
Appendix A

Floristic Quadrat Data

Table A.1 SPECIES FREQUENCY ABUNDANCE DATA FOR QUADRAT SAMPLES COLLECTED ON THE SUBJECT SITE

Family	Scientific Name	Quadrat Numbers																	
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23
TREES																			
Casuarinaceae	<i>Allocasuarina luehmannii</i>																		
Fabaceae - Mimosoideae	<i>Acacia parvipinnula</i>				1						1		1					+	
Myrtaceae	<i>Angophora floribunda</i>			1															
	<i>Corymbia maculata</i>			4	1		5					1	4				3	3	+
	<i>Eucalyptus crebra</i>	3		3			2			1	3	3			3			2	1
	<i>Eucalyptus fibrosa</i>												1						
	<i>Eucalyptus moluccana</i>				4														
	<i>Eucalyptus tereticornis</i>	4								4	1								3
SHRUBS																			
Asteraceae	<i>Cassinia quinquefaria</i>																		
	<i>Cassinia sp.</i>																		
	<i>Cassinia uncata</i>												1						
	<i>Olearia elliptica</i>												2		3				
	<i>Ozothamnus diosmifolius</i>			1			1										+		
Cactaceae	* <i>Opuntia aurantiaca</i>				1		2						1		1				
Dilleniaceae	<i>Hibbertia obtusifolia</i>																+		
Ericaceae - Styphelioideae	<i>Leucopogon sp.</i>																+	+	+

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		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23
Euphorbiaceae	<i>Lissanthe strigosa</i> subsp. <i>subulata</i>	3	3	2	2		3		3		2		2	3	1				
	<i>Breynia oblongifolia</i>	2		2	2														+
Fabaceae - Faboideae	<i>Daviesia genistifolia</i>																+		
	<i>Daviesia leptophylla</i>																		+
	<i>Daviesia ulicifolia</i>			2			3						4						
	<i>Pultenaea microphylla</i> var. <i>microphylla</i>				3													+	
	<i>Pultenaea</i> sp.																		+
Fabaceae - Mimosoideae	<i>Pultenaea spinosa</i>								2				1						
	<i>Acacia falcata</i>												1	1	1				
	<i>Acacia floribunda</i>			1															
	* <i>Melia azedarach</i>						1												
Myrtaceae	<i>Angophora floribunda</i> (juvenile)	1																	
	<i>Corymbia maculata</i> (juvenile)			1	1		2						1	1	1	2			
	<i>Eucalyptus crebra</i> (juvenile)	2		2			2				1	2			1				
	<i>Eucalyptus fibrosa</i> (juvenile)												1						
	<i>Eucalyptus tereticornis</i> (juvenile)	2							1	1	1								
Oleaceae	<i>Melaleuca decora</i>																		
	<i>Notolea microcarpa</i>																		
	* <i>Oleus europaea</i> subsp. <i>cuspidata</i>	3		1	2		2					3	2	1	2		+	+	2

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Family	Scientific Name	Quadrat Numbers																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22	23
Pittosporaceae	<i>Bursaria spinosa</i> ssp. <i>spinosa</i>			2	2									3		3		+	+	1
Proteaceae	<i>Hakea sericea</i>														1					
	<i>Hakea teretifolia</i>																			
Rutaceae	* <i>Citrus</i> sp.			1																
Santalaceae	<i>Exocarpos cupressiformis</i>																			
Verbenaceae	* <i>Lantana camara</i>	1											5	1						
DICOT-HERBS																				
Acanthaceae	<i>Brunoniella australis</i>	2		1	2			2					3	2		2		+	+	1
Apiaceae	* <i>Cyclospermum leptophyllum</i>			1	1	1			2		1					1	1			
	<i>Daucus glochidiatus</i>															1		+		+
Apocynaceae	* <i>Gomphocarpus physocarpus</i>		1							1		1				2			+	
Asteraceae	* <i>Bidens pilosa</i>				1			1											+	+
	<i>Calotis cuneifolia</i>	3	1	3	3	3	3	3	1	2	3	2	2	3		3		+	+	+
	<i>Calotis lappulacea</i>	1				1	2				1		1	1		2			+	+
	<i>Chrysocephalum apiculatum</i>	2	2	2	2	3	2	3	3	2		2			2	2	2	+	+	+
	* <i>Cirsium vulgare</i>				1			1								2	1	+		+
	* <i>Conyza bonariensis</i>	1	1	1	2	3	2	2	2		2	2	1	1	1	1	1	+	+	+
	<i>Euchiton involucreatus</i>				2										1	2				

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Family	Scientific Name	Quadrat Numbers																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	<i>Euchiton sphaericus</i>	2						2					2	1		2					+	+
*	<i>Gamochaeta americanum</i>				1		1			1	1				1	1	1			+	+	+
	<i>Glossocardia bidens</i>	2		1							1											
*	<i>Hypochoeris microcephala</i>	1		1																		
*	<i>Hypochoeris radicata</i>	2	2	2	2	2	2	2	1	3	2	2	1	2	2	2	3			+	+	+
*	<i>Lactuca saligna</i>				1																	
*	<i>Lactuca serriola</i>																					
*	<i>Senecio madagascariensis</i>	1	1	1			1		1	1	2	2			1	2	2					
	<i>Solenogyne bellioides</i>	2	1																			
*	<i>Sonchus oleraceus</i>																			+	+	+
*	<i>Tagetes minuta</i>																					
	<i>Vernonia cinerea</i> var. <i>cinerea</i>	2	2	2	2	2		2			2		2	3		1				+	+	+
	<i>Vittadinia cuneata</i>	1		1																		
*	<i>Lepidium</i> sp.			1	1	1	1	1	1		1					1						
	<i>Wahlenbergia communis</i>	1		1	1				2							1						
	<i>Wahlenbergia gracilis</i>			1																		
	<i>Wahlenbergia stricta</i>	1		1	1	1	1	1	2				1							+	+	+
*	<i>Paronychia brasiliana</i>																				+	+
*	<i>Petrorhagia nanteuillii</i>			1				1													+	+

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Family	Scientific Name	Quadrat Numbers																	
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23
Chenopodiaceae	* <i>Polycarpon tetraphyllum</i>																+		
	<i>Einadia hastata</i>	1															+		
	<i>Einadia nutans</i>			1			2						2		2				
	<i>Einadia polygonoides</i>										1						+		
	<i>Einadia trigonos</i>			1											1				
	<i>Hypericum gramineum</i>																		+
Clusiaceae	<i>Centella asiatica</i>		2												1				
Convolvulaceae	<i>Dichondra repens</i>			1			2					2	3		1		2	1	2
Crassulaceae	<i>Crassula sieberana</i>	1																	
Dilleniaceae	<i>Hibbertia diffusa</i>	2		2							2		2						
Euphorbiaceae	<i>Chamaesyce drummondii</i>		1										1		1				
	<i>Phyllanthus virgatus</i>			2	1					1		1	1			1	+	+	+
	<i>Chorizema parviflorum</i>						1												
Fabaceae - Faboideae	<i>Templetonia sp.</i>																	+	
	<i>Templetonia stenophylla</i>												1						
	* <i>Trifolium arvense</i>															1			
	* <i>Trifolium sp.</i>															1			
Gentianaceae	<i>Zornia dyciocarpa</i> var. <i>dyciocarpa</i>	2						1							1				
	* <i>Centaurium erythraea</i>																	+	+

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Family	Scientific Name	Quadrat Numbers																	
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23
Geraniaceae	* <i>Centaurium tenuiflorum</i>	1	1	2	2	1		1	1	1	2			2	1	2			
	<i>Geranium homeanum</i>											1				1	+		
Goodeniaceae	<i>Goodenia hederacea</i>																		
	<i>Goodenia sp.</i>																		
Haloragaceae	<i>Gonocarpus sp.</i>																		
Lamiaceae	<i>Ajuga australis</i>											1			1		+		
	<i>Mentha saturooides</i>					2						1			3				+
Linaceae	<i>Linum marginale</i>			1					1										
	* <i>Linum trigynum</i>	1	3	1	1			3		2							+		+
Lobeliaceae	<i>Pratia purpurescens</i>			1	2								1				+		+
Malvaceae	* <i>Modiola caroliniana</i>			1															
	<i>Sida corrugata</i>					2	1			1		1			2			+	
	<i>Sida cunninghamii</i>	1			1	1													
	* <i>Sida rhombifolia</i>			1	1	1		1		2	2		1		2	2	1		+
Myoporaceae	<i>Eremophila debilis</i>	3	2	3			3			1		2	2		3		+		
Myrsinaceae	* <i>Anagallis arvensis</i>	2		1						1					1		+		+
Oxalidaceae	<i>Oxalis exilis</i>	1	1	1	1	1				1	1		1						
	<i>Oxalis perennans</i>																+	+	
	* <i>Oxalis sp.</i>	1														1			

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Family	Scientific Name	Quadrat Numbers																				
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23			
Phyllanthaceae	<i>Poranthera microphylla</i>	2		1			1			2												
	<i>Plantago debilis</i>																+		+			
Plantaginaceae	<i>Plantago gaudichaudii</i>																					
	* <i>Plantago lanceolata</i>	2	1	2	2	1		1	2	1					2		+					
	<i>Plantago varia</i>				2		2															
	<i>Veronica plebia</i>			1			1												+			
	<i>Rumex brownii</i>															1						
Polygonaceae	<i>Opercularia diphylla</i>			2			2				1		1									
Rubiaceae	<i>Pomax umbellata</i>	3		3			2											+				
	* <i>Richardia humistrata</i>	2	3	2		3	1			3	3	1		4		3						
Solanaceae	* <i>Richardia stellaris</i>				1			1						1								
	* <i>Solanum nigrum</i>						1							1			+					
	<i>Solanum prinophyllum</i>				1		1					2	2		2		+		+			
	* <i>Solanum sp.</i>							1											+			
	<i>Stackhousia viminea</i>	2	2	1	1	1	1		1		1		1					+	+			
Verbenaceae	* <i>Verbena bonariensis</i>		1					1		1					2		+					
	* <i>Verbena rigida</i>		2			3			3				2	1	2	2						
MONOCOT HERBS																						

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Family	Scientific Name	Quadrat Numbers																		
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23	
Anthericaceae	<i>Arthropodium milleflorum</i>	2			2							2	2							
	<i>Laxmannia gracilis</i>	2	1	1			3				3			2						
	<i>Tricoryne elatior</i>											1			1				+	
	<i>Wurmbea dioica</i>																			
	<i>Commelina cyanea</i>	2												2			+	+		
Cyperaceae	<i>Bolboschoenus caldwellii</i>																			
	<i>Carex inversa</i>											1	1			2				
	<i>Cyperus gracilis</i>	2			1	1	1	2		1	1	2	2		2		+		+	
	<i>Cyperus</i> sp.			1			1	1								1	+			
	<i>Fimbrostylis dichotoma</i>	3	3	2	1	3	1	2	3	2	2			1	1	2				
Hypoxidaceae	<i>Gahnia clarkei</i>																			
	<i>Lepidosperma laterale</i>												2							
	<i>Hypoxis hygrometrica</i>																			
	* <i>Romulea rosea</i>	1			1			2						2						
	<i>Juncus subsecundus</i>						2					1	2				+		+	
Lomandraceae	<i>Lomandra filiformis</i> subsp. <i>filiformis</i>	1	3	1	3	1	2	2	1	2	2	2	2	2	2	2	+	+	+	
	<i>Lomandra longifolia</i>																			
	<i>Lomandra micrantha</i> ssp. <i>tuberculata</i>	1																		
	<i>Lomandra multiflora</i> ssp. <i>multiflora</i>			2	2	1	2		1			1	3	3	1		+	+	+	

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Family	Scientific Name	Quadrat Numbers																	
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23
Orchidaceae	<i>Caladenia alba</i>																		
	<i>Microtis unifolia</i>		2																
	<i>Thelymitra</i> sp.		1																
	<i>Dianella longifolia</i>	2								1		2							
	<i>Dianella revoluta</i>	3		2	2		1					2	2		2	1		+	+
GRASSES																			
Poaceae	<i>Aristida jerichoensis</i>																		
	<i>Aristida ramosa</i>	4	4	4	3	3	3	3		2	3	3		2	2	4		+	1
	<i>Aristida vagans</i>	4	5	3	3		2	3	2		3		3	3			+		+
	<i>Austrodanthonia fulva</i>				2		2						2		2		+	+	
	<i>Austrodanthonia racemosa</i> var. <i>obtusata</i>											2						+	
	<i>Austrostipa scabra</i> ssp. <i>scabra</i>																		
	<i>Austrostipa verticillata</i>																	+	
	* <i>Axonopus fissifolius</i>	3	3	1		1			3			3			3		3		
	<i>Bothriochloa macra</i>	3	1	1	1		2	3	2						2		3		+
	* <i>Briza maxima</i>	1																	
* <i>Chloris gayana</i>										2					1				
	<i>Chloris truncata</i>							1	2										

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Family	Scientific Name	Quadrat Numbers																	
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23
	<i>Chloris ventricosa</i>	2	2		4					1			2		4			+	+
	<i>Cymbopogon refracta</i>	5	4	4	3	4	3	2	4	3	4	2		5	3	3	+	+	+
	<i>Cynodon dactylon</i>	3	3		2	4	2	3	2	3	3		2	2	2	3	3		3
	<i>Dichantium sericeum</i>	2	3	2	2	3	2	3	3	2		2	2	3	4				
	<i>Dichelachne micrantha</i>	1	1		2	2			3		2		2	2		2			+
	<i>Digitaria divaricittissima</i>		1		1														
	<i>Digitaria</i> sp.																		+
	<i>Echinopogon caespitosus</i>	3			2						2	1			2		+	+	+
	<i>Echinopogon ovatus</i>			2															
*	<i>Eleusine tristachya</i>							1		1									
	<i>Entolasia stricta</i>												2						+
	<i>Eragrostis brownii</i>	3	3	4	2	2	2	3	4	3	3			4	3				
	<i>Eragrostis elongata</i>								1				3						
	<i>Eragrostis leptoshachya</i>	2	3		3		2	2	2	3	3	2			2		+	+	+
*	<i>Eragrostis</i> sp.															1			
*	<i>Eragrostis curvula</i>																		+
	<i>Imperata cylindrica</i>			3															
	<i>Lachnagrostis filiformis</i>																+		
*	<i>Melinis repens</i>										1			1					

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Family	Scientific Name	Quadrat Numbers																	
		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23
VINES AND CREEPERS	<i>Microlaena stipoides</i> var. <i>stipoides</i>	1		3	2	4				2		2	1	2		3		+	+
	<i>Panicum effusum</i>	2	4	3		3		3	2	2	4			2	3	3			
	<i>Paspalidium distans</i>			4	3		3	2			3	3	2		3		+	+	
	* <i>Paspalum dilatatum</i>	1	1	2	1		1	1	1	1	1			2	1	2			
	<i>Paspalum distichum</i>																+		+
	<i>Poa labillardierei</i> var. <i>labillardierei</i>											1	1						+
	* <i>Setaria gracilis</i>	2	1	1		2		2	2	2	2				1	2			+
	<i>Sorghum leiocladum</i>																	+	
	* <i>Sporobolus africanus</i>		1		2	1		2	2			1				2	+		+
	* <i>Sporobolus creber</i>														1				+
	<i>Themeda australis</i>	2	2	1			2						2	2			+	+	+
	<i>Calystegia marginata</i>																		
	<i>Convolvulus erubescens</i>	3	1										2		2		+		
Fabaceae - Faboideae	<i>Desmodium brachypodium</i>			2											1				
	<i>Desmodium varians</i>	2	1	1	2	1	2	2				2	2	1	2		+		+
	<i>Glycine clandestina</i>	2	2	1		1				1			1		1	2		+	
	<i>Glycine microphylla</i>	1	1	1			1					1			1		+	+	

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		1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	21	22	23	
Luzuriagaceae	<i>Glycine tabacina</i>	3	2	3	3	2	3		1	2	2	2	2	2	2	2	2	+	+	
	<i>Hardenbergia violaceae</i>						1						2							
	<i>Eustrephus latifolius</i>																			
FERNS AND ALLIES																				
Adiantaceae	<i>Cheilanthes distans</i>											2	2					+		
	<i>Cheilanthes sieberi</i>	2	3	2		3	2	2	2		2	2	2	2	2	2		+	+	

Appendix B

Flora List

Table B.1 FLORA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
TREES			
Casuarinaceae	<i>Allocasuarina luehmannii</i>	Bulloak	
Fabaceae - Mimosoideae	<i>Acacia parvipinnula</i>	Silver-stemmed Wattle	
Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple	
	<i>Corymbia maculata</i>	Spotted Gum	
	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	
	<i>Eucalyptus fibrosa</i>	Broad-leaved Ironbark	
	<i>Eucalyptus moluccana</i>	Grey Box	
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	
SHRUBS			
Asteraceae	<i>Cassinia quinquefaria</i>		
	<i>Cassinia sp.</i>		
	<i>Cassinia uncata</i>		
	<i>Olearia eliptica</i>		
	<i>Ozothamnus diosmifolius</i>		
Cactaceae	* <i>Opuntia aurantiaca</i>	Tiger Pear	
Dilleniaceae	<i>Hibbertia obtusifolia</i>		
Ericaceae - Styphelioideae	<i>Leucopogon sp.</i>		
	<i>Lissanthe strigosa subsp. subulata</i>	Peach Heath	
Euphorbiaceae	<i>Breynia oblongifolia</i>	Coffee Bush	
Fabaceae - Faboideae	<i>Daviesia genistifolia</i>		
	<i>Daviesia leptophylla</i>		
	<i>Daviesia ulicifolia</i>		
	<i>Pultenaea microphylla var. microphylla</i>		
	<i>Pultenaea sp.</i>		
	<i>Pultenaea spinosa</i>		
Fabaceae - Mimosoideae	<i>Acacia falcata</i>	Hickory Wattle	
	<i>Acacia floribunda</i>		

Table B.1 FLORA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
Meliaceae	* <i>Melia azedarach</i>	White Cedar	
Myrtaceae	<i>Melaleuca decora</i>		
Oleaceae	<i>Notolea microcarpa</i>		
	* <i>Oleus europaea</i> subsp. <i>cuspidata</i>	African Olive	
Pittosporaceae	<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Blackthorn	
Proteaceae	<i>Hakea sericea</i>		
	<i>Hakea teretifolia</i>		
Rutaceae	* <i>Citrus</i> sp.	A citrus	
Santalaceae	<i>Exocarpos cupressiformis</i>		
Verbenaceae	* <i>Lantana camara</i>	Lantana	
DICOT HERBS			
Acanthaceae	<i>Brunoniella australis</i>		
Apiaceae	* <i>Cyclospermum leptophyllum</i>	Slender Celery	
	<i>Daucus glochidiatus</i>		
Apocynaceae	* <i>Gomphocarpus physocarpus</i>	Cotton Bush	
Asteraceae	* <i>Bidens pilosa</i>	Farmer's Friend	
	<i>Calotis cuneifolia</i>		
	<i>Calotis lappulacea</i>	Yellow Burr-daisy	
	<i>Chrysocephalum apiculatum</i>	Common Everlasting	
	* <i>Cirsium vulgare</i>	Spear Thistle	
	* <i>Conyza bonariensis</i>	Fleabane	
	<i>Euchiton involucratus</i>	Common Cudweed	
	<i>Euchiton sphaericus</i>		
	* <i>Gamochaeta americanum</i>	Cudweed	
	<i>Glossocardia bidens</i>	Cobblers Tick	
	* <i>Hypochaeris microcephala</i>		
	* <i>Hypochaeris radicata</i>	Flatweed	
	* <i>Lactuca saligna</i>		
	* <i>Lactuca serriola</i>		
	* <i>Senecio madagascariensis</i>	Fireweed	
	<i>Solenogyne bellioides</i>		

Table B.1 FLORA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
	* <i>Sonchus oleraceus</i>		
	* <i>Tagetes minuta</i>	Stinking Roger	
	<i>Vernonia cinerea</i> var. <i>cinerea</i>		
	<i>Vittadinia cuneata</i>	Fuzzweed	
Brassicaceae	* <i>Lepidium</i> sp.		
Campanulaceae	<i>Wahlenbergia communis</i>		
	<i>Wahlenbergia gracilis</i>	Native Bluebell	
	<i>Wahlenbergia stricta</i>		
Caryophyllaceae	* <i>Paronychia brasiliensis</i>		
	* <i>Petrorhagia nanteuillii</i>		
	* <i>Polycarpon tetraphyllum</i>		
Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush	
	<i>Einadia nutans</i>		
	<i>Einadia polygonoides</i>		
	<i>Einadia trigonos</i>		
Clusiaceae	<i>Hypericum gramineum</i>		
Convolvulaceae	<i>Centella asiatica</i>	Pennywort	
	<i>Dichondra repens</i>	Kidney Weed	
Crassulaceae	<i>Crassula sieberana</i>		
Dilleniaceae	<i>Hibbertia diffusa</i>		
Euphorbiaceae	<i>Chamaesyce drummondii</i>	Caustic Creeper	
	<i>Phyllanthus virgatus</i>	a spurge	
Fabaceae - Faboideae	<i>Chorizema parviflorum</i>		
	<i>Templetonia</i> sp.		
	<i>Templetonia stenophylla</i>		
	* <i>Trifolium arvense</i>		
	* <i>Trifolium</i> sp.	Clover	
	<i>Zornia dyctiocarpa</i> var. <i>dyctiocarpa</i>		
Gentianaceae	* <i>Centaurium erythraea</i>		
	* <i>Centaurium tenuiflorum</i>	Common Centaury	
Geraniaceae	<i>Geranium homeanum</i>		

Table B.1 FLORA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
Goodeniaceae	<i>Goodenia hederacea</i>		
	<i>Goodenia sp.</i>		
Haloragaceae	<i>Gonocarpus sp.</i>		
Lamiaceae	<i>Ajuga australis</i>		
	<i>Mentha saturoides</i>	Native Mint	
Linaceae	<i>Linum marginale</i>	Wild Flax	
	* <i>Linum trigynum</i>		
Lobeliaceae	<i>Pratia purpurescens</i>		
Malvaceae	* <i>Modiola caroliniana</i>	Red-flowered Mallow	
	<i>Sida corrugata</i>	Corrugated Sida	
	<i>Sida cunninghamii</i>		
	* <i>Sida rhombifolia</i>	Paddy's Lucerne	
Myoporaceae	<i>Eremophila debilis</i>	Winter Apple	
Myrsinaceae	* <i>Anagallis arvensis</i>	Scarlet Pimpernell	
Oxalidaceae	<i>Oxalis exilis</i>	a wood sorrel	
	<i>Oxalis perennans</i>		
	* <i>Oxalis sp.</i>		
Phyllanthaceae	<i>Poranthera microphylla</i>		
Plantaginaceae	<i>Plantago debilis</i>		
	<i>Plantago gaudichaudii</i>		
	* <i>Plantago lanceolata</i>		
	<i>Plantago varia</i>		
	<i>Veronica plebia</i>		
Polygonaceae	<i>Rumex brownii</i>		
Rubiaceae	<i>Opercularia diphylla</i>		
	<i>Pomax umbellata</i>		
	* <i>Richardia humistrata</i>		
	* <i>Richardia stellaris</i>		
Solanaceae	* <i>Solanum nigrum</i>	Blackberry Nightshade	
	<i>Solanum prinophyllum</i>		
	* <i>Solanum sp.</i>		
Stackhousiaceae	<i>Stackhousia viminea</i>	Slender Stackhousia	
Verbenaceae	* <i>Verbena bonariensis</i>	Purple Top	
	* <i>Verbena rigida</i>		

Table B.1 FLORA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
MONOCOT HERBS			
Anthericaceae	<i>Arthropodium milleflorum</i>	Vanilla Lily	
	<i>Laxmannia gracilis</i>	Slender Wire Lily	
	<i>Tricoryne elatior</i>		
Colchicaceae	<i>Wurmbea dioica</i>	Early Nancy	
Commelinaceae	<i>Commelina cyanea</i>		
Cyperaceae	<i>Bolboschoenus caldwellii</i>		
	<i>Carex inversa</i>		
	<i>Cyperus gracilis</i>		
	<i>Cyperus sp.</i>		
	<i>Fimbrostylis dichotoma</i>		
	<i>Gahnia clarkei</i>		
	<i>Lepidosperma laterale</i>		
Hypoxidaceae	<i>Hypoxis hygrometrica</i>		
Iridaceae	* <i>Romulea rosea</i>		
Juncaceae	<i>Juncus subsecundus</i>		
Lomandraceae	<i>Lomandra filiformis subsp. filiformis</i>	Wattle Mat-rush	
	<i>Lomandra longifolia</i>		
	<i>Lomandra micrantha ssp. tuberculata</i>		
	<i>Lomandra multiflora ssp. multiflora</i>	Many-flowered Mat-rush	
	<i>Caladenia alba</i>		
Orchidaceae	<i>Cymbidium canaliculatum</i>	Tiger Orchid	E4 (TSC)
	<i>Microtis unifolia</i>		
	<i>Thelymitra sp.</i>	A Sun Orchid	
Phormiaceae	<i>Dianella longifolia</i>		
	<i>Dianella revoluta</i>	Flax Lily	
GRASSES			
Poaceae	<i>Aristida jerichoensis</i>		
	<i>Aristida ramosa</i>	Three-awned Spear Grass	

Table B.1 FLORA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
	<i>Aristida vagans</i>	Three-awned Spear Grass	
	<i>Austrodanthonia fulva</i>	Wallaby Grass	
	<i>Austrodanthonia racemosa</i> var. <i>obtusata</i>	Wallaby grass	
	<i>Austrostipa scabra</i> ssp. <i>scabra</i>	Corkscrew Grass	
	<i>Austrostipa verticillata</i>		
*	<i>Axonopus fissifolius</i>	Carpet Grass	
	<i>Bothriochloa macra</i>	Red-leg Grass	
*	<i>Briza maxima</i>		
*	<i>Chloris gayana</i>	Rhodes Grass	
	<i>Chloris truncata</i>	Windmill Grass	
	<i>Chloris ventricosa</i>	Windmill Grass	
	<i>Cymbopogon refracta</i>	Barb-wire Grass	
	<i>Cynodon dactylon</i>	Couch Grass	
	<i>Dichantium sericeum</i>	Queensland Bluegrass	
	<i>Dichelachne micrantha</i>	Plume Grass	
	<i>Digitaria divaricittissima</i>		
	<i>Digitaria sp.</i>		
	<i>Echinopogon caespitosus</i>	Tufted Hedgehog Grass	
	<i>Echinopogon ovatus</i>	Tufted Hedgehog Grass	
*	<i>Eleusine tristachya</i>	Crab Grass	
	<i>Entolasia stricta</i>		
	<i>Eragrostis brownii</i>	Brown's Lovegrass	
	<i>Eragrostis elongata</i>		
	<i>Eragrostis leptoshachya</i>		
*	<i>Eragrostis sp.</i>		
*	<i>Eragrostris curvula</i>		
	<i>Imperata cylindrica</i>	Blady Grass	
	<i>Lachnagrostis filiformis</i>		
*	<i>Melinis repens</i>	Red Natal Grass	
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Meadow Grass	
	<i>Panicum effusum</i>	Hairy Panic	

Table B.1 FLORA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
	<i>Paspalidium distans</i>		
	* <i>Paspalum dilatatum</i>	Paspalum	
	<i>Paspalum distichum</i>		
	<i>Poa labillardierei</i> var. <i>labillardierei</i>	Tussock Grass	
	* <i>Setaria gracilis</i>		
	<i>Sorghum leiocladum</i>		
	* <i>Sporobolus africanus</i>	Giant Parramatta Grass	
	* <i>Sporobolus creber</i>	Slender Rat's Tail Grass	
	<i>Themeda australis</i>	Kangaroo Grass	
VINES AND CREEPERS			
Convolvulaceae	<i>Calystegia marginata</i>		
	<i>Convolvulus erubescens</i>	Australian Bindweed	
Fabaceae - Faboideae	<i>Desmodium brachypodium</i>		
	<i>Desmodium varians</i>	Tick Trefoil	
	<i>Glycine clandestina</i>		
	<i>Glycine microphylla</i>		
	<i>Glycine tabacina</i>	Love Creeper	
	<i>Hardenbergia violaceae</i>	Native Sasparilla	
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry	
FERNS AND ALLIES			
Adiantaceae	<i>Cheilanthes distans</i>		
	<i>Cheilanthes sieberi</i>	Poison Rock Fern	

Appendix C

Fauna List

Table C.1 FAUNA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
FROGS			
Myobatrachidae	<i>Crinia</i> sp.	Common Froglet	
Hylidae	<i>Litoria fallax</i>	Eastern Dwarf Tree Frog	
	<i>Litoria jervisiensis</i>	Jervis Bay Tree Frog	
	<i>Litoria latopalmata</i>	Broad-palmed Frog	
	<i>Litoria peronii</i>	Peron's Tree Frog	
AVES			
Anatidae	<i>Anas gracilis</i>	Grey Teal	
	<i>Anas superciliosa</i>	Pacific Black Duck	
Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon	
Apodidae	<i>Hirundapus caudacutus</i>	White-throated Needletail	M (EPBC)
Ardeidae	<i>Egretta novaehollandiae</i>	White-faced Heron	
Accipitridae	<i>Accipiter</i> sp (<i>cirrocephalus</i> or <i>fasciatus</i>)	Accipiter hawk (Brown Goshawk OR Collared Sparrowhawk)	
	<i>Aquila audax</i>	Wedge-tailed Eagle	
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel	
	<i>Falco peregrinus</i>	Peregrine Falcon	
Rallidae	<i>Gallinula tenebrosa</i>	Dusky Moorhen	
Psittacidae	<i>Platycercus eximius</i>	Eastern Rosella	
Culculidae	<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo	
Halcyonidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	

Table C.1 FAUNA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
Maluridae	<i>Malurus cyaneus</i>	Superb Fairy Wren	
Pardalotidae	<i>Pardalotus punctatus</i>	Spotted Pardalote	
Meliphagidae	<i>Manorina melanocephala</i>	Noisy Miner	
	<i>Philemon corniculatus</i>	Noisy Friarbird	
Pomatostomidae	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V (TSC)
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo Shrike	
Artamidae	<i>Cracticus torquatus</i>	Grey Butcherbird	
	<i>Cracticus nigrogularis</i>	Pied Butcherbird	
	<i>Cracticus tibicen</i>	Australian Magpie	
	<i>Strepera graculina</i>	Pied Currawong	
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail	
Corvidae	<i>Corvus coronoides</i>	Australian Raven	
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark	
Corcoracidae	<i>Corcorax melanorhamphos</i>	White-winged Chough	
REPTILES			
Chelidae	<i>Chelodina longicollis</i>	Eastern snake-necked turtle (?)	
Elapidae	<i>Pseudechis porphyriacus</i>	Red-bellied Black snake	
	<i>Pseudonaja textalis</i>	Eastern Brown Snake	
	<i>Vermicella annulata</i>	Bandy Bandy	
Scincidae	<i>Lampropholis delicata</i>	Dark-flecked Garden Sunskink	

Table C.1 FAUNA SPECIES DETECTED ON THE SUBJECT SITE

Family	Scientific Name	Common Name	Legal Status
MAMMALS			
Phalangeridae	<i>Trichosurus vulpecula</i>	Brushtail Possum	
Petauridae	<i>Petaurus breviceps</i>	Sugar glider	
	<i>Petaurus norfolcensis</i>	Squirrel Glider (?)	V (TSC)
Macropodidae	<i>Macropus giganteus</i>	Eastern Grey Kangaroo	
Molossidae	<i>Austronomus australis</i>	White-striped Freetail-bat	
	<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V (TSC)
	<i>Mormopterus ridei</i>	Eastern Freetail-bat	
	<i>Mormopterus</i> species 4	Southern Freetail-bat	
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat	
	<i>Miniopterus australis</i>	Little Bentwing-bat	V (TSC)
	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V (TSC)
	<i>Nyctophilus</i> sp.	Long-eared Bat	
	<i>Scotoeanax rueppellii</i>	Greater Broad-nosed Bat	V (TSC)
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	
	<i>Scotorepens greyii</i>	Little Broad-nosed Bat	
	<i>Vespadelus</i> sp (<i>pumilus</i> or <i>vulturinus</i>)	Forest Bat	
Leporidae	<i>Lepus capensis</i> *	Brown Hare	

Appendix D

Likelihood of Occurrence Analysis

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Amphibia							
Hylidae	<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	5	Permanent or ephemeral swamps, dams and slow flowing streams with emergent vegetation such as reeds, particularly those containing bulrushes (<i>Typha</i> spp.) and Spikerushes (<i>Eleocharis</i> spp.). Optimal habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and sheltering sites available. Can occur in highly disturbed areas. It inhabits a variety of forest types including coastal forest, open woodland and cleared areas.	No suitable habitat. No sightings despite targeted surveys in summer, when the species is known to breed.
	<i>Litoria booroolongensis</i>	Booroolong Frog	E	E	0	Permanent flowing rocky streams and rivers in open woodland and montane forest. Found at altitudes above about 400 m.	No suitable habitat. Unlikely to occur.
	<i>Litoria daviesae</i>	Davies' Tree Frog	V	V	5	Permanent flowing rivers and streams with abundant streamside vegetation. It inhabits montane forest and occasionally rainforest at altitudes above about 500 m.	No suitable habitat. Unlikely to occur.
	<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V	V	1	Streams and dams in heathland and open woodland. It is most often found at altitudes above 300 m.	No suitable habitat. Unlikely to occur.
Myobatrachidae	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	10	Ephemeral or semi-permanent small sandy streams in heathland or open woodland are used for breeding. Foraging may occur several kilometers from a breeding site within the same habitat.	No suitable habitat. Unlikely to occur.
	<i>Mixophyes balbus</i>	Stuttering Frog	E	V	10	Permanent flowing rocky rivers and streams. It inhabits rainforest, wet sclerophyll forest and montane forests; it is rarely encountered	No suitable habitat. Unlikely to occur.

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
	<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	0	far from a stream. Large flowing streams often with rocky or sandy banks in rainforest and wet sclerophyll forest. Occasionally will inhabit dams within suitable forest.	No suitable habitat. Unlikely to occur.
	<i>Philoria sphagnicolus</i>	Sphagnum Frog	V		1	Permanently wet bogs and soaks at the headwaters of small streams in montane forest and occasionally rainforest at altitudes above 800 m. It is a secretive species and lives in burrows in sphagnum or wet mud.	No suitable habitat. Unlikely to occur.
	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		35	Drainage lines in areas of sandstone. It is found in woodland, open forest and heathland. The drainage lines in which it inhabits rarely hold more than small pools of water in which tadpoles develop, adult frogs live under rocks and in leaf litter piles.	No suitable habitat. Unlikely to occur.
	<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	V		130	Lives in a wide range of eucalypt dominated communities that have a grassy understorey, often on rocky ridges or gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary, occupying a breeding territory of about 10ha, with a slightly larger home-range	Sub-optimal forage habitat on the subject site. Areas supporting trees do not support species understorey vegetation and are dominated by aggressive species such as Noisy Miner. Fallen timber is regularly

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Accipitridae	<i>Circus assimilis</i>	Spotted Harrier	V		4	Open grassy woodland, especially grassland, Acacia/mallee remnants, riparian woodland and shrub steppe. It is occasionally encountered in agricultural land and forages over open areas including wetlands.	removed. However, this species is well known in the locality, and has been recorded in Belford NP.
	<i>Hieraaetus morphnoides</i>	Little Eagle	V		17	Inhabits open eucalypt forest and woodland as well as sheoak/acacia or riparian woodlands in drier areas. It nests in tall trees within a remnant patch.	Potential to occur. May occasionally forage over the subject site. No nests were recorded on site. Potential to occur. May occasionally forage over the subject site. No nests were recorded on site.
Anatidae	<i>Oxyura australis</i>	Blue-billed Duck	V		2	Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. Blue-billed Ducks will feed by day far from the shore, particularly if dense cover is available in the central parts of the wetland. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed	Potential to occur. No suitable habitat. Unlikely to occur.

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	V		1	during spring and early summer. Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes. Terrestrial and eustrine wetlands, normally in areas of permanent water and dense vegetation. It may occur in a variety of forest types including flooded grassland, forest, woodland, rainforest and mangroves.	No suitable habitat. Unlikely to occur.
Cacatuidae	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V		137	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet eucalypt forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. In winter it may be found at lower altitudes even inhabiting urban areas. No preferred habitat but suboptimal habitat present. Species shows high fidelity to nesting trees and thus due to limited hollows, is unlikely to nest on site.	Potential to occur.
	<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V		137	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur. Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species). Dependent on large	Very few feed trees or nesting hollows on the subject site. May fly over the site as this species is known in the locality but unlikely to

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E		11	hollow-bearing eucalypts for nest sites. Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water on a variety of prey items including fish, frogs, eels, turtles, snakes and crabs. Nesting occurs in tall trees within wetlands.	rely on the site. Unlikely to occur. No suitable habitat. Unlikely to occur.
Climacteridae	<i>Climacteris picumnus victorinae</i> (eastern subspecies)	Brown Treecreeper	V		69	Eucalypt woodland (particularly box-gum) and dry open forest without a dense shrub layer. Occasionally inhabits forest bordering wetlands with an open understorey. Hollows in standing trees and stumps are required for nesting.	Sub-optimal habitat on the subject site. Areas dominated by aggressive species such as Noisy Miner. Fallen timber is regularly removed. Noisy Miner. Fallen timber is regularly removed. However, this species is known in the locality and could occasionally forage on site. Potential to occur.

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Estrildidae	<i>Stagonopleura guttata</i>	Diamond Firetail	V		36	Occurs in grassy eucalypt woodland, often around riparian areas. Feeds on the ground on grass seeds and insects. Nests are constructed in a shrubby understorey.	Sub-optimal habitat on the subject site. Areas supporting trees do not support understorey vegetation and are dominated by aggressive species such as Noisy Miner. However, this species is known in the locality and could occasionally forage on site.
Meliphagidae	<i>Grantiella picta</i>	Painted Honeyeater	V		2	Nomadic, usually concentrated on the inner slopes of the Great Dividing Range. Found in Boree, Brigalow, box-gum and box-ironbark forests. Feeds on the fruits of mistletoes (<i>Amyema</i> spp). Nests in the outer canopy of eucalypts, sheoaks or mistletoes.	Potential to occur. Subject site not within core range of the species. Sub-optimal forage habitat on the subject site, which may form a component of a much larger home-range.
Potential to occur.							

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
<i>Melithreptus gularis</i>	<i>Melithreptus gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V		13	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>Eucalyptus albens</i>), Grey Box (<i>Eucalyptus microcarpa</i>), Yellow Box (<i>Eucalyptus melliodora</i>) and Forest Red Gum (<i>Eucalyptus tereticornis</i>). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. Feeding territories are large making the species locally nomadic. The Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares	Sub-optimal forage habitat on the subject site, which may form a component of a much larger home-range. Potential to occur.
	<i>Xanthomyza phrygia</i>	Regent Honeyeater	E4A	E, M	82	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises : <i>E. microcarpa</i> , <i>E. punctata</i> , <i>E. polyanthemus</i> , <i>E. moluccana</i> , <i>Corymbia robusta</i> , <i>E. crebra</i> , <i>E. caleyi</i> , <i>Corymbia maculata</i> ,	Sub-optimal forage habitat on the subject site. Potential to occur.

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		59	<i>E.mckieana</i>, <i>E. macrorhyncha</i>, <i>E. laevopinea</i>, and <i>Angophora floribunda</i>. Nectar and fruit from the mistletoes <i>A. miquelii</i>, <i>A. pendula</i>, <i>A. cambagei</i> are also eaten during the breeding season. Eucalypt forest and woodlands, especially with rough barked species, smooth-barks with dead branches, mallee and acacia. Nests in living trees and feeds off insects in dead trees.	Sub-optimal habitat on the subject site. Areas supporting trees are dominated by aggressive species such as Noisy Miner. Fallen timber is regularly removed. However, this species is known in the locality and could occasionally forage on site.
Petroicidae	<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V		31	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season.	Potential to occur. Sub-optimal habitat on the subject site. Areas supporting trees are dominated by aggressive species such as Noisy Miner. Fallen timber is regularly removed. However, this species is

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
					29	Dry eucalypt forests and woodlands with an open, grassy understorey. Areas of inhabitation feature abundant logs and fallen timber. Nests are made in branches of trees or shrubs.	known in the locality and could occasionally forage on site. Potential to occur. Sub-optimal habitat on the subject site. Areas supporting trees are dominated by aggressive species such as Noisy Miner. Fallen timber is regularly removed. However, this species is known in the locality and could occasionally forage on site.
	<i>Petroica boodang</i>	Scarlet Robin	V				Potential to occur.
	<i>Petroica phoenicea</i>	Flame Robin	V		7	Tall, moist eucalypt forest with an open understorey often on ridges or slopes. In winter it inhabits drier, open, grassy forests.	No suitable habitat. Unlikely to occur.
Psittacidae	<i>Glossopsitta pusilla</i>	Little Lorikeet	V		74	Nomadic movements common and dependant on food availability. Inhabits open eucalyptus forest and woodland, riparian habitats and occasionally flowering trees in opens areas. Nests in tree hollows.	Sub-optimal forage habitat on the subject site, which may form a component of a much

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Rostratulidae	<i>Lathamus discolor</i>	Swift Parrot	E	E, M	10	Migrates to the Australian south-east mainland between March and October where it inhabits areas with abundant flowering eucalypts and lerps.	larger home-range. Potential to occur. Forage habitat on the subject site. Potential to occur.
	<i>Neophema pulchella</i>	Turquoise Parrot	V		8	Inhabits the edges of eucalypt woodland adjoining clearings, forested ridges and creeks in farmland. Forages for food on the ground and nests in tree hollows.	Forage habitat on the subject site. Potential to occur.
	<i>Rostratula benghalensis australis</i>	Painted Snipe (Australian subspecies)	E	V	0	Fringes of swamps, dams and nearby marshy areas with a cover of grasses, low scrub or open timber. Nests on the ground amongst tall grasses or reeds. Forages in shallow water.	No suitable habitat. Unlikely to occur.
Strigidae	<i>Ninox connivens</i>	Barking Owl	V		11	Woodland, open forest, fragmented remnants and partly cleared farmland. Roosts in tall midstorey trees such as <i>Acacia</i> spp. Requires large territories up to 6000 hectares and nesting occurs in tree hollows.	Sub-optimal forage habitat on the subject site, which may form a component of a much larger home-range. No suitable roosting or nesting habitat. Potential to occur.
	<i>Ninox strenua</i>	Powerful Owl	V		33	A variety of forest types including woodland, open sclerophyll forest, tall open wet forest, rainforest and occasionally fragmented areas. Territories may be as large as 1450 ha and	Sub-optimal forage habitat on the subject site, which may form a

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Tytonidae	<i>Tyto novaehollandiae</i>	Masked Owl	V		18	nesting occurs in large tree hollows of old, mature trees.	component of a much larger home-range. No suitable roosting or nesting habitat.
							However, this species is well known in the locality, and has been recorded in Belford NP.
							Potential to occur.
Tytonidae	<i>Tyto tenebriosa</i>	Sooty Owl	V		19	Occurs in rainforest communities and moist eucalypt forests. Roosts and nests in large tree hollows.	No suitable habitat.
							Unlikely to occur.
Mammalia							
Dasyuridae	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	112	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Females occupy	Sub-optimal forage habitat on the subject site, which may form a component of a much larger home-range. No

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
						home ranges up to about 750 hectares and males up to 3500 hectares; usually traverse their ranges along densely vegetated creeklines.	suitable den habitat. however, this species is well known in the locality, and has been recorded in Belford NP.
	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V		13	Prefers dry sclerophyll open forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter. Occasionally inhabits rainforest and heath. Nests and shelters in tree hollows.	Potential to occur. Sub-optimal habitat on the subject site.
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		2	Found in a large variety of habitats including treed and treeless areas. Inhabits tree hollows or mammal burrows in treeless areas.	Potential to occur. Suitable foraging and roosting habitat on the subject site.
Macropodidae	<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	63	Occupies rock outcrops, escarpments and cliffs with features such as caves, fissures and ledges. Browsers on adjacent vegetation. Has a home range of about 15 ha and shelters in caves.	Potential to occur. No suitable habitat. Unlikely to occur.
	<i>Thylogale stigmatica</i>	Red-legged Pademelon	V		16	Inhabits rainforest, moist eucalypt forest and vine scrub with a dense understorey and ground cover. It shelters in wet gullies and dense ground cover.	No suitable habitat. Unlikely to occur.
Petauridae	<i>Petaurus australis</i>	Yellow-bellied Glider	V		355	Tall mature eucalypt forest in high rainfall areas. Often in coastal gullies and creek flats. Dens in hollow trees and has a large home range up to 85 ha.	No suitable habitat. Unlikely to occur.

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
	<i>Petaurus norfolcensis</i>	Squirrel Glider	V		44	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia mid-storey. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Sub-optimal forage habitat on the subject site. Possible feed scars and potential sighting. This species is well known in the locality, and has been recorded in Belford NP.
Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	V		67	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but insite but unlikely to occur any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to likely be moving through several hundred hectares in size.	Potential to occur. Suitable feed trees on site. If present, will be moving through the site in very low densities.
Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	119	Found within 200km of the coast in rainforests, sclerophyll forests, Sub-optimal forage woodlands, heaths, swamps and urban areas. Roosting camps are habitat on the subject located within 20km of a reliable food source and are commonly close to water.	Unlikely to occur.
Vespertilionidae	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	48	Found in well-timbered areas containing gullies. Roosts in caves, crevices in cliffs and old mine workings frequenting low to mid-	Potential to occur. No suitable habitat. Unlikely to occur.

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		28	elevation dry open forest and woodland close to these features. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	No suitable habitat. Unlikely to occur.
	<i>Myotis macropus</i>	Southern Myotis	V		10	Roosts close to water in caves, mines, tree hollows, storm water channels, bridges, buildings or in dense foliage. Forages over streams and pools catching insects and fish.	Suitable foraging and roosting habitat on the subject site. This species is well known in the locality, and has been recorded in Belford NP. Potential to occur.
	<i>Nyctophilus timoriensis</i> (South-eastern form)	Greater Long-eared Bat	V	V	2	It inhabits a variety of vegetation types mallee, bullock and box/ironbark/cypress pine dominated woodland. It roosts in tree hollows, crevices and under loose bark.	Suitable foraging and roosting habitat on the subject site. Potential to occur.
	<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V		9	A cave-roosting species which inhabits dry open forest and woodland. Normally near rocky overhangs and cliffs it has also been recorded from disused mines. Occasionally found in rainforest and wet sclerophyll forest.	No suitable habitat. Unlikely to occur.
Reptilia							
Elapidae	<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E	V	2	Rock crevices and under flat sandstone rocks on cliff edges and escarpments. Shelters in tree hollows in summer. Most often in	No suitable habitat. Unlikely to occur.

Table D.1 LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Varanidae	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V		2	woodland. Heath, open forest and woodland, often associated with rock escarpments. Strongly associated with termite mounds, which are used for breeding. Shelters in rock crevices, hollow logs and burrows.	No suitable habitat. Unlikely to occur.

V = Vulnerable; **E** = Endangered; **E4A** = Critically endangered; **M** = Migratory

Table D.2 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Apocynaceae	<i>Cynanchum elegans</i>	White-flowered Wax Plant	E1	E	6	The species typically occurs at the edge of dry rainforest but can occur in a number of other habitat types including Forest Red Gum or Spotted Gum open forests and woodland. The species flowers from August through to May with a peak in November but survey can take place at any time of year as the species can be readily identified.	Suitable habitat present but no preferred habitat present. No individuals have been recorded during survey despite being readily identifiable. Unlikely to occur.
Asteraceae	<i>Olearia cordata</i>		V	V	7	Grows on sandstone ridges in shrubland or open sclerophyll forests	No suitable habitat present. Unlikely to occur.
	<i>Ozothamnus tessellatus</i>		V		1	This species has a very restricted distribution. Occurs in eucalypt woodland.	Is restricted to only a few places north of Rylstone. Unlikely to occur.
Fabaceae (Faboideae)	<i>Dillwynia tenuifolia</i>		V		7	The core distribution is the Cumberland Plain from Windsor to Penrith east to Deans Park. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities include: the Bulga Mountains at Yengo in	Outside known distribution. No individuals were recorded during survey. Unlikely to occur.

Table D.2 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
	<i>Pultenaea glabra</i>	Smooth Bush-pea	V	V	0	the north, Kurrajong Heights and Woodford in the Lower Blue Mountains. Restricted to the higher Blue Mountains and has been recorded from the Katoomba-Hazelbrook and Mount Victoria areas, with unconfirmed sightings in the Mount Wilson and Mount Irvine areas. All known populations occur within the Blue Mountains Local Government Area. Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and tall damp heath on sandstone.	No suitable habitat present. Unlikely to occur.
Fabaceae (Mimosoideae)	<i>Acacia pendula</i>	Acacia pendula population in the Hunter catchment	E2		4	Occurs typically on heavy soils and on the margins of small floodplains.	No suitable habitat present. Unlikely to occur.
Lamiaceae	<i>Prostanthera cineolifera</i>	Singleton Mint Bush	V	V	4	Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands.	No suitable habitat present. Unlikely to occur.
	<i>Prostanthera stricta</i>	Mount Vincent Mint Bush	V	V	0	Prostanthera stricta occurs in the Widdien Valley district of New South Wales. The species is also known from Mt Vincent and Genowlan Mountain in the Central Tablelands. The species is found at Dingo Creek and the Widdien and Baerami Valleys in	No suitable habitat present. Unlikely to occur.

Table D.2 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Myrtaceae	<i>Angophora inopina</i>	Charmhaven Apple	V		1	the Central Western Slopes. Grows in areas of both skeletal soil and on deeper, well-drained soil profiles in areas characterised by steep rocky sideslopes, cliff lines, sandstone platforms, or gentle slopes with exposed sandstone outcroppings.	No suitable habitat present.
						Occurs most frequently in four main vegetation communities: (i) <i>Eucalyptus haemastoma</i> – <i>Corymbia gummifera</i> – <i>Angophora inopina</i> woodland/forest; (ii) <i>Hakea teretifolia</i> – <i>Banksia oblongifolia</i> wet heath; (iii) <i>Eucalyptus resinifera</i> – <i>Melaleuca sieberi</i> – <i>Angophora inopina</i> sedge woodland; (iv) <i>Eucalyptus capitellata</i> – <i>Corymbia gummifera</i> – <i>Angophora inopina</i> woodland/forest.	Unlikely to occur.
	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V		1	Grows in dry sclerophyll forest on the coast, often on sandstone. Records in the Singleton area come from Yengo National Park.	No suitable habitat present.
	<i>Darwinia biflora</i>		V		2	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include <i>Eucalyptus haemastoma</i> , <i>Corymbia gummifera</i> and/or <i>E. squamosa</i> . The vegetation structure is usually woodland, open forest or scrub-heath.	Unlikely to occur.

Table D.2 **LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA**

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
	<i>Darwinia peduncularis</i>		V		3	Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone	No suitable habitat present. Unlikely to occur.
	<i>Eucalyptus camaldulensis</i>	Eucalyptus camaldulensis population in the Hunter catchment	E2		503	Occurs on the major floodplains of the Hunter and Goulburn Rivers, from the west at Bylong, south of Merriwa, to the east at Hinton, on the bank of the Hunter River, in the Port Stephens local government area.	No suitable habitat present. Unlikely to occur.
	<i>Eucalyptus fracta</i>	Broken Back Ironbark	V		22	Locally common but restricted to the northern Broken Back Range near Cessnock, NSW. The dominant tree in a narrow band along the upper edge of a sandstone escarpment. Occurs in dry eucalypt woodland in shallow soils.	Outside known distribution. No suitable habitat. No individuals were recorded during survey. Unlikely to occur.
	<i>Eucalyptus glaucina</i>	Slaty Red Gum	V	V	155	Grows in grassy woodland and dry eucalypt forest. Grows on deep, moderately fertile and well-watered soils.	Recorded in Belford National Park. Habitat exists for the species on the subject site but no individuals were recorded during survey. Unlikely to occur.
	<i>Melaleuca groveana</i>	Grove's Paperbark	V		15	Grove's Paperbark grows in heath and shrubland,	No suitable habitat

Table D.2 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Orchidaceae	<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V	V	0	often in exposed sites, at high elevations, on rocky outcrops and cliffs. It also occurs in dry woodlands. Unlikely to occur. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. that there is suitable habitat for this species on the subject site. Unlikely to occur. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).	Based on the associated vegetation, it is unlikely
	<i>Prasophyllum</i> sp. <i>Wybong</i>	a leek-orchid		CE		Generally found in shrubby and grassy habitats in dry to wet soil and is known to occur in open eucalypt woodland and grassland. The distribution of this species overlaps with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EPBC Act-listed threatened ecological community.	Suitable habitat present. Potential to occur.
	<i>Pterostylis gibbosa</i>	Illawarra Greenhood	E1	E	6	All known populations grow in open forest or	The subject site is

Table D.2 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Proteaceae	<i>Grevillea evansiana</i>	Evans Grevillea	V	V	4	Restricted to a small area east of Rylstone on the Central Tablelands. Known populations occur on the western side of Wollemi National Park and nearby private lands, within the Rylstone Local Government Area. Grows in dry sclerophyll forest or woodland, occasionally in swampy heath, in sandy soils, usually over Hawkesbury sandstone.	possibly on the periphery of this species' Hunter Valley distribution but suitable habitat is present on the subject site. No individuals were detected despite targeted survey at the appropriate time of year.
	<i>Persoonia hirsuta</i>	Hairy Geebung	E1	E	5	The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. <i>Persoonia hirsuta</i> has a large area of occurrence, but occurs in small populations, increasing the species fragmentation in the landscape. The Hairy Geebung is found in sandy	No suitable habitat present. Unlikely to occur.

Table D.2 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
	<i>Persoonia pauciflora</i>	North Rothbury Persoonia	E4A	CE	0	soils in dry sclerophyll open forest, woodland and heath on sandstone. Restricted to a small area east of Rylstone on the Central Tablelands. Known populations occur on the western side of Wollemi National Park and nearby private lands, within the Rylstone Local Government Area.	Outside known range of the species. Unlikely to occur.
Santalaceae	<i>Thesium australe</i>	Austral Toadflax	V	V	0	Occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (<i>Themeda australis</i>). A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass.	This species is sensitive to grazing, residential or agricultural development and invasion from weeds. However suitable habitat exists on the subject site. Potential to occur.
Rhamnaceae	<i>Pomaderris burnnea</i>	Rufous Pomaderris	V	V	0	Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. The NSW distribution is known only from Wollemi National Park.	Suboptimal habitat on the subject site and outside known distribution of the species. Unlikely to occur.
Rutaceae	<i>Leionema sympetalum</i>	Rylstone Bell	V	V	1	Restricted to a small area within Wollemi National Park, east of Rylstone on the Central Tablelands. Has only ever been recorded at four sites. All known	No suitable habitat present. Unlikely to occur.

Table D.2 LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA SPECIES KNOWN FROM OR PREDICTED FOR THE SINGLETON LGA

Family	Scientific Name	Common Name	TSC	EPBC	Count	Habitat Requirements	Likelihood of occurrence on the Subject Site
Winteraceae	<i>Tasmannia glaucifolia</i>	Fragrant Pepperbush	V	V	0	sites are in the Rylstone Local Government Area. Restricted to exposed rocky sandstone formations known as pagodas. The species occurs in dry sclerophyll forest and probably also occurs in open or closed heathland communities. Fragrant Pepperbush is restricted to three disjunct areas on the eastern side of the Northern Tablelands present. NSW: Gloucester Tops/Barrington Tops area, Ben Halls Gap National Park (NP) and Point Lookout/Moffat Falls, east of Armidale. The species prefers riparian zones and drainage lines, in cool, high rainfall areas and is known to grow on basalt and occasionally granite substrates.	No suitable habitat Unlikely to occur.

V = Vulnerable; E = E1 = Endangered; E2 = Endangered population; E4A = CE = Critically Endangered

Appendix E

Classification Dendogram and nMDS Plot

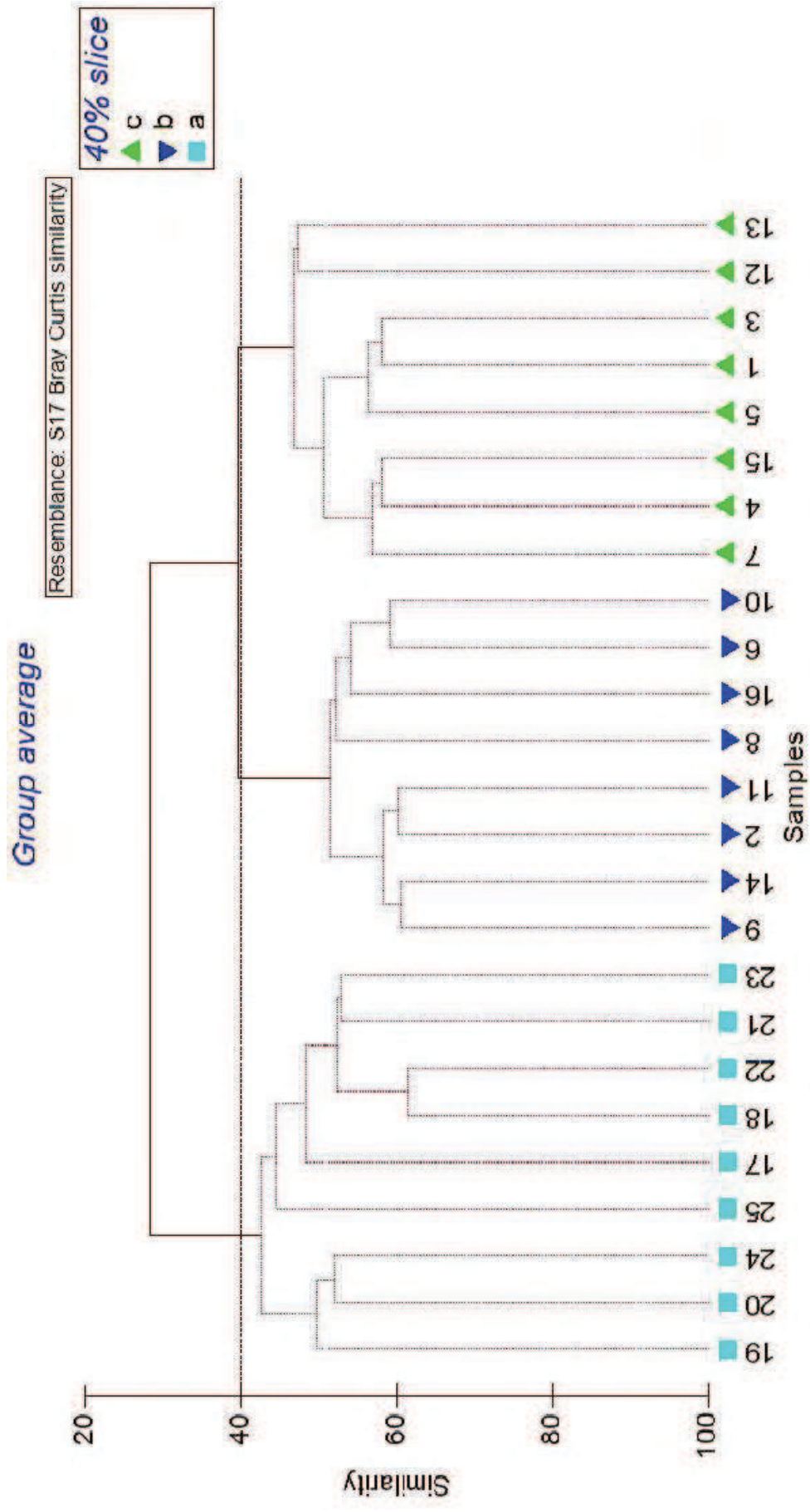


Figure E.1 CLASSIFICATION ANALYSIS OF 25 FLORISTIC SAMPLE QUADRATS SHOWING SIGNIFICANT ($p < 0.05$) SEPARATION BETWEEN 2008 SAMPLES (TURQUOISE □) AND 2011 SAMPLES, AND BETWEEN WOODLAND PLOTS (GREEN Δ) AND GRASSLAND PLOTS (BLUE ▽)

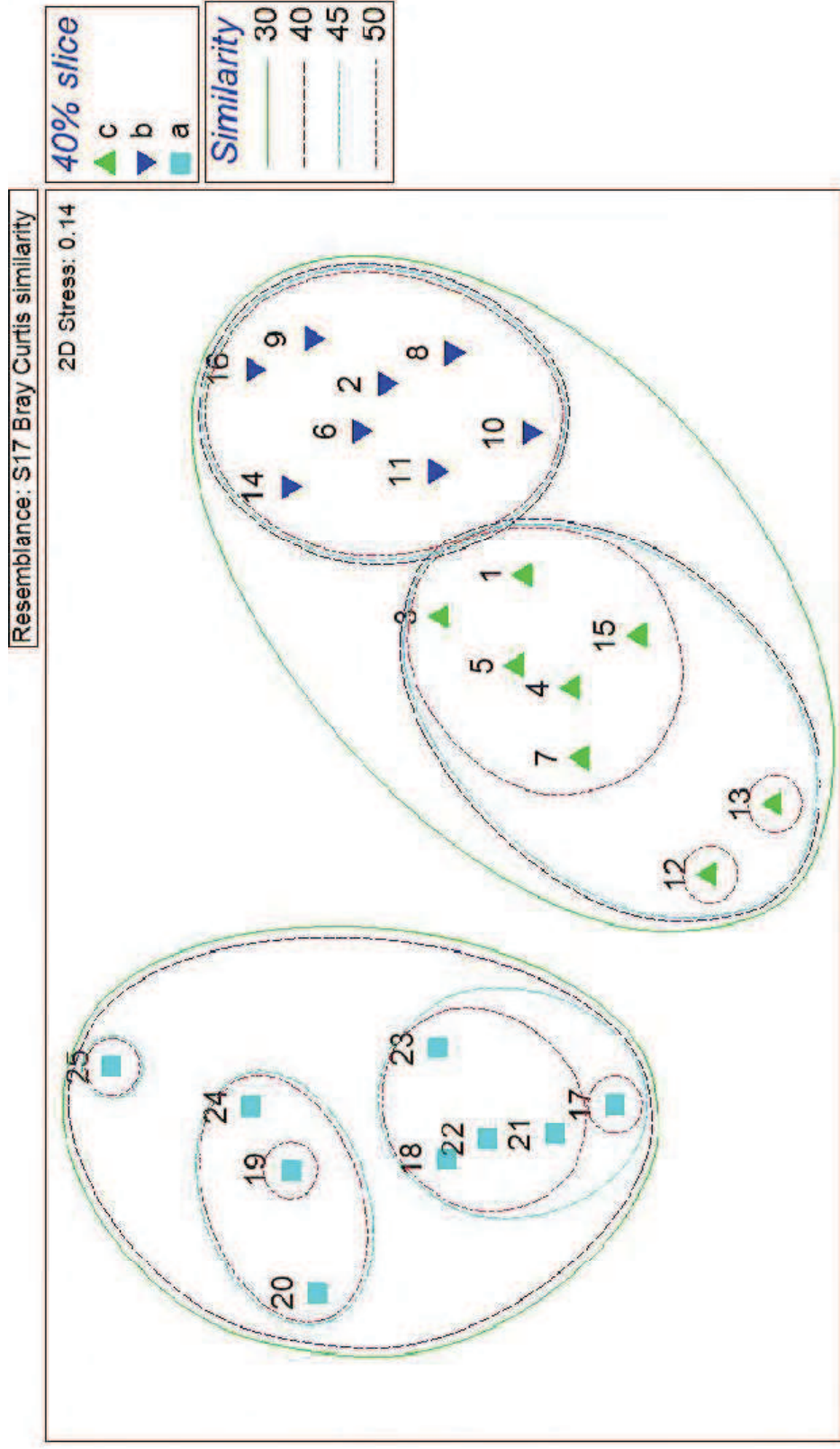


Figure E.2 nMDS ORDINATION PLOT OF 25 FLORISTIC SAMPLE QUADRATS WITH CLASSIFICATION OVERLAY, SHOWING CLUSTERING AT 30, 40, 45 AND 50% SIMILARITY. STRESS IS LESS THAN 0.2 WHICH INDICATES A RELIABLE ORDINATION. 2008 SAMPLES (TURQUOISE □) 2011 SAMPLES - WOODLAND PLOTS (GREEN △) - GRASSLAND PLOTS (BLUE ▽)

Appendix F

Assessments of Significance

F.1 Endangered Ecological Communities

This assessment of significance covers the following communities:

- Central Hunter Ironbark-Spotted Gum-Grey Box Forest; and
- Hunter Lowlands Redgum Forest

Central Hunter Ironbark-Spotted Gum-Grey Box Forest is a mid tall open forest typically dominated by Narrow-leaved Ironbark (*Eucalyptus crebra*), Spotted Gum (*Corymbia maculata*) and Grey Box (*Eucalyptus moluccana*). Broad-leaved Ironbark (*Eucalyptus fibrosa*) and/or Forest Red Gum (*Eucalyptus teretecornis*) may occasionally dominate or co-dominate (NSW Scientific Committee, 2009). This community occurs mostly on clay soils on Permian sediments and whilst it predominantly occupies low rises and slopes, it may also occur on alluvial and colluvial soils in valleys (Peake, 2006). The presence of the community in Belford National Park is considered to be a significant occurrence, especially as the community has been subject to intense livestock grazing (NSW Scientific Committee, 2009).

Hunter Lowlands Redgum Forest is a mid tall open forest that is typically dominated by Forest Red Gum and Grey Gum (*Eucalyptus punctata*), although other tree species like Narrow-leaved Ironbark, Spotted Gum, Grey Box and Rough-barked Apple (*Angophora costata*) can also occur frequently in this community (NSW Scientific Committee, 2002). This community generally occupies open depressions and drainage flats on Permian sediments and is associated with minor creeklines (Peake, 2006). This community is under-represented in the formal reserve system; the majority of its occurrence is on private land. There is only a minor occurrence of this community on the subject site at the southern boundary fronting the New England Highway.

- (a) *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

Not applicable.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

No applicable.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The proposal will facilitate residential developments involving an average total building envelope of 2,500 m² per lot, which is intended to be accommodated in the current landscape in existing cleared areas. This means that vegetation clearance can be avoided and minimal areas of habitat are likely to be removed to develop the future residential area. Thus the proposal has a potential to avoid adverse impacts on the extent of both of the communities.

The vegetation on the subject site has been highly modified and has a highly altered understorey across a large proportion of the subject site, particularly in the smaller fragments of remnant woodland and forest. If a Biodiversity Management Plan is implemented as recommended, the proposed rezoning has a good opportunity to improve the composition of both of the communities. As the communities are represented in Belford National Park, the proposed rezoning is not likely to substantially alter the communities such that their local occurrence is at risk of extinction.

(d) *In relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

As aforementioned, the proposed rezoning and subsequent subdivision plans allow for building envelopes that can be located in existing cleared areas, which means that minimal areas of vegetation require clearing.

The habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park. This larger patch of vegetation encompassing Belford National Park is currently isolated from significant areas of vegetation in its vicinity. Thus, the proposed rezoning will not further fragment or isolate the vegetation on site or in the vicinity of the subject site.

As the communities are represented in Belford National Park and their on-site occurrence is currently altered and fragmented, the importance of the subject site as habitat for these communities is not considered to be exceptional. However, considering the rarity of Hunter Lowlands Redgum Forest in the reserve system, it would be of a high

conservational benefit to retain as much of these communities on-site as possible. If a Biodiversity Management Plan is implemented as recommended, the proposed rezoning has a good opportunity to consolidate the on-site occurrences of both of the communities.

- (e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for these communities has currently been identified by the Director-General of the DECCW.

- (f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.*

No recovery plan has been prepared for these communities.

No threat abatement plans are relevant to these communities.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal may impact the EEC mosaic through the following process:

- **Clearing of native vegetation** as this destroys populations of the species and their habitats.

The proposal may also exacerbate the following processes, further impacting on the communities:

- **Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands** as it may alter the habitat for this species;
- **Invasion and establishment of exotic vines and scramblers** as these species smother native vegetation and seedlings as well as preventing recruitment;
- **Invasion of native plant communities by exotic perennial grasses** as these species compete with native vegetation;
- **Invasion of Native Plant Communities by African Olive *Olea europaea*** as this species may suppresses native vegetation and seedlings through shading, nutrient competition, smothering and allelopathy;
- **Invasion, establishment and spread of *Lantana camara*** as this species may suppresses native vegetation and seedlings through shading, nutrient competition, smothering and allelopathy; and
- **Competition and grazing by the feral European rabbit** as this may reduce recruitment and survival of native species.

Central Hunter Ironbark-Spotted Gum-Grey Box Forest is recognised to be at risk from Lantana, African Olive and exotic grasses, particularly Coolatai Grass (*Hyparrhenia hirta*) and Giant Parramatta Grass (*Sporobolus africanus*). Hunter Lowlands Redgum Forest is known to be at risk from Lantana. African Olive has already been recorded on site and in the adjacent Belford National Park and can be exacerbated by future development of the subject site if active management of the subject site according to a management plan is not undertaken.

Conclusion

The subject site supports habitat for the above communities but is part of a larger distribution that comprises one patch encompassing Belford National Park and surrounding properties. Considering the fragmented and much altered nature of the vegetation on site, particularly of the Hunter Lowlands Redgum Forest patch at the southern boundary, they could be considered unimportant to the long term survival of the communities across their range. However, when it is also considered that the communities are not well represented in the reserve system, the on site distribution becomes more worthy of retention. The implementation of a Biodiversity Management Plan will provide the proposed rezoning with a good opportunity to consolidate the on-site occurrences of both of the communities.

F.2 *Cymbidium canaliculatum* population in the Hunter Catchment

The Tiger Orchid (*Cymbidium canaliculatum*) belongs to a group of epiphytic orchids that grow in tree hollows and decaying branches in rainforests to dry forests and woodland (Jones, 2006). The Hunter Catchment population is listed as Endangered under the TSC Act and occurs at the south-easternmost extent of the species' range. This population is significant because the species is one of the few epiphytic orchids that occur at temperate latitudes (NSW Scientific Committee, 2011). Central Hunter Ironbark-Spotted Gum-Grey Box Forest is known to be habitat for this species (NSW Scientific Committee, 2009). One plant was recorded on site.

- (a) *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

This species is not listed as a threatened species under the TSC Act.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

Future development of the subject site could potential remove this plant. There is very good opportunity to avoid clearance of this individual, which is particularly desirable as the

species occurs as scattered individuals and it is not known whether there are other individuals in the study area without further survey. If there are no other occurrences of this species, and the on site occurrence is removed, the species could potentially be at risk of local extinction.

In the wider locality and elsewhere in the Hunter Catchment, there are other occurrences of the species that will not be impacted by the proposal, although population numbers are expected to be as low as 90 (NSW Scientific Committee, 2011).

(c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable.

(d) *In relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposal will facilitate residential developments involving an average total building envelope of 2,500 m² per lot, which is intended to be accommodated in the current landscape in existing cleared areas. This means that vegetation clearance can be avoided and minimal areas of habitat are likely to be removed to develop the future residential area. Thus the proposal has a potential to avoid adverse impacts on the habitat of this species.

The habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park. This larger patch of vegetation encompassing Belford National Park is currently isolated from significant areas of vegetation in its vicinity. Thus, the proposed rezoning will not further fragment or isolate the vegetation on site or in the vicinity of the subject site.

The habitat that potentially will be removed as a result of the proposal is not considered to be important for the long term survival these species. Only one individual has been

recorded on the subject site to date despite the availability of suitable habitat; however, considering the scattered nature of the species' distribution, this is not entirely unexpected. Much larger areas of suitable habitat will remain in the vicinity of the subject site in Belford National Park. Retained vegetation and bushland adjacent to the subject site potentially contains hollow-bearing trees and stags that would supply habitat for this species. The removal and modification of the vegetation on the subject site is not likely to have an adverse effect on the long-term survival of these species.

- (e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the DECCW.

- (f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.*

No recovery plan has been prepared for this species.

No threat abatement plans are relevant to this species.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Future development of the subject site may impact the Tiger Orchid through the following process:

- **Clearing of native vegetation** as this destroys populations of the species and their habitats.

Threats to the population of the Tiger Orchid in the Hunter Catchment also include fragmentation of habitat, on-going removal of remnant trees, and illegal collecting, which are all associated with habitat clearance. If the onsite individual is retained and the majority of the extant vegetation is managed under a management plan, then this can mitigate any potential impacts to the individual and avoid significant impact to the local occurrence of this species.

Conclusion

The local occurrence of the species is not absolutely known; however, the future development of the site has excellent opportunity to avoid clearance of the plant on site, as well as improve habitat for this species under a management plan.

F.3 Microchiropteran Bats

The following Assessment of Significance applies to the following species of microchiropteran bats that are known to occur or have the potential to occur on the subject lands:

- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*);
- Little Bentwing-bat (*Miniopterus australis*); and
- Greater Broad-nosed Bat (*Scoteanax rupellii*).

The Eastern Freetail Bat occurs from southern Queensland to southern NSW, in dry sclerophyll forest and woodland. It roosts in tree hollows and sometimes under bark or in man-made structures (DEC (NSW), 2005b). The Eastern Freetail Bat is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004c).

The Eastern Bentwing-bat occurs along the east and north west coasts of Australia. It roosts in caves, derelict mines, stormwater tunnels, buildings and other man made structures. It forages above the canopy in forested areas. This species also can potentially roost in some rock crevices and overhangs (DEC (NSW), 2005a). The Eastern Bentwing-bat forms maternity colonies in caves and populations usually centre on such caves (DEC (NSW), 2005a). The Eastern Bentwing-bat is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004b).

The Little Bentwing-bat is distributed along the east coast of Australia from Cape York in Queensland to Wollongong in NSW (DEC (NSW), 2005f). This species inhabits moist eucalypt forest, rainforest or dense coastal banksia scrub (DEC (NSW), 2005f). Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats (DEC (NSW), 2005f). The Little Bentwing-bat is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004f).

The Greater Broad-nosed Bat occurs from the Atherton Tableland to north eastern Victoria in gullies and river systems that drain the Great Dividing Range. It roosts in tree hollows and sometimes in buildings. It occurs in woodland to moist and dry eucalypt forest and rainforest but is most common in tall wet forest (DEC (NSW), 2005c). The Greater Broad-nosed Bat is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004d).

- (a) *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

The Eastern Freetail Bat, Eastern Bentwing-bat, Little Bentwing-bat and Greater Broad-nosed Bat have been detected on the subject site. However, the subject site provides

suboptimal roosting habitat for these species as there are very few hollow-bearing trees and no caves to supply roosting sites. Thus, it is not likely that the subject site is a roost site for any of these species. Despite this, these species can roost in man-made structures such as building eaves on the subject site, although they are more likely using the subject site as a foraging area or moving across the subject to access more suitable foraging areas.

The proposed rezoning of the subject site for residential development will have a potential to reduce the area of available foraging habitat but a significant area of better foraging and roosting habitat will persist locally in Belford National Park to the west of the subject site. Thus the proposal is not likely to place any of these species at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

There are no endangered populations of these microchiropteran bat species listed under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*
- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.*

The proposal will facilitate residential developments involving an average total building envelope of 2,500 m² per lot, which is intended to be accommodated in the current landscape in existing cleared areas. This means that vegetation clearance can be

avoided and minimal areas of habitat are likely to be removed to develop the future residential area.

The habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park. This larger patch of vegetation encompassing Belford National Park is currently isolated from significant areas of vegetation in its vicinity. Thus, the proposed rezoning will not further fragment or isolate the vegetation on site or in the vicinity of the subject site.

The habitat that potentially will be removed as a result of the proposal is not considered to be important for the long term survival of these species. As aforementioned, the habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park, providing few nesting or roosting sites for these species. Therefore, much larger areas of suitable habitat will remain in the vicinity of the subject site. Retained vegetation and bushland adjacent to the subject site potentially contains hollow-bearing trees and stags that would supply nesting habitat for this species. The removal and modification of the vegetation on the subject site is not likely to have an adverse effect on the long-term survival of these species.

- (e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for these species has currently been identified by the Director-General of the DECCW.

- (f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.*

No recovery plan has been prepared for these species.

No threat abatement plans are relevant to these species.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

If the recommendations within this report are not undertaken, the proposal has the potential to impact these species on the subject site through the following processes:

- **Clearing of native vegetation** as this destroys populations of the species and their habitats;
- **Loss of hollow-bearing trees** (or future hollow-bearing trees) as they provide hollow logs that serve as important roosting sites;
- **Removal of dead wood and dead trees** as they provide hollow logs that serve as important roosting sites; and

The proposal may also exacerbate the following process, further impacting on the species:

- **Infection of native plants by *Phytophthora cinnamomi*** as vegetation that are utilised by this species may be susceptible and may be killed or damaged.

There are no signs that *Phytophthora cinnamomi* is currently impacting vegetation on the subject site and it is not likely that the process will be exacerbated as a result of the proposal.

Conclusion

The subject site provides suboptimal foraging or roosting habitat for these microchiropteran species and is unlikely to be an important site for their persistence in the local area. The proposal can avoid significantly reducing foraging habitat and exacerbating key threatening processes during future development and occupation if the recommendations in the report are implemented, which provides for the maintenance and improvement of the existing habitat. Given this, the proposed rezoning is considered to have a very high potential for avoiding adverse impacts on these threatened microchiropteran species.

F.4 Squirrel Glider

The Squirrel Glider (*Petaurus norfolkensis*) is sparsely distributed along the east coast and immediate inland districts from western Victoria to north Queensland (NSW NPWS, 1999c). The Squirrel Glider inhabits dry sclerophyll forest and woodland and is generally absent from rainforest and closed forest. The Squirrel Glider requires abundant hollow-bearing trees and a mix of eucalypts, acacias and banksias (NSW NPWS, 1999c). The Squirrel Glider is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004h).

- (a) *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*

The Squirrel Glider has only been tentatively detected on the subject site but is known to occur in Belford National Park, which is adjacent to the subject site. Since there is only one record confirmed for the National Park, it suggests that the species does not occur in the area in any significant numbers. The potential sighting was made very close to the western border adjacent to the National Park, which implies that there is movement between the National Park and the subject site. Since the species relies on significant numbers of hollows and the subject site offers very few, it is likely that the species largely forages on the subject site within proximity of the protection of the National Park. Whilst there may be a potential loss of some foraging habitat, the largest risk posed by the proposal is that the access to foraging resources on the subject site may be impeded by residential development. Notwithstanding this, there is better foraging habitat in the

National Park and thus the proposal is unlikely to have an adverse effect on the species such that a viable population will be placed at risk.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

The Squirrel Glider population occurring on the subject site does not form an endangered population listed under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposal will facilitate residential developments involving an average total building envelope of 2,500 m² per lot, which is intended to be accommodated in the current landscape in existing cleared areas. This means that vegetation clearance can be avoided and minimal areas of habitat are likely to be removed to develop the future residential area.

The habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park. This larger patch of vegetation encompassing Belford National Park is currently isolated from significant areas of vegetation in its vicinity. Thus, the proposed rezoning will not further fragment or isolate the vegetation on site or in the vicinity of the subject site.

The habitat that potentially will be removed as a result of the proposal is not considered to be important for the long term survival these species. As aforementioned, the habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park, providing supplementary foraging resources but few nesting or sites for these species. Therefore, much larger areas of suitable habitat will remain in the vicinity of the subject site. Retained vegetation and bushland adjacent to the subject site potentially contains hollow-bearing trees and stags that would supply nesting habitat for this species. The removal and modification of the vegetation on the subject site is not likely to have an adverse effect on the long-term survival of these species.

- (e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for these species has currently been identified by the Director-General of the DECCW.

- (f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan has been prepared for the Squirrel Glider.

No threat abatement plans are relevant to these species.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

If the recommendations within this report are not undertaken, the proposal has the potential to impact these species on the subject site through the following processes:

- **Clearing of native vegetation** as this destroys populations of these species and their habitats.
- **Loss of hollow-bearing trees** (or future hollow-bearing trees) as this reduces the abundance of nesting habitat;
- **Removal of dead wood and dead trees** as this reduces the abundance of nesting habitat;

The proposal may also exacerbate the following processes, further impacting on the species:

- **Competition from feral honeybees** as this species competes with native species for tree hollows;
- **Predation by the European Red Fox** as this species preys upon native species; and

- **Predation by the feral cat** as this species preys upon native species.

Conclusion

The subject site provides blossom and other food resources that would be supplementary to that provided by forest and woodland in Belford National Park. However, it is recognised that marginal habitat such as that afforded by the subject site plays a role in supporting an increasing population. Since the species does not appear to occur in significant numbers, and the proposal can avoid significantly impeding access to foraging habitat and exacerbating key threatening processes during future development and occupation, the proposed rezoning is considered to have a very high potential for avoiding adverse impacts on the species.

F.5 Grey-crowned Babbler

The Grey-crowned Babbler is the largest of the four Australian babblers. It is typically a sedentary bird, being laborious in flight, and is largely unable to cross wider open areas of cleared land. The species is highly territorial and lives in large family groups in box, box-gum, or box-ironbark woodlands and builds large conspicuous nests that are used for roosting as well as breeding (DEC (NSW), 2005d). This species is present on the subject site and also roosts on site, with one nest observed to be active during survey.

- (a) *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

The proposal will facilitate a subdivision plan that can allow the establishment of building envelopes in existing cleared areas. This means that the proposal has a good opportunity to avoid having an adverse impact on the species or their nest sites.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

The species does not form an endangered population listed under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
 - (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
 - (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

Not applicable.

(d) *In relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

As aforementioned, the proposal will facilitate residential developments involving an average total building envelope of 2,500 m² per lot, which is intended to be accommodated in the current landscape in existing cleared areas. This means that vegetation clearance can be avoided and minimal areas of habitat are likely to be removed to develop the future residential area.

The habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park. This larger patch of vegetation encompassing Belford National Park is currently isolated from significant areas of vegetation in its vicinity. Thus, the proposed rezoning will not further fragment or isolate the vegetation on site or in the vicinity of the subject site.

The habitat that potentially will be removed as a result of the proposal is not considered to be important for the long term survival these species. The habitat on the subject site has supports a larger patch of forest encompassing Belford National Park and therefore, much larger areas of suitable habitat will remain in the vicinity of the subject site. Retained vegetation and bushland adjacent to the subject site potentially contains hollow-bearing trees and stags that would supply nesting habitat for this species. The development of the subject site is not likely to have an adverse effect on the long-term survival of these species, provided that they are able to move between the National Park and the remnant vegetation on site so that they can seek better habitat or migrate.

(e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the DECCW.

(f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.*

No recovery plan is relevant to this species.

No threat abatement plans are relevant to this species.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal may impact this species on the subject lands through the following process:

- **Clearing of native vegetation** as this destroys populations of the species and their habitats;
- **Removal of dead wood and dead trees** as dead wood and dead trees provide essential habitat for a wide variety of native animals and are important to the functioning of many ecosystems.

Clearing of woodland remnants is recognised to be one of the biggest threats to the species, as well as clearing coarse, woody debris and heavy grazing. The proposal may also exacerbate the following processes, further impacting on the species:

- **Predation by feral cats** as this species preys upon native species;
- **Infection of native plants by *Phytophthora cinnamomi*** as this can reduce the amount of foraging and nesting habitat for this species; and
- **Predation by the European red fox** as this species preys upon native species.

Increased predation by domestic cats and dogs due to residential development could also be a significant risk to the species without responsible care by pet owners, as the species forages close to the ground and is not swift in flight. Their nests are also often built relatively close to the ground, possibly within access range of many domestic animals.

Conclusion

The subject site is likely to be able to continue supporting this species throughout future development and subsequent occupation of the site provided that minimal vegetation is cleared, a degree of connectivity is maintained with Belford National Park and feral/domestic predators are controlled and managed.

F.6 Spotted-tailed Quoll

The Spotted-tailed Quoll (*Dasyurus maculatus*) is found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland and is only in Tasmania it is still considered common (NSW Government, 2010). It has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline (NSW Government, 2010). The Spotted-

tailed Quoll is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004g) and as Endangered under the EPBC Act.

- (a) *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

The Spotted-tailed Quoll is not known to occur on the subject site but has been detected in Belford National Park. Potential habitat exists for this species. The Spotted-tailed Quoll dens in rock shelters, small caves, hollow logs or tree hollows and utilises numerous dens within its home range (NSW NPWS, 1999b). No dens were detected on the subject site but this species may potentially utilise the land in the future or forage across it, as the species is known to have a large home range.

The proposal may facilitate future residential development that could impact the species' movement across its foraging range, either through the erection of fences, road kill due to vehicle strike or predation from domestic and feral fauna, if these factors are not managed. Notwithstanding this, the species usually traverses its range along densely vegetated creeklines and the subject site would comprise only a small proportion of the home range, which is known to be up to 3 500 hectares. Thus the proposal is unlikely to have an adverse effect on the species such that a viable population will be placed at risk.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

The Spotted-tailed Quoll population potentially occurring on the subject site does not form an endangered population listed under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposal will facilitate residential developments involving an average total building envelope of 2,500 m² per lot, which is intended to be accommodated in the current landscape in existing cleared areas. This means that vegetation clearance can be avoided and minimal areas of habitat are likely to be removed to develop the future residential area.

The habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park. This larger patch of vegetation encompassing Belford National Park is currently isolated from significant areas of vegetation in its vicinity. Thus, the proposed rezoning will not further fragment or isolate the vegetation on site or in the vicinity of the subject site.

The habitat that potentially will be removed as a result of the proposal is not considered to be important for the long term survival these species. As aforementioned, the habitat on the subject site forms a small proportion of the species' home range and is not currently an important movement corridor. Retained vegetation and bushland adjacent to the subject site contains better habitat for this species, which has already been detected in the National Park. The potential future development of the subject site is not likely to have an adverse effect on the long-term survival of these species.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat for this species has currently been identified by the Director-General of the DECCW.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

No recovery plan has been prepared for this species.

The predation by the European Red Fox Threat Abatement Plan is relevant to this species. The Spotted-tailed Quoll is listed as a medium priority threatened species for fox control. The proposal is not inconsistent with the objectives of the plan, which focus on fox control programs.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Without management, the proposal may potentially impact the species through the following processes:

- **Clearing of native vegetation** as this destroys populations of the species and their habitats.

The proposal may also exacerbate the following processes, further impacting on the species:

- **Bushrock removal** as this reduces shelter sites for this species, and increases soil disturbance and erosion;
- **Loss of hollow-bearing trees** as they provide hollow logs that serve as important nesting sites;
- **Removal of dead wood and dead trees** as they provide hollow logs that serve as important nesting sites; and
- **Predation by the European red fox** as this species preys upon native species; and

The species is already at risk from predation by the European Red Fox as the fox is already known to be present in the National Park.

Conclusion

The subject site contains potential habitat for the Spotted-tailed Quoll. Although some vegetation will be removed as a result of the proposal, substantial areas of similar habitat will be retained on the subject lands outside of the subject development footprint. Given the amount of retained vegetation within the subject lands, the Spotted-tailed Quoll is not considered to be adversely affected by the proposed development.

F.7 Koala

In NSW the Koala (*Phascolarctos cinereus*) mainly occurs on the central and north coasts with some populations in the western region (DEC (NSW), 2005e). Koalas inhabit eucalypt woodlands and forests (DEC (NSW), 2005e). The suitability of woodland and forest communities as habitat for Koalas is influenced by the size and species of trees present, soil nutrients, climate, rainfall and the size and disturbance history of the habitat patches (NSW NPWS, 1999a). The Koala is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004e, NSW Scientific Committee, 2004a).

- (h) *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

No individuals were recorded on site and no evidence of an active, breeding population was recorded on site or is known from the locality. The subject site is unlikely to support a population of koalas, although they may move between places across the subject site from time to time. The proposal is unlikely to have an adverse effect on the species such that a local population will be placed at risk of extinction.

- (i) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

The species does not form an endangered population listed under the TSC Act.

- (j) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable.

- (k) *In relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposal will facilitate residential developments involving an average total building envelope of 2,500 m² per lot, which is intended to be accommodated in the current landscape in existing cleared areas. This means that vegetation clearance can be avoided and minimal areas of habitat are likely to be removed to develop the future residential area.

The habitat on the subject site has been highly modified and forms peripheral fragments of remnant vegetation fringing a larger patch of forest encompassing Belford National Park. This larger patch of vegetation encompassing Belford National Park is currently isolated from significant areas of vegetation in its vicinity. Thus, the proposed rezoning will not further fragment or isolate the vegetation on site or in the vicinity of the subject site.

The habitat on the subject site is not considered to be important to the long-term survival of the species. The subject site contains only one of the primary food tree species listed within Management Area 2 (*Eucalyptus teretecornis*, Forest Red Gum) and does not contain any secondary food tree species. Forest Red Gum occurs on site as a sub dominant canopy species in the woodland and forest areas and comprises less than 30% of the overall overstorey species. According to the Phillips (2000) definition, the site contains Secondary habitat (Class A), which means that is capable of supporting a medium density koala population. Based on the Callaghan (unpublished) definition, the site contains Secondary habitat (Class B), which means that the site is only capable of supporting a medium to low density population.

- (l) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the DECCW.

- (m) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.*

A recovery plan has been prepared for the Koala. The overall aim of the recovery plan is to reverse the decline of the Koala in NSW, to ensure adequate protection, management and restoration of koala habitat, and to maintain healthy breeding populations of koala throughout their current range (DECC (NSW), 2008). The following main objectives are relevant to the proposal:

- Objective 1: To conserve koalas in their existing habitat; and
- Objective 2: To rehabilitate and restore koala habitat and populations.

Minimal habitat will likely be removed for the future development of the site. Retained vegetation includes potential foraging habitat (including SEPP 44 listed feed tree species) of a size that may support a low to medium density population of the Koala. In conjunction with adjoining properties, potential habitat will remain in the locality.

No threat abatement plans are relevant to this species.

- (n) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal may impact this species on the subject site through the following process:

- **Clearing of native vegetation** as this destroys populations of the species and their habitats.

The proposal may also exacerbate the following processes, further impacting on the species:

- **Forest Eucalypt dieback associated with over-abundant psyllids and bell miners** as this process can lead to a reduction in the amount of foraging and nesting habitat for this species;
- **Infection of native plants by *Phytophthora cinnamomi*** as this can reduce the amount of foraging and nesting habitat for this species; and
- **Predation by the European red fox** as this species preys upon native species.

Conclusion

Due to the highly disturbed and fragmented nature of the vegetation within the subject site, it is not considered significant Koala habitat. No Koala scat or tree scratches were identified during habitat assessments. The subject site however could provide suitable wildlife corridors for koalas moving through the landscape to access areas of primary food trees in the wider locality. The proposal is unlikely to have a significant adverse impact on the species.