

Memorandum

To	Bree Atkinson	Page	1
CC	Floora de Wit		
Subject	Ecological Assessment - Alkimos SDP Pipeline Integration		
From	Jared Leigh		
File/Ref No.	60555264	Date	31-Aug-2018

Water Corporation required biological investigations to define and map environmental values for a linear infrastructure corridor in Alkimos (Western Australia).

A detailed flora and vegetation survey was conducted by Principal Botanist Floora de Wit and Environmental Scientist Danielle Sullivan 16 to 18 July 2018. Twenty vegetation types were described and mapped as detailed in Table 1. One Threatened Ecological Community (TEC) listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was recorded. The TEC 'Banksia Woodlands of the Swan Coastal Plain' was recorded extensively. At the time of writing, no detailed assessment against key diagnostic characteristics has been undertaken for patches thought to represent the TEC. This TEC assessment is based on community descriptions and field observations. One WA listed TEC was recorded, '*Melaleuca huegelii* - *Melaleuca systena* shrublands on limestone ridges'. One WA listed Priority Ecological Community (PEC) was recorded, 'Northern Spearwood Shrublands and Woodlands'. Community significance was based on observations and the Alkimos North (AECOM, 2018) and no Floristic Community Analysis has yet been completed.

The targeted black cockatoo and level 1 fauna surveys were conducted in July and August 2018 by Ecologist Jared Leigh, Botanist Floora de Wit and Environmental Scientist Danielle Sullivan. The 212 breeding and potential breeding trees recorded and assessed within the Survey Area are presented in Attachment A. No confirmed roosting sites were recorded. Foraging habitat for both Carnaby's Cockatoo (*Calyptorhynchus latirostris* [Endangered under the EPBC Act and under the *Wildlife Conservation Act 1950*]) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii* subsp. *naso* [Vulnerable under the EPBC Act and under the *Wildlife Conservation Act 1950*]) were assessed and are presented in Table 2. Foraging evidence for both black cockatoo species were recorded throughout the survey area. Fauna habitats mapped in the survey area comprised:

- Woodland
- Shrubland and heath
- Pine plantation
- Pine plantation regeneration
- Scattered Trees
- Parkland, planted vegetation and maintained gardens
- Cleared.

The fauna recorded during the survey are presented in Table 3.

Table 1 Vegetation Communities

Vegetation Description
<p>AfHhMp <i>Allocasuarina fraseriana</i>, <i>Banksia attenuata</i>, <i>Eucalyptus marginata</i> subsp. <i>marginata</i> and <i>Banksia menziesii</i> mid woodland over <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i>, <i>Stirlingia latifolia</i>, <i>Daviesia triflora</i> and <i>Hypocalymma robustum</i> mid shrubland with <i>Mesomelaena pseudostygia</i>, <i>Lepidosperma pubisquameum</i> and <i>Schoenus grandiflorus</i> low open sedgeland over <i>Tricoryne elatior</i>, <i>Podolepis gracilis</i>, <i>*Ursinia anthemoides</i>, <i>Dampiera linearis</i> and <i>*Gladiolus caryophyllaceus</i> low sparse forbland with <i>Alexgeorgea nitens</i>, <i>Desmocladius flexuosus</i>, and <i>Lyginia imberbis</i> low sparse rushland.</p> <p>Represents Banksia Woodland of the SCP TEC (Federal) and Banksia Dominated Woodlands of the SCP (P3, State).</p>
<p>BaEpDf <i>Banksia attenuata</i>, <i>Eucalyptus todtiana</i>, <i>Nuytsia floribunda</i> and <i>Banksia menziesii</i> mid open woodland over <i>Eremaea pauciflora</i> var. <i>pauciflora</i>, <i>Leucopogon polymorphus</i>, <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i> and <i>Conostephium pendulum</i> mid shrubland over <i>Desmocladius flexuosus</i>, <i>Alexgeorgea nitens</i> and <i>Lyginia barbata</i> low sparse rushland with <i>Mesomelaena pseudostygia</i> and <i>Schoenus</i> sp. low sparse sedgeland over <i>*Hypochaeris glabra</i>, <i>*Gladiolus caryophyllaceus</i>, <i>Patersonia occidentalis</i>, <i>Drosera erythrorhiza</i> and <i>Conostylis setigera</i> low sparse herbland.</p> <p>Represents Banksia Woodland of the SCP TEC (Federal) and Banksia Dominated Woodlands of the SCP (P3, State).</p>
<p>BaSIAn <i>Banksia attenuata</i>, <i>Banksia menziesii</i>, <i>Corymbia calophylla</i>, <i>Eucalyptus marginata</i> subsp. <i>marginata</i> and <i>Allocasuarina fraseriana</i> mid woodland over <i>Stirlingia latifolia</i>, <i>Jacksonia furcellata</i>, <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i>, and <i>Scaevola repens</i> low open shrubland over <i>Alexgeorgea nitens</i>, <i>Hypolaena exsulca</i> and <i>Lyginia barbata</i> low open rushland with <i>*Briza maxima</i>, <i>Amphipogon turbinatus</i> and <i>Tetrarrhena laevis</i> low open grassland.</p> <p>Represents Banksia Woodland of the SCP TEC (Federal) and Banksia Dominated Woodlands of the SCP (P3, State).</p>
<p>BaXpAe <i>Banksia attenuata</i>, <i>Eucalyptus todtiana</i>, <i>Banksia menziesii</i> and <i>Allocasuarina fraseriana</i> low open woodland over <i>Xanthorrhoea preissii</i>, <i>Hibbertia hypericoides</i>, <i>Jacksonia calcicola</i>, <i>Acacia pulchella</i> var. <i>glaberrima</i> and <i>Calothamnus sanguineus</i> low shrubland with <i>Mesomelaena pseudostygia</i>, <i>Schoenus clandestinus</i> and <i>Tetraria octandra</i> with <i>Austrostipa elegantissima</i> and <i>*Avena barbata</i> low open grassland over <i>Podolepis gracilis</i>, <i>*Ursinia anthemoides</i>, <i>Ptilotus manglesii</i>, <i>Acanthocarpus preissii</i> and <i>*Gladiolus caryophyllaceus</i> low open herbland.</p> <p>Represents Banksia Woodland of the SCP TEC (Federal) and Banksia Dominated Woodlands of the SCP (P3, State).</p>
<p>BsMs <i>Banksia sessilis</i> var. <i>cygnorum</i> and <i>Calothamnus quadrifidus</i> tall open shrubland over <i>Melaleuca systema</i>, <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i>, <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i> and <i>Phyllanthus calycinus</i> low shrubland over <i>Conostylis aurea</i>, <i>Cassytha racemosa</i>, <i>Tricoryne elatior</i>, <i>Drosera erythrorhiza</i> and <i>Lomandra maritima</i> low sparse herbland with <i>Mesomelaena pseudostygia</i>, <i>Lepidosperma tenue</i> and <i>Schoenus clandestinus</i> low sparse sedgeland.</p> <p>Mosaic heathland. Amended herbs and sedges since AECOM 2017 report to reflect excellent condition vegetation and additional quadrat data. Represents WA PEC 'Northern Spearwood Shrublands and Woodlands' at some locations, or WA TEC '<i>Melalauca huegelii</i> - <i>Melaleuca systema</i> shrublands on limestone ridges'.</p>
<p>Cleared/Degraded</p> <ol style="list-style-type: none"> 1. Horticulture 2. Paddock 3. Trees 4. Pine Plantation 5. Pine Plantation Regeneration

Vegetation Description
<p>EgBaXp <i>Eucalyptus gomphocephala</i> tall forest over <i>Banksia attenuata</i>, <i>Allocasuarina fraseriana</i> and <i>Banksia menziesii</i> low open woodland over <i>Xanthorrhoea preissii</i>, <i>Hibbertia hypericoides</i>, <i>Jacksonia furcellata</i>, <i>Macrozamia riedlei</i> and <i>Hardenbergia comptoniana</i> mid open shrubland over *<i>Euphorbia terracina</i>, <i>Lomandra maritima</i>, *<i>Romulea rosea</i>, and <i>Acanthocarpus preissii</i> low open herbland with *<i>Briza maxima</i>, *<i>Eragrostis curvula</i> and *<i>Avena barbata</i> mid grassland.</p> <p>May represent WA PEC 'Northern Spearwood shrublands' (P3).</p>
<p>EgHhAb <i>Eucalyptus gomphocephala</i>, <i>Eucalyptus marginata</i> and isolated <i>Banksia attenuata</i> and <i>Banksia grandis</i> mid woodland over <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i>, <i>Bossiaea eriocarpa</i>, <i>Macrozamia riedlei</i> and <i>Hardenbergia comptoniana</i> mid open shrubland with *<i>Avena barbata</i> and *<i>Briza maxima</i> low open grassland over <i>Tricoryne elatior</i>, <i>Conostylis aurea</i>, <i>Conostylis candicans</i> subsp. <i>candicans</i>, *<i>Gladiolus caryophyllaceus</i> and *<i>Sonchus asper</i> low open herbland with <i>Mesomelaena pseudostygia</i> and <i>Tetraria octandra</i> low open sedgeland.</p> <p>Represents WA PEC 'Northern Spearwood shrublands and woodlands' (P3).</p>
<p>EmGtPo <i>Eucalyptus marginata</i> subsp. <i>marginata</i> and isolated <i>Corymbia calophylla</i> mid woodland over <i>Gompholobium tomentosum</i>, <i>Bossiaea eriocarpa</i>, <i>Xanthorrhoea preissii</i>, <i>Hibbertia hypericoides</i> and <i>Daviesia triflora</i> low shrubland over <i>Patersonia occidentalis</i>, *<i>Ursinia anthemoides</i>, <i>Podotheca angustifolia</i>, <i>Haemodorum laxum</i> and <i>Opercularia vaginata</i> low open herbland with <i>Alexgeorgea nitens</i>, <i>Lyginia barbata</i> and <i>Desmocladius flexuosus</i> low sparse rushland.</p>
<p>EmHIMp <i>Eucalyptus marginata</i> subsp. <i>marginata</i>, <i>Allocasuarina fraseriana</i>, <i>Banksia attenuata</i> and <i>Banksia grandis</i> mid to tall open woodland over <i>Hakea lissocarpha</i>, <i>Hibbertia hypericoides</i>, <i>Xanthorrhoea preissii</i>, <i>Acacia pulchella</i> var. <i>glaberrima</i> and <i>Gompholobium tomentosum</i> mid to low shrubland with <i>Mesomelaena pseudostygia</i>, <i>Lepidosperma leptostachyum</i>, <i>Tetraria octandra</i> and <i>Schoenus clandestinus</i> low sparse sedgeland with *<i>Carpobrotus edulis</i>, *<i>Hypochaeris glabra</i>, <i>Drosera erythrorhiza</i>, <i>Lomandra nigricans</i> and <i>Gonocarpus pithyoides</i> low sparse herbland.</p>
<p>ErAcEc <i>Eucalyptus rudis</i> subsp. <i>rudis</i> and occasional <i>Banksia ilicifolia</i> mid open woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>, <i>Acacia rostelifera</i>, <i>Acacia saligna</i> and <i>Jacksonia furcellata</i> tall open shrubland over *<i>Eragrostis curvula</i>, *<i>Lagurus ovatus</i>, *<i>Cynodon dactylon</i> and *<i>Avena barbata</i> mid grassland over *<i>Oxalis pes-caprae</i>, *<i>Pelargonium capitatum</i>, *<i>Euphorbia terracina</i> and *<i>Carpobrotus edulis</i> low herbland.</p>
<p>MpHaEc <i>Melaleuca preissiana</i>, <i>Banksia ilicifolia</i>, <i>Eucalyptus rudis</i> subsp. <i>rudis</i> and <i>Eucalyptus gomphocephala</i> mid woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>, <i>Jacksonia furcellata</i> and <i>Kunzea glabrescens</i> tall sparse shrubland over <i>Hypocalymma angustifolium</i>, <i>Jacksonia furcellata</i>, <i>Gompholobium tomentosum</i> and <i>Xanthorrhoea preissii</i> mid sparse shrubland over *<i>Ehrharta calycina</i>, *<i>Briza maxima</i>, *<i>Pentameris airoides</i> and *<i>Vulpia myuros</i> tall to low tussock grassland over *<i>Carpobrotus edulis</i>, <i>Patersonia occidentalis</i>, <i>Gonocarpus cordiger</i> and <i>Corynotheca micrantha</i> low open herbland.</p>
<p>MsLm <i>Melaleuca systema</i>, <i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i>, <i>Rhagodia baccata</i> and <i>Hardenbergia comptoniana</i> mid open heathland over <i>Lomandra maritima</i>, *<i>Euphorbia terracina</i>, <i>Acanthocarpus preissii</i>, and <i>Conostylis pauciflora</i> subsp. <i>euryrhipis</i> (P4) low herbland with <i>Desmocladius asper</i> low open rushland and <i>Lepidosperma tenue</i> and <i>Schoenus grandiflorus</i> mid open sedgeland.</p>

Table 2 Black Cockatoo Foraging Habitat

Foraging Quality	Areas (ha)	
	Carnaby's Cockatoo	Forest Red-tailed Black Cockatoo
Low Quality (1-3)	19.64	5.00
Quality (4-6)	8.20	4.34
High Quality (7-8)	21.83	1.99
Very High Quality (>8)	24.40	13.13
TOTAL	74.07	24.46

Note: foraging quality scores were determined by utilising the foraging habitat scoring system from DotEE (2017). The scoring tool is used by initially defining the quality of the overall habitat present, and then adding or subtracting points from this depending on the ecological values of the habitat (i.e. proximity to water, evidence of foraging material etc.). This determines an overall quantitative rating which is used as a representative score for that vegetation unit.

Table 3 Fauna Species Observed in the Survey Area

Name	Common Name	Status
Birds		
<i>Anthochaera carunculata</i>	Red Wattlebird	Native
<i>Artamus cyanopterus</i>	Dusky Woodswallow	Native
<i>Barnardius zonarius semitorquatus</i>	Australian Ringneck	Native
<i>Cacatua pastinator</i>	Western Corella	Native
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	Native
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	Native
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	Native
<i>Chenonetta jubata</i>	Australian Wood Duck	Native
<i>Corvus coronoides</i>	Australian Raven	Native
<i>Cracticus tibicen</i>	Australian Magpie	Native
<i>Cracticus torquatus</i>	Grey Butcherbird	Native
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Naturalised Exotic
<i>Eolophus roseicapilla</i>	Pink and Gray Galah	Native
<i>Grallina cyanoleuca</i>	Magpie Lark	Native
<i>Lichenostomus virescens</i>	Singing Honeyeater	Native
<i>Lichmera indistincta</i>	Brown Honeyeater	Native
<i>Petrochelidon nigricans</i>	Tree Martin	Native
<i>Phaps chalcoptera</i>	Common Bronzewing	Native
<i>Phylidonyris niger</i>	White-cheeked Honeyeater	Native
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Native
<i>Rhipidura leucophrys</i>	Willie Wagtail	Native
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	Introduced
Mammals		
<i>Canis lupus familiaris</i>	Dog (domestic and feral both likely)	Introduced
<i>Equus caballus</i>	Horse	Introduced
<i>Isodon obesulus fusciventer</i>	Southern Brown Bandicoot / Quenda	Introduced

Name	Common Name	Status
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	Native
<i>Oryctolagus cuniculus</i>	European Wild Rabbit	Introduced
<i>Vulpes vulpes</i>	Red Fox	Introduced

Kind Regards



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Attachment A

Black Cockatoo Potential Breeding and Breeding Trees

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
1			Eucalyptus gomphocephala (Tuart)	30	56		0	0							115.7466749	-31.62260027
2			Eucalyptus gomphocephala (Tuart)	30	110		0	0							115.7404389	-31.62477163
3			Eucalyptus marginata (jarrah)	15	52		0	0							115.7468801	-31.6225181
4		5-20 Years	Eucalyptus gomphocephala (Tuart)	22	65	biggest trunk of three measured	0	0							115.7382926	-31.62484265
5			Eucalyptus marginata (jarrah)	15	100	dead main trunk, epicormic growth	0	0							115.7404206	-31.62443302
6			Eucalyptus marginata (jarrah)	25	80		3	2	10m high, 25cm D	16m high, 20cm D					115.7462414	-31.62263412
7			Eucalyptus marginata (jarrah)	25	62		0	0							115.7460203	-31.62268173
8			Eucalyptus marginata (jarrah)	18	65		0	0						tree 2m north	115.7476316	-31.62234002
9			Eucalyptus marginata (jarrah)	16	52		0	0							115.7404593	-31.62457408
10			Eucalyptus gomphocephala (Tuart)	20	75	below node	0	0							115.7383259	-31.62501015
11	No		Eucalyptus marginata (jarrah)	15	70		0	0							115.7405452	-31.62443343
12			Eucalyptus marginata (jarrah)	25	70		1	0	facing down, 5m above ground, small						115.7466743	-31.62256968

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
13			Eucalyptus gomphocephala (Tuart)	25	56		0	0							115.7387674	-31.62491038
14			Eucalyptus todtiana	8	55		0	0						4m north	115.7483972	-31.62215683
15			Eucalyptus marginata (jarrah)	18	52		0	0							115.7404839	-31.62458288
16			Eucalyptus marginata (jarrah)	12	56		0	0						main trunk dead	115.7470181	-31.6223765
17			Eucalyptus marginata (jarrah)	16	60		0	0							115.7405446	-31.62466328
18	No		Eucalyptus marginata (jarrah)	15	55		0	0						recent dead	115.7405928	-31.62446302
19			Eucalyptus marginata (jarrah)	18	51		2	0	small branch hollow 10cm D	small branch hollow 10cm				recent dead	115.7405175	-31.62449633
20	No		Eucalyptus gomphocephala (Tuart)	30	75		0	0							115.7461703	-31.62264353
21			Stag (old dead tree, unknown species)	30	100		5+	3	8m high, 15cm D	12m high, 18cm D	branch end, assumed hollow				115.7388214	-31.62495812
22			Eucalyptus marginata (jarrah)	13	62		0	0							115.7408044	-31.62448038
23			Eucalyptus gomphocephala (Tuart)	14	150		0	0							115.7155635	-31.62066155
24			Eucalyptus gomphocephala (Tuart)	14	120		0	0							115.7124039	-31.61178568
25			Eucalyptus gomphocephala (Tuart)	11	62		0	0							115.7138795	-31.61544915
26			Corymbia calophylla (marri)	11	64		0	0							115.7158295	-31.62151823

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27			Eucalyptus gomphocephala (Tuart)	11	72		0	0							115.7372654	-31.6248077
28	No		Eucalyptus gomphocephala (Tuart)	12	63		0	0							115.7122931	-31.61104628
29			Eucalyptus gomphocephala (Tuart)	13	67		0	0							115.7150815	-31.61806035
30			Eucalyptus gomphocephala (Tuart)	16	75		0	0							115.7439235	-31.62336542
31			Eucalyptus gomphocephala (Tuart)	15	80		0	0							115.7124697	-31.61171257
32			Eucalyptus gomphocephala (Tuart)	16	65		0	0							115.7444936	-31.62311967
33			Eucalyptus gomphocephala (Tuart)	15	200		0	0							115.738035	-31.62491837
34			Eucalyptus gomphocephala (Tuart)	10	200		0	0						branches snapped not actual hollows	115.7374914	-31.6247758
35			Stag (old dead tree, unknown species)	5	60		1	0	skyward facing hollow, 25cm wide, trunk hollow, 4m from base						115.7123617	-31.6118313
36			Eucalyptus gomphocephala (Tuart)	14	64		0	0							115.7153263	-31.61902352
37			Eucalyptus gomphocephala (Tuart)	16	54		0	0							115.7447468	-31.6231094
38			Eucalyptus gomphocephala (Tuart)	15	50		0	0							115.7422114	-31.62389405
39			Eucalyptus gomphocephala (Tuart)	14	64		0	0							115.7369963	-31.62478132
40			Eucalyptus gomphocephala	12	53		0	0							115.7452659	-31.62294107

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
			(Tuart)													
41			Eucalyptus gomphocephala (Tuart)	14	78		0	0							115.7409241	-31.62429988
42			Eucalyptus gomphocephala (Tuart)	14	64		0	0							115.7152036	-31.61840953
43			Eucalyptus gomphocephala (Tuart)	14	50		0	0							115.7448677	-31.62305595
44			Eucalyptus gomphocephala (Tuart)	16	50		0	0							115.7416272	-31.62427073
45			Eucalyptus gomphocephala (Tuart)	13	51		0	0							115.7124422	-31.61190155
46			Stag (old dead tree, unknown species)	10	50		0	0							115.7377271	-31.62493778
47			Eucalyptus gomphocephala (Tuart)	16	51		0	0							115.7448393	-31.62307223
48			Eucalyptus gomphocephala (Tuart)	10	65		0	0							115.7151378	-31.61831863
49			Eucalyptus gomphocephala (Tuart)	18	200		2	2	sky facing, 16m from base, 50cm wide, trunk hollow	east facing, 15m from base, 20cm wide, branch hollow					115.7423482	-31.62390887
50			Corymbia calophylla (marri)	12	51		0	0							115.715921	-31.62148967
51			Eucalyptus gomphocephala (Tuart)	12	60		0	0							115.7123854	-31.61174588
52			Eucalyptus gomphocephala (Tuart)	16	64		0	0							115.7449574	-31.62307218

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
53			Eucalyptus gomphocephala (Tuart)	17	54		0	0							115.7454258	-31.62292853
54			Eucalyptus gomphocephala (Tuart)	13	200		0	0							115.7162466	-31.62288968
55			Eucalyptus gomphocephala (Tuart)	11	55		0	0							115.7377416	-31.62491298
56			Corymbia calophylla (marri)	15	63		0	0							115.7159901	-31.62263523
57			Eucalyptus marginata (jarrah)	13	50		0	0							115.7410055	-31.62427103
58			Eucalyptus gomphocephala (Tuart)	16	200		0	0							115.7454209	-31.62295432
59			Eucalyptus gomphocephala (Tuart)	11	51		0	0							115.7154341	-31.6205773
60			Eucalyptus gomphocephala (Tuart)	11	160		0	0							115.7135374	-31.61453752
61			Eucalyptus gomphocephala (Tuart)	15	53		0	0							115.712313	-31.61201432
62			Eucalyptus gomphocephala (Tuart)	11	53		0	0							115.7455575	-31.62280188
63			Eucalyptus gomphocephala (Tuart)	13	70		0	0							115.715594	-31.62043408
64			Eucalyptus gomphocephala (Tuart)	13	87		0	0							115.7122417	-31.61165378
65			Eucalyptus gomphocephala (Tuart)	16	200		0	0							115.7162099	-31.62409342
66			Eucalyptus gomphocephala (Tuart)	13	54		0	0							115.7417645	-31.62422752

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
67			Corymbia calophylla (marri)	12	68		0	0							115.7160407	-31.62259077
68			Eucalyptus marginata (jarrah)	14	90		0	0							115.7426937	-31.62371917
69			Eucalyptus gomphocephala (Tuart)	14	200		0	0							115.7413752	-31.6242106
70			Eucalyptus gomphocephala (Tuart)	11	54		0	0							115.7134785	-31.6145984
71			Eucalyptus gomphocephala (Tuart)	12	51		0	0							115.7434641	-31.62354827
72			Eucalyptus gomphocephala (Tuart)	16	59		0	0							115.7156405	-31.62107932
73			Corymbia calophylla (marri)	15	200		0	0							115.7161137	-31.62280113
74			Eucalyptus marginata (jarrah)	14	50		0	0							115.7426081	-31.62384067
75			Eucalyptus gomphocephala (Tuart)	16	90		0	0							115.7410786	-31.62441223
76			Eucalyptus gomphocephala (Tuart)	12	110		0	0							115.7151472	-31.61855235
77			Eucalyptus gomphocephala (Tuart)	16	50		0	0							115.7443766	-31.62332357
78			Corymbia calophylla (marri)	14	73		0	0							115.7159911	-31.62287727
79			Eucalyptus gomphocephala (Tuart)	12	55		0	0							115.7386199	-31.6250047
80			Eucalyptus gomphocephala (Tuart)	16	90		0	0							115.7457234	-31.62278908

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
81			Eucalyptus gomphocephala (Tuart)	13	64		0	0							115.742153	-31.62397308
82			Eucalyptus gomphocephala (Tuart)	15	60		0	0							115.7124646	-31.61189357
83			Eucalyptus gomphocephala (Tuart)	10	64		5+	5+	end of trunk, 20cm, skyward facing, 8m from base	end of trunk, 15cm, skyward facing, 7m from base	end of trunk, west facing, 25cm, 9m from base	end of trunk, skyward facing, 25cm, 7m from base	end of trunk, skyward facing, 20cm, 7m from base		115.7150855	-31.61806697
84			Eucalyptus gomphocephala (Tuart)	13	50		0	0							115.7151351	-31.61838533
85			Eucalyptus gomphocephala (Tuart)	16	53		0	0							115.7420906	-31.62389503
86			Eucalyptus marginata (jarrah)	13	89		0	0							115.741177	-31.62425153
87			Eucalyptus gomphocephala (Tuart)	15	63		0	0							115.7421908	-31.6240373
88			Stag (old dead tree, unknown species)	13	78		5+	5+	skyward, 45cm, trunk hollow, 7m from base	ground facing, 15cm, branch hollow, 5m from base	north facing, 15cm, branch hollow, 8m from base	skyward facing, 10cm, branch hollow, 11m from base	east facing, 12m from base, branch hollow, 25cm		115.7388279	-31.62495843
89			Eucalyptus gomphocephala (Tuart)	12	200		0	0							115.714953	-31.61765863
90			Eucalyptus gomphocephala (Tuart)	13	50		0	0							115.7425303	-31.62397938
91			Eucalyptus gomphocephala (Tuart)	15	55		0	0							115.7123987	-31.61196042
92			Eucalyptus gomphocephala (Tuart)	10	75		0	0							115.7410285	-31.624363

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
93			Eucalyptus gomphocephala (Tuart)	13	61		0	0							115.740705	-31.62444017
94			Eucalyptus gomphocephala (Tuart)	14	55		0	0							115.7122651	-31.61138283
95			Eucalyptus gomphocephala (Tuart)	16	53		0	0							115.744425	-31.6233746
96			Eucalyptus gomphocephala (Tuart)	13	110		0	0							115.7155976	-31.6206246
97			Eucalyptus gomphocephala (Tuart)	13	53		0	0							115.7407323	-31.62436228
98			Eucalyptus gomphocephala (Tuart)	24	200		3	1	trunk hollow, 15m from base, east facing, 15cm wide						115.7432792	-31.62356604
99			Eucalyptus gomphocephala (Tuart)	16	62		0	0							115.7155599	-31.62056727
100			Eucalyptus gomphocephala (Tuart)	14	58		0	0							115.7151674	-31.61828547
101			Eucalyptus gomphocephala (Tuart)	13	52		0	0							115.7406792	-31.62435997
102			Eucalyptus gomphocephala (Tuart)	15	60		0	0							115.7156561	-31.62111658
103			Eucalyptus gomphocephala (Tuart)	15	72		0	0							115.7151801	-31.6184809
104			Eucalyptus gomphocephala (Tuart)	16	66		0	0							115.7154955	-31.62044638
105			Eucalyptus gomphocephala (Tuart)	10	64		0	0							115.712357	-31.61181653

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
106			Eucalyptus gomphocephala (Tuart)	16	66		0	0							115.7443795	-31.62322372
107			Eucalyptus gomphocephala (Tuart)	17	70		0	0							115.7443439	-31.62337415
108			Eucalyptus gomphocephala (Tuart)	13	64		0	0							115.7152013	-31.61846867
109	Yes	5-20 Years	Eucalyptus marginata (jarrah)	10	60		0	0						main trunk dead recent, epicormic saplings	115.7576362	-31.62505093
110	Yes	5-20 Years	Eucalyptus marginata (jarrah)	10	60		2	1	facing up, may be shallow	too small					115.7613845	-31.62524252
111	Yes	>20 Years	Eucalyptus todtiana	10	60		0	0							115.7552891	-31.62520855
112	Yes	>20 Years	Eucalyptus todtiana	15	60		0	0							115.7554434	-31.6250259
113	Yes	<5 Years	Eucalyptus marginata (jarrah)	20	70		5+	3	branch 15m high, 15cm D	branch 3m high, 10cm D	trunk 12m high, 10cm D				115.7648046	-31.62692973
114	Yes	5-20 Years	Eucalyptus marginata (jarrah)	18	80		2	0							115.7610255	-31.6251503
115			Eucalyptus gomphocephala (Tuart)	15	70		2	2	6m high, 30cm D, trunk hollow facing up	6m high, 40cm D, trunk hollow facing up					115.7620567	-31.62503185
116			Eucalyptus marginata (jarrah)	20	60		5+	0						hollows too small	115.7600261	-31.62508845
117			Eucalyptus marginata (jarrah)	18	80		0	2	10m high, 20cm D end branch	14m h, 20cm d end branch					115.7603667	-31.62514365
118	Yes		Eucalyptus todtiana	10	60		0	0							115.7521043	-31.62519998

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
119		5-20 Years	Eucalyptus marginata (jarrah)	18	100		2	0	12m high, 15cm D						115.7614848	-31.62505658
120			Eucalyptus gomphocephala (Tuart)	20	55		0	0							115.7621356	-31.62519432
121		>20 Years	Eucalyptus gomphocephala (Tuart)	20	67		0	0							115.7622309	-31.6252944
122	Yes	5-20 Years	Eucalyptus marginata (jarrah)	18	65		0	0							115.7574793	-31.62499773
123			Stag (old dead tree, unknown species)	20	90		5+	0	15m high, 15cm D, bees utilising	10m high, 12cm D branch hollow	18m high, 30cm d, facing up				115.7582287	-31.62507482
124			Eucalyptus marginata (jarrah)	15	80		0	2	4m high, 40cm D branch broken	8m high, ?30cm D, trunk broken facing up					115.756753	-31.62666865
125	Yes	5-20 Years	Eucalyptus marginata (jarrah)	15	56		0	0							115.7611884	-31.62513638
126	No	>20 Years	eucalyptus decipiens	22	50		0	0							115.7564938	-31.63871473
127	Yes	<5 Years	Eucalyptus marginata (jarrah)	18	80		0	0							115.76493	-31.62668062
128	Yes		Eucalyptus marginata (jarrah)	18	75		1	1	8m high, 35cm d, may be shallow						115.7597108	-31.62495143
129			Corymbia calophylla (marri)	18	56		0	0							115.7892385	-31.6406183
130	Yes	5-20 Years	Corymbia calophylla (marri)	19	68		0	0							115.7868852	-31.64002688
131			Eucalyptus marginata (jarrah)	16	57		0	0							115.7893935	-31.64065563

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132			Eucalyptus todtiana	15	53		0	0							115.7975768	-31.66309312
133			Eucalyptus marginata (jarrah)	18	55		0	0							115.75679	-31.62623837
134	Yes	5-20 Years	Eucalyptus marginata (jarrah)	17	71		2	1	trunk hollow, 6m from base, 30cm wide	at base of trees, 60cm wide					115.7616465	-31.62505253
135			Eucalyptus marginata (jarrah)	24	66		0	0							115.7984354	-31.66314074
136			Eucalyptus todtiana	14	56		0	0							115.7974171	-31.66309079
137			eucalyptus discipiens	16	63		0	0							115.7566939	-31.63881835
138			Eucalyptus marginata (jarrah)	26	62		0	0							115.7981655	-31.66308422
139			Eucalyptus rudis (Flooded Gum)	24	70		0	0							115.7998694	-31.66305811
140			Eucalyptus marginata (jarrah)	25	65		0	0							115.7981868	-31.66315533
141	Yes	5-20 Years	Eucalyptus marginata (jarrah)	17	63		0	0							115.7567421	-31.62783208
142			Eucalyptus todtiana	14	54		0	0							115.7968943	-31.66308249
143			Eucalyptus todtiana	15	85		0	0							115.7964791	-31.6631328
144			Eucalyptus marginata (jarrah)	16	200		1	0	skyward, 5m from base, trunk hollow, 20cm wide						115.7561777	-31.62525138
145	Yes	>20 Years	Eucalyptus marginata	17	65		3	0	10cm wide, 14m from						115.756711	-31.62749002

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			(jarrah)						base, branch hollow							
146			Corymbia calophylla (marri)	17	52		0	0							115.7892304	-31.6405519
147	Yes	5-20 Years	Eucalyptus marginata (jarrah)	17	80		0	3	trunk hollow, 50cm wide, 8m from base	trunk hollow, 5m from base, 50cm wide	trunk hollow, 7m from base, 70cm wide				115.7568857	-31.62813349
148	Yes	>20 Years	Eucalyptus marginata (jarrah)	15	63		1	0	at base of trees, 65cm wide						115.7580638	-31.62523492
149			Stag (old dead tree, unknown species)	16	58		0	0							115.7566685	-31.62755098
150	Yes		Eucalyptus marginata (jarrah)	15	51		0	0							115.7603037	-31.62520273
151			Eucalyptus rudis (Flooded Gum)	18	90		0	0							115.8171114	-31.69069688
152	No	>20 Years	Eucalyptus rudis (Flooded Gum)	22	80		0	0							115.8062323	-31.66830057
153	No	>20 Years	Eucalyptus todtiana	5	52		0	0							115.8183924	-31.67955652
154	Yes	>20 Years	Corymbia calophylla (marri)	18	55		0	0							115.7886929	-31.66018157
155	Yes	>20 Years	Eucalyptus todtiana	7	80		0	0							115.8185301	-31.67982062
156			Eucalyptus marginata (jarrah)	16	90		Unable to Assess	Unable to Assess						Unable to assess hollows suitably from ground	115.7876501	-31.66055815
157	Yes	>20 Years	Eucalyptus marginata (jarrah)	16	68		0	0							115.8187894	-31.6808611

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158			Eucalyptus marginata (jarrah)	18	110		Unable to Assess	Unable to Assess						Unable to assess hollows suitably from ground	115.7883343	-31.66039522
159	Yes	>20 Years	Eucalyptus marginata (jarrah)	10	80		0	0						dead hollow, half missing	115.8188589	-31.68159263
160			Corymbia calophylla (marri)	20	70		0	0							115.7871771	-31.66071635
161	Yes	>20 Years	Eucalyptus marginata (jarrah)	15	90		0	0							115.8191521	-31.68214623
162	No		Eucalyptus todtiana	6	50		0	0							115.8183801	-31.67953438
163	No		Corymbia calophylla (marri)	20	80		0	0							115.7872567	-31.660579
164	Yes	>20 Years	Corymbia calophylla (marri)	20	60		Unable to Assess	Unable to Assess						Unable to assess hollows suitably from ground	115.7886071	-31.66035359
165	No	>20 Years	Eucalyptus marginata (jarrah)	15	70		0	0							115.8128252	-31.70138107
166	No	>20 Years	Eucalyptus rudis (Flooded Gum)	28	90		0	0							115.8068626	-31.6691009
167	No		Eucalyptus marginata (jarrah)	15	78		0	0							115.818868	-31.68068003
168	No	>20 Years	Eucalyptus rudis (Flooded Gum)	25	72		0	0							115.8033434	-31.66357727
169	No		Eucalyptus marginata (jarrah)	16	90		Unable to Assess	Unable to Assess						Unable to assess hollows suitably from ground	115.7875781	-31.66056016
170		>20 Years	Corymbia calophylla (marri)	20	70		0	0						no access	115.7871678	-31.66062601

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
171	Yes	>20 Years	Eucalyptus marginata (jarrah)	18	76		1	1	5m high, 15cm D, branch hollow						115.8186719	-31.68060682
172	No	>20 Years	Eucalyptus rudis (Flooded Gum)	18	70		0	0							115.8052606	-31.6672193
173	No		Corymbia calophylla (marri)	16	56		0	0							115.7888706	-31.66015347
174			Eucalyptus gomphocephala (Tuart)	26	160		0	0							115.8276511	-31.75133715
175			Eucalyptus rudis (Flooded Gum)	18	75		0	0							115.8059644	-31.66786552
176			Corymbia calophylla (marri)	12	55		0	0							115.7829164	-31.66120785
177			Eucalyptus marginata (jarrah)	18	54		0	0	base of trees hollow, 70cm						115.8129214	-31.70115872
178			Eucalyptus marginata (jarrah)	19	150		1	1	trunk hollow, 9m from base, 70cm wide						115.8157684	-31.69600353
179			Eucalyptus marginata (jarrah)	10	60		1	1	branch hollow, 8m from base, 45cm wide, north facing						115.8186169	-31.67989702
180			Eucalyptus marginata (jarrah)	12	80		1	1	skyward facing, 10m from base, 25cm wide						115.8188155	-31.6809804

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
181			Stag (old dead tree, unknown species)	24	100		3	1	branch hollow, 15m from base, 15cm wide						115.790179	-31.6600741
182			Stag (old dead tree, unknown species)	10	52		0	0							115.7829137	-31.66118417
183			Stag (old dead tree, unknown species)	21	55		0	0							115.8041849	-31.6652365
184			Corymbia calophylla (marri)	16	65		0	0							115.7905318	-31.65977058
185			Eucalyptus marginata (jarrah)	22	65		0	0	less than 8cm wide						115.7907989	-31.65981747
186			Eucalyptus marginata (jarrah)	9	68		0	0							115.8185558	-31.67987747
187			Eucalyptus marginata (jarrah)	25	68		0	0							115.7901215	-31.65993347
188			Corymbia calophylla (marri)	16	85		0	0							115.782784	-31.66117393
189			Eucalyptus marginata (jarrah)	11	90		0	0							115.8184352	-31.67937708
190			Stag (old dead tree, unknown species)	13	98		0	0							115.782942	-31.66119459
191			Eucalyptus rudis (Flooded Gum)	19	110		0	0							115.8038041	-31.66461872
192			Eucalyptus rudis (Flooded Gum)	20	100		0	0							115.8037873	-31.66458922
193			Corymbia calophylla (marri)	14	72		0	0							115.7830646	-31.66109769
194			Eucalyptus rudis (Flooded	19	62		0	0							115.8056902	-31.66760119

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
			Gum)													
195			Eucalyptus rudis (Flooded Gum)	18	100		0	0							115.8066381	-31.66893865
196			Eucalyptus marginata (jarrah)	10	52		0	1	5m from base, 20cm wide, trunk hollow						115.8183237	-31.67946832
197			Eucalyptus marginata (jarrah)	20	64		0	0							115.8189592	-31.68215118
198			eucalyptus dicipiens	12	76		0	0							115.782269	-31.66109915
199			Eucalyptus rudis (Flooded Gum)	17	53		0	0							115.8065243	-31.6687464
200			Corymbia calophylla (marri)	16	70		2	2	15cm wide, branch hollow, 14m from base	15m from base, branch hollow, 15cm wide					115.7831793	-31.66125072
201			Stag (old dead tree, unknown species)	9	54		2	2	branch hollow, 9m from base, east facing, 50cm wide	branch hollow, 9m from base, west facing, 50cm wide					115.7828876	-31.66099087
202			Stag (old dead tree, unknown species)	10	90		2	2	trunk hollow, 70cm wide, 9m from base	7m from base, 80cm wide, trunk hollow					115.7834207	-31.66118212
203			Corymbia calophylla (marri)	16	89		0	0							115.7827044	-31.6610629
204			Corymbia calophylla (marri)	15	86		0	0							115.7825026	-31.66100312

ID	Fire Scaring	Years Since Fire	Species	Tree Height (m)	DBH (cm)	DBH Comments	No. of Potential Hollows	No. of Potentially Suitable Hollows	Hollow 1	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Comments	Coordinates	
205			Corymbia calophylla (marri)	14	98		0	0							115.7827742	-31.6611456
206			Corymbia calophylla (marri)	17	63		0	0							115.7909583	-31.65964982
207			Eucalyptus marginata (jarrah)	25	120		0	0							115.8148258	-31.69729638
208			Stag (old dead tree, unknown species)	17	68		0	0							115.7828899	-31.66101368
209			Stag (old dead tree, unknown species)	13	100		3	1	65cm wide, sky facing, 9m from base						115.8186737	-31.68055325
210			Corymbia calophylla (marri)	16	68		0	0							115.7833897	-31.66114893
211	No	>20 Years	Eucalyptus gomphocephala (Tuart)	30	100		0	0							115.8263796	-31.75183517
212	No	>20 Years	Corymbia calophylla (marri)	25	70		0	0							115.8265093	-31.75174427