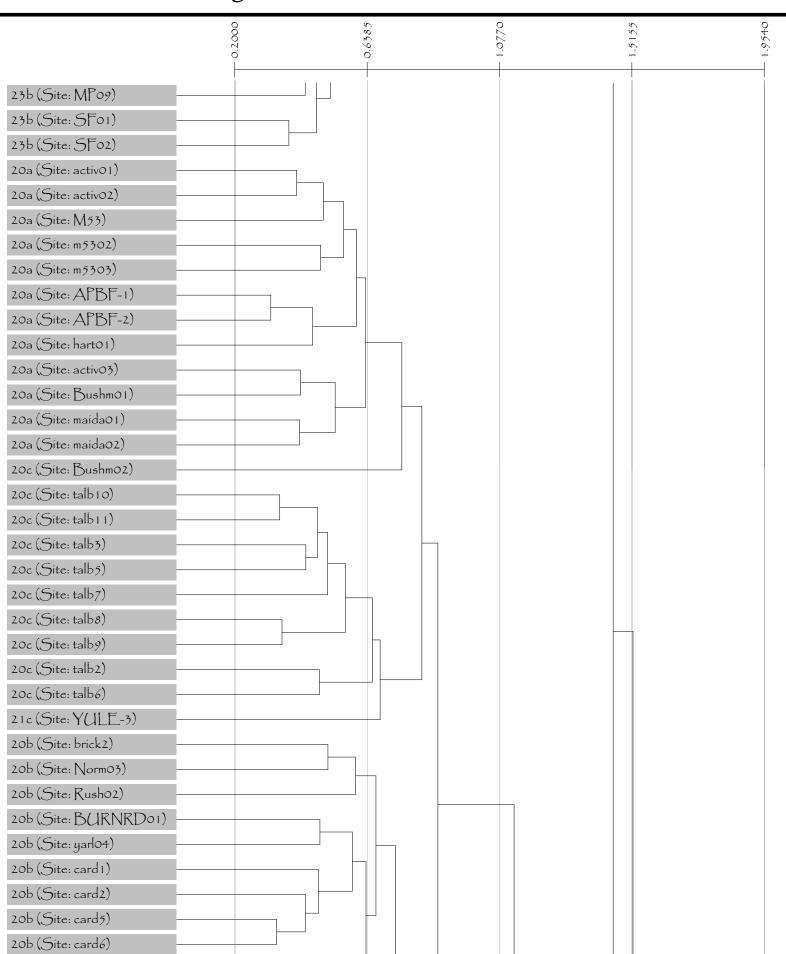


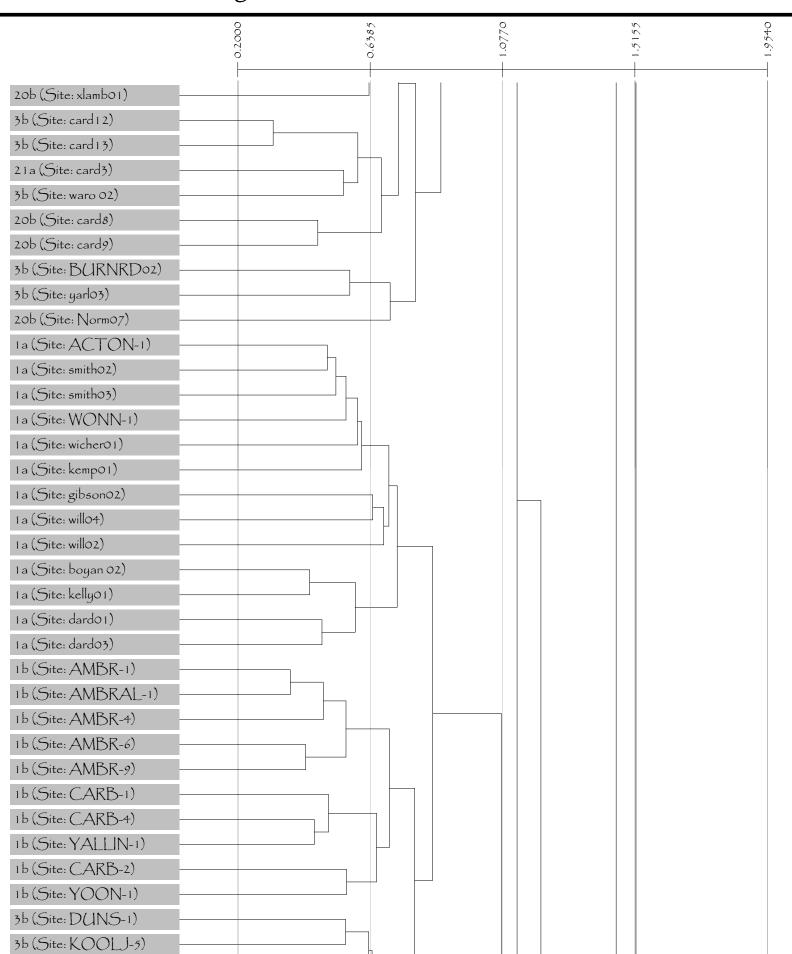


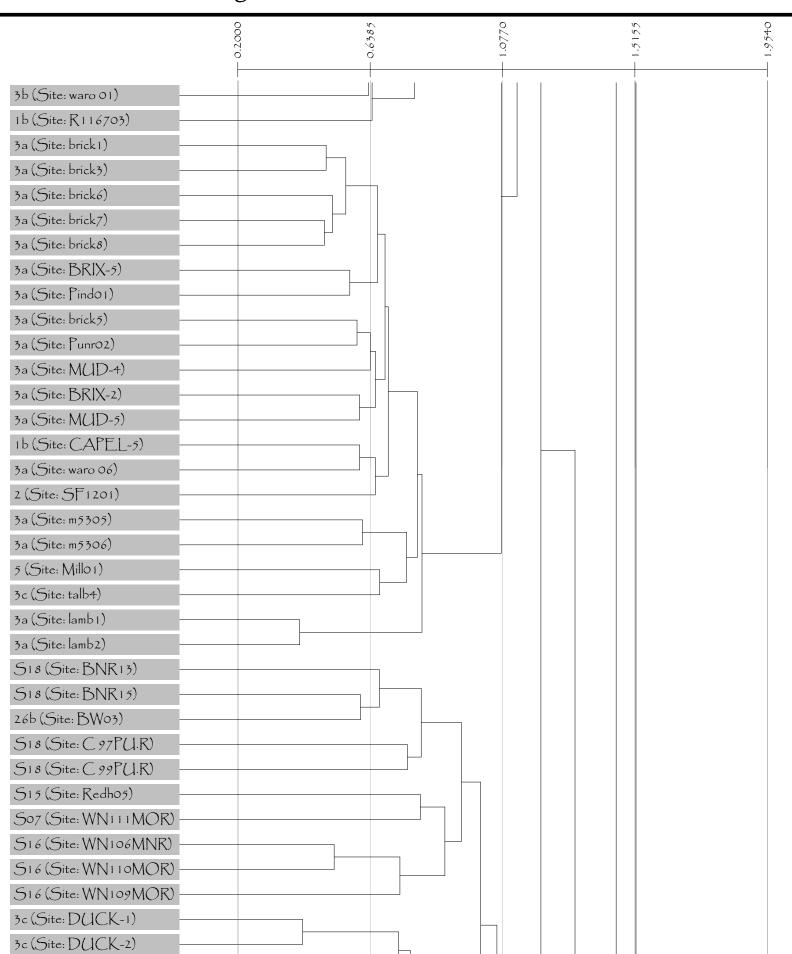


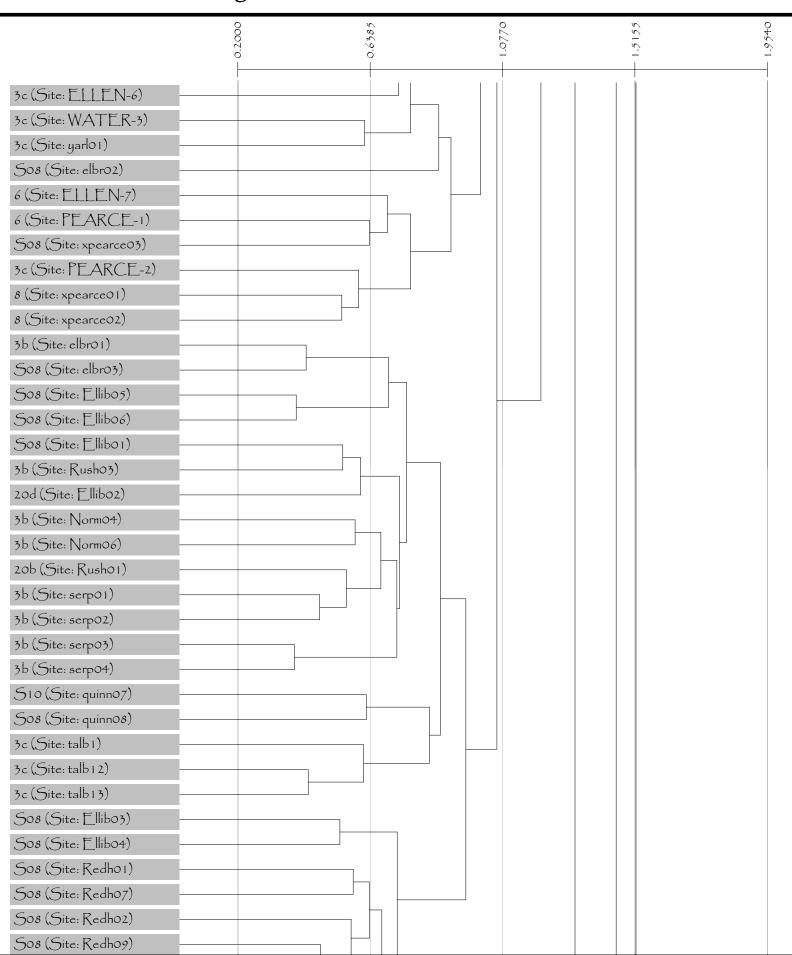


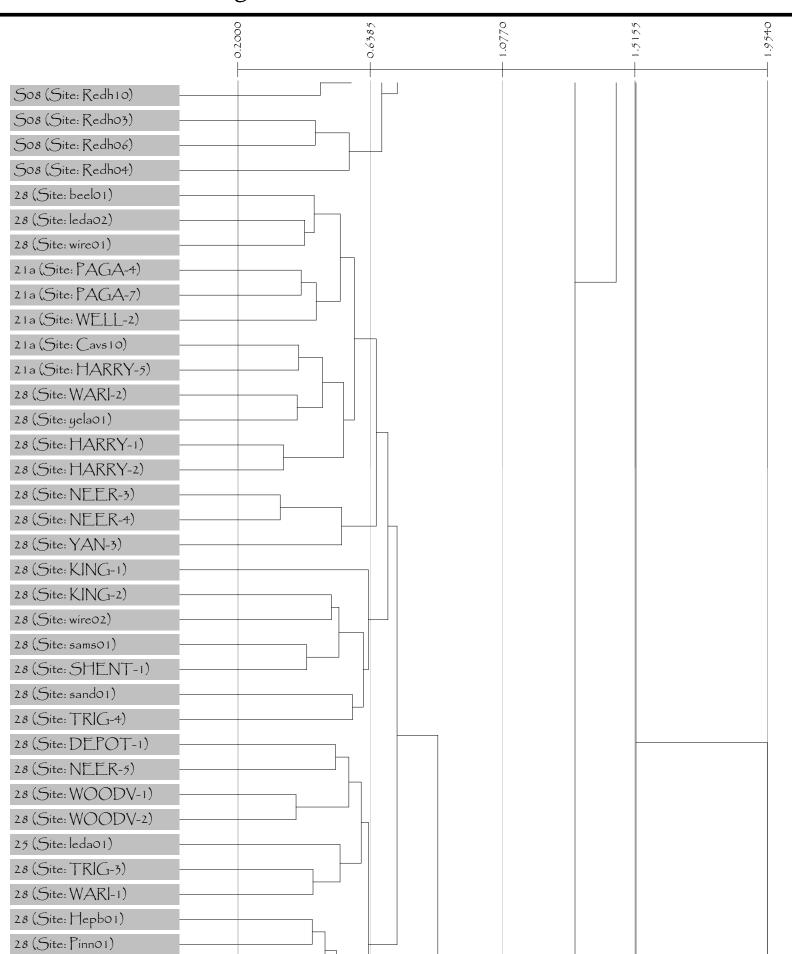


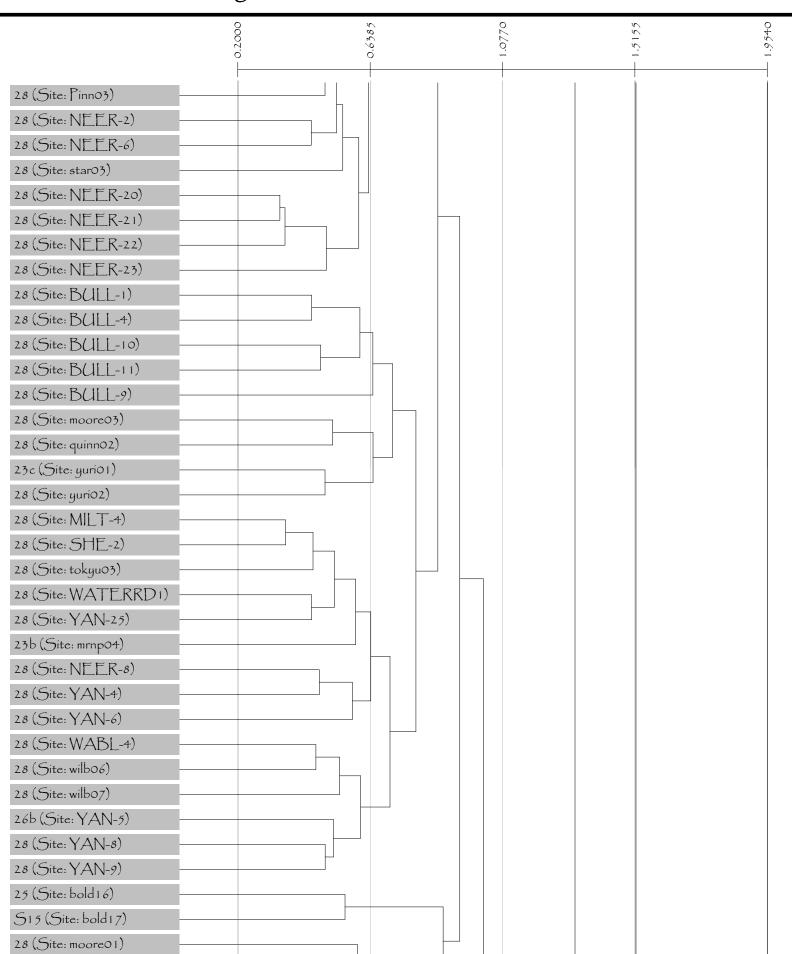


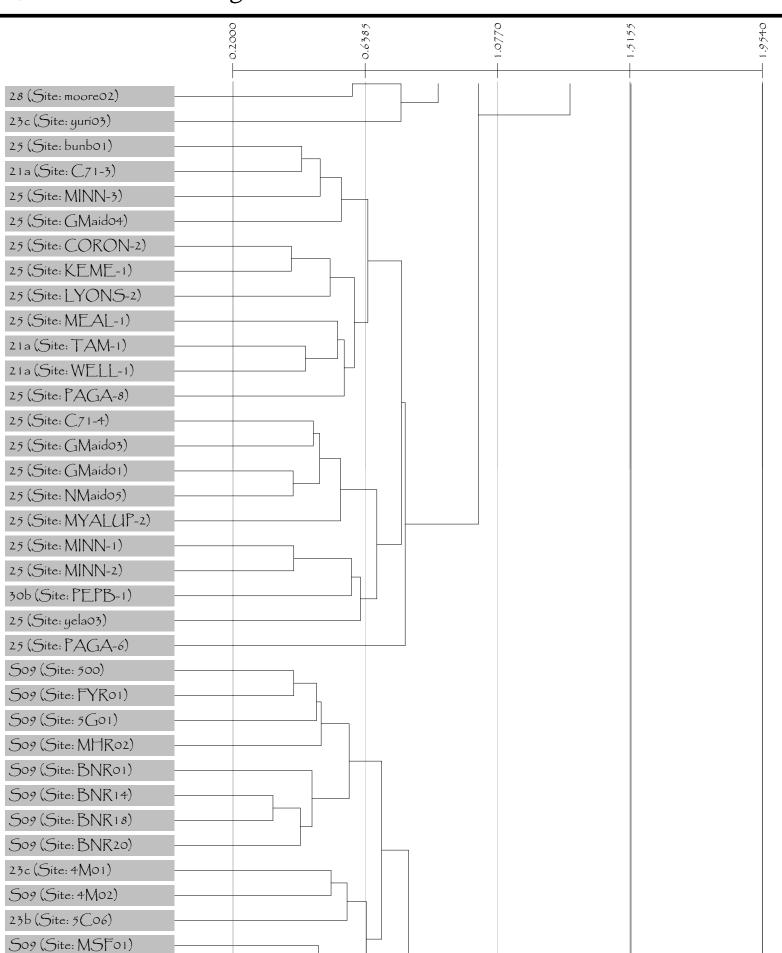


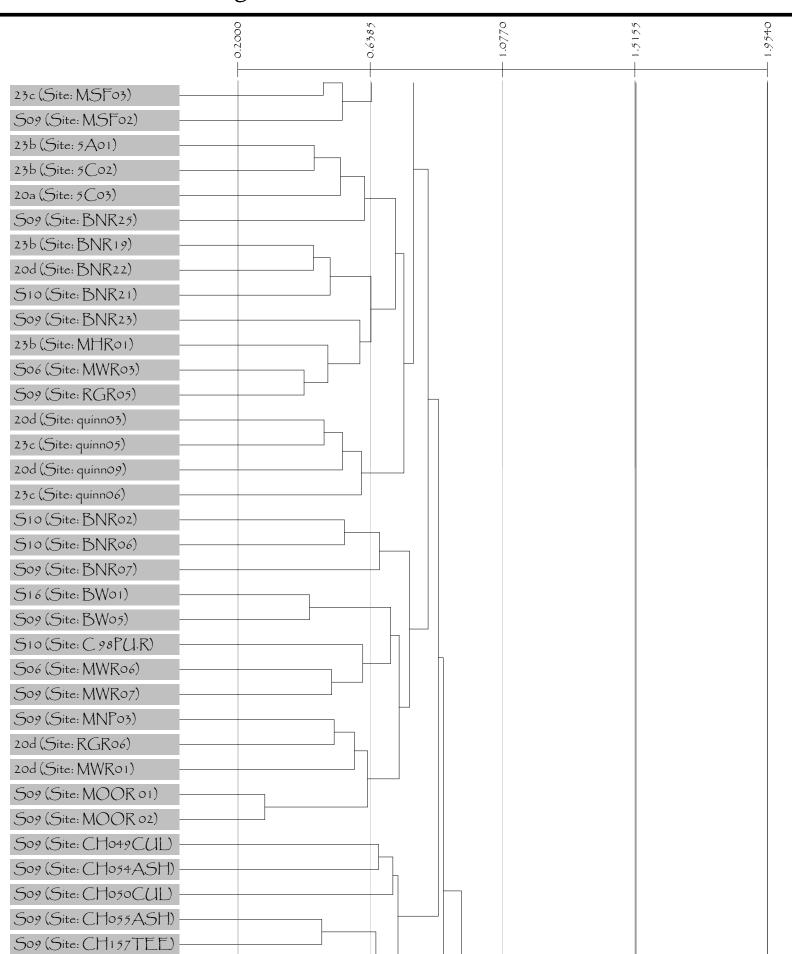


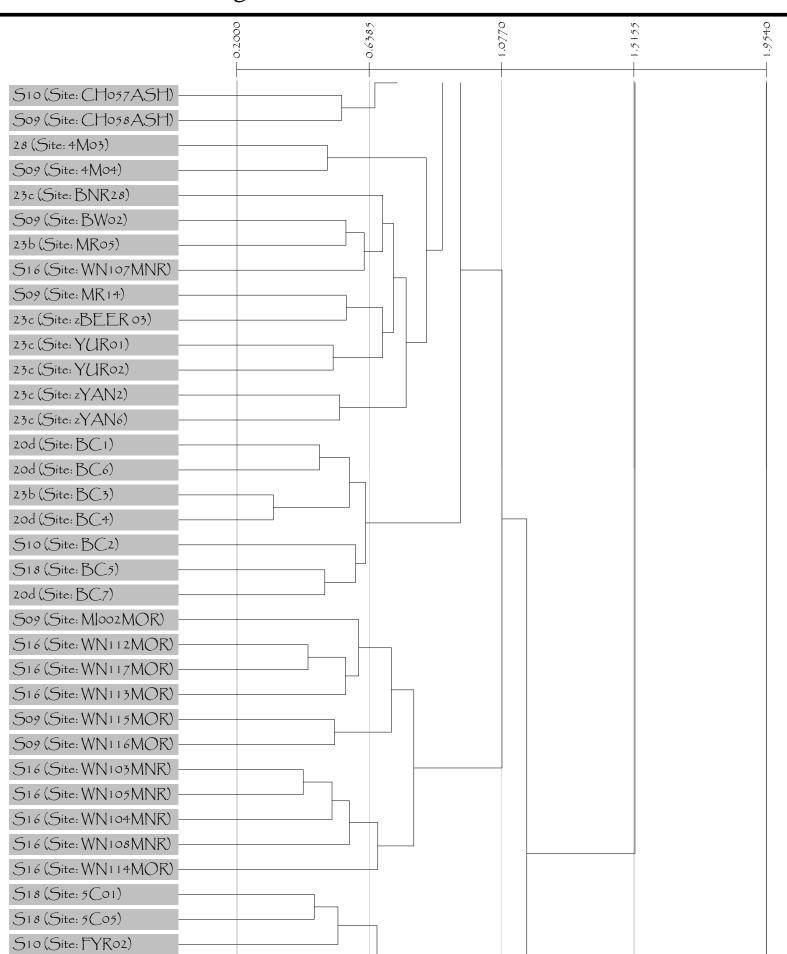


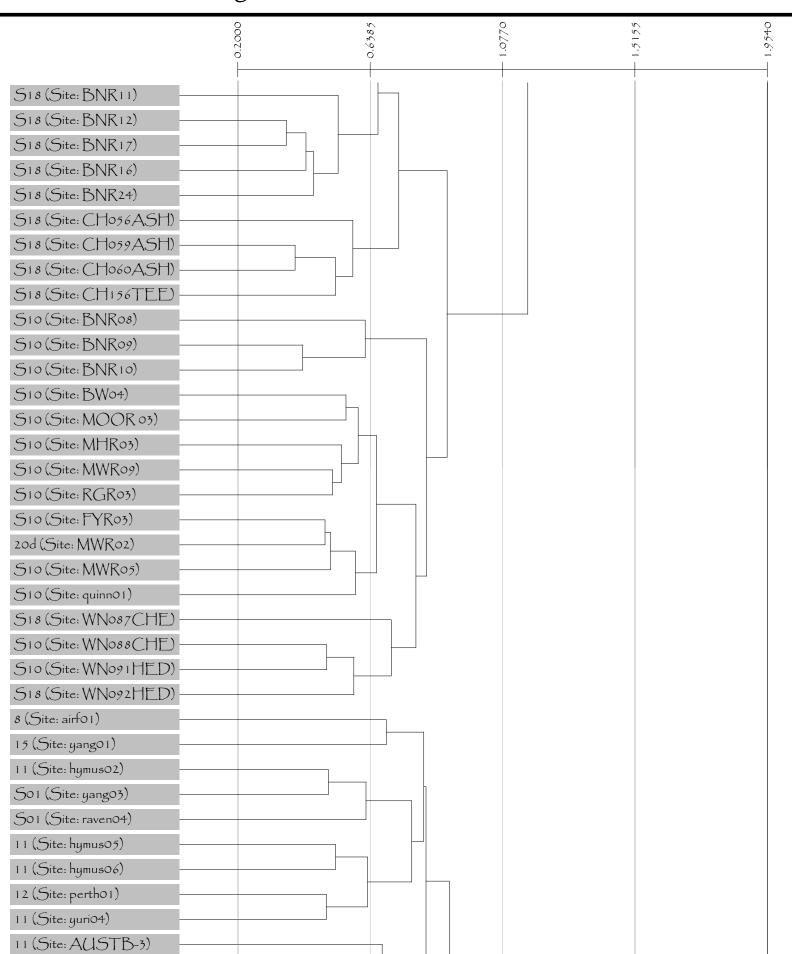


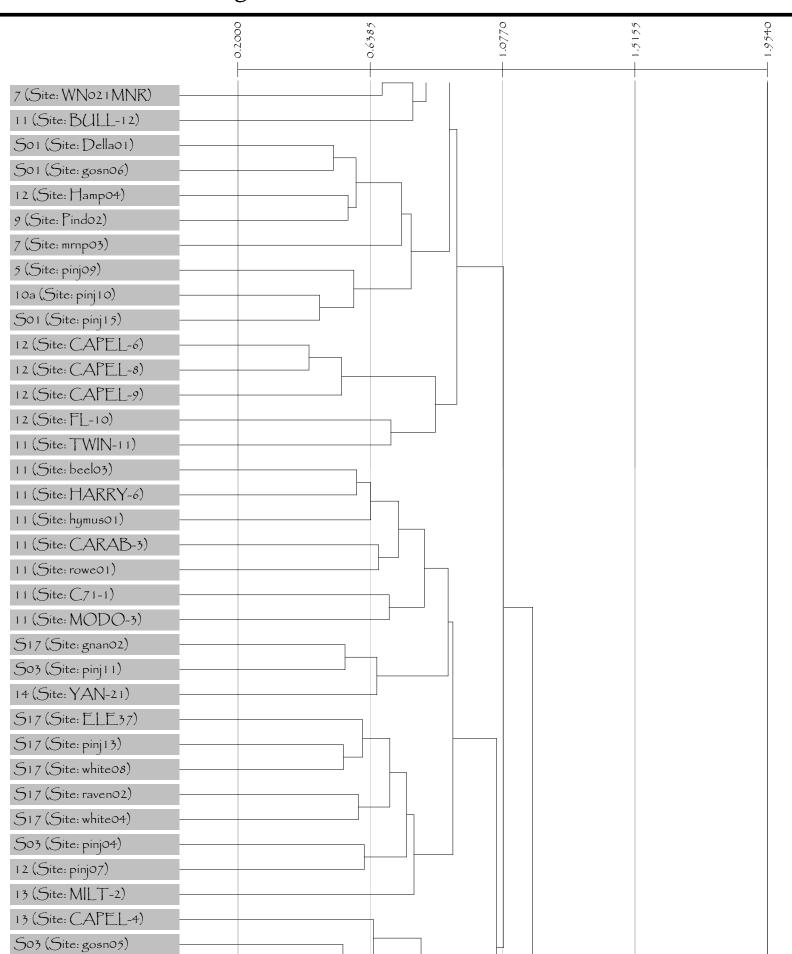


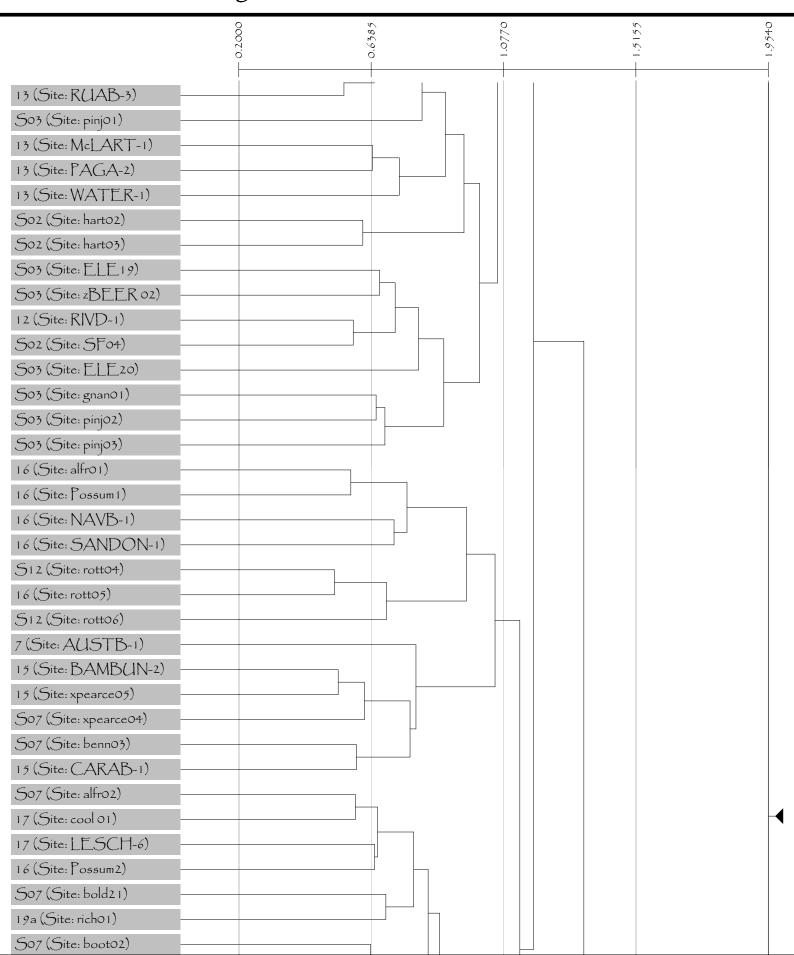


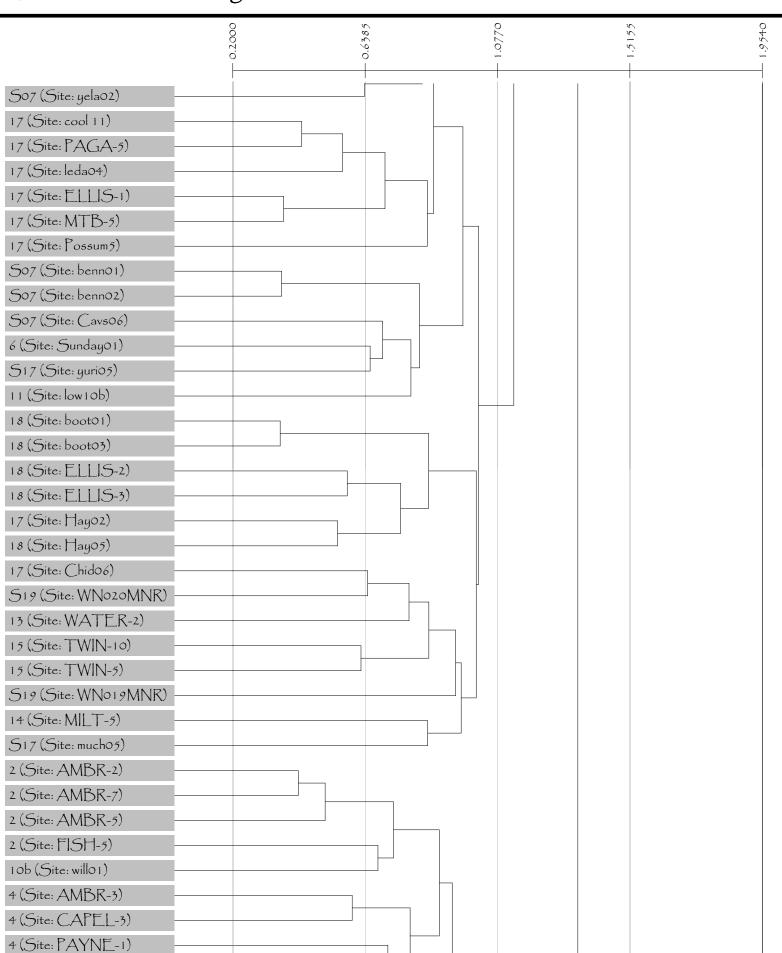


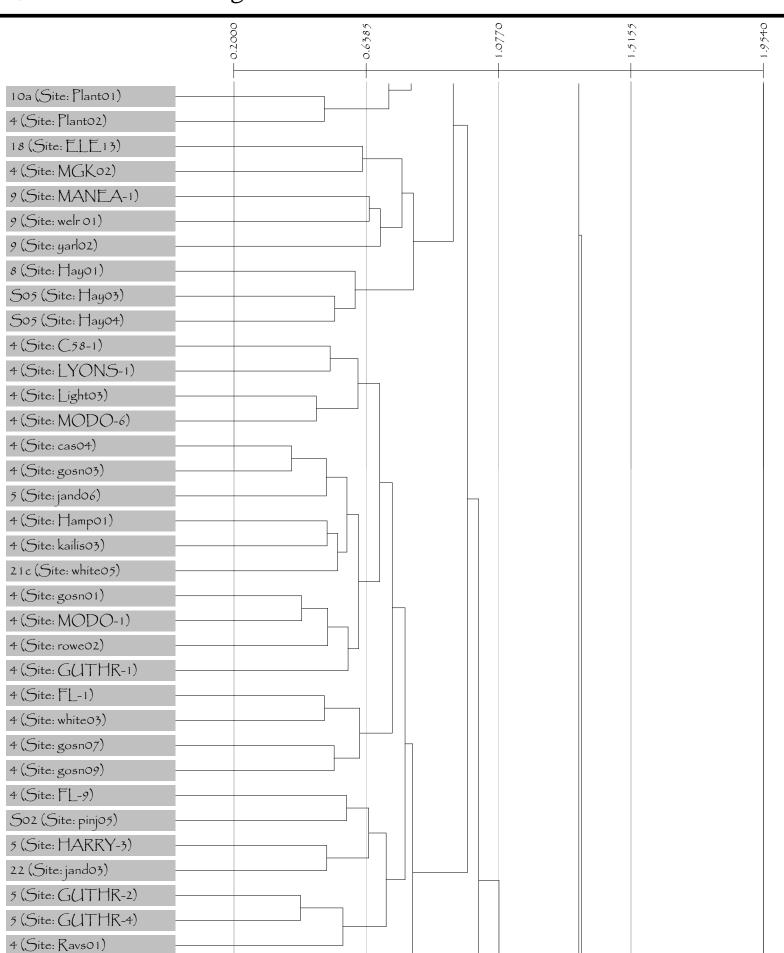


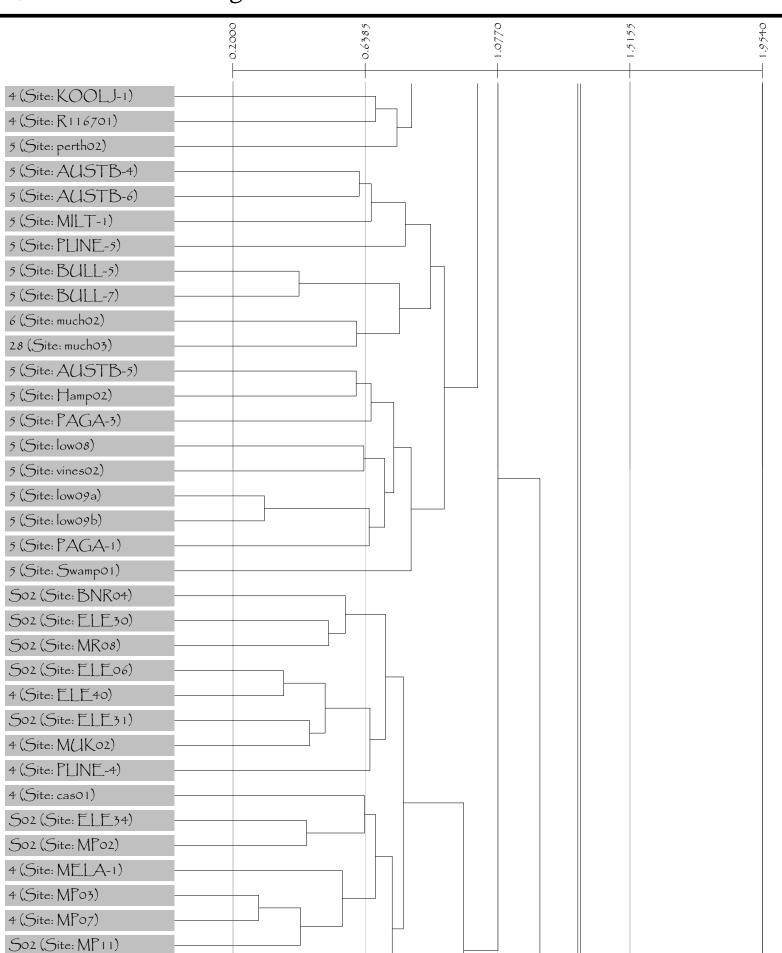


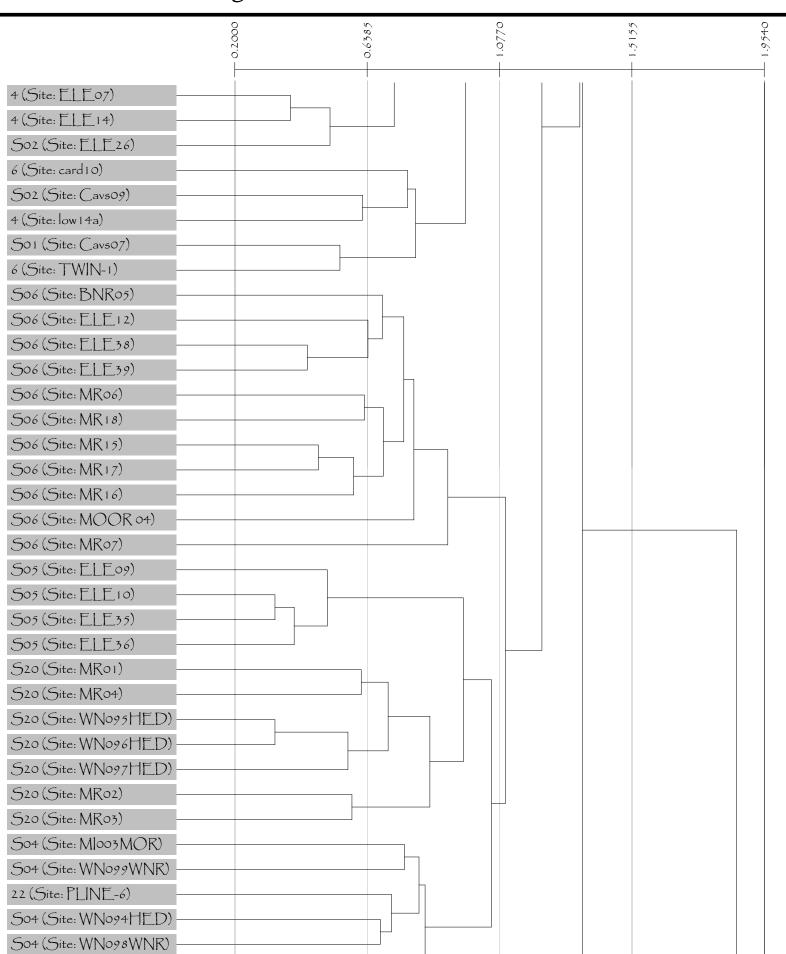


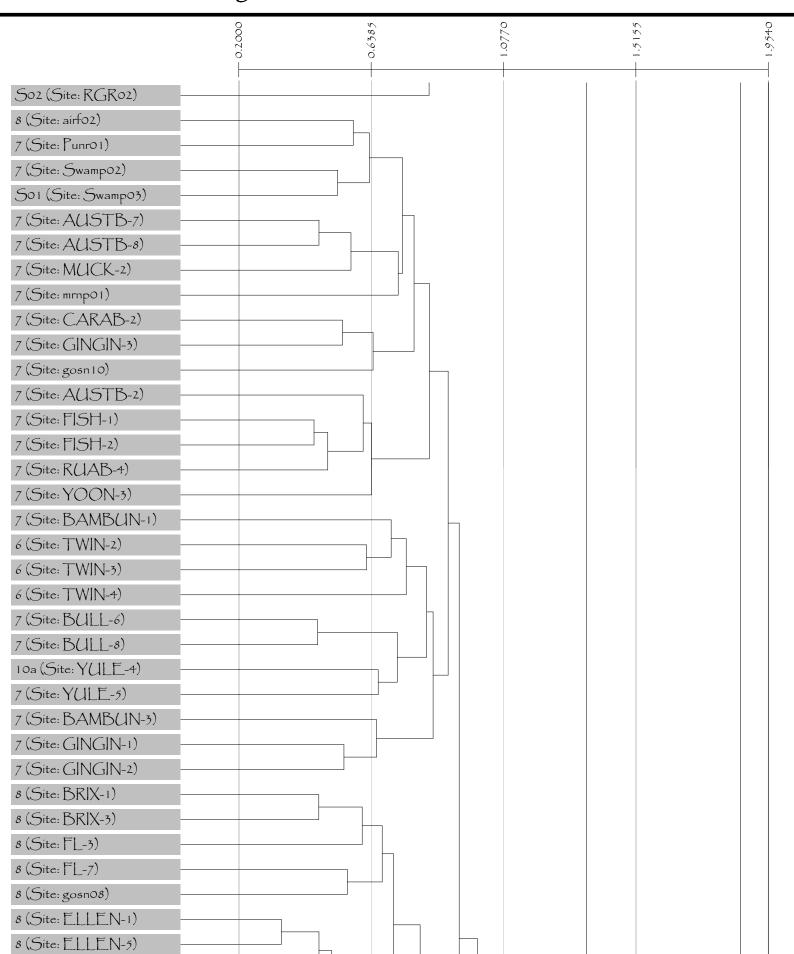


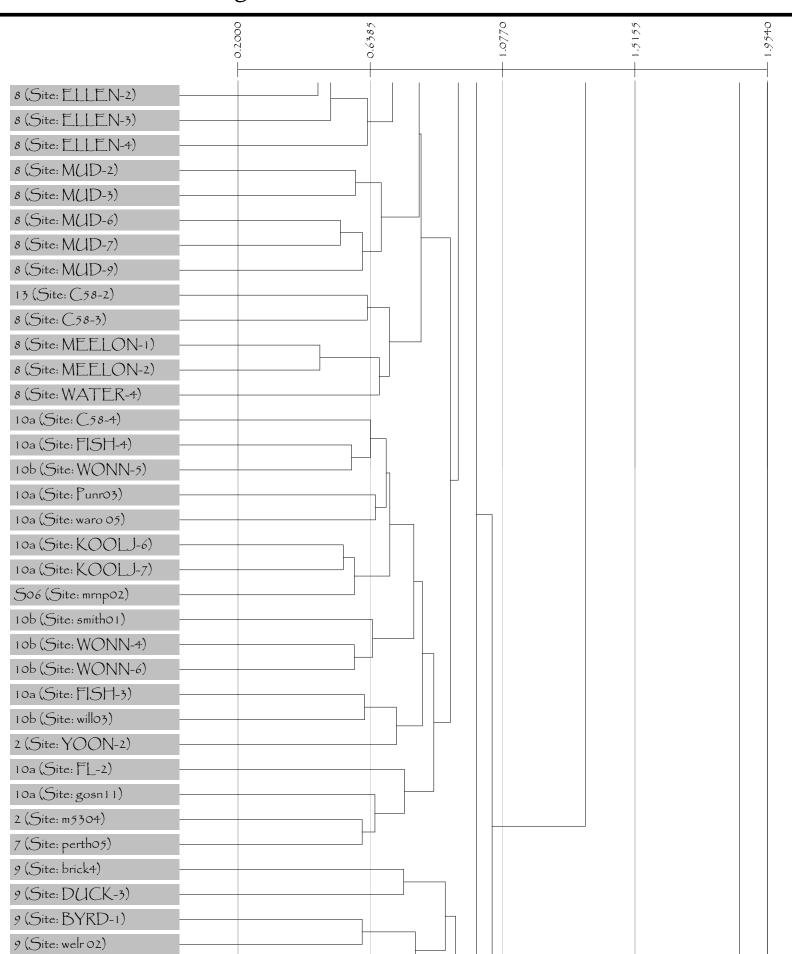


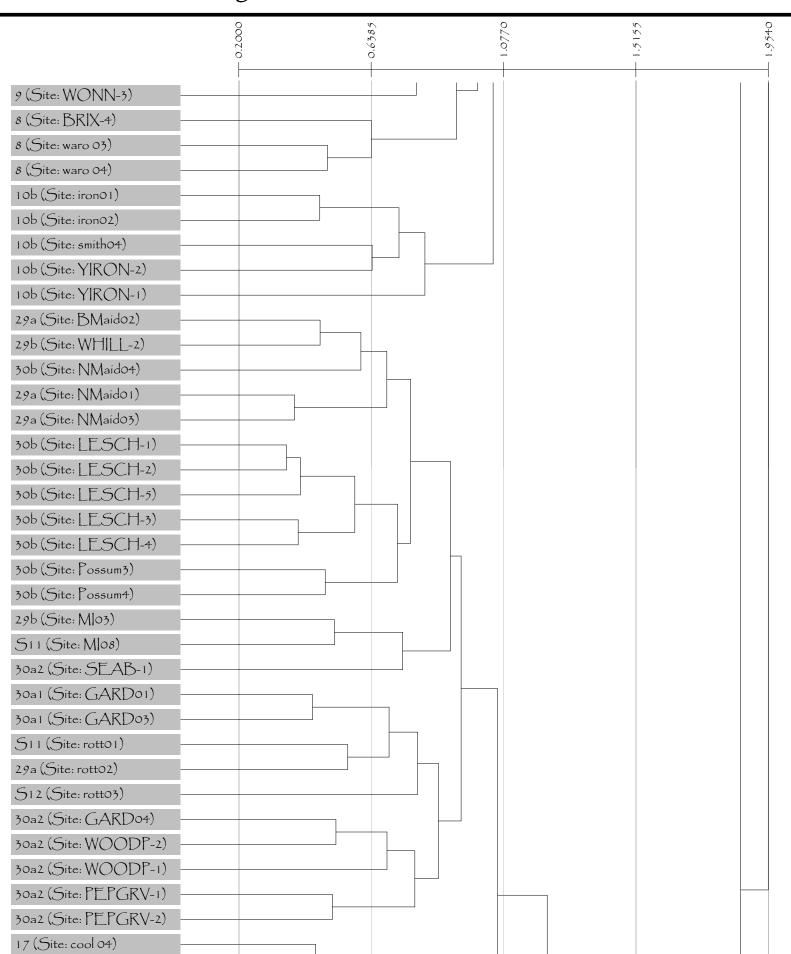


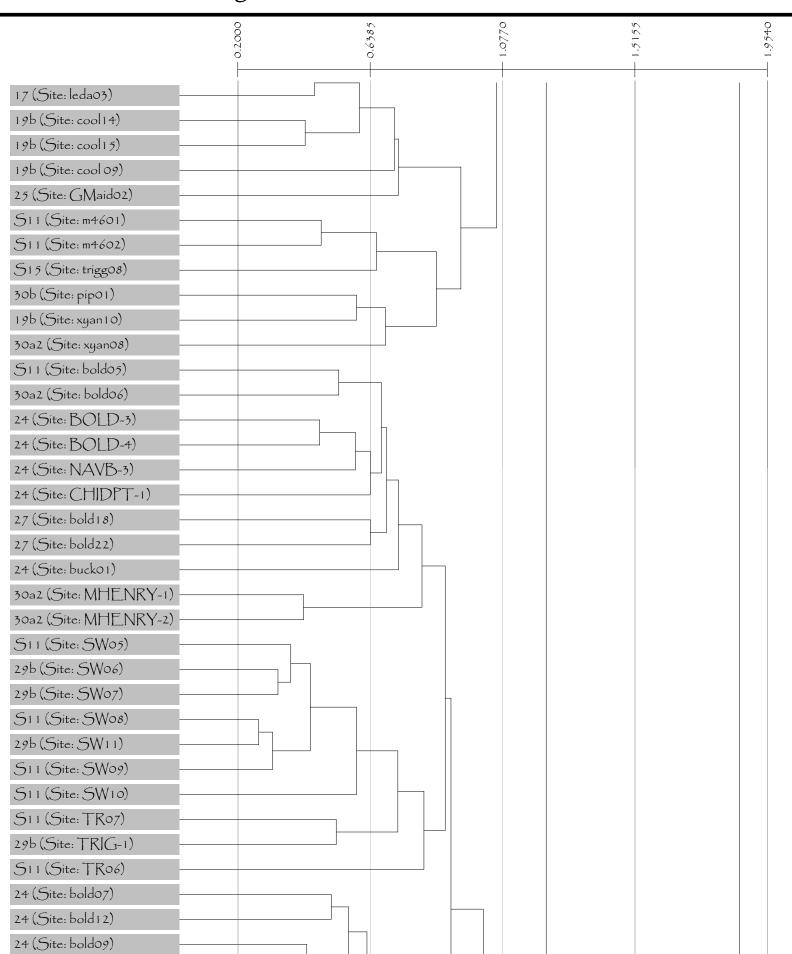


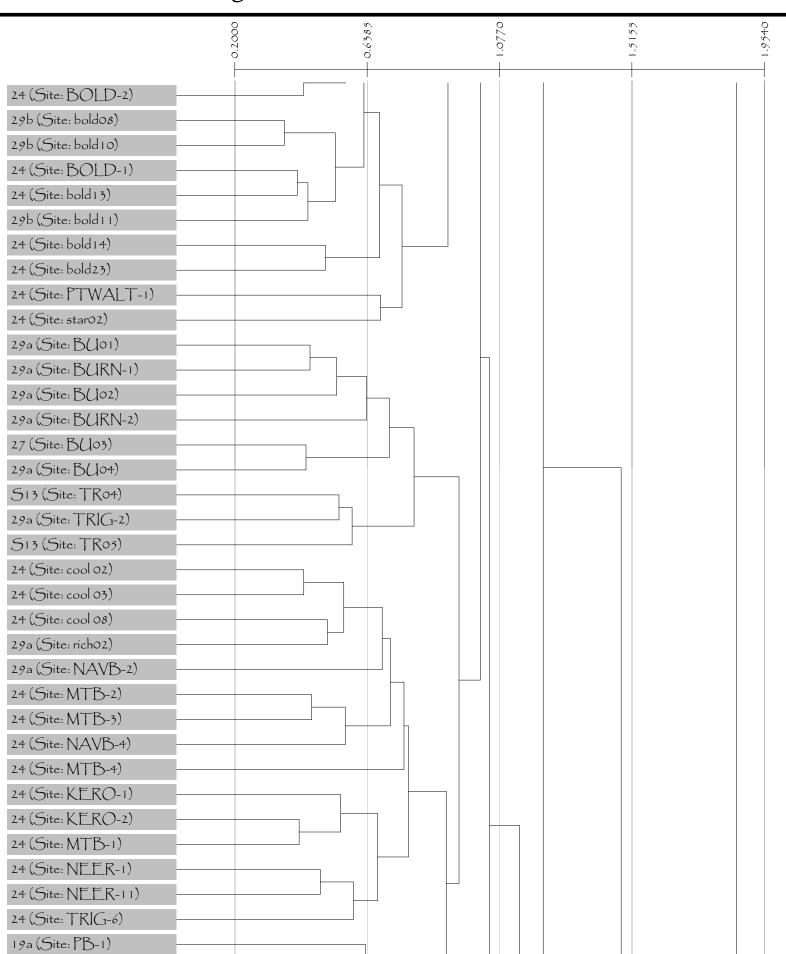


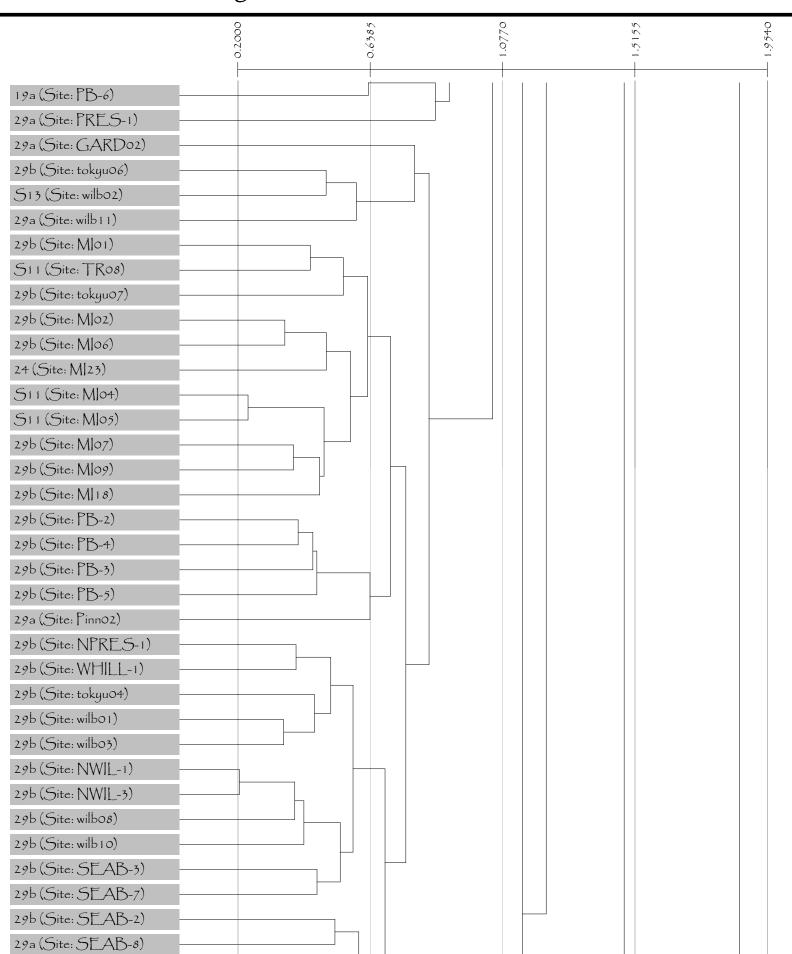


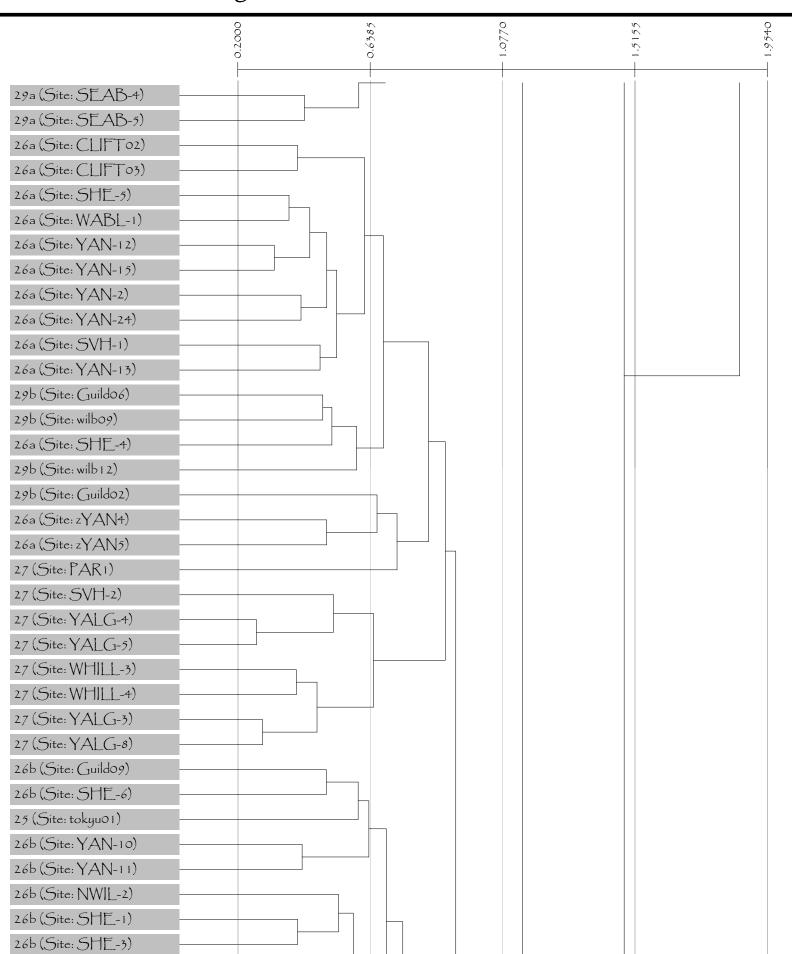


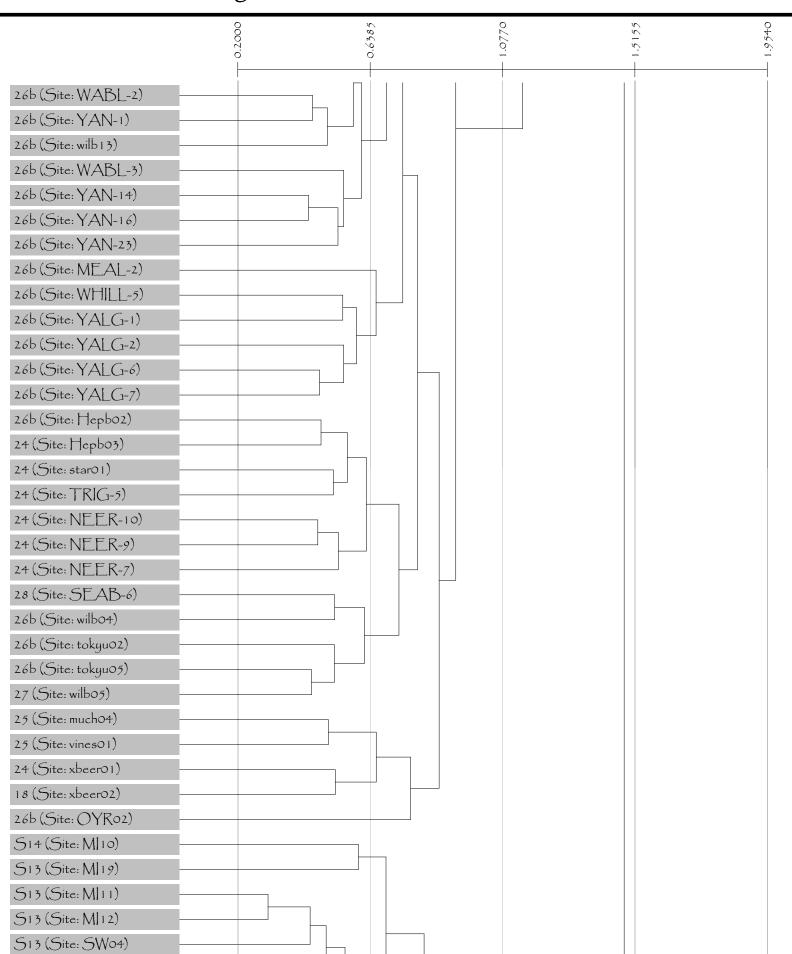


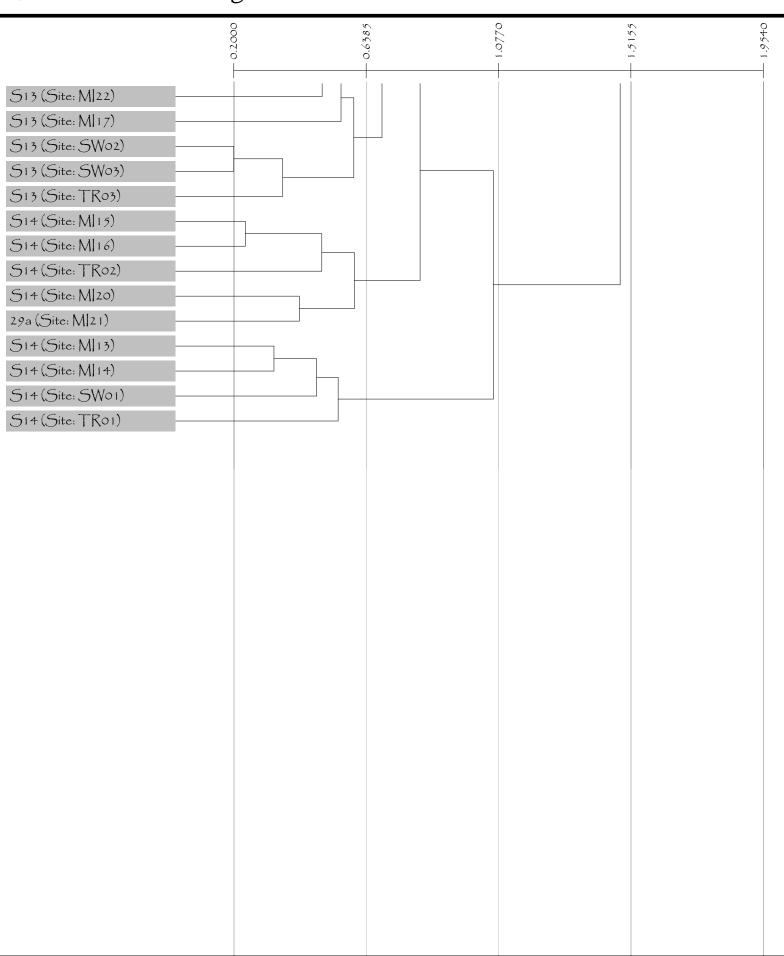














Appendix E Banksia Woodlands of the Swan Coastal Plain Assessment

Banksia Woodland of the SCP Assessment

1.0 Methods

1.1 Introduction

The Banksia woodlands of the Swan Coastal Plain encompasses a large natural variation across its range. Furthermore it is subject to varying degrees of disturbance and degradation that have influenced the quality of patches.

The Threatened Species Scientific Committee (TSSC) published the approved Conservation Advice for this community in September 2016. This document details the key diagnostic features applicable for determining the presence of this TEC. Patches must meet the following key diagnostic characteristics, condition thresholds, and minimum patch sizes:

- Step 1: use key diagnostic characteristics to determine if TEC is present
- Step 2: determine condition of patch
- Step 3: consider if patch meets minimum size threshold
- Step 4: surrounding context of a patch must be taken into account when considering factors that add to the importance of a patch that meets the condition thresholds.

1.2 Condition

The condition of vegetation of each patch needs to be determined in accordance with the following:

- The condition assessment of a patch should be centred on the area of highest native floristic diversity and/or cover of the patch.
- Timing of surveys and recent disturbance should be taken into account
- Surrounding context of a patch should be considered
- Certain vegetation components of Banksia Woodlands community merit consideration as critical elements to protect. Three components are recognised as threatened in their own right i.e. Priority Ecological Communities
- A relevant expert may be useful to help identify the ecological community and its condition.
- Vegetation must be in 'Good' or better condition in accordance with **Table 1**.

Table 1 Keighery (1994) Condition Scale For Vegetation

KEIGHERY (1994) VEGETATION CONDITION SCALE	INDICATIVE CONDITION MEASURES/THRESHOLDS			
	TYPICAL NATIVE VEGETATION COMPOSITION	TYPICAL WEED COVER		
Pristine No obvious signs of disturbance	Native plant species diversity fully retained or almost so ¹ .	Zero or almost no weed cover/abundance		
Excellent Vegetation structure intact, disturbance only affecting individual species, weeds are non- aggressive species.	High native plant species diversity ¹	Less than 10%		
Very Good Vegetation structure altered, obvious signs of disturbance (e.g. repeated fires, dieback, logging,grazing). Aggressive weeds present.	Moderate native plant species diversity ¹	5-20%		
Good Vegetation structure altered but retains basic vegetation structure or ability to regenerate it. Obvious signs of disturbance (from partial clearing, dieback, logging, grazing). Presence of very aggressive weeds.	Low native plant species diversity ¹	5-50%		
Degraded Basic vegetation structure severely impacted by disturbance. Requires intensive management. Disturbance evident such as partial clearing, dieback, logging and grazing. Presence of very aggressive weeds at high density.	Very low native plant species diversity	20-70%		

KEIGHERY (1994) VEGETATION CONDITION SCALE	INDICATIVE CONDITION MEASURES/THRESHOLDS		
Completely Degraded Vegetation structure is no longer intact and the area is completely or almost completely without native flora. Equivalent to 'Parkland Cleared'.	Very low to no native species diversity	Greater than 70%	

1. relative to expected natural range of diversity for that vegetation unit e.g. Floristic Community Type where comparative data exists.

1.3 Minimum Patch Size

Different minimum patch sizes apply to different levels of condition, as outlined below:

- Pristine no minimum patch size
- Excellent 0.5 ha or 5,000 m² (50 x 100 m)
- Very Good 1 ha or 10,000 m² (100 x 100 m)
- Good 2 ha or 20,000 m² (200 x 100 m)

1.4 Further Information

The following information should be taken into consideration when applying the key diagnostic criteria and condition thresholds:

- Land use history and landscape position of patch including position relative to surrounding vegetation
- A patch is a discreet and mostly continuous area of the ecological community and may include small-scale variations (<30 m), gaps
 and disturbances such as tracks paths or breaks that do not significantly alter the overall functionality of the ecological community.
- Variation in canopy cover, quality or condition of vegetation across a patch should not be considered evidence of multiple patches
- A buffer zone is a contiguous area immediately adjacent to a patch of the ecological community. The recommended minimum buffer
 zone is 20-50 m. larger buffer zones should be considered for patches of particularly high conservation value, or if patches are down
 slope of drainage lines or a source of nutrient enrichment, or groundwater drawdown.
- Restored vegetation is not excluded provided it meets the key diagnostic criteria, condition threshold and patch size.
- Sampling protocols includes developing a quick map of the vegetation, landscape qualities and management history. Following this, a thorough sampling exercise must be undertaken to represent the range of variation. At least one hour per plot in early to midspring and a second survey in late spring may be required to detect the majority of species. plots to be at least 100 m² (10 x 10 m). Search effort (number of person hours per plot across entire patch) and surveyor's level of expertise can be useful for future reference.
- Timing of surveys should allow a reasonable interval after a disturbance. Surveys at least one year post fire may be required to assess a site against the key diagnostic characteristics and minimum condition thresholds.
- Surrounding environment, landscape context and other significance considerations:
 - patches that are more species rich and less disturbed are likely to provide greater biodiversity value.
 - Patches that provide corridors or linkages within a largely modified landscape are particularly important.

The Conservation Advice provides an additional ten indicators to be considered when assessing impacts of actions or proposed actions under the EPBC Act. These are not further listed here.

2.0 Assessment

Patches are defined as a discreet and mostly continuous area of the ecological community. All native vegetation in Good or better condition were considered for an assessment against the key diagnostic criteria for the TEC. A preliminary review of Banksia species present was undertaken. Patches that had no Banksia overstorey species were excluded from further consideration.

The native vegetation has been separated into four patches:

- Patch 1 = quadrat 6
- Patch 2 = quadrat 13
- · Patch 3 = quadrat 9; and
- · Patch 4 = quadrat S01.

The key diagnostic features have been assessed using quadrats from each patch .

Key diagnostic characteristics of Patch	1	2	3	
Location and physical environment		,	į	
The Banksia Woodlands ecological community primarily occurs on the Swan Coastal Plain IBRA bioregion. Pockets of the community also extent into the adjacent lower parts of the Darling and Whicher escarpments that lie within the Jarrah Forest IBRA bioregion to the immediate east and south of the Swan Coastal Plain.	Y	Y	Y	Y

Key diagnostic characteristics of Patch	1	2	3	
Soils and landform				
Typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands. Is also common on sandy colluvium and Aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau. In other less common scenarios (transitional substrates, sandflats)	Υ	Interzone of Pinjarra Plain and Bassendean Sands.	Y	Y
Structure				
A distinctive upper sclerophyllous layer of low trees (occasionally large shrubs more than 2 m tall), typically dominated or co-dominated by one or more of the Banksia species identified below; AND	Y – sparse low woodland	Y — low open woodland	Y — low open woodland	Y — low open woodland
Emergent trees of medium or tall (<10 m) height <i>Eucalyptus</i> or <i>Allocasuarina</i> species may sometimes be present above the <i>Banksia</i> canopy; AND	Y – A. fraseriana, Nuytsia floribunda	Y – A. fraseriana, Nuytsia floribunda	Y – E. todtiana, A. fraseriana	Y – A. fraseriana, Nuytsia floribunda
An often highly species-rich understorey that consists of: A layer of sclerophyllous shrubs of various heights A herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs that sometimes includes grasses. The development of a ground layer may vary depending on the density of the shrub layer and disturbance history.	Y – 31 sclerophyllous shrubs, 12 sedges and rushes, and 26 forbs	Average – 19 sclerophyllous shrubs, 5 rushes and sedges, and 21 forbs	Average (due to poor condition) – 14 sclerophyllous shrubs, 4 rushes and sedges, 15 forbs.	
Composition				
Canopy is most commonly dominated or co-dominated by <i>Banksia attenuata</i> and/or <i>Banksia menziesii</i> . Other <i>Banksia</i> species that dominate in some examples of the ecological community are <i>B. prionotes</i> or <i>B. ilicifolia</i> ; AND	Y – 5% B. attenuata	Y – 3-8% B. attenuata, 10- 15% B. menziesii	Y – 5% B. menziesii	Y – 3-8% B. attenuata, 10- 15% B. menziesii
Patch must include at least one of the following diagnostic species: Banksia attenuata Banksia menziesii Banksia prionotes Banksia ilicifolia	Y	Y	Υ	Υ
If present, the emergent tree layer often includes Corymbia calophylla, E. marginata, or less commonly E. gomphocephala; AND	Not present	Not present	Not present	Not present
Other trees of a medium height may be present and may be co-dominant with the Banksia species across a patch, include E. todtiana, Nuytsia floribunda, Allocasuarina fraseriana, Callitris arenaria, Callitris pyramidalis and Xylomelum occidentale; AND	Sparse A. fraseriana	Y – 0-15% A. fraseriana, isolated E. todtiana	Y – 5% E. todtiana	Y – 0-15% A. fraseriana, isolated E. todtiana
Understorey typically contains high to very high diversity of shrub and herb species that often vary from patch to patch.	Y – 76 total species richness (n=2)	Average – 53 total species richness (n=2)	Average – 42 total species richness (n=2)	Average -
Contra-indicators				

Key diagnostic characteristics of Patch	1	2	3	
Patches clearly dominated by Banksia littoralis are not part of the TEC	N	N	N	N
Patches clearly dominated by Banksia burdettii are not the TEC	N	N	N	N
FCT 20c – Eastern shrublands and woodlands, corresponds with a separate EPBC ecological community listing, Shrublands and Woodlands of the eastern Swan Coastal Plain. Occurrences of this FCT should be considered under that separate listing.	N	N	N	N

2.1 Patch 1 – 79 Victoria Road

Patch 1 incorporates native vegetation at 79 Victoria Road. This patch meets all the key diagnostic features, size and condition thresholds as published in the approved conservation advice (TSSC, 2016).

It is likely that the patch extends beyond this cadastral boundary however adjacent properties were excluded from the survey. The patch is mapped as Banksia woodland with an isolated pocket of Jarrah woodland on the southern tip. The patch also represents the WA TEC SCP20a *B. attenuata* over species rich dense shrublands. Vegetation condition is excellent.

Site Detail	Site Description
Location	79 Victoria Road, Wattle Grove
Key Diagnostic characteristics	Meets all key diagnostic characteristics. Very open overstorey of Banksia trees over species-rich dense shrublands.
Condition	Excellent
Patch Size	1.8 ha
Additional features	Represents FCT20a <i>B. attenuata</i> over species rich dense shrublands. Potential to re-establish connection with adjacent Banksia woodlands beyond survey area. Supports populations of threatened <i>Conospermum undulatum</i> and Priority 3 <i>Isopogon autumnalis</i> .
Land use history	Rural to urban development
Any variations in patch	Patch has been resilient to significant weed invasion (<1m from edge excluded).
Buffer zone present	Limited buffer present for approximately 25% of patch.
Sampling protocol	Single scoring event of one non-permanent quadrat 10X10m delineated by measuring tape.
Disturbance History	Represents remnant native vegetation
Surrounding environment	Predominantly cleared for lawn, houses and various private estate use.



2.2 Patch 2 – 58 Victoria Road

Patch 2 is isolated to remnant native vegetation on 58 Victoria Road. This patch meets all key diagnostic criteria, condition and size thresholds.

The patch is likely to extend beyond this cadastral boundary, particularly northwest. The patch includes two discreet areas separated by planted and native trees and a house. Due to the connection of canopies of trees along both sides of the house these two areas are considered representative of the same patch.

The patch represents two vegetation communities, both broadly described as Banksia woodlands. Vegetation condition varied between Degraded to Excellent which reflects historical clearing. In particular, the patch at the front of the house has been subject to partial clearing of the understorey. It falls outside the required 0.5 ha by such a minute amount which relies on precise mapping. The precautionary principle has been applied.

Site Detail	Site Description
Location	58 Victoria Road, Wattle Grove
Key Diagnostic characteristics	Meets all key diagnostic characteristics. Very open overstorey of Banksia trees over species-rich dense shrublands.
Condition	Excellent
Patch Size	0.49
Additional features	Patch represents two occurrences on 58 Victoria Road separated by planted trees and a house. Has the potential to be linked to larger remnant native vegetation on adjacent property. Continues to support high species richness and be resilient to weed invasion. Supports small population of threatened <i>Conospermum undulatum</i> flora.
Land use history	Rural to urban development
Any variations in patch	The northwest section of the patch has been resilient to significant weed invasion (<1 m from edge excluded). The area in front of the house has been partially cleared (understorey only) and weeds have displaced some native vegetation.
•	The northwest section of the patch has been resilient to significant weed invasion (<1 m from edge excluded). The area in front of the house has been partially cleared (understorey
Any variations in patch	The northwest section of the patch has been resilient to significant weed invasion (<1 m from edge excluded). The area in front of the house has been partially cleared (understorey only) and weeds have displaced some native vegetation. Buffer of native and introduced trees (no hardstand) present around
Any variations in patch Buffer zone present	The northwest section of the patch has been resilient to significant weed invasion (<1 m from edge excluded). The area in front of the house has been partially cleared (understorey only) and weeds have displaced some native vegetation. Buffer of native and introduced trees (no hardstand) present around entire patch. Single scoring event of one non-permanent quadrat 10x10 m



Plate 2 Patch 2 vegetation

Patch 3 is restricted to the southeast corner of 30 and 38 Brentwood Road, separated by a cleared track approximately 15 m wide. The northern area of this patch (represented by relevé 08) is significantly disturbed with understorey species displaced by weeds and suffering from considerable edge effects. The southern area represented by quadrat 09 was in better condition.

This patch is not representative of the EPBC TEC Banksia Woodlands of the SCP due to degradation and size of the patch.

Site Detail	Site Description
Location	30 and 38 Brentwood Road, Wattle Grove
Key Diagnostic characteristics	Arguably could meet the key diagnostic characteristics despite low diversity due to degraded condition.
Condition	Good to Very Good
Patch Size	0.42
Additional features	Isolated from other patches of native vegetation with the exception of native and introduced trees. The quadrat infers FCT23a central <i>B. attenuata-B. menziesii</i> woodlands.
Land use history	Rural to urban development
Any variations in patch	Weeds affect 50% of the patch. Edge effects are significant.
Buffer zone present	Surrounded by gardens, road and cleared areas.
Sampling protocol	Single scoring event of one non-permanent 10x10 m quadrat delineated by measuring tape and one relevé.
Disturbance History	Unknown. The area in better condition is likely to represent remnant native vegetation. The other area may represent regrowth or has been significantly cleared.
Surrounding environment	Cleared for lawn, houses and various private estate use.



Plate 4 - Patch 3 vegetation

2.5 Patch 4 – 30 and 38 Crystal Brook Road, Wattle Grove

Patch 4 is restricted to the eastern half of 30 Crystal Brook Road, with some sections of more disturbed vegetation on 38 Crystal Brook Road, separated by a property access road approximately 8 m wide. The western area of this patch (which could not be accessed) appeared to be in excellent condition compared to the more disturbed understorey species displaced by weeds and suffering from considerable edge effects in the eastern section. The eastern area is represented by quadrat NO4, with 5 relevés helping to delineate this community.

This patch is representative of the EPBC TEC Banksia Woodlands of the SCP due to its generally excellent condition and the size of the patch.

Site Detail	Site Description
Location	30 and 38 Crystal Brook Road, Wattle Grove
Key Diagnostic characteristics	Meets all key diagnostic characteristics. Very open overstorey of Banksia trees over species-rich dense shrublands.
Condition	Good to Excellent
Patch Size	2.07 ha

Site Detail	Site Description
Additional features	Isolated from other patches of native vegetation with the exception of native and introduced trees. The quadrat infers FCT23a central <i>B. attenuata-B. menziesii</i> woodlands.
Land use history	Rural to urban development
Any variations in patch	Western area of vegetation is in excellent condition, but the area on 38 Crystal Brook Road is affected by weeds 50% of the patch and also significant edge effects.
Buffer zone present	Surrounded by gardens, road and cleared areas.
Sampling protocol	Single scoring event of one non-permanent quadrat 10x10 m delineated by measuring tape and five relevés.
Disturbance History	Represents remnant native vegetation
Surrounding environment	Predominantly cleared for lawn, houses and various private estate use.



Plate 5 – Patch 4 vegetation

Flora Species by Family & Community Matrix

Family				Com	munity		
	Taxon	BaEpPf	BmXpEc	CcHaEc	EmCaFa	EmMpLp	EmPcAh
Anarthriacea							
l	Lyginia imberbis	х	х				
Apiaceae	B1						
	Platysace tenuissima				Х		
	Xanthosia atkinsoniana				X		
	Xanthosia candida				Х		Х
Aroliasas	Xanthosia huegelii						Х
Araliaceae	Trach mana nilasa						
Asparagoos	Trachymene pilosa	Х	Х			Х	
Asparagacea	Acanthocarpus preissii	x					
	Acanthocarpus preissir Asparagus asparagoides	^		х			
	Lomandra caespitosa		х	^			x
	Lomandra drummondii	V	_ ^				^
	Lomandra drummondii Lomandra hermaphrodita	X X	v				_
	Lomandra micrantha	X	X				X
	Lomandra micranina Lomandra preissii	X	X X		_	_	X X
	Lomandra sonderi	X	X X		X X	X X	X
	Lomandra sp.	X	^		·		^
	Thysanotus multiflorus	^				V	
	Thysanotus mullillorus Thysanotus patersonii	x	х	х		X X	x
	Thysanotus patersonii Thysanotus thyrsoideus	l x	_ ^	_ ^		^	^
	Thysanotus triandrus	^			v		
Asteraceae	rnysanotas trialiaras				Х		
, isicialeae	* Arctotheca calendula	x	х				
	* Hypochaeris glabra	X	×		х	х	x
	Podolepis gracilis	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	X		, ×		
	* Sonchus oleraceus		_ ^				x
	* Ursinia anthemoides	х	х		х		X
Campanulace		^	_ ^		^		^
Campanalao	?Lobelia anceps	х		х	х		x
Casuarinacea	•	^		^	_ ^		^
	Allocasuarina fraseriana	x	х		х	x	
	Allocasuarina humilis	l x	X		_ ^	x	
Celastraceae] ^	
	Tripterococcus brunonis				x		
Colchicaceae							
	Burchardia congesta	x	х		х	х	x
Cyperaceae		^	^			1 ^	1 ^
]	Cyathochaeta avenacea		х	х	х		
	Lepidosperma leptostachyum	х				х	х
	Lepidosperma pubisquameum				х		
	Lepidosperma sp.				X		
	Lepidosperma tenue		х		X	х	
	Mesomelaena pseudostygia	х	x		X	X	
	Mesomelaena tetragona	x	X		X		
	Phlebocarya filifolia	X	X				
	Schoenus clandestinus	X					
	Schoenus pedicellatus	х	х				
	Tetraria capillaris						х
	Tetraria octandra	х	х	х	х	х	X
Dasypogona] ^] ^
), ga.	Calectasia narragara		х				
	Dasypogon bromeliifolius	x	X			х	
Dillenaceae	<i>,,</i> 3] ^	
			I	I	I		
	Hibbertia aurea	X					

Appendix C Flora Species by Family by Community Matrix

				Com	munity		
Family	Taxon	BaEpPf	BmXpEc	CcHaEc	EmCaFa	EmMpLp	EmPcAh
Dillenaceae	Hibbertia hypericoides	х	х		х	х	х
	Hibbertia subvaginata			х			
Droseracea							
	Drosera erythrorhiza	х			х		х
	Drosera gigantea				х		
	Drosera porrecta	х	х			х	х
Ericaceae							
	Conostephium preissii		х			х	
	Leucopogon capitellatus						х
	Lysinema pentapetalum	х					
Euphorbiace	eae						
	Monotaxis grandiflora var.						
	grandiflora	х					
Fabaceae							
	Acacia alata var. alata		х				
	Acacia lasiocarpa var. lasiocarpa		х		х	х	х
	* Acacia longifolia					х	
	Acacia nervosa				х		
	Acacia pulchella var. pulchella			х	х	х	х
	Acacia sp.		х			х	х
	Bossiaea aquifolium				х		
	Bossiaea eriocarpa	x	х		X	х	
	Bossiaea ornata	^	^		x	^	
	* Chamaecytisus palmensis				^	x	x
	Daviesia decurrens subsp.					^	^
	decurrens	v			v		
	Daviesia divaricata subsp.	Х			Х		
					,,		
	divaricata		х		Х		
	Daviania mudiflama aubam mudiflama						
	Daviesia nudiflora subsp. nudiflora	Х	Х				
	Gompholobium confertum	Х					
	Gompholobium knightianum		Х		Х		Х
	Gompholobium tomentosum				Х		Х
	Hovea chorizemifolia			Х			
	Hovea pungens	Х	Х				
	Hovea trisperma	Х	Х		Х		Х
	Isotropis cuneifolia subsp. cuneifolia				Х		Х
	Jacksonia floribunda		Х		Х		
	Jacksonia furcellata				Х	Х	
	Jacksonia lehmannii	Х					
	Kennedia coccinea				Х		Х
	Labichea punctata	х	Х		х	Х	х
	 Lotus angustissimus 		Х		х	Х	
	 * Lupinus angustifolius 						х
	Sphaerolobium medium	х					
Goodeniace	eae						
	Dampiera alata	1	х				
	Dampiera linearis	х	х			х	х
	Lechenaultia biloba				х	х	х
	Scaevola canescens						х
	Scaevola repens var. repens	x	х				
Haemodora							
	Anigozanthos manglesii subsp.						
	manglesii		х		x		
	Conostylis aculeata		X		_ ^		
	Conostylis aurea	x	_ ^				
	23001,0 44.04	^				I	

Appendix C Flora Species by Family by Community Matrix

				Com	munity		
Family	Taxon	BaEpPf	BmXpEc	CcHaEc	EmCaFa	EmMpLp	EmPcAh
Haemodorum	Conostylis setigera	Х			Х		
	Conostylis setigera subsp. setigera		х				
	Haemodorum laxum	х	х		х	х	х
	Haemodorum sp.		х		Х	х	
	Haemodorum spicatum	х			Х		
Haloragaceae	•						
	Gonocarpus pithyoides				Х	х	
Hemerocallida	aceae						
	Agrostocrinum hirsutum	х			Х		Х
	Caesia micrantha		х		Х	х	
	Tricoryne elatior	х	х		Х	х	
Iridaceae							
,	* Freesia alba x leichtlinii		х		Х	х	х
,	* Gladiolus caryophyllaceus	х	х		Х	х	
	Patersonia juncea				Х		
	Patersonia occidentalis	х	х				
	Patersonia pygmaea	х					
,	* Romulea rosea				Х		
,	* Watsonia meriana			Х			
Lamiaceae							
	Hemiandra pungens	х	х				
	Hemiphora bartlingii	х					
Lauraceae							
	Cassytha glabella	х			Х		
Loranthaceae							
	Nuytsia floribunda	х					
Myrtaceae							
	Agonis flexuosa		х				
	Babingtonia camphorosmae		Х				Х
	Calytrix glutinosa				Х		
	Chamelaucium uncinatum		Х				
	Conothamnus trinervis	х					
	Corymbia calophylla			х	Х		Х
	Darwinia citriodora			Х			
	Eremaea pauciflora var. pauciflora	х	Х		Х	Х	
	Eucalyptus gomphocephala		Х				
	Eucalyptus marginata subsp.						
	marginata		Х		Х	х	Х
	Eucalyptus sp.		Х		Х		
	Eucalyptus todtiana	х	Х				
	Hovea chorizemifolia				Х		
	Hypocalymma angustifolium			Х			
	Hypocalymma robustum		Х		Х	Х	
	Melaleuca systena		Х			Х	
	Melaleuca trichophylla	Х					
	Pericalymma ellipticum	х					
Orchidaceae							
	Caladenia flava	х					
	Prasophyllum sp.				Х		
	Pterostylis sanguinea				Х		
	Thelymitra graminea	х			х		х
Oxalidaceae							
,	* Oxalis pes-caprae		Х				

				Com	munity		
Family	Taxon	BaEpPf	BmXpEc	СсНаЕс	EmCaFa	EmMpLp	EmPcAh
Phyllanthace							
	Phyllanthus calycinus				Х		Х
	Pittosporaceae				Х		
_	Billardiera fraseri				Х		
Poaceae							
	Austrostipa compressa		Х				Х
	* Avena barbata		Х	Х			
	* Briza maxima	Х	Х		X	Х	Х
	Briza minor Ehrharta calycina			X	X	.,	v
	* Eragrostis curvula	X X	Х	Х	X X	Х	Х
	Neurachne alopecuroidea	×			X		
	Tetrarrhena laevis	l x			^		х
Primulaceae		^					^
- minalacca	* Lysimachia arvensis				х		х
Proteaceae	Lyeaea arrenese						,
	Adenanthos cygnorum subsp.						
	cygnorum	х	х				
	Banksia armata var. armata	х			х		
	Banksia attenuata	х	х				
	Banksia dallanneyi	х			х	х	
	Banksia menziesii	х	х				
	Banksia sessilis var. sessilis		х				х
	Conospermum undulatum	Х					
	Grevillea bipinnatifida subsp.						
	bipinnatifida		Х		х	х	
	Hakea amplexicaulis		Х				
	Hakea conchifolia	Х					
	Hakea lissocarpha						Х
	Hakea prostrata	Х					
	Hakea ruscifolia		Х				
	Hakea stenophylla				Х		
	Hakea trifurcata		Х	Х	Х	Х	
	Hakea undulata		Х		Х		
	Isopogon autumnalis	Х	Х				
	Isopogon dubius	Х			Х	Х	
	Lambertia multiflora var.						
	darlingensis Persoonia angustiflora	X	Х		х	Х	
	Persoonia angustiilora Petrophile linearis	X					
	Petrophile infeats Petrophile macrostachya	X X			v		
	Petrophile macrostachya Petrophile seminuda	x x			Х		
	Stirlingia latifolia	x x	×			x	
	Synaphea spinulosa subsp.	^	^			^	
	spinulosa		x			×	
Restionacea	•		_ ^			^	
	Alexgeorgea nitens	х	x				
	Desmocladus fasciculatus	X	x		х	х	х
	Hypolaena exsulca	X					
	Loxocarya cinerea	X			х		
Rhamnacea	-						
	Spyridium globulosum			х			
Rubiaceae							
	Opercularia vaginata		х				
Rutaceae							
	Philotheca spicata	х	х		х	х	

Family	Tayon			Com	munity		
Family	Taxon	BaEpPf	BmXpEc	CcHaEc	EmCaFa	EmMpLp	EmPcAh
Solanaceae							
	* Solanum nigrum						Х
Stylidiaceae							
	Stylidium amoenum	Х					
	Stylidium brunonianum		х		х		
	Stylidium hispidum				х		
	Stylidium piliferum				х		х
	Stylidium schoenoides	Х	х				Х
Violaceae							
	Hybanthus calycinus	х	х				
Xanthorrhoe	aceae						
	Chamaescilla corymbosa var.						
	corymbosa		х				х
	Xanthorrhoea acanthostachya	х	х				
	Xanthorrhoea gracilis		х				х
	Xanthorrhoea preissii	х	Х		х	х	х



Appendix F Reconnaissance Flora and Vegetation Assessment

A reconnaissance flora and vegetation assessment was undertaken by Rachel Pratt, an ecologist with over 20 years' experience undertaking flora and vegetation assessments on the swan coast plan. Surveys were undertaken on 24 January 2022 date on Lot 210, 21, 4, 803, 802 and 801.

Lot 210 (Plate 1; Plate 2) contained an intact Banksia woodland with a high diversity of shrubs and groundcover. Structurally the vegetation was consistent with the *Banksia Woodlands of the Swan Coastal Plain* Threatened Ecological Community (TEC) listed under the EPBC Act. The site showed floristic similarities to the Western Australian listed TEC *Banksia attenuata woodlands over species rich dense shrublands* (SCP20A).

Due to the time of year (summer) and lack of access to the lot, it was not possible to record the quadrat data which would be required for a Floristic Community Analysis using statistical software, however the site appeared floristically similar to vegetation in Lot 804 in which data was collected from a spring quadrat that could be used to infer the Floristic Community Type of Lot 210.

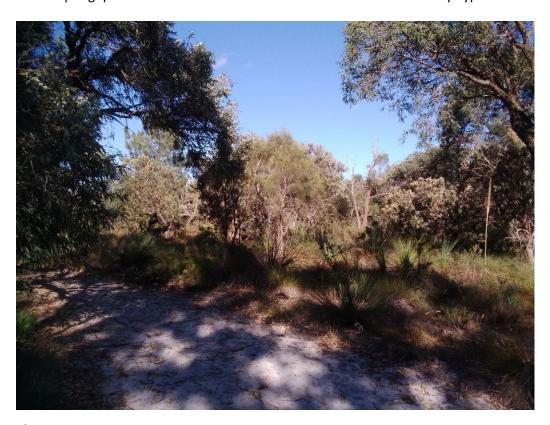


Plate 1: Lot 210





Plate 2: Lot 210

The following taxa were identifiable from the south-eastern boundary of lot 210:

- *Briza maxima
- *Ehrharta calycina
- *Gladiolus caryophyllaceus
- *Leptospermum laevigatum
- *Pinus pinaster
- *Ursinia anthemoides
- Adenanthos cygnorum subsp. cygnorum
- Allocasuarina fraseriana
- Allocasuarina humilis
- Banksia ?dallanneyi
- Banksia attenuata
- Banksia dallannevi
- Banksia menziesii
- Bossiaea eriocarpa
- Burchardia congesta
- Calothamnus sp.
- Conospermum undulatum (T)
- Dampiera linearis
- Dasypogon bromeliifolius
- Daviesia decurrens subsp. decurrens

- Daviesia nudiflora
- Desmocladus fasciculatus
- Desmocladus flexuosus
- Eremaea pauciflora var. pauciflora
- Eucalyptus marginata
- Eucalyptus todtiana
- Gastrolobium capitatum
- Gompholobium tomentosum
- Haemodorum sp.
- Isopogon autumnalis (P3)
- Jacksonia floribunda
- Johnsonia pubescens
- Lambertia multiflora
- Lomandra sonderi
- Lyginia sp.
- Mesomelaena pseudostygia
- Patersonia sp.
- Petrophile ?rigida
- Petrophile macrostachya
- Pterostylis sp.



- Scaevola repens
- Scholtzia involucrata
- Stirlingia latifolia
- Thysanotus sp.

- Xanthorrhoea brunonis
- Xanthorrhoea preissii
- Xylomelum occidentale

The majority of remnant vegetation on Lot 210 was in Excellent condition, with the north-eastern vegetation being more degraded due to an infestation of Victorian tea tree (*Leptospermum laevigatum), as shown in Plate 3.



Plate 3: Victorian tea-tree infestation

Two conservation significant flora taxa were identified from Lot 210, *Conospermum undulatum* (T) and *Isopogon autumnalis* (P3). Both taxa have been identified on neighboring lots previously (Plate 4)





Plate 4 Conospermum undulatum on Lot 210

Lot 201 contained suitable foraging habitat for Western Australia's three Threatened black cockatoo species. Based on visual estimates from the site boundary, The lot most likely contained foraging species at sufficient cover to qualify as Moderate (3-4) foraging value (Bamford, 2018). The site context score is low (0) as the local area (within 15 km) contains approximately 32,000 ha of remnant native vegetation. It was not possible to assess the Species Density (stocking rate).

An ecological linkage is present between vegetation in Lot 210 and vegetation in neighbouring lots.

Lot 21

Lot 21 did not contain any native vegetation other than one large tuart (*Eucalyptus gomphocephala*). Several eastern states Eucalypts (**Eucalyptus grandis* and **E. botryoides*) on the property would have roosting or foraging value for black cockatoos and were of greater than 500 mm DBH (Plates 5 and 6)





Plate 5: Lot 21





Plate 6: Lot 21

Lot 4

Lot 4 did not contain any native vegetation other than one large jarrah (*Eucalyptus marginata*) of approximately 400 mm DBH. One lemon scented gum (**Corymbia citriodora*) would have roosting or foraging value for black cockatoos and was of greater than 500 mm DBH.



Plate 7: Lot 4





Plate 8: Lot 4

Lot 803

Lot 803 appears predominately cleared, with the rear of the block appearing to contain pines with no understory (Plate 9).



Plate 9: Lot 803



Lot 802

Lot 802 was predominantly cleared (Completely Degraded) with a small pocket of native vegetation (Condition: Good) (0.05 ha) at the rear of the block (see photos below of the pocket of veg) as shown in Plate 10, 11, 12 and 13.



Plate 10: Lot 802





Plate 11 Lot 802



Plate 12 Lot 802



Plate 13 Lot 802

Remnant vegetation on Lot 802 contained the following taxa:



- *Briza maxima
- *Ehrharta calycina
- *Gladiolus caryophyllaceus
- *Leptospermum laevigatum
- *Ursinia anthemoides
- *Wahlenbergia capensis
- ?Styphelia sp.
- Acacia saligna
- Adenanthos cygnorum subsp. cygnorum
- Allocasuarina fraseriana
- Allocasuarina humilis
- Anigozanthos manglesii subsp. manglesii
- Banksia attenuata
- Banksia menziesii
- Bossiaea eriocarpa
- Conospermum undulatum (T)
- Dasypogon bromeliifolius
- Eremaea pauciflora var. pauciflora
- Eucalyptus marginata
- Gastrolobium capitatum
- Gompholobium tomentosum
- Hibbertia hypericoides
- Isopogon autumnalis (P3)
- Jacksonia floribunda
- Mesomelaena pseudostygia
- Petrophile seminuda
- Scaevola repens
- Scholtzia involucrata
- Tetraria octandra
- Xanthorrhoea? preissii (a seedling)





Plate 14 Conospermum undulatum on Lot 802.

Lot 801

Lot 801 was cleared (Completely Degraded) and is a significant source of weeds invading remnant vegetation on Lot 210. Lot 801 contained bamboo, Victorian tea tree, common fig, eastern states bottle brush species, Brazilian pepper tree, Flinders Range wattle, Cootamundra wattle and pines. Two old growth Jarrah were present, with a DBH of approximately 1000 mm (Plate 15-17).





Plate 15 Lot 801



Plate 16 Lot 801





Plate 17 Lot 801



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