



**RESPONSE TO ENVIRONMENTAL ASSESSMENT REVIEW  
THREATENED SPECIES AND BIODIVERSITY (FAUNA SURVEYS)**

**RIVERSIDE CONCEPT PLAN  
TEA GARDENS  
(MP10\_136)**

**JULY 2012**

**EPA REF: DOC12/3972; FIL08/2053-03**

[www.cegconsult.com](http://www.cegconsult.com)

Suite E, 78 York Street, East Gosford NSW 2250  
PO Box 4300, East Gosford NSW 2250

• Ph (02) 4324 7888 • Fax (02) 4324 7899

• Email [cegconsult@bigpond.com](mailto:cegconsult@bigpond.com)

ABN 62 274 841 042

# RESPONSE TO ENVIRONMENTAL ASSESSMENT REVIEW THREATENED SPECIES AND BIODIVERSITY (FAUNA SURVEYS)

## 1.1 INTRODUCTION

The following response has been prepared to address the issues raised in the Environmental Assessment Review of the Riverside Concept Plan for threatened species and biodiversity with regard to fauna surveys.

The NSW Office of Environment and Heritage (OEH) have requested further information with regard to fauna surveys undertaken for the subject site between 2004 and 2010. Specifically clarification of how the stratification units were determined and how the survey design was applied has been requested. A table detailing sampling methods and effort per stratification unit, including the size of each unit and how they meet the minimum requirements in the OEH survey guidelines (DEC 2004) and a map overlaying the survey details over the stratification units has been suggested. OEH has also requested that details of survey locations and survey methodologies applied are provided, to demonstrate that current surveys are adequate for the predicted species.

## 1.2 CLARIFICATION OF FAUNA SURVEY STRATIFICATION UNITS

A comparison of the fauna survey areas (stratification units) identified is provided in Table 1.1. The consideration of stratification units was undertaken in accordance with the Guidelines provided by DEC (2004). Although several of the stratification variables of survey areas B and C were similar, these areas were separated based on consideration of broad floristic variability and aspect. To further account for variation in fauna habitats within survey areas, further consideration was given to the placement of fauna survey sites for sampling of special habitats such as seasonal flowering and fruiting trees and shrubs, the presence of soaks and depressions and the occurrence of dams. This methodology enabled the effective utilisation of the stratification areas identified for conducting effective surveys of the full range of targeted threatened fauna species. Detailed surveys were not required to be undertaken in fauna survey area E mapped in Figure 1.

<b>TABLE 1.1 CHARACTERISTICS OF FAUNA STRATIFICATION UNITS / SURVEY AREAS</b>				
<b>Stratification Variable</b>	<b>Survey Area A</b>	<b>Survey Area B</b>	<b>Survey Area C</b>	<b>Survey Area D</b>
<b>Landform</b>	Rolling rise	Gently undulating plain	Gently undulating plain	Level plain
<b>Mitchell Landscape</b>	Newcastle Coastal Ramp	Myall – Forster Barrier System	Myall – Forster Barrier System	Myall – Forster Barrier System
<b>Geology</b>	Carboniferous fossiliferous mudstones and lesser interbeds of lithic sandstones of the Wootton Beds	Pleistocene beach ridges - marine and aeolian quartz sands	Pleistocene beach ridges - marine and aeolian quartz sands	Pleistocene beach ridges - marine and aeolian quartz sands
<b>Elevation</b>	10-20m	<10m	<10m	<10m
<b>Slope</b>	Moderately inclined (10-32%)	Very gently inclined (1-3%)	Very gently inclined (1-3%)	Level (<1%)
<b>Soil Type</b>	Podzolic soils of the Pindimar	Poorly drained Peaty Humus Podzols of the	Imperfectly drained Humus	Poorly drained Peaty Humus

Environmental Assessment Review – Riverside Concept Plan, Tea Gardens (Ref: 2042)

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<b>TABLE 1.1 CHARACTERISTICS OF FAUNA STRATIFICATION UNITS / SURVEY AREAS</b>				
<b>Stratification Variable</b>	<b>Survey Area A</b>	<b>Survey Area B</b>	<b>Survey Area C</b>	<b>Survey Area D</b>
	Road erosional soil landscape	Tea Gardens Aeolian soil landscape	Podzols of the Tea Gardens Aeolian soil landscape	Podzols of the Tea Gardens Aeolian soil landscape
<b>Aspect</b>	South-east	South	South-east	South-east
<b>Vegetation Structure</b>	Open Forest intact understorey	Remnant Forest / disturbed understorey	Remnant Forest / disturbed understorey	Open Forest intact understorey
<b>Floristics</b>	Contains floristics broadly characteristic of dry forest	Contains floristics broadly characteristic of regenerating wet forest	Contains floristics broadly characteristic of regenerating dry forest	Contains floristics broadly characteristic of inundated swamp vegetation
<b>Size (ha)</b>	18	75	72	30

### 1.3 EVALUATION OF FAUNA SURVEY EFFORT PER STRATIFICATION UNIT

Fauna survey locations within survey areas are shown on a geo-referenced aerial photograph of the site in Figure 1. An evaluation of the fauna survey effort undertaken per stratification unit compared to the suggested minimum survey guideline provided by DECC (2004) is provided in Table 2.2. Predicted species with corresponding survey and stratification requirements were grouped together for the purposes of this analysis.

**TABLE 1.2  
EVALUATION OF FAUNA SURVEY EFFORT PER STRATIFICATION**

Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
<b>Wallum Froglet</b>	<b>Diurnal Habitat Search</b>	Targeted diurnal meander searches undertaken across all stratification units.  Opportunistic diurnal surveys undertaken while completing other method specific surveys across all stratification units.  Summer Survey - 26hrs over 6 days. Autumn Survey - 61hrs over 11 days. Spring Survey - 13hrs over 4 days.				1hr per stratification unit.  (Note: Seasonal peak activity period = November to May).	Surveys undertaken satisfy guideline by 2500%.
	<b>Night Habitat Search</b>	No suitable habitat	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	30min x 2 nights / stratification unit.	Surveys undertaken satisfy guideline by 280%.
	<b>Nocturnal Call Playback</b>	No suitable habitat	-8 surveys on separate nights	-7 surveys on separate nights	-2 surveys on separate nights	2 nights.	Surveys undertaken satisfy guideline by 280%.
	<b>Night watercourse Search</b>	No suitable habitat	-undertaken during night habitat searches	-undertaken during night habitat searches	-undertaken during night habitat searches	2hrs per 200m of water body edge.	As per night habitat searches.
<b>Green and Golden Bell Frog</b>	<b>Diurnal Habitat Search</b>	Targeted diurnal meander searches undertaken across all stratification units.  Opportunistic diurnal surveys undertaken while completing other method specific surveys across all stratification units.  Summer Survey - 26hrs over 6 days. Spring Survey - 13hrs over 4 days.				1hr per stratification unit.  (Note: Seasonal peak activity period =August to February).	Surveys undertaken satisfy guideline by 240%.

**TABLE 1.2  
EVALUATION OF FAUNA SURVEY EFFORT PER STRATIFICATION**

Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
	<b>Night Habitat Search</b>	No suitable habitat	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	30min x 2 nights / stratification unit.	Surveys undertaken satisfy guideline by 280%.
	<b>Nocturnal Call Playback</b>	No suitable habitat	-8 surveys on separate nights	-7 surveys on separate nights	-2 surveys on separate nights	2 nights.	Surveys undertaken satisfy guideline by 280%.
	<b>Night watercourse Search</b>	No suitable habitat	-undertaken during night habitat searches	-undertaken during night habitat searches	-undertaken during night habitat searches	2hrs per 200m of water body edge.	As per night habitat searches.
<b>Green Thighed Frog</b>	<b>Diurnal Habitat Search</b>	Targeted diurnal meander searches undertaken across all stratification units.  Opportunistic diurnal surveys undertaken while completing other method specific surveys across all stratification units.  Summer Survey - 26hrs over 6 days. Spring Survey - 13hrs over 4 days.				1hr per stratification unit.  (Note: Seasonal peak activity period =November to February).	Surveys undertaken satisfy guideline by 240%.
	<b>Night Habitat Search</b>	No suitable habitat	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	30min x 2 nights / stratification unit.	Surveys undertaken satisfy guideline by 280%.
	<b>Nocturnal Call Playback</b>	No suitable habitat	-8 surveys on separate nights	-7 surveys on separate nights	-2 surveys on separate nights	2 nights.	Surveys undertaken satisfy guideline by 280%.

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Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
	<b>Night watercourse Search</b>	No suitable habitat	-undertaken during night habitat searches	-undertaken during night habitat searches	-undertaken during night habitat searches	2hrs per 200m of water body edge.	As per night habitat searches.
<b>Stephens Banded Snake</b>	<b>Diurnal Habitat Search</b>	Targeted diurnal meander searches undertaken across all stratification units. Opportunistic diurnal surveys undertaken while completing other method specific surveys across all stratification units.  Summer Survey - 26hrs over 6 days. Spring Survey - 13hrs over 4 days.				30min x 2 days / per 100ha stratification unit.	Surveys undertaken satisfy guideline by 975%.
	<b>Pitfall Traps with Drift Nets</b>	12 pitfall trap nights	15 pitfall trap nights	-	-	24 trap nights (6 traps over 4 nights) / per 100ha stratification unit.	Survey guideline not met.  Method considered not likely to detect target species.  More likely to be detected during spotlighting searches.
	<b>Spotlighting</b>	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	30min x 2 nights / per 100ha stratification unit.	Surveys undertaken satisfy guideline by 250%.
<b>WATER BIRDS</b> -Magpie Goose -Painted Snipe -Black-necked Stork -Sooty Oystercatcher -Pied Oystercatcher -Little Tern	<b>Area Search</b>	Targeted diurnal area census undertaken across all stratification units.  Opportunistic diurnal census undertaken while completing other method specific surveys across all stratification units.  Summer Survey - 26hrs over 6 days. Autumn Survey - 61hrs over 11 days. Winter Survey - 19.5hrs over 7 days. Spring Survey - 13hrs over 4 days.				Methodology not resolved – (search utilising species time curve may be used).  Undertake seasonal searches.	Extensive seasonal searches undertaken across all stratification units. Exceeds survey guidelines.

**TABLE 1.2  
EVALUATION OF FAUNA SURVEY EFFORT PER STRATIFICATION**

Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
	<b>Wetland Census</b>	No wetlands present	No wetlands present	No wetlands present	Area not subject to detailed surveys.	1hr census at dawn or dusk per wetland.	Not required.
	<b>Water Source Census</b>	Undertaken during area searches	Undertaken during area searches	Undertaken during area searches	Undertaken during area searches	20min census at dawn or dusk for each water source.	Farm dams and other water bodies targeted during dawn and dusk periods as a part of extensive diurnal area censuses.
<b>OTHER DIURNAL BIRDS</b> Osprey Square-tailed Kite Little Eagle Wompoo Fruit-dove Rose-crowned Fruit Dove Superb Fruit-dove Glossy Black-Cockatoo Gang-gang Cockatoo Little Lorikeet Swift Parrot Turquoise Parrot Regent Honeyeater	<b>Area Search</b>	<p>Targeted diurnal area census undertaken across all stratification units.</p> <p>Opportunistic diurnal census undertaken while completing other method specific surveys across all stratification units.</p> <p>Summer Survey - 26hrs over 6 days. Autumn Survey - 61hrs over 11 days. Winter Survey - 19.5hrs over 7 days. Spring Survey - 13hrs over 4 days.</p>				<p>Methodology not resolved – (search utilising species time curve may be used).</p> <p>Undertake seasonal searches.</p>	Extensive seasonal searches undertaken across all stratification units. Exceeds survey guidelines.

**TABLE 1.2  
EVALUATION OF FAUNA SURVEY EFFORT PER STRATIFICATION**

Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
OTHER DIURNAL BIRDS (cont) Black-chinned Honeyeater Brown Treecreeper Speckled Warbler							
Bush Stone-curlew	Call playback	-1 survey	-8 surveys on separate nights	-7 surveys on separate nights	-2 surveys on separate nights	2-4km apart during breeding season (Spring).	Surveys undertaken satisfy guideline by 1800%.
	Spotlighting	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	By foot or from vehicle.	Surveys undertaken satisfy guideline.
	Day habitat search	Targeted diurnal/flushing census undertaken across all stratification units.  Opportunistic diurnal/flushing census undertaken while completing other method specific surveys across all stratification units.  Summer Survey - 26hrs over 6 days. Autumn Survey - 61hrs over 11 days. Winter Survey - 19.5hrs over 7 days. Spring Survey - 13hrs over 4 days.				Flushing from suitable habitat / per 50ha stratification unit.	Surveys undertaken satisfy guideline.



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EVALUATION OF FAUNA SURVEY EFFORT PER STRATIFICATION**

Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
<b>NOCTURNAL BIRDS</b> -Barking Owl -Powerful Owl -Masked Owl -Grass Owl -Sooty Owl	<b>Call playback</b>	-1 survey	-8 surveys on separate nights	-7 surveys on separate nights	-2 surveys on separate nights	Sites separated by 800m to 1km. -5 visits for Powerful Owl, Barking Owl and Grass Owl -6 visits for Sooty Owl -8 visits for Masked Owl	Call playback locations were <1km apart. Surveys undertaken satisfy guideline by 225%.
	<b>Day habitat search</b>	Targeted diurnal search undertaken across all stratification units.  Opportunistic diurnal search undertaken while completing other method specific surveys across all stratification units.  Summer Survey - 26hrs over 6 days. Autumn Survey - 61hrs over 11 days. Winter Survey - 19.5hrs over 7 days. Spring Survey - 13hrs over 4 days.				Search for pellets and likely hollows.	Surveys undertaken satisfy guideline.
	<b>Stagwatching</b>	Undertaken during spotlighting surveys	Undertaken during spotlighting surveys	Undertaken during spotlighting surveys	Undertaken during spotlighting surveys	Observing potential roost hollows for 30mins prior to sunset and 60mins following sunset.	Undertaken during spotlighting surveys.  Surveys undertaken satisfy guideline.
	<b>Spotlighting</b>	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	By foot or from vehicle.	Surveys undertaken satisfy guideline.
<b>MEDIUM TERRESTRIAL MAMMALS</b> Spotted-tailed Quoll	<b>Medium terrestrial mammal Elliot trapping</b>	180 Terrestrial Elliot trap nights	150 Terrestrial Elliot trap nights	370 Terrestrial Elliot trap nights	180 Terrestrial Elliot trap nights	Combined Elliot trapping must equate to 100 trap nights over 3-4 consecutive nights / per 50ha stratification unit , plus additional effort required for every additional 100ha.	Surveys undertaken satisfy guideline by 220%.

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		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
<b>MEDIUM TERRESTRIAL MAMMALS (cont)</b> <b>Rufous Bettong</b> <b>Long-nosed Potoroo</b>	<b>Wire Cage Trapping</b>	6 Wire cage Trap Nights	15 Wire cage Trap Nights	36 Wire cage Trap Nights	36 Wire cage Trap Nights	<b>Wire Cage Traps</b> – 24 nights over 3-4 consecutive nights / per 50ha stratification unit, plus additional effort required for every additional 100ha.	<p>Survey guideline not met for survey areas A and B.</p> <p>Surveys undertaken exceed guideline for survey areas B and C.</p> <p>Additional effort undertaken for medium terrestrial mammal Elliot trapping to compensate for deficiencies.</p>
	<b>Hair Tube Survey</b>	100 hair tube nights	-	200 hair tube nights	-	10 large and 10 small hair tubes in pairs for at least 4 days and 4 nights / per 50ha stratification unit, plus additional effort required for every additional 100ha.	<p>Survey guideline not met for survey areas B and D.</p> <p>Surveys undertaken exceed guideline for survey areas A and C.</p> <p>Additional effort undertaken for medium terrestrial mammal Elliot trapping to compensate for deficiencies.</p>
	<b>Spotlighting</b>	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	(on foot or from vehicle) -2 x 1hr and 1km up to 200 hectares of stratification unit, walking at approx. 1km per hour on 2 separate nights.	Surveys undertaken exceed guideline by 250%.

**TABLE 1.2  
EVALUATION OF FAUNA SURVEY EFFORT PER STRATIFICATION**

Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
	<b>Search for scats and signs</b>	Undertaken at each trapping transect & opportunistically throughout site  18hrs (6 x 30min searches x 6 days)	Undertaken at each trapping transect & opportunistically throughout site  15hrs (5x30min searches x 5 days)	Undertaken at each trapping transect & opportunistically throughout site  49.5hrs (11x 30min searches x 9 days)	Undertaken at each trapping transect & opportunistically throughout site  6 hrs (3 x 30min searches x 4 days)	- 30 minutes searching each relevant habitat, including trees for scratch marks / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Surveys undertaken satisfy guideline by 4425%.
	<b>Track Search</b>	Undertaken while traversing the site during other method specific surveys	Undertaken while traversing the site during other method specific surveys	Undertaken while traversing the site during other method specific surveys	Undertaken while traversing the site during other method specific surveys	1km / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Undertaken but no details of locations or distance of searches recorded.
	<b>Collection of predator scats</b>	18hrs  Opportunistic	15hrs  Opportunistic	49.5hrs  Opportunistic	6 hrs  Opportunistic	Opportunistic.	Surveys undertaken satisfy guideline.
<b>SMALL TERRESTRIAL MAMMALS -Common Planigale</b>	<b>Small terrestrial mammal Elliot trapping</b>	180 Terrestrial Elliot trap nights	150 Terrestrial Elliot trap nights	370 Terrestrial Elliot trap nights	180 Terrestrial Elliot trap nights	Combined Elliot trapping must equate to 100 trap nights over 3-4 consecutive nights / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Surveys undertaken satisfy guideline by 220%.
<b>SMALL TERRESTRIAL MAMMALS (cont.) -Eastern Chestnut</b>	<b>Pitfall traps with drift nets</b>	12 pitfall trap nights	15 pitfall trap nights	-	-	24 trap nights over 3-4 consecutive nights / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Survey guideline not met.  Additional effort undertaken for small terrestrial mammal Elliot trapping to compensate for deficiencies.

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Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
<b>Mouse</b>	<b>Hair Tube Survey</b>	100 hair tube nights	-	200 hair tube nights	-	10 large and 10 small hair tubes in pairs for at least 4 days and 4 nights / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Survey guideline not met for survey areas B and D.  Surveys undertaken exceed guideline for survey areas A and C.  Additional effort undertaken for small terrestrial mammal Elliot trapping to compensate for deficiencies.
	<b>Spotlighting</b>	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	(on foot or from vehicle) -2 x 1hr and 1km up to 200 hectares of stratification unit, walking at approx. 1km per hour on 2 separate nights.	Surveys undertaken satisfy guideline by 250%.
	<b>Collection of predator scats</b>	Opportunistic	Opportunistic	Opportunistic	Opportunistic	Opportunistic.	Surveys undertaken satisfy guideline.
<b>ARBOREAL MAMMALS</b> <b>Brush-tailed Phascogale</b> <b>Koala</b> <b>ARBOREAL MAMMALS (cont)</b> <b>Eastern</b>	<b>Arboreal Mammal Elliot trapping</b>	90 Arboreal Elliot trap nights	75 Arboreal Elliot trap nights	120 Arboreal Elliot trap nights	120 Arboreal Elliot trap nights	24 trap nights over 3-4 consecutive nights / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Surveys undertaken satisfy guideline by 420%.
	<b>Arboreal Hair Tube Survey</b>	100 hair tube nights	-	200 hair tube nights	-	3 tubes in each of 10 habitat trees up to 100 hectares of stratification unit, for at least 4 days and 4 nights.	Survey guideline not met for survey areas B, C and D.

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Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
Pygmy-possum Yellow-bellied Glider Squirrel Glider	<b>Spotlighting</b>	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	(on foot or from vehicle) -2 x 1hr and 1km up to 200 hectares of stratification unit, walking at approx. 1km per hour on 2 separate nights.	Surveys undertaken satisfy guideline by 250%.
	<b>Call Playback</b>	-1 survey	-8 surveys on separate nights	-7 surveys on separate nights	-2 surveys on separate nights	2 sites per stratification unit (up to 200ha).	Survey guidelines meet for survey areas B, C and D. Only 1 site undertaken in survey area A, however several nearby sites were undertaken in other survey areas.  It is considered that no further survey is necessary.
	<b>Stag-watching</b>	Undertaken during spotlighting surveys	Undertaken during spotlighting surveys	Undertaken during spotlighting surveys	Undertaken during spotlighting surveys	1 survey / per 50ha stratification unit, plus additional effort required for every additional 100ha.	Undertaken during spotlighting surveys.

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Threatened Fauna Species	Survey Methodology	Survey Effort Per Stratification unit/Survey Area				Suggested Minimum Survey Guideline (DECC 2004)	Survey Evaluation
		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
	<b>Search for scats and signs</b>	Undertaken at each trapping transect & opportunistic ally throughout site  18hrs (6 x 30min searches x 6 days)  4 targeted Koala scat and sign searches	Undertaken at each trapping transect & opportunistic ally throughout site  15hrs (5x30min searches x 5 days)	Undertaken at each trapping transect & opportunistic ally throughout site  49.5hrs (11x 30min searches x 9 days)  8 targeted Koala scat and sign searches	Undertaken at each trapping transect & opportunistic ally throughout site  6 hrs (3 x 30min searches x 4 days)  2 targeted Koala scat and sign searches	30 minutes searching each relevant habitat, including trees for scratch marks / per 50ha stratification unit, plus additional effort for every additional 100 hectares.	Surveys undertaken satisfy guideline by 4425%.
	<b>Collection of predator scats</b>	Opportunistic	Opportunistic	Opportunistic	Opportunistic	Opportunistic.	Surveys undertaken satisfy guideline.
<b>Common Blossom Bat</b>	<b>Mist Netting</b>	-	-	-	-	1 trap for 2hrs x 2 nights / 100ha stratification unit.	Survey guideline not met.  Additional effort undertaken for spotlighting to compensate for deficiencies.
	<b>Spotlighting</b>	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	1hr x 2 nights / per 100ha stratification unit.	Surveys undertaken satisfy guideline by 250%.

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		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
Grey-headed Flying-fox	Spotlighting	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	1 hr x 2 nights / per 100ha stratification unit.	Surveys undertaken satisfy guideline by 250%.
	Diurnal Habitat Search	<p>Targeted diurnal search undertaken across all stratification units.</p> <p>Opportunistic diurnal search undertaken while completing other method specific surveys across all stratification units.</p> <p>Summer Survey - 26hrs over 6 days. Autumn Survey - 61hrs over 11 days. Winter Survey - 19.5hrs over 7 days. Spring Survey - 13hrs over 4 days.</p>				Search for bat excreta at or near potential habitats.	Surveys undertaken satisfy guideline.
<b>MICRO BATS</b> -Yellow-bellied Sheath-tail-bat -Eastern Freetail-bat -Large-eared Pied Bat -Little Bentwing-bat -Eastern Bentwing-bat -Eastern False Pipistrelle -Greater Broad-nosed Bat -Southern Myotis	Harp Trapping	3 trap nights during peak seasonal activity period	3 trap nights during peak seasonal activity period	3 trap nights during peak seasonal activity period	-	4 trap nights over 2 consecutive nights / per 100ha stratification unit (October to March).	Survey guideline not met.  Additional effort undertaken for ultrasonic call recording to compensate for deficiencies.
	Ultrasonic Call Recording	4 ultrasonic call recording surveys undertaken over >2 nights	14 ultrasonic call recording surveys undertaken over >2 nights	11 ultrasonic call recording surveys undertaken over >2 nights	2 ultrasonic call recording surveys undertaken over >2 nights	2 devices overnight (min 4 hrs) x 2 nights / per 100ha stratification unit (October to March).	Surveys undertaken satisfy guideline overall by 193%.  Only 2 surveys undertaken in Survey Area D.
	Spotlighting	-3 survey nights (1-2 hours per night)	-8 survey nights (1-2 hours per night)	-7 survey nights (1-2 hours per night)	-2 survey nights (1-2 hours per night)	1 hr x 2 nights / per 100ha stratification unit.	Surveys undertaken satisfy guideline by 250%.

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		Survey Area A (18ha)	Survey Area B (75ha)	Survey Area C (72ha)	Survey Area D (30ha)		
	<b>Diurnal Searches</b>	<p>Targeted diurnal searches undertaken across all stratification units.</p> <p>Opportunistic diurnal search undertaken while completing other method specific surveys across all stratification units.</p> <p>Summer Survey - 26hrs over 6 days. Autumn Survey - 61hrs over 11 days. Winter Survey - 19.5hrs over 7 days. Spring Survey - 13hrs over 4 days.</p>				Search for bat excreta at or near potential habitats.	Surveys undertaken satisfy guideline.



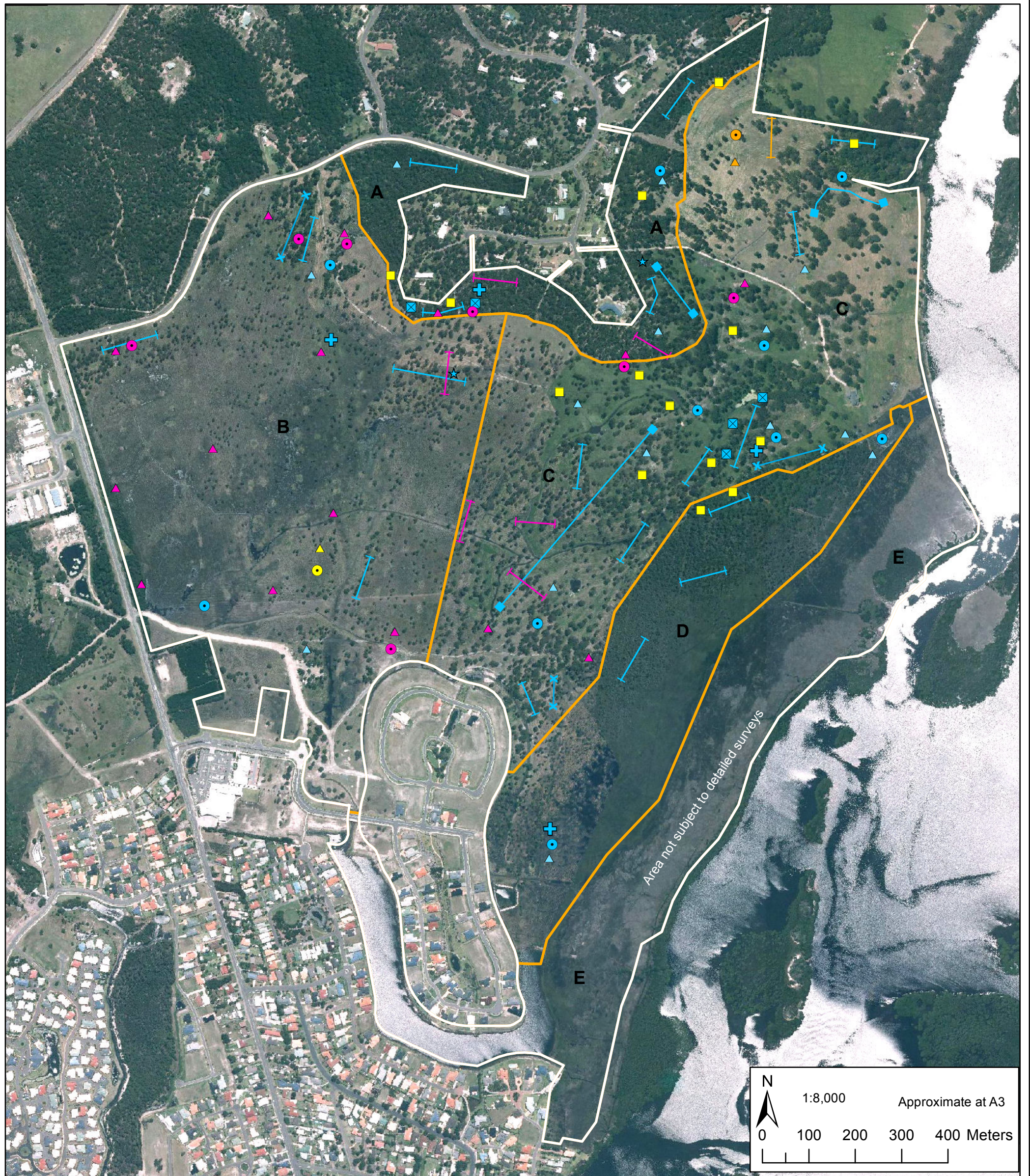
#### **1.4 CONCLUDING COMMENTS**

The survey methodologies and effort documented by DEC (2004) are intended as a guideline and the selection of survey methods required depends on the investigator's assessment of the site, with appropriate justification. The large number of fauna species observed within the site reflects the comprehensive effort applied for fauna surveys over a period over many years.

The surveys undertaken in most cases significantly exceed the guidelines provided by DEC (2004). Methodologies such as pitfall trapping, cage trapping, hair tube surveys, harp trapping and mist netting were determined to be not as effective as other targeted survey methodologies, for reasons including the open and disturbed conditions of the site, potential damage to survey equipment and risk of harm to captured fauna by livestock and inundation of some habitats. Where the minimum survey guideline was not met for a particular method, additional effort was applied for an alternative method acceptable for detection of the target species.

It is therefore considered that the level of surveys undertaken is justified as appropriate for the detection of the threatened fauna species targeted.





**Legend**

- |   |  |   |   |  |
|---|--|---|---|--|
| <ul style="list-style-type: none"> <li>◻ Subject Site Boundary</li> <li>▲ Anabat, 2004</li> <li>● Nocturnal Survey Point, 2004</li> <li>▲ Anabat, 2005</li> </ul> | <ul style="list-style-type: none"> <li>● Nocturnal Survey Point, 2005</li> <li>▲ Anabat, 2007</li> <li>● Nocturnal Survey Point, 2007</li> </ul> | <ul style="list-style-type: none"> <li>▲ Anabat, 2008</li> <li>⊕ Harp trap, 2008</li> <li>● Nocturnal Survey Point, 2008</li> <li>★ Pitfall Trap, 2008</li> <li>⊠ Single Cage Trap, 2008</li> </ul> | <ul style="list-style-type: none"> <li>— Elliot Trapline, 2004</li> <li>— Elliot Trapline, 2005</li> <li>— Elliot Trapline, 2008</li> <li>— Cage Trapline, 2008</li> <li>— Hair Tube, 2008</li> </ul> | <p><b>Survey Areas</b></p> <ul style="list-style-type: none"> <li>◻ A Northern Slopes Open Forest</li> <li>◻ B Western Lowlands Woodland</li> <li>◻ C Central Northern Open Forest/Woodland</li> <li>◻ D Eastern Swamp Forest</li> <li>◻ E Estuarine Wetlands</li> </ul> |
|---|--|---|---|--|

Plan for indicative purposes only. Not for detailed measurement. Plan produced in A3 colour.



ABN: 62 274 841 042  
 PO Box 4300  
 78 York Street  
 East Gosford NSW 2250  
 Ph: (02) 4324 7888  
 Fax: (02) 4324 7899  
 cegconsult@bigpond.com

Drawing No.	2042	Date	13/07/12
Drawn By	DC	Date	
Amendment		Date	
A			
B			
C			

**Figure 1**  
**Fauna Survey Locations 2004-2008**

Riverside Tea Gardens

Source: Aerial © Department of Lands 2012