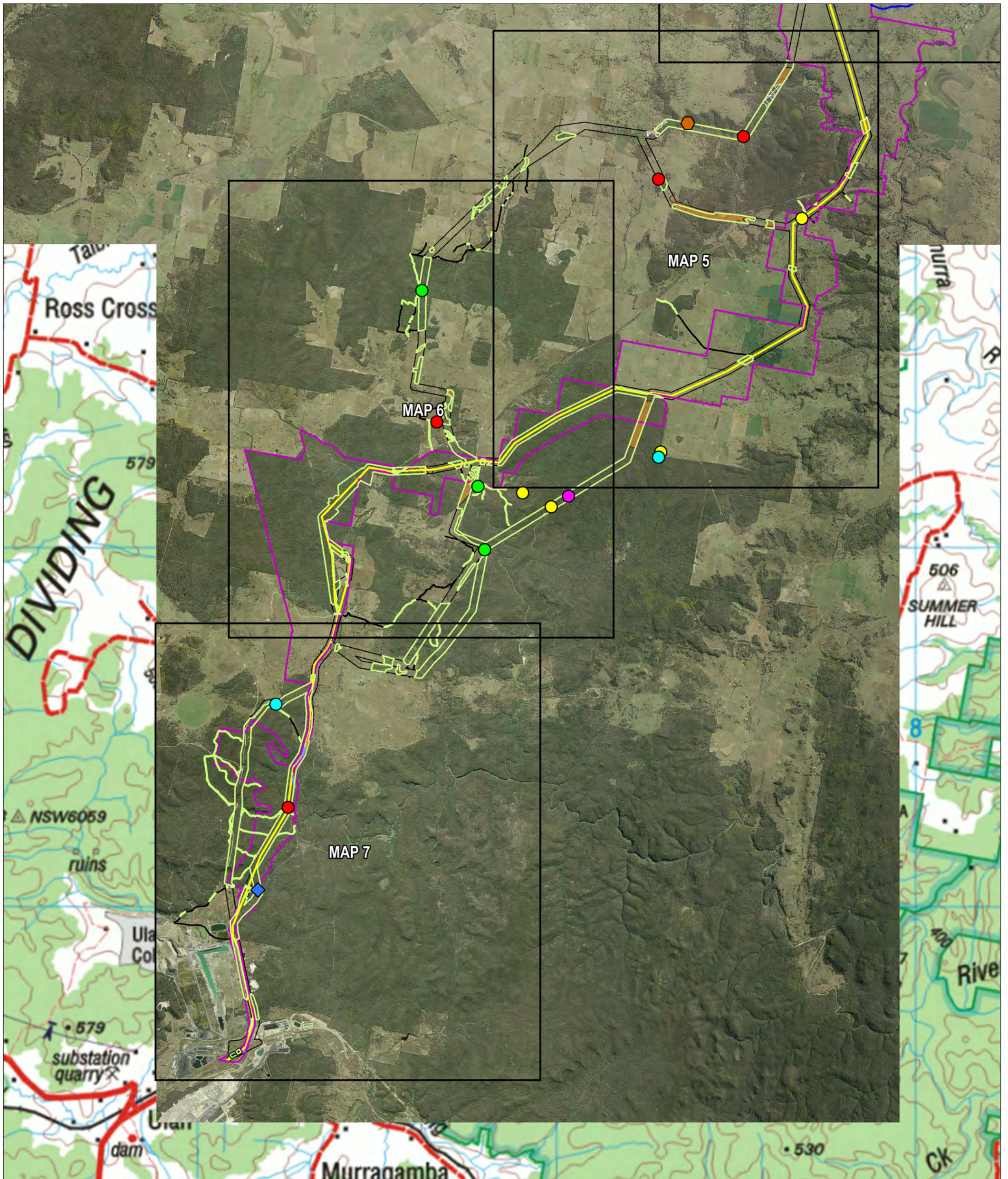


Mammal Survey Results Southern Overview Map



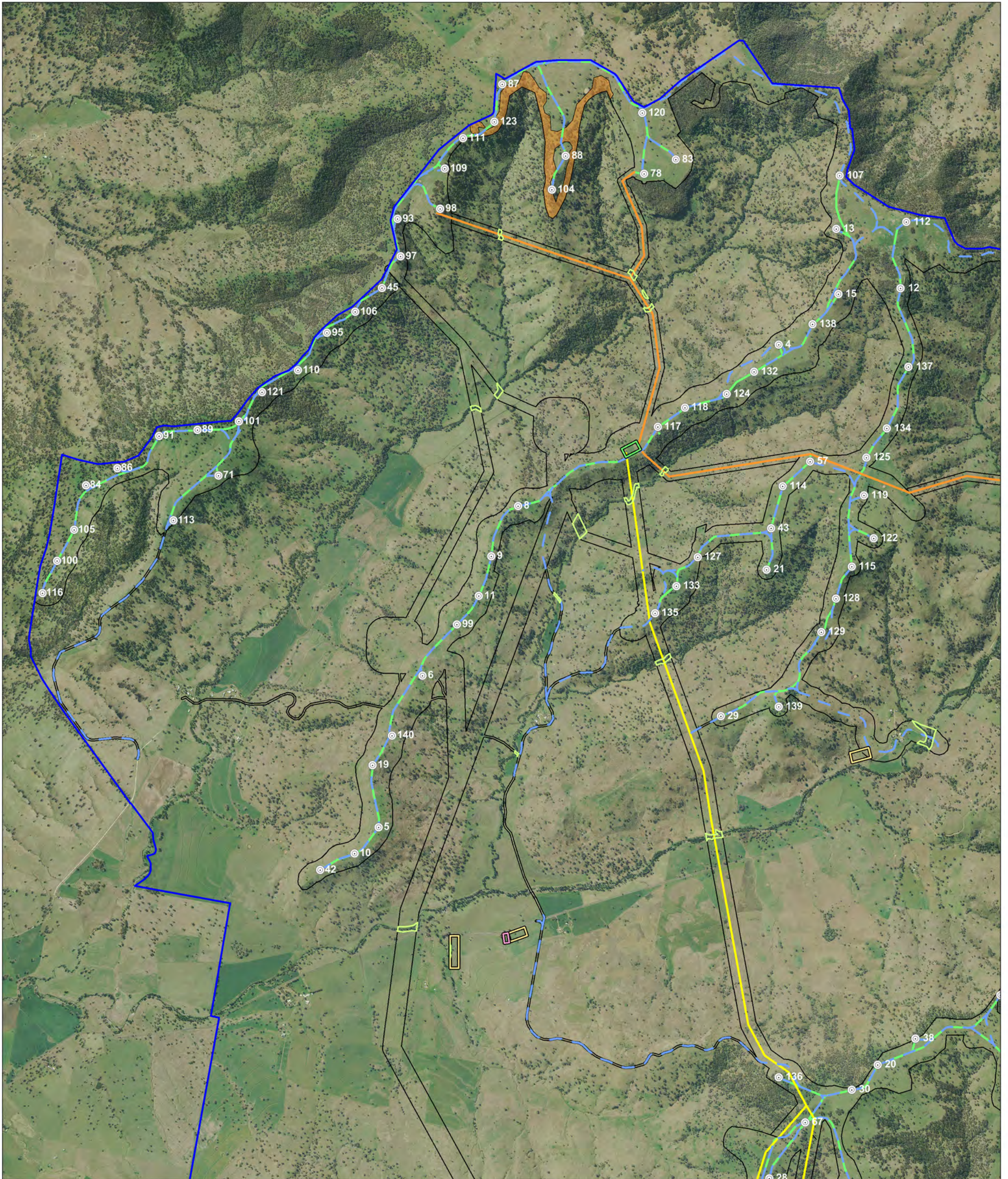
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0 1.5 3 4.5
Kilometers


A3 @ 1:100,000

Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55

Mammal Survey Results Zoom View Map 1



<ul style="list-style-type: none"> Combined survey area Site perimeter Wind Turbine Area Transmission Area Infrastructure Turbine location Access track Underground cabling 	<ul style="list-style-type: none"> OH powerline Transmission line Proposed substation Alternative substation Construction compound Concrete batch plant O&M building 	<ul style="list-style-type: none"> Hollow quality Excellent Good Overall habitat quality Good Habitat feature Caves 	<ul style="list-style-type: none"> Listed Microbats ● Common bent-wing bat ● Corben's long-eared bat ● Eastern cave bat ● Large-eared pied bat ● Yellow-bellied sheath-tail bat Listed Mammals ◆ Squirrel glider 	<ul style="list-style-type: none"> Additional data Squirrel glider habitat
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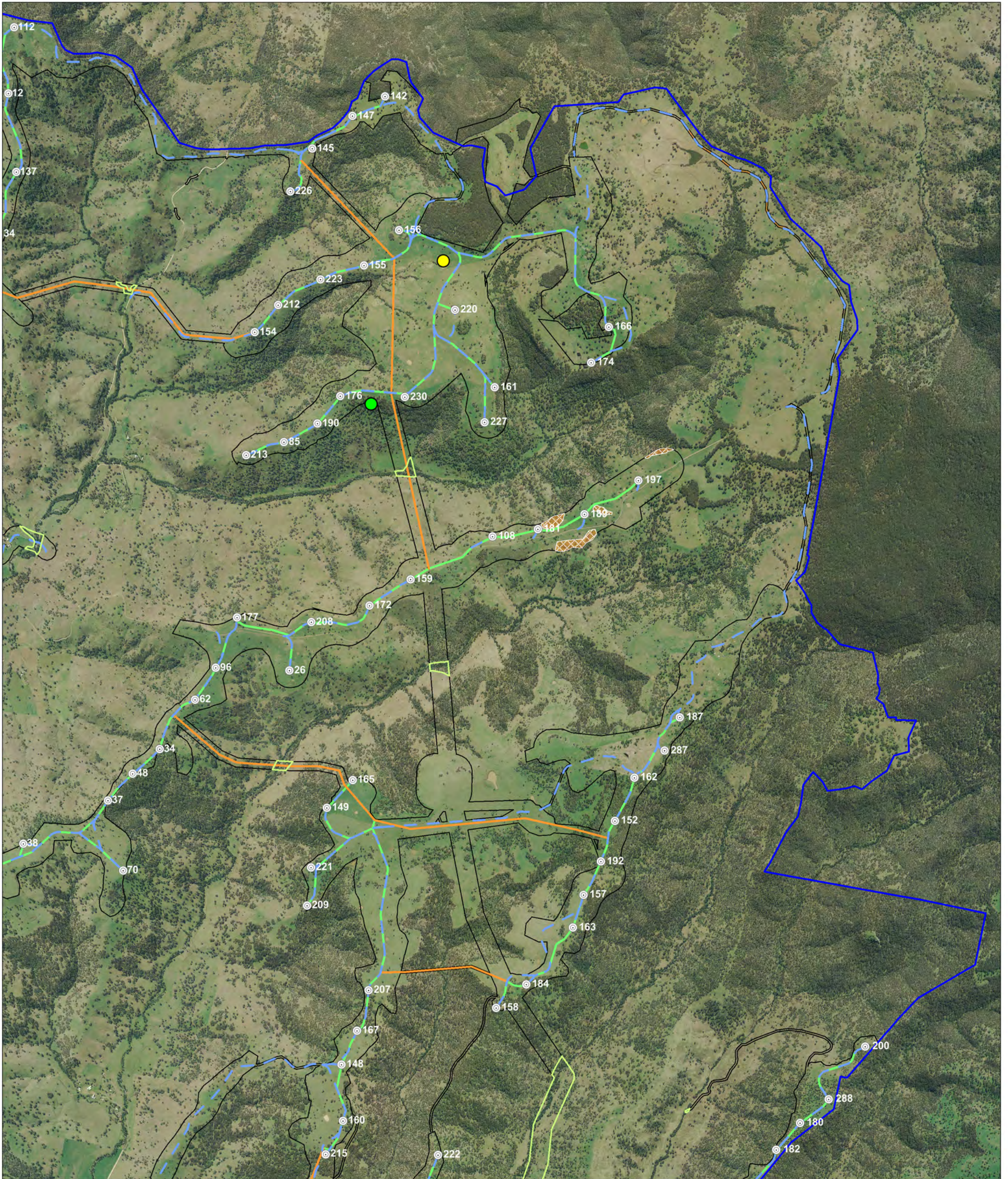
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Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55



Mammal Survey Results Zoom View Map 2



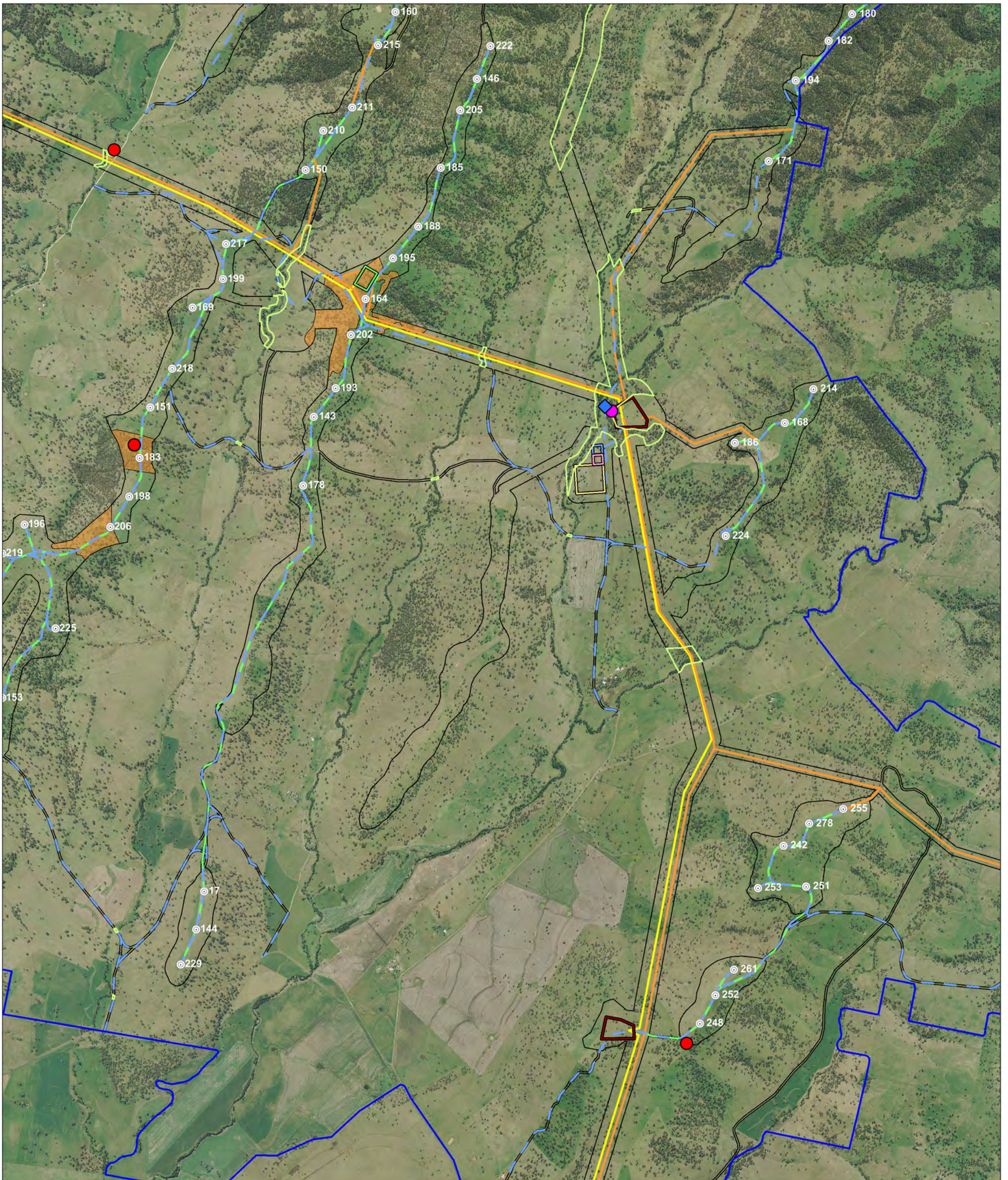
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0 0.5 1 1.5
Kilometers


A3 @ 1:38,500

Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55

Mammal Survey Results Zoom View Map 3




<ul style="list-style-type: none"> ☐ Combined survey area ☐ Site perimeter ☐ Wind Turbine Area ☐ Transmission Area Infrastructure ⊙ Turbine location — Access track — Underground cabling 	<ul style="list-style-type: none"> — OH powerline — Transmission line ☐ Proposed substation ☐ Alternative substation ☐ Construction compound ☐ Concrete batch plant ☐ O&M building 	<ul style="list-style-type: none"> Hollow quality ☐ Excellent ☐ Good Overall habitat quality ☐ Good Habitat feature ☐ Caves 	<ul style="list-style-type: none"> Listed Microbats ● Common bent-wing bat ● Corben's long-eared bat ● Eastern cave bat ● Large-eared pied bat ● Yellow-bellied sheath-tail bat Listed Mammals ◆ Squirrel glider 	<ul style="list-style-type: none"> Additional data ☐ Squirrel glider habitat
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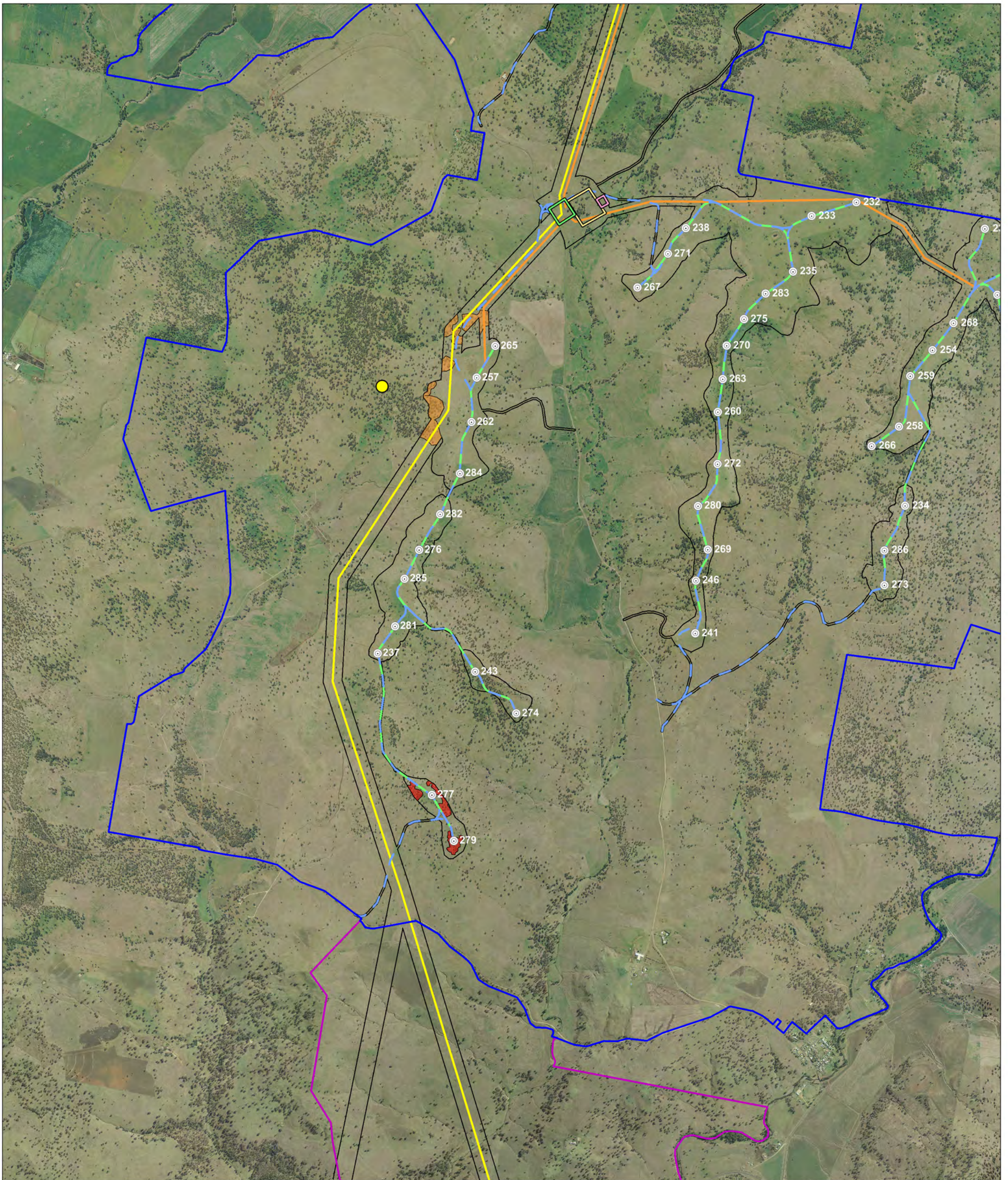
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A3 @ 1:38,500


Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55



Mammal Survey Results Zoom View Map 4




<ul style="list-style-type: none"> Combined survey area Site perimeter Wind Turbine Area Transmission Area Infrastructure Turbine location Access track Underground cabling 	<ul style="list-style-type: none"> OH powerline Transmission line Proposed substation Alternative substation Construction compound Concrete batch plant O&M building 	<ul style="list-style-type: none"> Hollow quality Excellent Good Overall habitat quality Good Habitat feature Caves 	<ul style="list-style-type: none"> Listed Microbats Common bent-wing bat Corben's long-eared bat Eastern cave bat Large-eared pied bat Yellow-bellied sheath-tail bat Listed Mammals Squirrel glider 	<ul style="list-style-type: none"> Additional data Squirrel glider habitat
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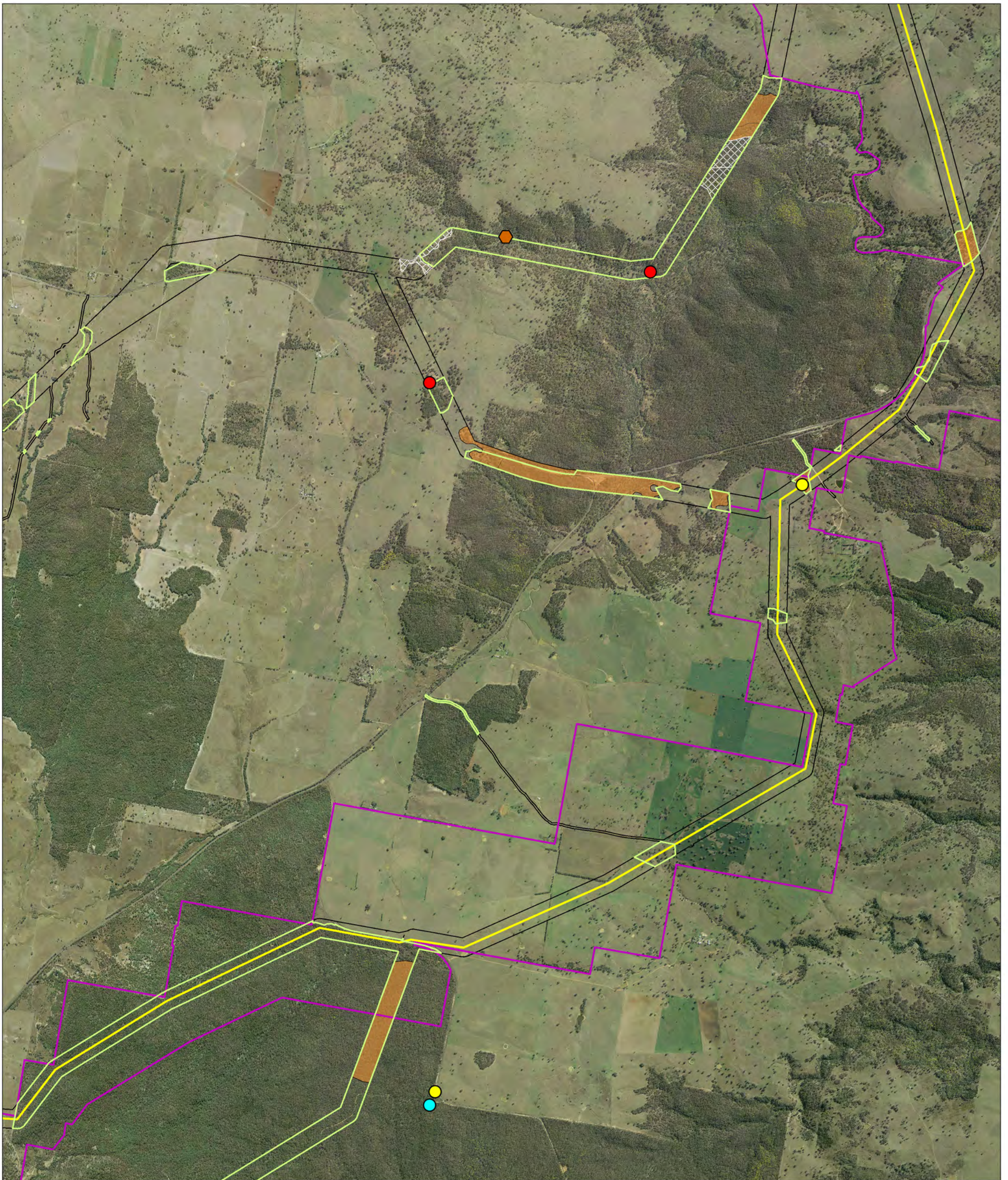
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A3 @ 1:38,500

Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55



Mammal Survey Results Zoom View Map 5



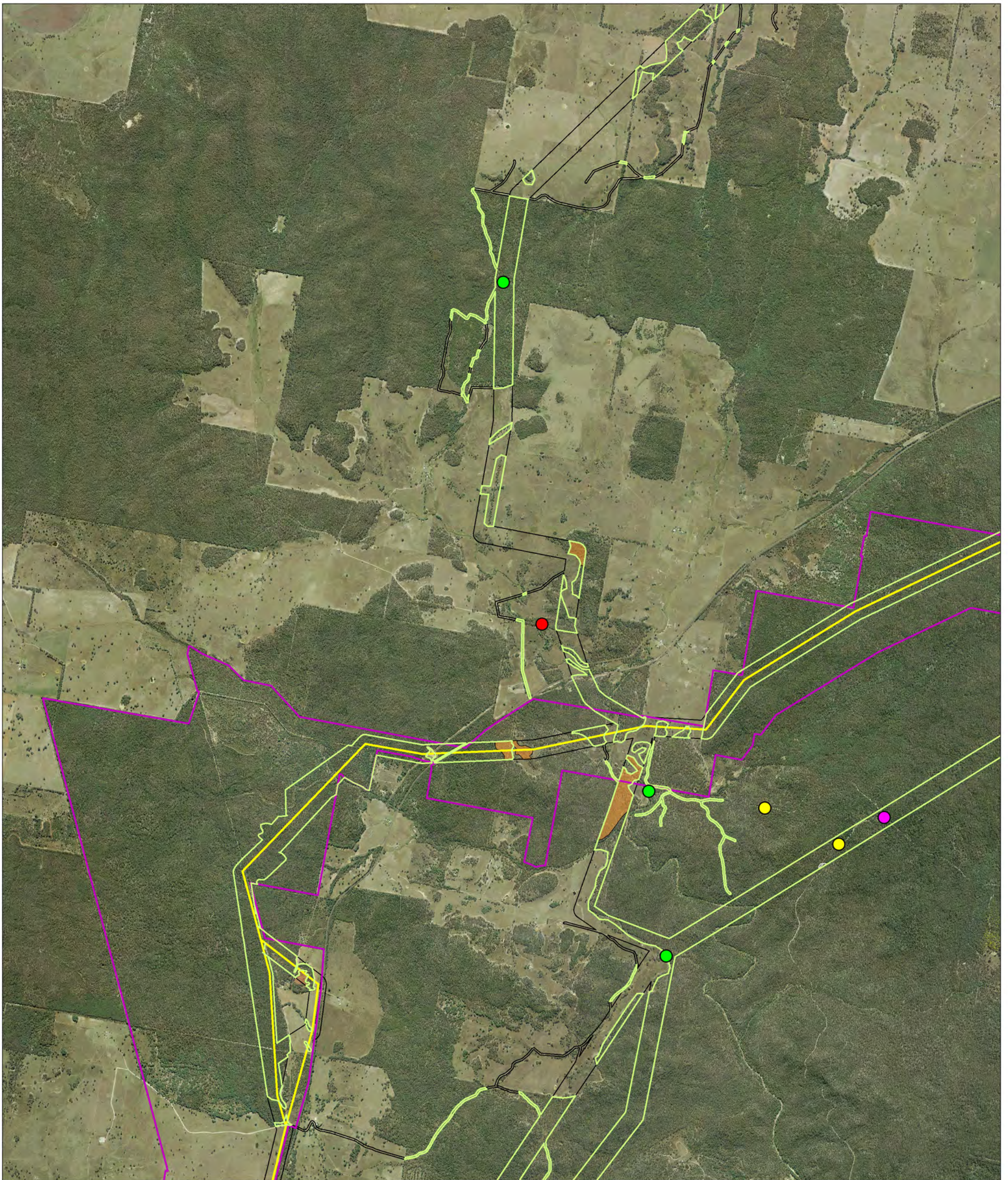
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0 0.5 1 1.5
Kilometers


A3 @ 1:38,500

Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55

Mammal Survey Results Zoom View Map 6




<ul style="list-style-type: none"> Combined survey area Site perimeter Wind Turbine Area Transmission Area Infrastructure Turbine location Access track Underground cabling 	<ul style="list-style-type: none"> OH powerline Transmission line Proposed substation Alternative substation Construction compound Concrete batch plant O&M building 	<ul style="list-style-type: none"> Hollow quality Excellent Good Overall habitat quality Good Habitat feature Caves 	<ul style="list-style-type: none"> Listed Microbats Common bent-wing bat Corben's long-eared bat Eastern cave bat Large-eared pied bat Yellow-bellied sheath-tail bat Listed Mammals Squirrel glider 	<ul style="list-style-type: none"> Additional data Squirrel glider habitat
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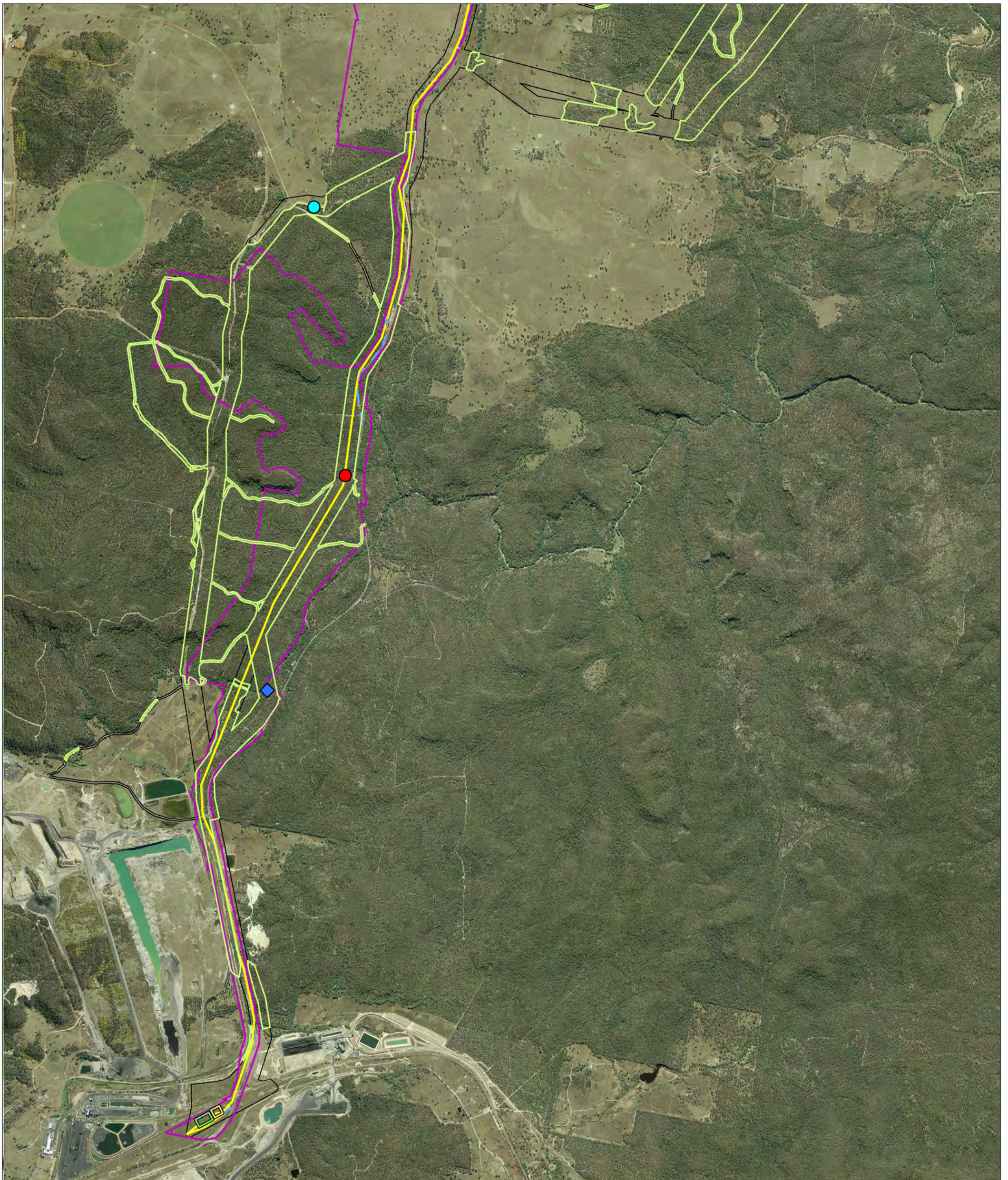
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Kilometers

A3 @ 1:38,500

Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55



Mammal Survey Results Zoom View Map 7



<ul style="list-style-type: none"> Combined survey area Site perimeter Wind Turbine Area Transmission Area Infrastructure Turbine location Access track Underground cabling 	<ul style="list-style-type: none"> OH powerline Transmission line Proposed substation Alternative substation Construction compound Concrete batch plant O&M building 	<ul style="list-style-type: none"> Hollow quality Excellent Good Overall habitat quality Good Habitat feature Caves 	<ul style="list-style-type: none"> Listed Microbats Common bent-wing bat Corben's long-eared bat Eastern cave bat Large-eared pied bat Yellow-bellied sheath-tail bat Listed Mammals Squirrel glider 	<ul style="list-style-type: none"> Additional data Squirrel glider habitat
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Kilometers

A3 @ 1:38,500

Project: Liverpool Range Wind Farm
Produced by: Virgil Robinson
Date: 31 January 2017
Projection: GDA94 MGA Zone 55

APPENDIX B SURVEY EFFORT AND RESULTS

B.1 SURVEY EFFORT COMBINED

Date	Method	Target species	No. Surveys	Time (mins) / survey Effort - Time	No. People	Total (hrs)	Area covered (m) Effort - Area	Known total (ha)
Flora - Transmission Line Study Area								
8-19 Oct 2012	Random meanders (including targeted searches)	All flora species	41	30	1	20.5	50 x 50	10.3
	Inspection searches	All flora species	30	10	1	5.0	25 x 25	1.9
Subtotal			71			25.5		12.1
1-8 Oct 2013	Random meanders (including targeted searches)	All flora species	90	30	1	45.0	50 x 50	22.5
	Inspection searches	All flora species	59	10	1	9.8	25 x 25	3.7
Subtotal			149			54.8		26.2
20-23 Mar 2015	Random meanders (including targeted searches)	All flora species	9	30	1	4.5	50 x 50	2.3
	Biometric plots	All flora species	2	45	1	1.5	20 x 20	0.1
Subtotal			11			6.0		2.4
4-6 October 2016	Random meander	Vegetation communities	81	15	1	20.3	30000 x 50	150.0
Subtotal			81			20.3		150.0
TOTALS - Flora transmission line study area	Random meanders (including targeted searches)		221			90.3		185.0
	Inspection searches		89			14.8		5.6
	Biometric plots		2			1.5		0.1
	All surveys combined		312			106.6		190.7
Flora - Wind Farm Study Area								
8-19 Oct 2012, 1-8 Oct 2013 (combined)	Random meanders (including targeted searches)	All flora species	79	30	1	39.5	50 x 50	19.8
	Inspection searches	All flora species	77	10	1	12.8	25 x 25	4.8

Date	Method	Target species	No. Surveys	Time (mins) / survey Effort - Time	No. People	Total (hrs)	Area covered (m) Effort - Area	Known total (ha)
Subtotal			156			52.3		24.6
4-6 October 2016	Random meanders (including targeted searches)	All flora species	16	35	1	9.3	20000 x 50	100.0
Subtotal			16			9.3		100.0
TOTALS - Flora wind farm study area	Random meanders (including targeted searches)		95	65		48.8		119.8
	Inspection searches		77	10		12.8		4.8
	All surveys combined		172	75		61.7		124.6
Flora - Liverpool Plains Wind Farm TLSA and WFSa combined								
	<i>Random meanders (including targeted searches)</i>		316	65		139.1		304.8
	<i>Inspection searches</i>		166	10		27.7		10.4
	<i>Biometric plots</i>		2	0		1.5		0.1
	<i>All surveys combined</i>		484	75		168.3		315.3
Fauna - Transmission Line Study Area								
8-19 Oct 2012	Habitat assessment and hollow-bearing tree survey	All vertebrate fauna	49	20	1	16.3	25 x 25	3.1
8-19 Oct 2012	Bird survey	All birds	49	10	1	8.2	50 x 50	12.3
	Herpetofauna search	All reptiles	49	10	1	8.2	50 x 50	12.3
	Bird utilisation survey	All birds	17	30	1 or 2	8.5	100 x 100	17.0
	Extended herpetofauna search	All reptiles	7	30	1 or 2	3.5	50 x 50	1.8
	Stagwatching /evening listening	All nocturnal fauna with focus on threatened species	10	20	2	6.7	n/a	n/a

Biodiversity Assessment Addendum
Liverpool Range Wind Farm and Transmission Line Project

Date	Method	Target species	No. Surveys	Time (mins) / survey Effort - Time	No. People	Total (hrs)	Area covered (m) Effort - Area	Known total (ha)
	Spotlighting - on foot	All nocturnal fauna with focus on threatened species	10	60	2	20.0	n/a	n/a
	Spotlighting - vehicle	All nocturnal fauna with focus on threatened species	8	30	2	8.0	n/a	n/a
	Call playback	Squirrel Glider, Powerful Owl, Masked Owl, Barking Owl	8	30	1	4.0	n/a	n/a
	Anabat	Insectivorous bats	12	480		96.0	n/a	n/a
Sub-total			219			179.3		46.3
1-8 Oct 2013	Habitat assessment and hollow-bearing tree survey	All vertebrate fauna	86	20	1	28.7	25 x 25	5.4
	Bird survey	All birds	86	10	1	14.3	50 x 50	21.5
	Herpetofauna search	All reptiles	86	10	1	14.3	50 x 50	21.5
	Bird utilisation survey	All birds	39	30	1 or 2	19.5	100 x 100	39.0
	Extended herpetofauna search	All reptiles	21	30	1 or 2	10.5	50 x 50	5.3
	Stagwatching /evening listening	All nocturnal fauna with focus on threatened species	11	20	2	7.3	n/a	n/a
	Spotlighting - on foot	All nocturnal fauna with focus on threatened species	11	60	2	22.0	n/a	n/a
	Spotlighting - vehicle	All nocturnal fauna with focus on threatened species	9	30	2	9.0	n/a	n/a
	Call playback	Squirrel Glider, Powerful Owl, Masked Owl, Barking Owl	11	30	2	11.0	n/a	n/a
	Anabat	Insectivorous bats	19	480		152.0	n/a	n/a
	IR camera	All nocturnal fauna with focus on threatened species	67	480		536.0	n/a	n/a
Sub-total			446			824.7		92.6

Biodiversity Assessment Addendum
Liverpool Range Wind Farm and Transmission Line Project

Date	Method	Target species	No. Surveys	Time (mins) / survey Effort - Time	No. People	Total (hrs)	Area covered (m) Effort Area	Known total (ha)
20-23 Mar 2015	Habitat assessment and hollow-bearing tree survey	All vertebrate fauna	11	20	1	3.7	20 x 20	0.4
	Bird utilisation survey	All birds	4	20	1	1.3	50 x 50	1.0
	Spotlighting - on foot	All nocturnal fauna with focus on threatened species	3			3.0	n/a	n/a
	Call playback	Squirrel Glider, Powerful Owl, Masked Owl, Barking Owl	2	45	1	1.5	n/a	n/a
	Anabat	Insectivorous bats	8	480		64.0	n/a	n/a
Sub-total			28			73.5		1.4
4 - 6 October 2016	Habitat assessment and hollow-bearing tree survey		n/a				30000 x 50	150.0
Subtotal								
TOTAL - fauna transmission line study area	Habitat assessment and hollow-bearing tree survey		146			48.7		8.9
	Bird survey		135			22.5		33.8
	Herpetofauna search		135			22.5		33.8
	Bird utilisation survey		60			29.3		57.0
	Extended herpetofauna search		28			14.0		7.0
	Stagwatching /evening listening		21			14.0		0.0
	Spotlighting - on foot		24			45.0		0.0
	Spotlighting - vehicle		17			17.0		0.0
	Call playback		21			16.5		0.0
	Anabat		39			312.0		0.0
	IR camera		67			536.0		0.0
	All surveys combined		693			1077.5		140.4

Date	Method	Target species	No. Surveys	Time (mins) / survey Effort - Time	No. People	Total (hrs)	Area covered (m) Effort Area	Known total (ha)
Fauna - Wind Farm Study Area								
8-19 Oct 2012, 1-8 Oct 2013 (combined)	Habitat assessment and hollow-bearing tree survey	All vertebrate fauna	84	20	1	28.0	50 x 50	21.0
	Bird survey	All birds	85	10	1	14.2	50 x 50	21.3
	Herpetofauna search	All reptiles	79	10	1	13.2	50 x 50	19.8
	Bird utilisation survey	All birds	24	30	1	12.0	100 x 100	24.0
	Extended herpetofauna search	All reptiles	11	30	1	5.5	50 x 50	2.8
	Stagwatching /evening listening	All nocturnal fauna with focus on threatened species	15	20	2	10.0	n/a	n/a
	Spotlighting - on foot	All nocturnal fauna with focus on threatened species	15	60	2	30.0	n/a	n/a
	Spotlighting - vehicle	All nocturnal fauna with focus on threatened species	13	30	2	13.0	n/a	n/a
	Call playback	Squirrel Glider, Powerful Owl, Masked Owl, Barking Owl	13	30	1	6.5	n/a	n/a
	Anabat	Insectivorous bats	18	480	1	144.0	n/a	n/a
Subtotal			357			276.3		88.8
4 - 6 October 2016	Habitat assessment and hollow-bearing tree survey		n/a				20000*50	100.0
Subtotal								100.0
TOTAL - fauna wind farm study area	Habitat assessment and hollow-bearing tree survey		84			28.0		121.0
	Bird survey		85			14.2		21.3
	Herpetofauna search		79			13.2		19.8
	Bird utilisation survey		24			12.0		24.0
	Extended herpetofauna search		11			5.5		2.8

Date	Method	Target species	No. Surveys	Time (mins) / survey Effort - Time	No. People	Total (hrs)	Area covered (m) Effort - Area	Known total (ha)
	<i>Stagwatching /evening listening</i>		15			10.0		
	<i>Spotlighting - on foot</i>		15			30.0		
	<i>Spotlighting - vehicle</i>		13			13.0		
	<i>Call playback</i>		13			6.5		
	<i>Anabat</i>		18			144.0		
	<i>All surveys combined</i>		357			276.3		188.8
Fauna - Liverpool Plains Wind Farm TLSA and WFSa combined								
	<i>Habitat assessment and hollow-bearing tree survey</i>		230			76.7		129.9
	<i>Bird survey</i>		220			36.7		55.0
	<i>Herpetofauna search</i>		214			35.7		53.5
	<i>Bird utilisation survey</i>		84			41.3		81.0
	<i>Extended herpetofauna search</i>		39			19.5		9.8
	<i>Stagwatching /evening listening</i>		36			24.0		
	<i>Spotlighting - on foot</i>		39			75.0		
	<i>Spotlighting - vehicle</i>		30			30.0		
	<i>Call playback</i>		34			23.0		
	<i>Anabat</i>		57			456.0		
	<i>IR camera</i>		67			536.0		
	<i>All surveys combined</i>		1050			1353.8		329.1

B.2 SURVEY RESULTS (ADDITIONAL SURVEYS)

B.2.1 2015 Surveys

Flora

Species Name	Common Name	Family Name
Trees		
<i>Acacia floribunda</i>	White Sally Wattle	Fabaceae
<i>Acacia linearifolia</i>		Fabaceae
<i>Brachychiton populneus</i>	Kurrajong	Malvaceae
<i>Callitris endlicheri</i>	Black Cypress Pine	Cupressaceae
<i>E albens x moluccana</i>	White box x Grey Box	Myrtaceae
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	Myrtaceae
<i>Eucalyptus fibrosa</i>	Red Ironbark	Myrtaceae
<i>Eucalyptus macrorhyncha</i>	Red Gum	Myrtaceae
<i>Eucalyptus mannifera</i>	Brittle Gum	Myrtaceae
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Myrtaceae
<i>Eucalyptus melliodora</i>	Yellow Box	Myrtaceae
<i>Eucalyptus bridgesiana</i>	Apple Box	Myrtaceae
Shrubs		
<i>Acacia buxifolia</i>		Fabaceae
<i>Acacia implexa</i>	Hickory Wattle	Fabaceae
<i>Acacia linearifolia</i>	Narrow-leaved Wattle	Fabaceae
<i>Acacia sp</i>		Fabaceae
<i>Allocasuarina diminuta</i>		Casuarinaceae
<i>Amyema pendula</i>		Loranthaceae
<i>Cassinia arcuata</i>	Sifton Bush	Asteraceae
<i>Astroloma humifusum</i>	Native Cranberry	Ericaceae
<i>Calytrix tetragona</i>	Common Fringe Myrtle	Myrtaceae
<i>Cassinia aculeata</i>	Dogwood	Asteraceae
<i>Hibbertia obtusifolia</i>	Hoary Guinea-flower	Dilleniaceae
<i>Indigofera australis</i>	Austral Indigo	Fabaceae
<i>Melichrus erubescens</i>	Ruby Urn Heath	Ericaceae
<i>Melichrus urceolatus</i>	Urn Heath	Ericaceae
Forbs		
<i>Ajuga australis</i>	Austral Bugle	Lamiaceae
<i>Bidens pilosa</i>	Cobbler's Pegs	Asteraceae
<i>Chrysocephalum apiculatum</i>	Yellow Buttons	Asteraceae
<i>Calotis cuneifolia</i>	Purple Burr-daisy	Asteraceae
<i>Calotis lappulacea</i>	Yellow Burr Daisy	Asteraceae
<i>Chamaesyce sp</i>		Euphorbiaceae
<i>Chenopodium pumilio</i>	Small Crumbweed	Chenopodiaceae
<i>Commelina cyanea</i>		Commelinaceae
<i>Desmodium varians</i>	Slender Tick-trefoil	Fabaceae
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae
<i>Dichopogon fimbriatus</i>	Nodding Chocolate Lily	Anthericaceae
<i>Einadia hastata</i>	Berry Saltbush	Chenopodiaceae
<i>Galium sp</i>		Rubiaceae
<i>Geranium solanderi</i>	Native Geranium	Geraniaceae
<i>Glycine tabacina</i>		Fabaceae
<i>Glycine clandestina</i>		Fabaceae
<i>Gonocarpus tetragynus</i>		Haloragaceae

Species Name	Common Name	Family Name
<i>Goodenia hederacea</i>	Forest Goodenia	Goodeniaceae
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Apiaceae
<i>Hypericum gramineum</i>	Small St. John's Wort	Clusiaceae
<i>Lagenophora stipitata</i>	Blue Bottle-daisy	Asteraceae
<i>Oxalis sp</i>		Oxalidaceae
<i>Phyllanthus hirtellus</i>	Thyme Spurge	Phyllanthaceae
<i>Plantago varia</i>		Plantaginaceae
<i>Pomax umbellata</i>		Rubiaceae
<i>Santalum sp</i>		Santalaceae
<i>Senecio sp</i>		Asteraceae
<i>Sida corrugata</i>	Corrugated Sida	Malvaceae
<i>Solanum prinophyllum</i>	Forest Nightshade	Solanaceae
<i>Swainsona reticulata</i>	Kneed Swainson-pea	Fabaceae
<i>Vittadinia muelleri</i>		Asteraceae
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	Campanulaceae
<i>Xerochrysum viscosum</i>	Sticky Everlasting	Asteraceae
Grasses		
<i>Aristida ramosa</i>	Purple Wiregrass	Poaceae
<i>Arundinella nepalensis</i>	Reedgrass	Poaceae
<i>Austrostipa verticillata</i>	Slender Bamboo Grass	Poaceae
<i>Chloris truncata</i>	Windmill Grass	Poaceae
<i>Cymbopogon refractus</i>	Barbed Wire Grass	Poaceae
<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	Poaceae
<i>Echinopogon ovatus</i>	Forest Hedgehog Grass	Poaceae
<i>Entolasia stricta</i>	Wiry Panic	Poaceae
<i>Eragrostis leptostachya</i>	Paddock Lovegrass	Poaceae
<i>Microlaena stipoides</i>	Weeping grass	Poaceae
<i>Panicum effusum</i>	Hairy Panic	Poaceae
<i>Rytidosperma sp</i>	Wallaby Grass	Poaceae
<i>Sporobolus creber</i>	Western Rat-tail Grass	Poaceae
<i>Themeda triandra</i>	Kangaroo Grass	Poaceae
Graminoids		
<i>Carex sp</i>		Cyperaceae
<i>Gahnia sp</i>	Saw-sedges	Cyperaceae
<i>Juncus sp.</i>		Juncaceae
<i>Lepidosperma laterale</i>		Cyperaceae
<i>Lomandra filiformis</i>	Wattle Mat-rush	Lomandraceae
<i>Macrozamia secunda</i>		Zamiaceae
<i>Lomandra longifolia</i>	spiny-headed mat-rush	Lomandraceae
Ferns		
<i>Cheilanthes sieberi</i>		Pteridaceae
Exotic		
* <i>Hypochoeris radicata</i>	Cat's Ear	Asteraceae
<i>Lepidium sp</i>		Brassicaceae
* <i>Opuntia sp</i>	Prickly Pear	Cactaceae
* <i>Solanum sp.</i>	Nightshade	Solanaceae
<i>Tagetes minuta</i>	Stinking Roger	Asteraceae

Fauna

Scientific Name	Species Name	Status
Amphibians		
<i>Litoria latopalmata</i>	Broad-palmed frog	
<i>Platyplectrum ornatum</i>	Ornate Burrowing Frog	
Aves		
<i>Cracticus tibicen</i>	Australian Magpie	
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	
<i>Corvus coronoides</i>	Australian Raven	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	
<i>Coturnix ypsilophora</i>	Brown Quail	
<i>Acanthiza pusilla</i>	Brown Thornbill	
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	
<i>Stagonopleura guttata</i>	Diamond Firetail	V TSC
<i>Taeniopygia bichenovii</i>	Double Barred Finch	
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V TSC
<i>Platycercus eximius</i>	Eastern Rosella	
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	
<i>Eopsaltria australis</i>	Eastern Yellow Robin	
<i>Eolophus roseicapillus</i>	Galah	
<i>Rhipidura albiscapa</i>	Grey Fantail	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	
<i>Microeca fascians</i>	Jacky Winter	
<i>Alisterus scapularis</i>	King Parrot	
<i>Dicaeum hirundinaceum</i>	Mistletoebird	
<i>Falco cenchroides</i>	Nankeen Kestrel	
<i>Philemon corniculatus</i>	Noisy Friarbird	
<i>Manorina melanocephala</i>	Noisy Miner	
<i>Cracticus nigrogularis</i>	Pied Butcherbird	
<i>Strepera graculina</i>	Pied Currawong	
<i>Neochmia temporalis</i>	Red Browed Finch	
<i>Myiagra inquieta</i>	Restless Flycatcher	
<i>Pachycephala rufiventris</i>	Rufous Whistler	
<i>Todiramphus sanctus</i>	Sacred Kingfisher	
<i>Chthonicola sagittata</i>	Speckled Warbler	V TSC
<i>Pardalotus punctatus</i>	Spotted Pardalote	
<i>Pardalotus striatus</i>	Striated Pardalote	
<i>Acanthiza lineata</i>	Striated Thornbill	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	
<i>Petrochelidon nigricans</i>	Tree Martin	
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V TSC
<i>Aquila audax</i>	Wedge-tailed Eagle	
<i>Smicrornis brevirostris</i>	Weebill	
<i>Lichenostomus penicillatus</i>	White Plumed Honeyeater	
<i>Gerygone albogularis</i>	White Throated Gerygone	
<i>Cormobates leucophaea</i>	White Throated Treecreeper	
<i>Lichenostomus leucotis</i>	White-eared Honeyeater	
<i>Rhipidura leucophrys</i>	Willie Wagtail	
<i>Acanthiza chrysorrhoa</i>	Yellow Rumped Thornbill	
<i>Acanthiza nana</i>	Yellow Thornbill	
<i>Lichenostomus chrysop</i>	Yellow-faced Honeyeater	
Mammals		
<i>Trichosurus vulpecula</i>	Brushtail Possum	
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	

Scientific Name	Species Name	Status
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	
<i>Oryctolagus cuniculus</i>	European Rabbit	
<i>Vulpes vulpes</i>	Fox	
<i>Sus scrofa</i>	Pig	
<i>Macropus rufofriseus</i>	Red-necked Wallaby	
<i>Petaurus breviceps</i>	Sugar Glider	
<i>Austronomus australis</i>	White-striped Freetail Bat	
<i>Vombatus ursinus</i>	Wombat	
Reptiles		
<i>Amalosia lesuerii</i>	Lesueur's velvet gecko	
<i>Morethia boulengeri</i>	Boulenger's Snake-eyed Skink	
<i>Furina diadema</i>	Red-naped snake	
<i>Underwoodisaurus mii</i>	Thick-tailed Gecko	

B.2.2 2016 Surveys

Flora

North

Species Name	Common Name	Family Name
Trees		
<i>Angophora floribunda</i>	Rough-barked Apple	Myrtaceae
<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>	River Oak	Casuarinaceae
<i>Eucalyptus albens</i>	White Box	Myrtaceae
<i>Eucalyptus laevopinea</i>	Silver-top Stringybark	Myrtaceae
<i>Eucalyptus melliodora</i>	Yellow Box	Myrtaceae
<i>Eucalyptus nortonii</i>	Large-flowered Bundy	Myrtaceae
Shrubs		
<i>Amyema cambagei</i>	Needle-leaf Mistletoe	Loranthaceae
<i>Cassinia laevis</i>	Cough Bush	Asteraceae
<i>Callistemon sieberi</i>	River Bottlebrush	Myrtaceae
<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i>	Sticky Hopbush	Sapindaceae
<i>Korthalsella rubra</i>		Viscaceae
<i>Pimelea curviflora</i>		Thymelaeaceae
Grass		
<i>Aristida ramosa</i>	Purple Wiregrass	Poaceae
<i>Austrostipa aristiglumis</i>	Plains Grass	Poaceae
<i>Austrostipa scabra</i>	Speargrass	Poaceae
<i>Chloris truncata</i>	Winmill Chloris	Poaceae
<i>Chloris ventricosa</i>	Tall Chloris	Poaceae
<i>Poa labillardierei</i> var. <i>labillardierei</i>	Tussock	Poaceae
Forbs		
<i>Acaena ovina</i>	Sheep's Burr	Rosaceae
<i>Arthropodium minus</i>	Small Vanilla Lilly	Anthericaceae
<i>Asperula conferta</i>	Common Woodruff	Rubiaceae
<i>Cymbonotus lawsonianus</i>	Bear's Ear	Asteraceae
<i>Dichopogon fimbriatus</i>	Nodding Chocolate Lily	Anthericaceae
<i>Geranium solanderi</i>	Native Geranium	Geraniaceae
<i>Mentha satereioides</i>	Native Pennyroyal	Lamiaceae
<i>Oxalis</i> sp.		Oxalidaceae
<i>Rhodanthe anthemoides</i>	Chamomile Sunray	Asteraceae
<i>Rumex brownii</i>	Swamp Dock	Polygonaceae
<i>Senecio quadridentatus</i>	Cotton Fireweed	Asteraceae
<i>Sigesbeckia australiensis</i>		Asteraceae
<i>Swainsona galegifolia</i>	Smooth Darling Pea	Fabaceae (Faboideae)
<i>Triptilodiscus pygmaeus</i>	Common Sunray	Asteraceae
<i>Urtica incisa</i>	Stinging Nettle	Urticaceae
Graminoids		
<i>Lomandra filiformis</i> subsp. <i>filiformis</i>		Lomandraceae
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Lomandraceae
<i>Melaleuca sieberi</i>		Myrtaceae
Exotic Species		
Forbs		
*?Arenaria sp.		Asteraceae
*Arctotheca calendula	Capeweed	Asteraceae

Species Name	Common Name	Family Name
* <i>Cirsium vulgare</i>	Spear Thistle	Asteraceae
* <i>Echium plantagineum</i>	Patterson's Curse	Boraginaceae
* <i>Erodium cicutarium</i>	Common Crowfoot	Geraniaceae
* <i>Galium aparine</i>	Goosegrass	Rubiaceae
* <i>Hypericum perforatum</i>	St. Johns Wort	Clusiaceae
* <i>Malva parviflora</i>	Small-flowered Mallow	Malvaceae
* <i>Marrubium vulgare</i>	White Horehound	Lamiaceae)
* <i>Medicago minima</i>	Woolly Burr Medic	Fabaceae (Faboideae)
* <i>Medicago sativa</i>	Lucerne	Fabaceae (Faboideae)
* <i>Medicago sp.</i>	A Medic	Fabaceae (Faboideae)
* <i>Plantago lanceolata</i>	Lamb's Tongues	Plantaginaceae
* <i>Rumex spp.</i>	Dock	Polygonaceae
* <i>Salvia verbenaca</i>	Vervain	Lamiaceae
* <i>Silybum marianum</i>	Variegated Thistle	Asteraceae
* <i>Taraxacum officinale</i>	Dandelion	Asteraceae
* <i>Trifolium arvense</i>	Haresfoot Clover	Fabaceae (Faboideae)
* <i>Trifolium repens</i>	White Clover	Fabaceae (Faboideae)
* <i>Trifolium subterraneum</i>	Subterranean Clover	Fabaceae (Faboideae)
Vines and Twiners		
* <i>Vicia sp.</i>	Vetch	Fabaceae (Faboideae)
Grasses		
* <i>Avena spp.</i>	Oats	Poaceae
* <i>Bothriochloa sp.</i>	Redgrass, Bluegrass	Poaceae
* <i>Bromus catharticus</i>	Praire Grass	Poaceae
* <i>Bromus diandrus</i>	Great Brome	Poaceae
* <i>Bromus molliformis</i>	Soft Brome	Poaceae
* <i>Dactylis glomerata</i>	Cocksfoot	Poaceae
* <i>Hordeum leporinum</i>	A Barley Grass	Poaceae
* <i>Lolium perenne</i>	Perennial Ryegrass	Poaceae
* <i>Phalaris aquatica</i>	Phalaris	Poaceae
Shrubs		
* <i>Rosa rubiginosa</i>	Sweet Briar	Rosaceae
* <i>Rubus fruticosus sp. agg.</i>	Blackberry complex	Rosaceae

South

Species Name	Common Name	Family
Trees		
<i>Acacia implexa</i>	Hickory Wattle	Fabaceae (Mimosoideae)
<i>Acacia linearifolia</i>	Narrow-leaved Wattle	Fabaceae (Mimosoideae)
<i>Allocasuarina luehmannii</i>	Bulloak	Casuarinaceae
<i>Angophora floribunda</i>	Rough-barked Apple	Myrtaceae
<i>Callitris endlicheri</i>	Black Cypress Pine	Cupressaceae
<i>Eucalyptus albens</i>	White Box	Myrtaceae
<i>Eucalyptus albens x moluccana</i>	White Box x Grey Box hybrid	Myrtaceae
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Myrtaceae
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	Myrtaceae
<i>Eucalyptus fibrosa</i>	Red Ironbark	Myrtaceae
<i>Eucalyptus macrorhyncha</i>	Red Stringybark	Myrtaceae
<i>Eucalyptus melliodora</i>	Yellow Box	Myrtaceae
<i>Eucalyptus microcarpa</i>	Inland Grey Box	Myrtaceae
<i>Eucalyptus moluccana</i>	Grey Box	Myrtaceae
<i>Eucalyptus moluccana x albens</i>	White Box x Grey Box hybrid	Myrtaceae
<i>Eucalyptus nubila</i>	Blue-leaved Ironbark	Myrtaceae
<i>Eucalyptus punctata</i>	Grey Gum	Myrtaceae
<i>Eucalyptus rossii</i>	Inland Scribbly Gum	Myrtaceae
<i>Eucalyptus sparsifolia</i>	Narrow-leaved Stringybark	Myrtaceae
<i>Eucalyptus tereticornis</i>	Forest Red Gum	Myrtaceae
<i>Santalum lanceolatum</i>	Sandalwood	Santalaceae
Shrubs		
<i>Acacia amoena</i>	Boomerang Wattle	Fabaceae (Mimosoideae)
<i>Acacia buxifolia</i>	Box-leaved Wattle	Fabaceae (Mimosoideae)
<i>Acacia gladiiformis</i>	Sword Wattle	Fabaceae (Mimosoideae)
<i>Acacia paradoxa</i>	Kangaroo Thorn	Fabaceae (Mimosoideae)
<i>Acacia penninervis var. penninervis</i>	Mountain Hickory	Fabaceae (Mimosoideae)
<i>Acacia piligera</i>		Fabaceae (Mimosoideae)
<i>Acrotriche rigida</i>		Ericaceae
<i>Allocasuarina diminuta subsp. diminuta</i>		Casuarinaceae
<i>Allocasuarina gymnanthera</i>		Casuarinaceae
<i>Bossiaea buxifolia</i>		Fabaceae (Faboideae)
<i>Daviesia acicularis</i>		Fabaceae (Faboideae)
<i>Dodonaea viscosa</i>	Sticky Hop-bush	Sapindaceae
<i>Einadia hastata</i>	Berry Saltbush	Chenopodiaceae
<i>Einadia nutans subsp. nutans</i>	Climbing Saltbush	Chenopodiaceae
<i>Exocarpos cupressiformis</i>	Cherry Ballart	Santalaceae
<i>Goodenia pinnatifida</i>	Scrambles Eggs	Goodeniaceae
<i>Grevillea ramosissima subsp. ramosissima</i>		Proteaceae
<i>Grevillea sericea</i>	Pink Spider Flower	Proteaceae
<i>Hakea decurrens subsp. decurrens</i>		Proteaceae
<i>Hibbertia acicularis</i>		Dilleniaceae
<i>Hibbertia obtusifolia</i>	Hoary Guinea-flower	Dilleniaceae
<i>Hibbertia riparia</i>		Dilleniaceae
<i>Hovea rosmarinifolia</i>		Fabaceae (Faboideae)
<i>Hybanthus monopetalus</i>	Slender Violet-bush	Violaceae
<i>Leptospermum polygalifolium</i>		Myrtaceae
<i>Leucopogon muticus</i>	Blunt Beard-heath	Ericaceae
<i>Melichrus erubescens</i>	Ruby Urn Heath	Ericaceae
<i>Melichrus urceolatus</i>	Urn Heath	Ericaceae

<i>Olearia ?tenuifolia</i>	Thin-leaf Daisy-bush	Asteraceae
<i>Podolobium ilicifolium</i>	Prickly Shaggy Pea	Fabaceae (Faboideae)
<i>Pomax umbellata</i>	Pomax	Rubiaceae
<i>Styphelia triflora</i>	Pink Five-Corners	Ericaceae
<i>Cassinia laevis</i>		Asteraceae
<i>Persoonia linearis</i>	Narrow-leaved Geebung	Proteaceae
<i>Phyllanthus hirtellus</i>	Thyme Spurge	Phyllanthaceae
<i>Platysace linearifolia</i>		Apiaceae
<i>Prostanthera scutellarioides</i>		Lamiaceae
<i>Astroloma humifusum</i>	Native Cranberry	Ericaceae
<i>Banksia marginata</i>	Silver Banksia	Proteaceae
<i>Bossiaea obcordata</i>	Spiny Bossiaea	Fabaceae (Faboideae)
<i>Brachyloma daphnoides</i>	Daphne Heath	Ericaceae
<i>Bursaria spinosa</i>	Native Blackthorn	Pittosporaceae
<i>Calytrix tetragona</i>	Common Fringe-myrtle	Myrtaceae
<i>Indigofera adesmiifolia</i>	Tick Indigo	Fabaceae (Faboideae)
<i>Indigofera australis</i>	Australian Indigo	Fabaceae (Faboideae)
<i>Cassinia arcuata</i>	Sifton Bush	Asteraceae
Forbs		
<i>Acaena echinata</i>	Sheep's Burr	Rosaceae
<i>Ajuga australis</i>	Austral Bugle	Lamiaceae
<i>Arthropodium sp.</i>		Anthericaceae
<i>Calotis cuneifolia</i>	Purple Burr-daisy	Asteraceae
<i>Calotis cuneifolia</i>	Purple Burr-daisy	Asteraceae
<i>Calotis lappulacea</i>	Yellow Burr-daisy	Asteraceae
<i>Dampiera lanceolata</i>	Grooved Dampiera	Goodeniaceae
<i>Desmodium brachypodium</i>	Large Tick-trefoil	Fabaceae (Faboideae)
<i>Dianella revoluta var. revoluta</i>	Blueberry Lily	Phormiaceae
<i>Dichondra repens</i>	Kidney Weed	Convolvulaceae
<i>Drosera peltata</i>		Droseraceae
<i>Gahnia aspera</i>	Rough Saw-sedge	Cyperaceae
<i>Geranium solanderi</i>	Native Geranium	Geraniaceae
<i>Gonocarpus elatus</i>	A Raspwort	Haloragaceae
<i>Gonocarpus tetragynus</i>	Poverty Raspwort	Haloragaceae
<i>Goodenia hederacea</i>	Ivy Goodenia	Goodeniaceae
<i>Haloragis heterophylla</i>	Variable Raspwort	Haloragaceae
<i>Laxmannia gracilis</i>	Slender Wire Lily	Anthericaceae
<i>Lepidosperma latens</i>		Cyperaceae
<i>Lomandra filiformis subsp. coriacea</i>		Lomandraceae
<i>Lomandra filiformis subsp. filiformis</i>		Lomandraceae
<i>Lomandra leucocephala</i>	Woolly Mat-rush	Lomandraceae
<i>Lomandra multiflora subsp. multiflora</i>	Many-flowered Mat-rush	Lomandraceae
<i>Plantago debilis</i>	Shade Plantain	Plantaginaceae
<i>Poranthera microphylla</i>	Small Poranthera	Phyllanthaceae
<i>Ranunculus sessiliflorus</i>	Small-flowered Buttercup	Ranunculaceae
<i>Scutellaria humilis</i>	Dwarf Skullcap	Lamiaceae
<i>Senecio quadridentatus</i>	Cotton Fireweed	Asteraceae
<i>Sida corrugata</i>	Corrugated Sida	Malvaceae
<i>Stackhousia monogyne</i>	Creamy Candles	Stackhousiaceae
<i>Stackhousia viminea</i>	Slender Stackhousia	Stackhousiaceae
<i>Stellaria pungens</i>	Prickly Starwort	Caryophyllaceae
<i>Stypantra glauca</i>	Nodding Blue Lily	Phormiaceae
<i>Swainsona reticulata</i>	Kneed Swainson-pea	Fabaceae (Faboideae)
<i>Thysanotus patersonii</i>	Twining Fringe Lily	Anthericaceae
<i>Triptilodiscus pygmaeus</i>	Common Sunray	Asteraceae
<i>Vittadinia sp.</i>	Fuzzweed	Asteraceae

<i>Wahlenbergia communis</i>	Bluebell	Campanulaceae
<i>Wahlenbergia gracilentia</i>	Annual Bluebell	Campanulaceae
<i>Whalenbergia stricta</i>	a Bluebell	Campanulaceae
<i>Wurmbea biglandulosa</i>		Colchicaceae
<i>Chrysocephalum semipapposum</i>		Asteraceae
<i>Galium leptogonium</i>		Rubiaceae
<i>Glossodia major</i>		Orchidaceae
<i>Macrozamia sp.</i>		Zamiaceae
<i>Oncinocalyx betchei</i>		Lamiaceae
<i>Opercularia diphylla</i>		Rubiaceae
<i>Oxalis radicata</i>		Oxalidaceae
<i>Oxalis sp.</i>		Oxalidaceae
<i>Patersonia sericea</i>		Iridaceae
<i>Rumex brownii</i>	Swamp Dock	Polygonaceae
<i>Stuartina meulleri</i>		Asteraceae
<i>Asperula conferta</i>	Common Woodruff	Rubiaceae
<i>Bulbine bulbosa</i>		Asphodelaceae
<i>Bulbine semibarbata</i>		Asphodelaceae
<i>Cotula australis</i>	Carrot Weed	Asteraceae
<i>Crassula sieberiana</i>	Australian Stonecrop	Crassulaceae
<i>Cymbonotus lawsonianus</i>	Bear's Ear	Asteraceae
<i>Daucus glochidiatus</i>	Native Carrot	Apiaceae
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Apiaceae
<i>Pimelea linifolia subsp. linifolia</i>	Slender Rice-flower	Thymelaeaceae
<i>Veronica plebeia</i>	Trailing Speedwell	Plantaginaceae
<i>Xerochrysum bracteatum</i>	Golden Everlasting	Asteraceae
Ferns		
<i>Asplenium flabellifolium</i>	Necklace Fern	Aspleniaceae
<i>Cheilanthes austrotenuifolia</i>	Rock Fern	Adiantaceae
<i>Cheilanthes sieberi</i>	Rock Fern	Adiantaceae
Grasses		
<i>Aristida ramosa</i>	Purple Wiregrass	Poaceae
<i>Aristida vagans</i>	Threeawn Speargrass	Poaceae
<i>Arundinella nepalensis</i>	Reedgrass	Poaceae
<i>Cymbopogon refractus</i>	Barbed Wire Grass	Poaceae
<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	Poaceae
<i>Microlaena stipoides var. stipoides</i>	Weeping Grass	Poaceae
<i>Phragmites australis</i>	Common Reed	Poaceae
<i>Rytidoperma pallidum</i>	Silvertop Wallaby Grass	Poaceae
<i>Rytidoperma sp.</i>		Poaceae
<i>Themeda australis</i>	Kangaroo Grass	Poaceae
Orchids		
<i>Pterostylis concinna</i>	Trim Greenhood	Orchidaceae
<i>Caladenia ?cucullata</i>	Hooded Caladenia	Orchidaceae
<i>Caladenia carnea</i>	Pink Fingers	Orchidaceae
<i>Calochilus robertsonii</i>	Purplish Beard Orchid	Orchidaceae
<i>Diuris goonooensis</i>	Western Donkey Orchid	Orchidaceae
<i>Carex inversa</i>	Knob Sedge	Cyperaceae
Graminoids		
<i>Hardenbergia violacea</i>	False Sarsaparilla	Fabaceae (Faboideae)
<i>Convolvulus erubescens</i>	Pink Bindweed	Convolvulaceae
<i>Eleocharis sphacelata</i>	Tall Spike Rush	Cyperaceae
<i>Schoenus apogon</i>	Common Bog-rush	Cyperaceae
<i>Typha orientalis</i>	Broadleaf Cumbungi	Typhaceae
<i>Xanthorrhoea sp.</i>	Grass tree	Xanthorrhoeaceae
Exotic		

<i>*Acetosella vulgaris</i>	Sheep Sorrel	Polygonaceae
<i>*Anagallis arvensis</i>	Scarlet Pimpernel	Myrsinaceae
<i>*Cirsium vulgare</i>	Spear Thistle	Asteraceae
<i>*Echium plantagineum</i>	Patterson's Curse	Boraginaceae
<i>*Hypericum perforatum</i>	St. Johns Wort	Clusiaceae
<i>*Hypochaeris glabra</i>	Smooth Catsear	Asteraceae
<i>*Hypochaeris radicata</i>	Catsear	Asteraceae
<i>*Petrorhagia spp.</i>		Caryophyllaceae
<i>*Senecio spp.</i>	Groundsel, Fireweed	Asteraceae
<i>*Silybum marianum</i>	Varigated Thistle	Asteraceae
<i>*Solanum spp.</i>		Solanaceae
<i>*Stellaria media</i>	Common Chickweed	Caryophyllaceae
<i>*Trifolium arvense</i>	Haresfoot Clover	Fabaceae (Faboideae)
<i>*Viola betonicifolia</i>	Showy Violet	Violaceae
Shrubs		
<i>*Opuntia stricta</i>	Common Prickly Pear, Smooth Pest Pear	Cactaceae
Grasses		
<i>*Aira sp.</i>	A Hairgrass	Poaceae
<i>*Lolium sp.</i>	A Ryegrass	Poaceae
<i>*Vulpia sp.</i>	Rat's-tail Fescue	Poaceae

Fauna

Scientific Name	Common Name	
Aves		
<i>Acanthiza chrysorrhoa</i>	Yellow Thornbill	
<i>Alisterus scapularis</i>	King Parrot	
<i>Aprosmictus erythropterus</i>	Red-winged parrot	
<i>Aquila audax</i>	Wedge-tailed Eagle	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	
<i>Calyptorhynchus funereus</i>	Yellow Tailed black cockatoo	
<i>Ceyx azurus</i>	Azure Kingfisher	
<i>Chalcites basalis</i>	Horsefields Cuckoo	
<i>Chenonetta jubata</i>	Australian Wood Duck	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	
<i>Coracina novaehollandiae</i>	Black-faced cuckooshrike	
<i>Corcorax melanorhamphos</i>	White winged Chough	
<i>Cormobates leucophaea</i>	White-throated Treecreeper	
<i>Corvus coronoides</i>	Australian Raven	
<i>Cracticus nigrogularis</i>	Pied Butcherbird	
<i>Cracticus tibicen</i>	Australian Magpie	
<i>Cracticus-tibicen</i>	Magpie	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	
<i>Dicaeum-hirundinaceum</i>	Mistletoebird	
<i>Egretta novaehollandiae</i>	White faced Heron	
<i>Elanus axillaris</i>	Black Shouldered Kite	
<i>Eolophus roseicapillus</i>	Galah	
<i>Eopsaltria australis</i>	Eastern Yellow Robin	
<i>Glossopsitta concinna</i>	Musk lorikeet	
<i>Grallina cyanoleuca</i>	Magpie- lark	
<i>Hirundo neoxena</i>	Welcome Swallows	
<i>Malurus cyaneus</i>	Fairy Wren	
<i>Malurus cyaneus</i>	Superb Fairy Wren	
<i>Manorina melanocephala</i>	Noisy Minor	

<i>Merops ornatus</i>	Rainbow Bee-eater	
<i>Pachycephala rufiventris</i>	Rufous Whistler	
<i>Philemon corniculatus</i>	Friarbird	
<i>Platycercus elegans</i>	Crimson Rosella	
<i>Platycercus eximius</i>	Eastern Rosella	
<i>Pomatostomus-temporalis</i>	Grey crowned babbler	V TSC
<i>Rhipidura albiscapa</i>	Grey fantail	
<i>Rhipidura-leucophrys</i>	Willie Wagtail	
<i>Strepera-graculina</i>	Pied currawong	
<i>Sturnus vulgaris</i>	Common Starling	
Mammals		
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	
<i>Macropus robustus</i>	Common Wallaroo	
<i>Sus scrofa</i>	Feral Pig	
<i>Oryctolagus cuniculus</i>	European Rabbit	
Reptiles		
<i>Pseudonaja textilis</i>	Eastern Brown Snake	

APPENDIX C ASSESSMENTS OF SIGNIFICANCE

Additional Assessments of Significance (AoS) have been prepared for the following threatened species:

- Regent Honeyeater (Critically Endangered TSC Act, Critically Endangered EPBC Act)
- Dusky Woodswallow (Vulnerable TSC Act)
- Koala (Vulnerable TSC Act, Vulnerable EPBC Act)
- Eastern Pygmy-possum (Vulnerable TSC Act)

The original AoS were revised for the following species:

- Large-eared Pied Bat (Vulnerable TSC Act, Vulnerable EPBC Act)
- Square-tailed Kite (Vulnerable TSC Act)
- Yellow-bellied Shearwater (Vulnerable TSC Act)

C.1 TSC ACT ASSESSMENTS

Section 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) specifies seven factors to be taken into account in deciding whether a development is likely to significantly affect threatened species, populations or ecological communities, or their habitats, listed at the state level under the *Threatened Species Conservation Act 1995* (TSC Act).

Regent Honeyeater

Although the Regent Honeyeater is known from the region, including Coolah Tops National Park and Goulburn river National Park (NPWS 2002), most records are from vegetation communities not present in the WFSAs such as box-ironbark and from wetter, fertile sites within such communities (Franklin et al. 1999). The Project Area does not support known core or good quality habitat for this species, as indicated by the habitat assessments undertaken on site and the lack of records known for the project area.

The turbines themselves would be located on the tops of ridges, which have been historically cleared (more so than the slopes and gullies). Clearing works for woodland birds has been modelled at:

- 75.9 ha of native grassland EEC
- 19 ha of moderate of better quality woodland

The microhabitat requirements that were considered for Regent Honeyeaters during habitat assessments were:

- Mature trees
- Mistletoe abundance

Information about other microhabitat requirements has become available since the surveys were undertaken. Information that can be gleaned from the original assessment includes:

- Vegetation coverage (using aerial imagery and BioBanking methodology)
- Elevation
- 'Rich-patches'

Vegetation condition assessments utilised BioBanking methodology which focuses on understorey species diversity rather than overstorey diversity; information about patches where tree diversity is high (greater than four species) cannot be obtained from NGH Environmental (2013a, 2013b).

The good quality forests in the southern half of the TLSA are Sandstone Forest and are located on sandstone soils of low fertility.

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.

Foraging

The Regent Honeyeater is a nomadic/migratory species that follows food availability across its range. The Recovery Plan (DoE 2016) lists key feed species including Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), and Needle-leaf Mistletoe (*Amyema cambagei*). These species occur throughout the Project Area in a number of vegetation communities:

- Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region (ID483)
- River Oak – Rough-barked Apple – red gum – box riparian tall woodland (ID084)
- Rough-barked Apple – Blakely’s Red Gum – Yellow Box woodland on alluvial clay to loam soils on valleys floors in the northern South-west Slopes and BBS Bioregions (ID281)
- Silvertop Stringybark - Yellow Box – Norton’s Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range (ID488)
- Yellow Box grassy woodland on lower hillslopes and valley flats in the southern Brigalow Belt South bioregion (ID437).

However, presence of suitable vegetation communities alone is insufficient to predict occurrence of Regent Honeyeaters. Scientific understanding of the habitat requirements and preferences of Regent Honeyeater are increasing. Regent Honeyeater habitat assessments have found that (DoE 2016, Roderick et al. 2014, Roderick & Ingerwsen 2014):

- The species is a “rich patch specialist” > dependent on high-yielding habitats on fertile soils
- The species requires areas with a high level of tree diversity (four or more tree species)
- The probability of presence is driven by vegetation *coverage*, followed by elevation and humidity/soil moisture

Regent Honeyeater was placed into the ‘woodland birds’ suite for the purposes of habitat mapping. This includes areas of moderate or better quality habitat. Mistletoe occurrence is shown at points where habitat assessments were undertaken (was not extrapolated across whole site as for other features). It is clear from the map that areas of moderate to good quality treed habitat, on low lying fertile sites with mistletoe are rare in the LRWP project area, Appendix A Map set A.7. The majority of habitat on site does not meet the specific foraging habitat requirements for the Regent Honeyeater.

Breeding

Regent Honeyeaters generally breed between early spring and mid-summer. Breeding is linked to patterns of flowering in key feed species (Franklin *et al.* 1988, DoE 2016). The species is not monogamous (Bird Life Australia 2016). There are four known key breeding regions for the Regent Honeyeater: north-east Victoria (Chiltern-Albury), Capertee Valley, Bundarra-Barraba region and Hunter Valley (DoE 2016, Roderick *et al.* 2013). Other breeding sites used intermittently include the

Australian Capital Territory, Munghorn Gap Nature Reserve and Mudgee-Wollar (DoE 2016, Roderick *et al.* 2013). The Mudgee-Wollar Important Bird and Biodiversity Area (IBA) is located approximately 15 km south of the TLSA and was dedicated in part due to regular use by Regent Honeyeaters. Regent Honeyeaters are certainly present in the region although there are few records nearby the proposed LRWF project area and they were not recorded in any of the surveys conducted for the project to date. The closest BioNet records to the WFSA are north-east of the wind farm within Coolah Tops National Park. BioNet records also exist south and east of the southern portion of the TLSA near the Goulburn River National Park.

Based on little specific foraging habitat for Regent Honeyeaters and no breeding habitat in the LRWF, the effect of habitat clearing for the proposal is unlikely to place a local population of the species at risk of extinction. (Please note that collision impacts to migrating Regent Honeyeaters is assessed in a Collision Risk Assessment (CRA) in Appendix D).

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.

Not applicable

In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

In relation to the habitat of a threatened species, population or ecological community:

- a) **the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- b) **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**
- c) **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.**

- a) Habitat for 'woodland birds' would be affected to the extent given in Table 5.8:
 - o 75.9 ha of native grassland EEC
 - o 19 ha of moderate of better quality woodland

In terms of the pattern of clearing, clearing for the wind farm area is relatively discrete; small patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25-60 m wide lineal cleared corridor and this is the most likely aspect of the proposal to cause habitat fragmentation. Regent Honeyeaters move through areas by hopping between rich patches of forest habitat, using vegetation corridors such as drainage lines and watercourses where available (DoE 2016).

The TL proposal crosses a number of riparian corridors at the far southern end just north of the Ulan Colliery. The transmission line in this part runs north-south and needs to enter the Ulan Colliery in order to utilise the existing electrical infrastructure there. The intersecting riparian corridors run mostly east-west and therefore avoiding the riparian areas is not

possible (refer to Appendix A Map set A.7) however, no moderate or better quality riparian habitat would not be directly impacted. Habitat surrounding the riparian zones in this area is mostly woodland and open forest, and is not considered of moderate or better quality. Although some riparian corridors would require disturbance, many more in the locality would not be affected (refer to aerial imagery in Maps). On this basis, and as the habitat is not considered of high importance to the Regent Honeyeater, it is considered that the proposal would not cause fragmentation or isolation of Regent Honeyeater habitat or corridors.

- a) The habitat to be removed is considered to be of moderate importance to Regent Honeyeaters on the basis of the critically endangered status of the species, that there is a secondary breeding area in the region (Mudgee-Wollar IBA is around 15 km from the LRWF area - DoE 2016, Roderick *et al.* 2013), and that the migratory species may move through vegetation in the LRWF project area when accessing suitable foraging and breeding habitat elsewhere in the region. Relatively little is known about their movement patterns.

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

There are no relevant critical habitat declarations for the Regent Honeyeater. The Recovery Plan for the species lists critical habitat as: any breeding or foraging areas where the species is likely to occur, and any newly discovered breeding or foraging locations. Breeding habitat is not likely to occur in the LRWF project area. Dispersal patterns are poorly known (Roderick *et al.* 2013), and key habitat sites change from year to year (DoE 2016). Foraging habitat, albeit marginal, is likely to occur, and the species is likely to pass through the area from time to time. The habitat is therefore considered critical foraging habitat. Areas of clearing, particularly around the transmission line, would be subject to an adverse impact. Conversely, areas of critical foraging habitat would also occur in the offsetting areas. Conserving habitat on private land is an objective of the Recovery Plan, and this LRWF project would help to achieve this in its commitment to offset the clearing impacts of the project in accordance with the FBA.

Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

The LRWF project would contribute to the objectives and actions of the *National Recovery Plan*, in particular Strategy 1 and Strategy 3. Strategy 1 of the *National Recovery Plan* (DoE 2016) is to improve the extent and quality of habitat for the species, including protection of critical habitat (1c) and rehabilitation of degraded habitat and corridors (1d, 1e). The proposal would assist these objectives of the *Recovery Plan* through the Offset Plan. The LRWF project would also indirectly contribute to Strategy 3 of the *Recovery Plan*; to increase understanding of population trends of the species. The LRWF project includes a commitment to a Bird and Bat Management Plan (BBMP) during the early operation phase of the wind farm. A component of this plan is bird utilisation surveys around the LRWF project area. These surveys, which would be repeated over several years, would contribute to the knowledge of birds in the local area. It would provide an opportunity for regular survey (indirectly) for Regent Honeyeaters on private land nearby to the Mudgee-Wollar IBA. All results would be submitted to the OEH BioNet database and would be available to the Regent Honeyeater Recovery Team.

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

The LRWF project consists of a several components which would reduce the effect of KTPs already acting upon the Regent Honeyeater. These components are the Offset Plan and the wind turbines, and are described below. According to the *National Recovery Plan*, key threats to the Regent Honeyeater include habitat loss and fragmentation, habitat degradation (such as weed invasion and pest animals), competition from noisy miners, and competition from introduced honeybees. Although potential foraging habitat would be removed (refer to Table 5.8 for full figures), similar or habitat would be 'gained' through offset and protected and managed in perpetuity. Existing processes of habitat

degradation would be addressed where relevant, through weed and feral animal management as part of the Offset Plan.

The LRWF project also contributes positively to the reduction of the effects of anthropogenic Climate Change (another KTP). The LRWF project is consistent with the *Priorities for Biodiversity Adaptation to Climate Change* (DECCW 2010), which acknowledges the need for mitigation of climate change impacts through reduction of greenhouse gas emissions. Wind turbines are a source of renewable energy.

Dusky Woodswallow

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.

Foraging

The Dusky Woodswallow is an aerial insectivore, sallying above the tree canopy catching insect prey, as well as perch-pouncing over leaf litter and dead timber (NSW Scientific Committee 2016). Thus, a rich and abundant insect population is important to the species for foraging. This is assumed to come about in floristically diverse forests and woodlands. Structural diversity is also important, with insect populations assumed to be reliant on dead wood and ground litter.

Breeding

Dusky Woodswallow is considered a 'woodland dependent bird', with most breeding records in woodland and dry open forest on the western slopes (NSW Scientific Committee 2016). They build a nest, often in a tree hollow or crevice (NSW Scientific Committee 2016). During breeding they mostly utilise an area of around two hectares around the nest site, although home ranges are larger (NSW Scientific Committee 2016). They are seasonal migrants, and move south in spring to breed (NSW Scientific Committee 2016). Dusky Woodswallow were recorded in LRWF project area in October. It is therefore assumed that the LRWF area provides breeding habitat for the species.

Clearing for the proposal in any one area is minimal, considering the large area over which the linear infrastructure will occur (19 ha of moderate or better quality woodland). Outside of clearing areas, the project would not affect the structural or floristic diversity of existing foraging and breeding habitat areas. The collision risk assessment for this species considers it a high risk species due to its possible likelihood of collision and moderate population consequence should ongoing collisions occur.

Specific recommendations to minimise adverse effects include: buffer high quality woodland areas, retain hollow-bearing paddock trees by micro-siting infrastructure where possible (these provide connectivity and nesting habitat), leave fallen timber in place or relocate to another area to retain habitat, control noxious and invasive weeds. These measures, in combination with the relatively low level of clearing required for the large scale infrastructure project, would ensure that the LRWF project would not place the Dusky Woodswallow at risk of extinction.

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.

Not applicable

In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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
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

In relation to the habitat of a threatened species, population or ecological community:

- a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
- b) 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
- c) 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.

- a) Habitat for 'woodland birds' would be affected to the extent given in Table 5.8:
 - a. 75.9 ha of native grassland EEC vegetation
 - b. 19 ha of moderate of better quality woodland habitat
- b) In terms of the pattern of clearing, clearing for the wind farm area is relatively discrete; small patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25-60 m wide lineal cleared corridor and this aspect of the proposal is likely to contribute to habitat fragmentation.
- c) The habitat to be affected in the LRWF project area is considered to be of moderate importance to the Dusky Woodswallow on the basis of: the western slopes (nearby the LRWF project area) being the core breeding habitat in NSW for the species (NSW Scientific Committee 2016) and that three species is assumed to breed in the LRWF project area. The majority of suitable habitat in the LRWF project area is considered of low to moderate quality, therefore the habitat is considered to be of moderate rather than high importance.

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

Critical habitat has not been officially declared for the Dusky Woodswallow.

Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

There is no Recovery Plan for the Dusky Woodswallow. Threat Abatement Plans have not been prepared for the specific threats identified for the Dusky Woodswallow (refer below). The Office of Environment and Heritage has identified no priority actions to help recover the Dusky Woodswallow in New South Wales.

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

Clearing of native vegetation, Noisy Miners and removal of dead wood and trees are listed as KTPs threatening the Dusky Woodswallow. Aspects of the LRWF project would have a positive effect on the operation of these KTPs: including offsetting to protect habitat in perpetuity. Although potential habitat would be removed (refer to Table 5.8 for full figures), similar or better quality potential habitat would be 'gained' through offsets and protected and managed in perpetuity.

Koala

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.

Foraging

Habitat for Koala centres around preferred feed tree species. The LRWF is between the Northern Tablelands and the Western Slopes and Plains koala management areas. One primary feed tree species occurs, Forest Red Gum *Eucalyptus tereticornis*. This feed tree is listed under the SEPP 44 and as a primary feed species for the Northern Tablelands koala management area. Several other secondary and supplementary feed tree species occur (refer to Table 5.8; 161.2 ha, considering all condition classes) across the range of vegetation communities in the LRWF project area. In addition to preferred feed trees, Koalas also prefer structurally diverse and nutrient rich habitat, and are more likely to be found in lower relief areas than on ridges (DECC 2008).

The primary feed tree, Forest Red Gum, occurs only in some areas of Riparian Forest – Rough-barked Apple, Blakely’s Red Gum (ID 481) that were surveyed in 2016. The tree species was not recorded in earlier vegetation surveys elsewhere in the LRWR project area. Thus, there are small pockets of secondary habitat (either class A – Phillips 2000b in DECC 2008, or class B – Callaghan in DECC 2008) capable of supporting medium to low densities of koala habitat. Elsewhere, habitat consists of secondary and supplementary habitat only, capable of supporting low koala densities (DECC 2008).

Breeding and dispersal

Significant breeding areas for Koala have been identified at Wedderburn, Pilliga, in the Brigalow Belt, Port Stephens and Dorrigo (NRMMC 2009). Koalas live in “breeding aggregations” within a large home range ranging from 5 ha to 500 ha depending on habitat quality (DECC 2008). They have a low fecundity (DECC 2008).

The habitat for Koalas at LRWF is low to moderate quality. There are recent records in the locality (within 15 years). Clearing areas for Koala habitat seem high (161.2 ha considering all condition classes), however, this is spread out over a very large project area; being linear, impacts in any one area would be low and unlikely to affect Koala dispersal. Further, no forest habitat would be directly impacted and only 19ha of the woodland is considered in moderate or better quality in terms of fauna habitat. The activities associated with the construction and operation of LRWF are unlikely to place the species at risk of extinction as the project would not affect known breeding areas, would cause small areas of clearing of low to moderate importance habitat and would not affect dispersal.

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.

Not applicable

In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

In relation to the habitat of a threatened species, population or ecological community:

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

- b) 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**
- c) 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.**

- a) Potential habitat for Koala would be affected to the extent given in 5.8:
 - o 161.2 ha of communities that contain primary or secondary feed species
 - o 19 ha of moderate or better quality woodland habitat
 - o 0 ha of forest habitat

Although not specifically targeted, 1,425 hours of fauna surveys failed to detect this species in this habitat.

- a) Clearing for the wind farm area is relatively minor in any one location; discrete patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a linear cleared corridor (25-60m wide) and this aspect of the proposal is the most likely to cause habitat fragmentation, by unlikely to restrict the dispersal ability of Koala. The latest TL route has been chosen to avoid as much riparian area as possible, and for the footprint to occupy already disturbed areas rather than go through continuous forest.
- b) The habitat to be affected in the LRWF project area is considered to be of low importance to Koalas on the basis of: few primary feed trees and that most of the secondary habitat is of low quality based on habitat components such as logs and cover. In the northern section of the LRWF (the WFS), the habitat is already quite fragmented and degraded. Better quality areas occur in Turrill SF and Durrigere SCA, although Koala is not known to occur in these protected areas (DECC 2008).

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

Critical habitat has not been officially declared for Koala.

Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

The LRWF project has potential to contribute toward Objective 2 of the Koala Recovery Plan through the LRWF Offset Plan: rehabilitate and restore Koala habitat (DECC 2008). Otherwise, the LRWF is not inconsistent with Recovery Plan objectives.

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

The LRWF project's Offset Plan and other construction environmental management plans have the potential to contribute positively toward reducing the operation of key threatening processes faced by Koalas. Offsets would secure, for perpetuity, similar habitat to that being removed, on private land. Areas under consideration are near to existing conservation reserves and would effectively extend the conserved area. Recommendations for habitat management within Offset Areas and in the LRWF include weed control and goat management, which would assist to reduce existing habitat degradation. Further, climatic extremes threaten Koalas (DECC 2008). The LRWF project contributes positively to the reduction of the effects of anthropogenic Climate Change (another KTP). The LRWF project is consistent with the *Priorities for Biodiversity Adaptation to Climate Change* (DECCW 2010), which acknowledges the need for mitigation of climate change impacts through reduction of greenhouse gas emissions. Wind turbines are a source of renewable energy.

Eastern Pygmy-possum

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.

According to BioNet, the nearest known Eastern Pygmy-possum record is about 36 kilometres to the north-west of the LRWF project. There are a few scattered records further to the south-west, in ironbark-cypress pine vegetation communities, and known populations about 45 kilometres to the south-east, near Wollemi National Park. Although none were recorded during the LRWF surveys, the species is notoriously difficult to encounter in fauna surveys (NSW Scientific Committee 2001).

Foraging and shelter

A study by Tulloch & Dickman (2006) found little evidence that the species responded to any structural components of habitat, but did find strong associations with particular genera in the Proteaceae family, including *Banksia*, *Eucalyptus* and *Xanthorrhoea*. This association has been noted previously, with Turner (1984) describing the protein benefits to the species by consumption of *Banksia* pollen. The species is thought to depend on flowering resources (nectar and pollen), supplemented with invertebrates (Huang *et al.* 1987). Habitat requirements at the western limits of the species range in NSW are poorly documented, but appear (based on data provided in historical records) to be primarily in areas with an overstorey dominated by Ironbarks and a shrubby understorey containing Tea-trees (*Leptospermum* spp.) or Guinea-flowers (*Hibbertia* spp.).

There is also some evidence to suggest that Eastern Pygmy-possums utilise open areas for foraging but use trees to avoid predation (Gresser 1996), and possibly use *Xanthorrhoea* species for shelter (Tulloch & Dickman 2006). Due to the widespread availability of these associated species, and the lack of other structural or floristic requirements of the species, they have been recorded in a variety of vegetation types, including coastal heath and scrub, moorland, low woodland, open forest, tall forest, rocky alpine vegetation, wet sclerophyll forests, and rainforest (Harris *et al.* 2008). Hollows used by the species range from 0-15 m above the ground, with entrance diameters of about 3.5 cm, with one study showing that between 6 and 9 den sites were used (Goldingay 2011).

Vegetation types in the LRWF project area that were observed to, or are known to, contain high abundances of *Xanthorrhoea* species include the Mountain Gum - Silvertop - Stringybark (ID 490) (known from near Coolah Tops National Park), and the sandstone forest communities in the southern half of the TLSA, which contained occasional patches of relatively dense *Xanthorrhoea* (thought to be *X. johnsonii*). The lack of any communities that contained high abundances of *Banksia* is notable, with just one species (*B. marginata*) recorded during the vegetation surveys in the TLSA, and not at all in the WFSA.

As the populations of Eastern Pygmy-possums in the western side of its distribution often contain Ironbarks in the overstorey and Tea-trees in the understorey, habitat comparisons for these species were also made with the study area. Some of the vegetation survey locations, mainly in the vicinity of Durridgere SCA, were found to contain communities that are similar to those containing known populations of Eastern Pygmy-possums, including Sandstone Forest – Black Cypress dominant (ID 480; 10.3 ha in all condition classes), Narrow-leaved Ironbark dominant (ID 468, 479; 42.6 ha in all condition classes). These communities were surveyed in 2012 and 2013 with spotlighting and some camera trapping (aimed at *Xanthorrhoea* flower spikes), with no Eastern Pygmy-possums recorded. Further, a survey of Durridgere commissioned by OEH in 2013 (OEH 2013) also failed to find any Eastern Pygmy-possums. More spotlighting was conducted by NGH Environmental in March 2015 over three nights at both Turill SF and Durridgere and did not detect the Eastern Pygmy-possum.

The area to be cleared of the communities listed above are very small in any one location (refer to Table 5.1 and Appendix A Map set A.5), especially considering the wide distribution of the LRWF project. The habitat generally contains a low abundance of tree hollows, although small hollows can be hard to detect from the ground accurately. The construction and operation of LRWF is unlikely to

affect foraging availability, dispersal or breeding opportunities for Eastern Pygmy-possum such that a local population could be placed at risk of extinction.

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.

Not applicable

In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

In relation to the habitat of a threatened species, population or ecological community:

- a) **the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- b) **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**
- c) **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.**

- a) Habitat for Eastern Pygmy-possum would be affected to the extent given in Table 5.8:
 - o 19 ha of moderate of better quality woodland
 - o 105 ha of habitat likely to contain moderate to excellent hollow abundance

Note: this modelling does not suggest that all areas contain all micro features important to this species, such as flora requirements for foraging.

- b) Clearing for the wind farm area is relatively minor; small patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25--65m wide lineal cleared corridor and this is the most likely aspect of the proposal to cause habitat fragmentation, limiting dispersal ability of the Eastern Pygmy-possum. The latest TL route has been chosen to occupy already disturbed areas rather than go through continuous forest wherever possible.
- c) Due to the low abundance of associated flora species, in combination with a lack of records from the locality, it is considered that the habitat in LRWF project area is of low importance to Eastern Pygmy-possum.

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

Critical habitat has not been officially declared for Eastern Pygmy-possum.

Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

A Recovery Plan has not been prepared for the Eastern Pygmy-possum. No relevant Threat Abatement Plans are known.

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

Threats listed on the species' profile (OEH 2017) include habitat loss and fragmentation and overgrazing by stock. Loss of hollow-bearing trees would also be a KTP relevant to the Eastern Pygmy-possum. The LRWF project's Offset Plan and other construction environmental management plans have potential to contribute positively toward reducing the operation of key threatening processes faced by the Eastern Pygmy-possum. Offsets would secure, for perpetuity, potential habitat for Eastern Pygmy-possum on private land. Areas under consideration are near to existing conservation reserves and would effectively extend the conserved area. This is consistent with actions listed in the 'action toolbox' under the Species Action Statement for Eastern Pygmy-possum (OEH 2017b). Recommendations for habitat management within Offset Areas and in the LRWF include weed control and goat management, which would assist to reduce existing habitat degradation.

Large-eared Pied Bat

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.

In southern parts of the Large-eared Pied Bat's range, it appears to be dependent upon the presence of large tracts of sclerophyll forest nearby to roost sites (Churchill 2008, Richards unpubl. in Richards 2005). Most records have been found around fertile woodlands or forests within kilometres of cliffs or rocky terrain that provide roosts (SPRAT 2016). Large-eared Pied Bats inhabit similar roost sites to the Eastern Cave Bat, and they are sometimes found roosting in caves together (van Dyck & Strahan 2008). Suitable roosts may be found in volcanic, karst or sandstone geology or in disused mines (DERM 2011).

BioNet shows seven records of this species, all from within Goulburn River NP. In the WFSA, Large-eared Pied Bats were identified from two calls (one tentative), both in woodland environments. The species was also identified from 13 calls in the TLSA, in four broad vegetation types. The Large-eared Pied Bat has also been detected by Anabat and in harp traps at cliff line sites at Ulan Mine (to the south of the TLSA) (Eco Logical 2012). Diurnal roosts are not known to occur in the LRWF project area, but have the potential to occur. For example, caves were found during surveys (refer to Appendix Map set A.9). This cave is no longer in the subject site and will not be impacted by the proposal.

Very little is known of the movement patterns of this species, although one colony was found to disperse during the autumn months, with individuals found in a state of deep torpor in winter (van Dyck & Strahan 2008). Individuals disperse from maternity roosts, but movements are thought to be less than 100 km (SPRAT 2016). Distribution is limited by the availability of suitable nursery roosts; only two are known in NSW (SPRAT 2016). One nursery cave is in Barraba NSW (approximately 200 km north-east of WFSA) and another near Coonabarabran (DERM 2011). Other maternity roosts could occur in the Pilliga and at the Ulan Mines, near Ulan (SPRAT 2016, DERM 2011). Ulan Mine is within 50 km of the WFSA and adjoins the southern end of the TLSA.

Their combination of short, broad wings and a low weight per unit area of wing suggests that Large-eared Pied Bats forage below the forest canopy on small flying insects (van Dyck & Strahan 2008). They tend to be recorded within canopied habitats including narrow riparian corridors, and appear to be sensitive to clearing (SPRAT 2016). They appear to forage within several kilometres of roosts (DERM 2011).

During the construction phase, the LRWF project could affect foraging habitat for the Large-eared Pied Bat, potentially foraging habitat near to a maternity cave (Ulan). Habitat would be modified and cleared, as well as protected under an Offset Plan. The extent of habitat to be affected is not expected to affect the lifecycle, i.e. ability to forage, disperse and breed, nor place Large-eared Pied Bat at risk of extinction. The LRWF is not expected to affect Large-eared Pied Bat during the operational phase. A Collision Risk Assessment (CRA Appendix D) found it has a rare likelihood of collision.

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.

Not applicable

In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

In relation to the habitat of a threatened species, population or ecological community:

- a) **the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- b) **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**
- c) **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.**

a) Habitat for Long-eared Pied Bat would be affected to the extent given in Table 5.8:

- o 19 ha of moderate of better quality woodland
- o 105 ha of habitat likely to contain moderate to excellent hollow abundance

Note: this modelling does not suggest that all areas contain all micro features important to this species.

b) Clearing for the wind farm area is relatively minor in any one location; discrete patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25-60m wide lineal cleared corridor and this is the most likely aspect of the proposal to cause habitat fragmentation. The revised TL route has been chosen to avoid as much riparian area as possible, and for the footprint to occupy already disturbed areas rather than go through continuous forest wherever possible.

c) As there is a potential nursery site just south of the LRWF project area and there is a concentration of records in the region, this habitat in the LRWF is considered of high importance to Large-eared Pied Bats (although roost sites were not identified in LRWF project area).

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

Critical habitat has not been officially declared for the Large-eared Pied Bat.

Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

A National Recovery Plan has been prepared for the Large-eared Pied Bat (DERM 2011). The LRWF project has the potential to assist in the recovery of this species, particularly: Action 2.1 “protection of known roosts and associated foraging habitats.”. The LRWF Offset Plan would provide protection for associated foraging habitats and includes recommendations to control goats, rabbits, pigs and foxes to reduce habitat degradation in offset areas.

The LRWF project has committed to a Bird and Bat Management Plan (BBMP), which would include regular surveys for microbats. This may also contribute indirectly to the data required for objectives 4 and 5 of the Recovery Plan.

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

Roost disturbance is a key threat to Large-eared Pied Bats. Although roosts are not known in the LRWF project area, they have the potential to occur and are likely to occur in the locality (based on records of the species). The Offset Plan includes recommendations for habitat management within Offset Areas and in the LRWF include weed control and goat management, which would assist to reduce the threat of roost disturbance existing habitat degradation.

Key threatening processes which are relevant to this project and Large-eared Pied Bat include clearing of native vegetation, anthropogenic climate change and removal of dead wood and dead trees. The clearing caused by the construction of LRWF would be offset and this represents a gain to conservation efforts of Large-eared Pied Bat. The LRWF, as a renewable energy generator, contributes to the solution for anthropogenic climate change.

Square-tailed Kite

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.

Square-tailed Kite was recorded nesting near the Ulan Mine site toward the southern end of the TLSA in 2013. A buffer on activities near the nest is now a recommendation of the report, with the aim of minimising any impacts on breeding. The species breeds between July and December (Debus 1998). Collision risk was considered in Appendix D to be high; although collision likelihood is unlikely, the consequence could be high given the low fecundity, low breeding density and low recruitment rate of the species (Debus 1998, NSW Scientific Committee 2009).

The Square-tailed Kite hunts over treed habitats (Schodde & Tidemann 2007). The nest is currently located near large blocks of vegetation nearby Durrigere SCA and Turrill SF. The transmission line would involve linear clearing through some of these large blocks of vegetation. Square-tailed Kites appear to continue utilising habitat around transmission lines where they occur through suitable habitat (B.Heinze *pers.obs*). Therefore, the clearing would not be likely to constitute a large impact in terms of loss of habitat for the species.

With protection and buffering of the nest site during the breeding period, the LRWF is not expected to place the local population at risk of extinction.

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.

Not applicable

In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

In relation to the habitat of a threatened species, population or ecological community:

- a) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
- b) 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
- c) 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.

- a) Habitat for the Square-tailed Kite would be affected to the extent given in Table 5.8; 0 ha. Table 5.7 shows that no forest habitat in moderate or better habitat quality would now be affected. It is however likely that lesser quality habitat is used by this species.
- b) Clearing for the wind farm area is relatively minor in any one location; discrete patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25-60m wide lineal cleared corridor and this is the most likely aspect of the proposal to cause habitat fragmentation. The revised TL route has been chosen to avoid as much riparian area as possible, and for the footprint to occupy already disturbed areas rather than go through continuous forest wherever possible.
- c) The habitat in the TLSA is considered of high importance, given the presence of a nest (active in 2013). The habitat in the WFSA is considered of moderate importance as it may not be part of the nest territory and has less suitable habitat.

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

Critical habitat has not been officially declared for the Square-tailed Kite.

Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

A Recovery Plan has not been prepared, and there are no relevant Threat Abatement Plans.

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

Key threatening processes which are relevant to this project and Square-tailed Kite include clearing of native vegetation, anthropogenic climate change and removal of dead wood and dead trees. The clearing caused by the construction of LRWF would be offset and this represents a gain to conservation of Square-tailed Kite foraging habitat. The LRWF, as a renewable energy generator, contributes to the solution for anthropogenic climate change.

The Offset Plan includes recommendations for habitat management within Offset Areas and in the LRWF include weed control and goat management, which would assist to reduce the existing threat of habitat degradation.

Yellow-bellied Sheathtail Bat

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 Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) is a widespread species, with records throughout most of NSW. Despite this, there are very few historical records from within the study area, possibly due to a lack of surveys being undertaken in the region. There are, however, two records of the species from Turill State Conservation Area, in the TLSA. No recordings of this species were made in the WFSA during the 2012 Anabat surveys. One probable recording was identified from sandstone forest vegetation in the TLSA during the 2012 surveys, but no calls were identified in this area after the more comprehensive 2013 surveys nor during the 2015 surveys. It is assumed that this species is more

widespread in the study area than is currently known, or that the species may be more common in the region towards the end of summer or in autumn. Surveys in the Ulan Mine site (similar habitat to the TLSA) have detected the presence of the Yellow-bellied Sheathtail Bat with Anabat devices, however it has only been recorded occasionally and would not be considered common in the area (Glenn Hoye, pers. comm. 11/03/2015).

Yellow-bellied Sheathtail-bats are found across most of northern and eastern Australia (Churchill 1998), but its seasonal movements are largely unknown. It is thought that the species migrates to the southern-most parts of its range in late summer or autumn as all records in the far south are between January and July (ALA 2016, Churchill 2008, OEH 2017). They appear to defend an aerial territory (OEH 2017, Churchill 2008), although this may be the case in the non-migratory parts of their range such as the far north. A CRA has been undertaken for this species in Appendix D and assesses collision risk for this species as moderate; low likelihood of collision and moderate consequence.

The species has one or two periods of birthing during December to Mid-march, with mating and gestation occurring from early spring through summer (Chimimba & Kitchener 1987). Yellow-bellied Sheathtail-bats are a tree roosting species, and are generally thought to roost solitarily or in small mixed-sex groups (less than 10) (OEH 2017, Churchill 2008). Larger colonies have been recorded from 30 to 100 (Rhoes & Hall 1997, ALA 2016). One large group was found roosting in a hollow eucalypt stag. Roost trees have been found in isolated trees and small stands in cleared areas (Law *et al.* 2000, Rhodes & Hall 1997). The distribution of Yellow-bellied Sheathtail Bat may be partly influenced by availability of suitable trees for roosts (Kitchener 1989).

Studies in the Cadia Valley (Orange, NSW) indicate that presence of this species may be dictated by the microhabitat elements of extensive high quality habitat with a shrub understorey, in tracts of several hundred hectares (Richards, unpubl. in Richards 2005b). Such micro-habitat is rare in the Project Area; shrubs are generally absent in all the vegetation communities in the WFSA, except for a small area of Sifton Bush shrubland and Bottlebrush Riparian Shrubland Wetland (NGH Environmental 2013a). The latter community is outside of the current LRWF project area and found in only one location.

Although potentially occurring in low densities at the LRWF, the Yellow-bellied Sheathtail Bat has the potential to be affected by loss of foraging, roosting and breeding habitat (in the form of hollow-bearing trees). In general, the quality of the habitat to be cleared is low to moderate, with low densities of hollow-bearing trees. Given the relatively small extent of clearing relative to the large site and the lower quality of habitat, any extant population at LRWF project area is unlikely to be placed at risk of extinction as a result of the proposal.

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.

Not applicable

In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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
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

In relation to the habitat of a threatened species, population or ecological community:

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

c) **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.**

a) Habitat for Yellow-bellied Sheathtail Bats would be affected to the extent given in Table 5.8:

- a. 19 ha of moderate of better quality woodland
- b. 105 ha of habitat likely to contain moderate to excellent hollow abundance

Note: this modelling does not suggest that all areas contain all micro features important to this species, such as flora requirements for foraging.

b) Clearing for the wind farm area is relatively minor in any one location; discrete patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25-60m wide lineal cleared corridor and this is the most likely aspect of the proposal to cause habitat fragmentation. However, the Yellow-bellied Sheathtail Bat is highly mobile and utilises open habitats and edges (OEH 2017). The TL may actually increase foraging areas along forest edges.

c) Given few records of the species but potential foraging, roosting and breeding habitat in the vast LRWF project area, the importance of the habitat on site is considered moderate.

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

Critical habitat has not been officially declared for Yellow-bellied Sheathtail Bat.

Whether the action proposed is consistent with the objectives or actions of a Recovery Plan or Threat Abatement Plan.

There is no Recovery Plan or relevant Threat Abatement Plan for the Yellow-bellied Sheathtail Bat. 'Activities to assist this species' are listed under its' OEH online profile (OEH 2017). Of note include: reduce the use of pesticides and poison-spraying in the environment. Weed management is recommended for the LRWF project area and offset sites. A recommendation is included to ensure that pesticides are used in a way that minimises the chance of spill, over-application and run-off. Weed spraying should be undertaken in accordance with best practice standards including training of users. Other activities include protecting native vegetation and hollow-bearing trees. This action is met by the LRWF through the Offset Plan, which offsets the loss of such habitat resources within the LRWF wind farm and transmission line sites.

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

Key threatening processes which are relevant to this project and Yellow-bellied Sheathtail Bat include clearing of native vegetation, anthropogenic climate change and removal of dead wood and dead trees. No known important sites (e.g. a roost site) would be affected by the proposal. The clearing of habitat caused by the construction of LRWF would be offset and this represents a gain to conservation efforts of Yellow-bellied Sheathtail Bat. The LRWF, as a renewable energy generator, contributes to the solution for anthropogenic climate change.

C.2 EPBC ACT ASSESSMENTS

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. The following assessment assesses the significance of the likely impacts associated with the proposed works on:

- Regent Honeyeater (Critically Endangered)
- Koala (Vulnerable)
- Large-eared Pied Bat (Vulnerable)

Regent Honeyeater

Will the action lead to a long-term decrease in the size of a population of a species?

As set out in C.2 for this species, the LRWF project is not expected to lead to a long-term decrease in a population of the Regent Honeyeater, with the implementation of specific mitigation measures. The habitat on site is considered sub-optimal potential foraging habitat as the majority does not meet the specific foraging habitat requirements of Regent Honeyeaters as detailed in DoE (2016), Roderick et al. (2013) and Roderick & Ingerwsen (2014). However, any potential foraging habitat is classed as critical habitat under the National Recovery Plan (DoE 2016).

A known intermittent breeding site, the Mudgee-Wollar IBA, is located approximately 15 km south of the LRWF project area. The southern portion is where the transmission lines are proposed; these meet up with the existing Ulan colliery, immediately south of the LRWF (i.e. the colliery is between the Mudgee-Wollar IBA and LRWF area).

A Collision Risk Assessment (CRA, Appendix D), found that turbine collision would be a rare/unlikely event for Regent Honeyeaters however, it is recognised that the high consequence of ongoing collisions make this a high risk species. A risk based adaptive bird and bat monitoring plan is already included for the project and would manage risks to this species. An offset plan will secure and manage for improvement habitat similar to that being removed in perpetuity.

Will the action reduce the area of occupancy of the species?

The Regent Honeyeater is a nomadic / migratory honeyeater species, and thus has a very large area of occupancy. At present, key areas for the species in NSW include Hunter Valley, Central Coast, Capertree Valley and the Bundarra-Barraba region north of Tamworth (Bird Life Australia 2016, Roderick 2010 in Roderick et al. 2013, OEH BioNet). The LRWF project does not affect any of these areas and onsite habitat is generally considered suboptimal for this species. As clearing for the wind farm area is relatively minor in any one location; discrete patches would be cleared, it is unlikely to affect the occupancy of this species.

Will the action fragment an existing population into two or more populations?

The LRWF proposal would not fragment the Regent Honeyeater population. The transmission lines necessitate clearing 25-60m in width. Vegetated riparian corridors are generally considered important for the Regent Honeyeater to move through the landscape (DoE 2016). The scale of clearing is not considered extensive enough to fragment the habitat and isolate portions of the population from each other.

Will the action adversely affect habitat critical to the survival of a species?

No breeding habitat is known to occur in the LRWF project area. As already discussed, all potential foraging habitat is considered critical habitat (DoE 2016). The turbines themselves would be located on

the tops of ridges, which have been historically cleared (more so than the slopes and gullies). Clearing works for woodland birds has been modelled at (refer to Table 5.8:

- 75.9 ha of native grassland EEC
- 19 ha of moderate or better quality woodland

Conversely, areas of critical foraging habitat would also occur in the offsetting areas. Conserving habitat on private land is an objective of the Recovery Plan, and this LRWF project would help to achieve this by offsetting in accordance with the FBA.

Will the action disrupt the breeding cycle of a population?

The LRWF project is not expected to disrupt the breeding cycle of the Regent Honeyeater. The key breeding areas are not nearby: north-east Victoria (Chiltern-Albury), Capertee Valley, Bundarra-Barraba region and Hunter Valley (DoE 2016, Roderick et al. 2013)

An intermittent breeding area, Mudgee-Wollar IBA, occurs 15 km south of the LRWF. Access to this breeding area is not anticipated to be negatively affected by the LRWF.

Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Habitat for 'woodland birds' would be affected to the extent given in Table 5.8. Of this, habitat suitable for Regent Honeyeater represents only a small portion.

Clearing for the wind farm area is relatively minor in any one location; discrete patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25-60m wide lineal cleared corridor and this is the most likely aspect of the proposal to cause habitat fragmentation. Regent Honeyeaters move through areas by hopping between rich patches of forest habitat, using vegetation corridors such as drainage lines and watercourses where available (DoE 2016).

The TL proposal crosses a number of riparian corridors at the far southern end just north of the Ulan Colliery. The transmission line in this part runs north-south and needs to enter the Ulan Colliery in order to utilise the existing electrical infrastructure there. It is clear from the map that areas of moderate to good quality treed habitat, on low lying fertile sites with mistletoe are rare in the LRWF project area, Appendix A Map set A.7. The majority of habitat on site does not meet the specific foraging habitat requirements for the Regent Honeyeater. Although some riparian corridors would require disturbance, clearing would be relatively minor in any one location and none of this habitat has been classed as moderate or better in terms of habitat quality. On this basis, and as the habitat is not considered of high importance to the Regent Honeyeater, it is considered that the proposal would not cause fragmentation or isolation of Regent Honeyeater habitat or corridors. These affects are unlikely to cause the Regent Honeyeater to decline.

Will the action result in invasive species that are harmful to a critically endangered species becoming established in the critically endangered species habitat?

The *National Recovery Plan* lists both the native Noisy Miner and the introduced honey bee (potentially) as species that threaten the Regent Honeyeater. Both compete for nectar and the bee also competes for tree hollows in breeding areas. The Noisy Miner has already been recorded in the LRWF, and the project would therefore not contribute to its colonisation of the locality. Noisy Miner numbers may increase with clearing, as the project would see an increase of their preferred habitat including forest/woodland edges and forest/woodland with an open mid- and under-storey (NSW Scientific Committee 2013). Noisy Miners were recorded in approximately half of the bird surveys undertaken at LRWF project area. This suggests that there is some potential for their spread if the project was to increase their preferred habitat.

Will the action introduce disease that may cause the species to decline?

The *National Recovery Plan* does not list any specific diseases to which the Regent Honeyeater is susceptible. The plan does, however, note that disease management is particularly important for the captive breed and release program for the species (DoE 2016). The LRWF project has no bearing on this aspect of the recovery plan. The proposal is not anticipated to introduce any disease that may cause the Regent Honeyeater to decline.

Will the action interfere with the recovery of the species?

The LRWF project would contribute positively to the objectives and actions of the *National Recovery Plan*, in particular Strategy 1 and Strategy 3. Strategy 1 of the *National Recovery Plan* (DoE 2016) is to improve the extent and quality of habitat for the species, including protection of critical habitat (1c) and rehabilitation of degraded habitat and corridors (1d, 1e). The proposal would assist these objectives of the *Recovery Plan* through the Offset Plan. The LRWF project would also indirectly contribute to Strategy 3 of the *Recovery Plan*; to increase understanding of population trends of the species. The LRWF project includes a commitment to a Bird and Bat Management Plan (BBMP) during the early operation phase of the wind farm. A component of this plan is bird utilisation surveys around the LRWF project area. These surveys, which would be repeated over several years, would contribute to the knowledge of birds in the local area. It would provide an opportunity for regular survey (indirectly) for Regent Honeyeater on private land nearby to the Mudgee-Wollar IBA. All results would be submitted to the OEH BioNet database and would be available to the Regent Honeyeater Recovery Team.

Koala

Will the action lead to a long-term decrease in the size of an important population of a species?

The proposal site has the potential to support an important population of the species. The primary feed tree occurs only in some areas of Riparian Forest – Rough-barked Apple, Blakely’s Red Gum (ID 481) that were surveyed in 2016. The tree species was not recorded in earlier vegetation surveys elsewhere in the LRWR project area. Thus, there are small pockets of secondary habitat (either class A – Phillips 2000b in DECC 2008, or class B – Callaghan in DECC 2008) capable of supporting medium to low densities of koala habitat. Elsewhere, habitat consists of secondary and supplementary habitat only, capable of supporting low koala densities (DECC 2008). In total 161.2 ha of communities that contain primary or secondary feed species would be impacted. The proposal is not considered likely to lead to a long term decrease in the size of the population in the locality, as the clearing may seem high but is spread over a large area and large patches of remnant vegetation will remain.

Will the action reduce the area of occupancy of an important population?

Potential habitat for Koala would be affected to the extent given in Table 5.8:

- 161.2 ha of communities that contain primary or secondary feed species
- 19 ha of moderate of better quality woodland habitat
- 0 ha of forest habitat

Although not specifically targeted, 1,425 hours of fauna surveys failed to detect this species in this habitat.

Will the action fragment an existing important population into two or more populations?

As discussed above the proposal area is likely to support only low to moderate density populations due to the low to moderate quality of the habitat. Clearing requirements are relatively discrete and unlikely to fragment populations.

Will the action adversely affect habitat critical to the survival of a species?

The proposal will have impacts mainly on habitat that contains secondary tree species that support low to moderate densities of koalas, it will not adversely affect habitat critical to the survival of the koala species.

Will the action disrupt the breeding cycle of an important population?

Significant breeding areas for Koala have been identified at Wedderburn, Pilliga, in the Brigalow Belt, Port Stephens and Dorrigo (NRMMC 2009). Koalas live in “breeding aggregations” within a large home range ranging from 5 ha to 500 ha depending on habitat quality (DECC 2008). They have a low fecundity (DECC 2008).

The habitat available for Koalas at LRWF is low to moderate quality. There are recent records in the locality (within 15 years). The activities associated with the construction and operation of LRWF are unlikely to place the species at risk of extinction as the project would not affect known breeding areas, would clear small areas of low to moderate habitat and would not affect dispersal.

Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Habitat for the Koala would be affected to the extent given in Table 5.8, and stated above. Clearing for the wind farm area is relatively minor; small patches for turbine footings and relatively narrow lineal sections for access tracks. Clearing for the transmission line area involves a 25-60m wide lineal cleared corridor and this aspect of the proposal is the most likely to cause habitat fragmentation, limiting dispersal ability of the Koala. The latest TL route has been chosen to avoid better habitat, within input from OEH, to occupy already disturbed areas rather than go through continuous forest wherever possible. The habitat to be affected in the LRWF project area is considered to be of low importance to the Koala on the basis of: few primary feed trees and low quality secondary habitat based on habitat components such as logs and cover. In the northern section of the LRWF (the WFSA), the habitat is already quite fragmented and degraded. Better quality areas occur in Turrill SF and Durridgere SCA, although the Koala is not known to occur in these protected areas (DECC 2008).

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat?

The proposal is considered unlikely to result in invasive species becoming established within the koala’s habitat. One threat to Koalas is dog attacks, however these occur more commonly in urban and rural-residential areas (recovery plan). It is suggested there is a low rate of mortality by other invasive species such as foxes. The LRWF Offset Plan would provide protection for associated foraging habitats and includes recommendations to control goats, rabbits, pigs and foxes to reduce habitat degradation in offset areas.

Will the action introduce disease that may cause the species to decline?

The main disease that is known to cause decline within the species is Chlamydia while *Phytophthora cinnamomi* impacts on the habitat itself. The proposal is not considered likely to introduce Chlamydia. The potential for construction activities to introduce phytophthora to the site is considered to be low, if measures are adhered to; a measure to manage the spread of *Phytophthora cinnamomi* is a recommendation of this report.

Will the action interfere substantially with the recovery of the species?

The LRWF project has potential to contribute towards Objective 2 of Koala Recovery Plan through the LRWF Offset Plan: rehabilitate and restore Koala habitat (DECC 2008). Otherwise, the LRWF is not inconsistent with Recovery Plan objectives.

Large-eared Pied Bat

Will the action lead to a long-term decrease in the size of an important population of a species?

Although the proposal will remove 19 ha of moderate of better quality woodland and 105 ha of habitat likely to contain moderate to excellent hollow abundance, the LRWF Offset Plan would provide protection for associated foraging habitats and includes recommendations to control goats, rabbits, pigs and foxes to reduce habitat degradation in offset areas. A Collision Risk Assessment (Appendix D) found it has a rare likelihood of collision and is a moderate collision risk. The proposal is unlikely to lead a long- term decrease

in the size of an important population, given mitigation measures to monitor collision impacts and offset habitat removal.

Will the action reduce the area of occupancy of an important population?

During the construction phase, the LRWF project would affect foraging habitat for the Large-eared Pied Bat, potentially foraging habitat near to a maternity cave (Ulan). The impact areas are relatively discrete over a broad area and unlikely to affect the occupancy of an important population. Habitat to be cleared would be offset.

Will the action fragment an existing important population into two or more populations?

Clearing for the transmission line area involves a 25-60m wide lineal cleared corridor and this aspect of the proposal is the most likely to cause habitat fragmentation. The revised TL route has been chosen to avoid as much of the riparian areas as possible, and for the footprint to occupy already disturbed areas rather than go through continuous forest wherever possible.

Will the action adversely affect habitat critical to the survival of a species?

In southern parts of the Large-eared Pied Bat's range, it appears to be dependent upon the presence of large tracts of sclerophyll forest nearby to roost sites (Churchill 2008, Richards unpubl. in Richards 2005). Most records have been found around fertile woodlands or forests within kilometres of cliffs or rocky terrain that provide roosts (SPRAT 2016). The roosting site is outside the development area, therefore will not be disturbed (see below).

Will the action disrupt the breeding cycle of an important population?

Large-eared Pied Bats inhabit similar roost sites to the Eastern Cave Bat, and they are sometimes found roosting in caves together (van Dyck & Strahan 2008). Suitable roosts may be found in volcanic, karst or sandstone geology or in disused mines (DERM 2011).

BioNet shows seven records of this species, all from within Goulburn River NP. In the WFSA, Large-eared Pied Bats were identified from two calls (one tentative), both in woodland environments. The species was also identified from 13 calls in the TLSA, in four broad vegetation types. The Large-eared Pied Bat has also been detected by Anabat and in harp traps at cliff line sites at Ulan Mine (to the south of the TLSA) (Eco Logical 2012). Diurnal roosts are not known to occur in LRWF project area, but have potential to occur. For example, caves were found during surveys (refer to Mammals Map). The cave identified is no longer in the subject site (i.e. will not be impacted by the proposal). The extent of habitat to be affected is not expected to affect the lifecycle, i.e. ability to forage, disperse and breed, nor place Long-eared Pied Bat at risk of extinction.

Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Habitat for Long-eared Pied Bat would be affected to the extent given in Table 5.8. Clearing for the wind farm area is relatively discrete. Clearing for the transmission line area involves a 20-65m wide lineal cleared corridor and this is the most likely aspect of the proposal to cause habitat fragmentation. The revised TL route has been chosen to avoid as much riparian area as possible, and for the footprint to occupy already disturbed areas rather than go through continuous forest wherever possible.

As there is a potential nursery site just south of the LRWF project area and there is a concentration of records in the region, this habitat in the LRWF is considered of high importance to the Large-eared Pied Bat (but would not be affected).

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Predation by introduced predators such as cats, foxes and rats can be exacerbated by creating clearings/movement corridors such as for the TL easement. Increased predators in the TL line are unlikely to impact this species, where foraging not congregation or breeding occurs.

As discussed above the LRWF Offset Plan would provide protection for associated foraging habitats and includes recommendations to control invasive species to reduce habitat degradation in offset areas.

Will the action introduce disease that may cause the species to decline?

No diseases are listed in the recovery plan as affecting this bat species. The proposal is unlikely to introduce disease that may cause this species to decline.

Will the action interfere substantially with the recovery of the species?

A National Recovery Plan has been prepared for the Large-eared Pied Bat (DERM 2011). The LRWF project has the potential to assist in the recovery of this species, particularly: Action 2.1 “protection of known roosts and associated foraging habitats.” The LRWF Offset Plan would provide protection for associated foraging habitats and includes recommendations to control goats, rabbits, pigs and foxes to reduce habitat degradation in offset areas.

The LRWF project has committed to a Bird and Bat Management Plan (BBMP), which would include regular surveys for microbats. This may also contribute indirectly to the data required for objectives 4 and 5 of the Recovery Plan.