



# Failford Road to Tritton Road

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Review of environmental factors - Appendix G  
Supplementary flora and fauna investigations

May 2008



## **HLA Envirosciences / NSW Roads & Traffic Authority**

### **Review of Flora & Fauna Assessment Report prepared for Pacific Highway Upgrade Failford Road to Tritton Road Review of Environmental Factors**

February 2008

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## 1 INTRODUCTION

AHA Ecology was commissioned by HLA Envirosiences Pty Ltd undertake a review of the *Review of Flora and Fauna - Pacific Highway Upgrade Failford Road to Tritton Road* report which was prepared by HLA-Envirosiences Pty Ltd for the NSW Roads and Traffic Authority (RTA) July 2006.

The proposal involves the establishment of a new southbound carriageway adjacent to the existing southbound carriageway. This would enable the current southbound carriageway to become the northbound carriageway and much of the existing northbound carriageway to be utilised as a two-way local service road linking Possum Brush Road, Bullocky Way, St Peters Close and local properties to the Failford Road interchange. The proposed works are to be undertaken in two stages (HLA Envirosiences 2006):

- **Stage 1** – establish new southbound carriageway, the two-way service road and a grade-separated interchange at Failford Road; and
- **Stage 2** – construction of Bullocky Way overbridge to link Failford Road and Bullocky Way to the service road, providing a connection across the highway between Possum Brush and Failford.

## 2 METHODS

### Site Inspection

A site inspection was conducted by AHA Ecology on 5 July 2007 to verify the findings of the *Review of Flora and Fauna - Pacific Highway Upgrade Failford Road to Tritton Road* report (HLA Envirosciences 2006) and to gather additional information to assist the review process.

### Literature Review

Available literature and database records pertaining to the site and locality (i.e. within a 10 km radius) were reviewed to account for any newly listed species and records within the locality. The literature reviewed included:

- NSW Department of Environment and Climate Change (DECC) – Threatened species database records (DECC 2007). Results were mapped by HLA ENSR; and
- Commonwealth Government Department of Environment, Heritage, Water and the Arts (formerly the Department of Environment and Water Resources) – Online protected matters search tool for Matters of National Environmental Significance (NES) (DEW 2007 – Accessed 11 July 2007);
- Greater Taree City Council (GTTC) Vegetation Mapping (2000); and
- *Review of Flora and Fauna – Pacific Highway Upgrade Failford Road to Tritton Road* report (HLA Envirosciences 2006).

### Limitations

This study involved the review of limited available background information and a brief site inspection. No original field notes were sighted. The site inspection was restricted to a one day survey of a large area with no detailed surveys and site access was limited due to land ownership constraints. Consequently, it is likely that a number of species, whether resident or transitory to the study area or cryptic species, may utilise the study area but have not been detected during the site inspection due to the limited survey effort. Therefore the precautionary principle has been evoked in this report with regards to the potential presence of threatened species within the study area where considered necessary.

### 3 RESULTS

#### 3.1 Literature Review

Key findings from the literature review are outlined below. The literature review included updated threatened species database searches and an assessment of the likelihood of threatened species occurring within the study area and has been included in Section 3.4. Searches for evidence of use by those threatened species highlighted in the review as being of particular concern such as the Powerful Owl (*Ninox strenua*), were also undertaken.

HLA Envirosciences (2006) carried out an ecological assessment of the proposed route between 5 and 7 October 2005. Key findings detailed in the *Review of Flora and Fauna – Pacific Highway Upgrade Failford Road to Tritton Road* report include:

- An egg with the potential to be from a Powerful Owl was found at the base of a tree between the north and south bound lanes;
- Presence of hollow-bearing trees;
- Taller trees either side of the carriageway would provide dispersal opportunities for gliders;
- No threatened species, endangered populations or endangered ecological communities were recorded, although potential habitat was present for some species;
- Glider feed scars recorded in the northern section;
- Potential Core Koala Habitat as defined under *State Environmental Planning Policy (SEPP) 44 – Koala Habitat Protection* present within study area; and
- No significant impacts from the proposal anticipated.

#### 3.2 Vegetation Communities

Table 1 below lists the proposed amount of vegetation clearance the proposal within the GTCC LGA. The majority of the vegetation within the GTCC LGA occurs on the western side of the current highway and is largely outside of the works area. Consequently the majority of the vegetation would be retained.

Results of a brief assessment of the vegetation present in the south of the study area previously mapped by HLA (2006) as Paperbark / Brush Box / Swamp Oak and Small Fruited Grey Gum by GTCC (2000) suggested that this vegetation may be characteristic of the endangered ecological community (TSC Act) *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions*. The attributes for determining the presence of this community are listed below in Table 2 (NSW Scientific Committee 2004) and each addressed with regards to the characteristics of the Paperbark / Brush Box / Swamp Oak found within the study area. When each

of these attributes were addressed it was concluded that the Paperbark / Brush Box / Swamp Oak was unlikely to represent a stand of the endangered ecological community *Swamp Oak Floodplain Forest* as the site does not fall within the specified elevation and has only a small number (6 out of 45) of the listed characteristic species. However, it should be noted that detailed surveys were not undertaken therefore the actual number of characteristic species present may be greater.

**Table 1 Proposed vegetation clearance within GTCC LGA**

<b>Vegetation Community</b>	<b>Amount to be cleared within GTCC section of study area (ha)</b>
Mahogany / Ironbark / Grey Gum / Blackbutt and Grey Gum / Grey Ironbark / White Mahogany	1.45*
Grey Gum / Grey Ironbark / White Mahogany	0.03*
<b>Note:</b> * = Estimated areas of vegetation clearance provided by HLA (2008).	

**Table 2 Defining attributes of *Swamp Oak Floodplain Forest***

<b>Attribute</b>	<b>Present at site</b>
Associated with grey-black clay-loams and sandy loams.	Yes
Where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains.	Yes
Occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions.	No – elevation approximately 30 m
Community structure - open forests to low woodlands, scrubs or reedlands with scattered trees.	Open forest
Community is characterised by the assemblage of species as outlined in the Final Determination (NSW Scientific Committee 2004).	6 of the 45 listed species recorded.
Local Government Areas listed with known occurrence of community.	Yes – Greater Taree

Attribute	Present at site
Dominance by a tree canopy of either <i>Casuarina glauca</i> or, more rarely, <i>Melaleuca ericifolia</i> with or without subordinate tree species; the relatively low abundance of <i>Eucalyptus</i> species; and the prominent groundcover of forbs and graminoids.	Canopy dominated by <i>Casuarina glauca</i> with groundcover of forbs and graminoids although disturbed due to cattle activity.
Occupies low-lying parts of floodplains, alluvial flats, drainage lines, lake margins and fringes of estuaries; habitats where flooding is periodic	Yes
Soils show some influence of saline ground water	Unknown
<b>Note:</b>  * = detailed surveys were not undertaken therefore the actual number of characteristic species present may be greater.	

### 3.3 Fauna Habitat

#### Ground-dwelling Mammals

Potential habitat for ground-dwelling mammals was limited as most of the study area supported an open understorey. Fallen logs were limited and ground-dwelling mammal habitat is likely to be restricted to dense areas of vegetation adjacent to riparian habitat. A runway leading to and from a watercourse within the study area (Figure 1, C1) through dense riparian vegetation was recorded during the inspection suggesting that small ground-dwelling mammals do inhabit the area. Macropods are also likely to utilise the study area but the primary mammal species using the area are likely to be introduced species, such as the House Mouse (*Mus musculus*), European Red Fox (*Vulpes vulpes*) and Domestic Cat (*Felis catus*).

#### Arboreal Mammals

Habitat features for arboreal mammals present within the study area included:

- Nectar producing trees;
- Hollow-bearing trees;
- Other foraging habitat;
- Koala feed trees; and
- Movement corridors.

## Microchiropteran Bats

Foraging resources for microchiropteran bats were present within the study area and roosting habitat was present for hollow-dependant species.

## Woodland Birds

Foraging and nesting resources for woodland birds were present throughout the study area and the dense vegetation along riparian areas would provide shelter for small birds.

## Birds of Prey

Nesting and foraging habitat for birds of prey was present within the woodland parts of the study area. The open pasture areas would also provide foraging habitat for these species.

## Owls

Potential habitat for owl species within the study area included limited nesting habitat in the form of hollow-bearing trees and foraging habitat throughout woodland, roadside and pasture areas.

### 3.4 Threatened Species

AHA Ecology undertook updated DECC (28 June 2007) and DEW (11 July 2007) database searches for the study area. Those threatened species recorded within the locality (DECC 2007a) or considered to have the potential to occur are listed in Table 3 together with their current conservation status and an assessment as to whether the study area provides potential habitat for the species. Although there are a number of threatened species records within the locality there are no records within the proposed impact area.

However, habitat for a number of threatened species is present within the study area (see Table 3) and there is the potential that they may occur within the study area but not have been detected during the initial survey due to a number of factors including cryptic habits, transitory species and the limited survey effort. Therefore an assessment of the potential impacts of the proposal on the habitat for these species should be undertaken in accordance with Section 5A of the EP&A Act. Assessments of Significance were undertaken for some species in the *Review of Flora and Fauna - Pacific Highway Upgrade Failford Road to Tritton Road*. Based on the proposed footprint provided and updated database searches, those additional species for which formal assessment is recommended due to potential impacts on habitat include:

- Leafless Tongue Orchid (*Cryptostylis hunteriana*);
- Swift Parrot (*Lathamus discolor*);
- Large-footed Myotis (*Myotis adversus*); and
- Green and Golden Bell Frog (*Litoria aurea*).

In addition an assessment of the significance of the potential impacts in accordance with the EPBC Act *Policy Statement 1.1 – Significant Impact Guidelines* (DEW 2006) should be undertaken to determine if there is likely to be any impact on any of the EPBC Act listed species to determine if a Referral is required. The guidelines list different criteria for endangered and vulnerable species and therefore the relevant criteria need to be address. Those species for which this initial formal assessment is recommended include:

- Leafless Tongue Orchid;
- Swift Parrot;
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Spotted-tailed Quoll (*Dasyurus maculatus*); and
- Green and Golden Bell Frog.

**Table 3           Threatened species recorded within the locality or with the potential to occur**

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Likelihood of occurring within study area
<b>Flora</b>				
<i>Allocasuarina defungens</i>	Dwarf Heath Casuarina	E	E	Unlikely. No suitable habitat present.
<i>Allocasuarina simulans</i>	Nabiac Casuarina	V	V	Unlikely. No suitable habitat present.
<i>Asperula asthenes</i>	Trailing Woodruff	V	V	Potential habitat present along creeks and drainage lines.
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	Potential habitat present within study area.
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	Potential habitat present in the north of the study area.
<i>Maundia triglochinos</i>		V		Potential habitat present within some creeks and drainage lines.
<i>Senna acclinis</i>	Rainforest Cassia	E		Potential habitat present in northern part of study area.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Likelihood of occurring within study area
<b>Fauna</b>				
<b>Avifauna</b>				
<i>Botaurus poiciloptilus</i>	Australasian Bittern	V		Unlikely. No suitable habitat present.
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V	V	Potential foraging and nesting habitat present.
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E		Unlikely. No suitable habitat present.

<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V		Unlikely. No suitable habitat present.
<i>Haematopus longirostris</i>	Pied Oystercatcher	V		Unlikely. No suitable habitat present.
<i>Ixobrychus flavicollis</i>	Black Bittern	V		Unlikely. No suitable habitat present.
<i>Lathamus discolor</i>	Swift Parrot	E	E	Potential foraging habitat present including, Spotted Gum, Pink Bloodwood and Forest Red Gum.
<i>Lophoictinia isura</i>	Square-tailed Kite	V		Potential foraging and nesting habitat present.
<i>Ninox connivens</i>	Barking Owl	V		Potential foraging and limited nesting habitat present.
<i>Ninox strenua</i>	Powerful Owl	V		Potential foraging and limited nesting habitat present.
<i>Pandion haliaetus</i>	Osprey	V		Unlikely. No suitable habitat present.
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V		Unlikely. No suitable habitat present.
<i>Sterna albifrons</i>	Little Tern	E		Unlikely. No suitable habitat present.
<i>Tyto capensis</i>	Grass Owl	V		Unlikely. No suitable habitat present.



Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Likelihood of occurring within study area
<i>Tyto novaehollandiae</i>	Masked Owl	V		Potential foraging and limited nesting habitat present.
<i>Tyto tenebricosa</i>	Sooty Owl	V		Unlikely. No suitable habitat present.
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	E	Unlikely. No suitable habitat present or very limited.
<b>Mammals</b>				
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	Potential foraging and limited denning habitat present.
<i>Miniopterus australis</i>	Little Bentwing-bat	V		Potential foraging habitat present.
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V		Potential foraging habitat present.
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V		Potential foraging and roosting habitat present.
<i>Myotis adversus</i>	Large-footed Myotis	V		Potential foraging and roosting habitat present.
<i>Petaurus australis</i>	Yellow-bellied Glider	V		Limited potential habitat present. Feed scars recorded during previous survey questionable.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		Potential foraging and denning habitat present.
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V		Potential foraging and denning habitat present.
<i>Phascolarctos cinereus</i>	Koala	V		Potential habitat present.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Potential foraging habitat present.
<i>Syconycteris australis</i>	Common Blossom-bat	V		Unlikely. No suitable habitat present.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Likelihood of occurring within study area
<b>Amphibians</b>				
<i>Crinia tinnula</i>	Wallum Froglet	V		Unlikely. No suitable habitat present.
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	Potential habitat present within study area.
<b>Note:</b> EPBC Act = <i>Environment Protection and Biodiversity Conservation Act 1999</i> ; TSC Act = <i>Threatened Species Conservation Act 1995</i> ; and E = Endangered, V = Vulnerable.				

### Migratory Species

A search of the EPBC Protected Matters Search Tool (DEW 2007 – Accessed 11 July 2007) was undertaken to identify any migratory species with the potential to occur within a 10 km radius of the study area. These species are listed in Table 4 below together with an assessment of the likelihood that they would occur at the site based on the presence of potential habitat. Given that the proposal would only impact on a narrow strip of vegetation and these species naturally travel long distances and can therefore forage in other nearby areas, it is unlikely that the proposal would have a major impact on any of these species or their habitat.

**Table 4 Migratory species with the potential to occur within a 10 km radius of the study area (DEW 2007)**

Scientific Name	Common Name	Likelihood of occurring within study area
<i>Ardea alba</i>	Great Egret, White Egret	Potential habitat present within study area.
<i>Ardea ibis</i>	Cattle Egret	Potential habitat present within study area.
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Limited potential habitat present within study area.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Potential foraging habitat present within study area.
<i>Hirundapus caudacutus</i>	White-throated Needletail	Potential foraging habitat present within study area.
<i>Merops ornatus</i>	Rainbow Bee-eater	Potential foraging habitat present within study area.

<i>Monarcha melanopsis</i>	Black-faced Monarch	Potential habitat present within the study area.
<i>Monarcha trivirgatus</i>	Spectacled Monarch	Unlikely. No suitable habitat present.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Unlikely. No suitable habitat present.
<i>Rhipidura rufifrons</i>	Rufous Fantail	Potential habitat present in the south of the study area.
<i>Rostratula benghalensis</i> *	Painted Snipe	Unlikely. No suitable habitat present.
<i>Xanthomyza phrygia</i> *	Regent Honeyeater	Unlikely. No suitable habitat present or very limited.
<b>Note:</b> * = Also listed as threatened under the EPBC Act & TSC Act.		

### 3.5 Aquatic Habitat

Aquatic habitats within the study area include creeks, drainage lines and dams. A brief habitat assessment of the majority of the watercourses present within the study area was undertaken during the site inspection. Table 5 lists the watercourses surveyed and Figure 1 illustrates their location. Given that the majority of the watercourses within the study area are ephemeral, currently support culverts and water quality appears poor due to the surrounding landuses, it is unlikely that they would provide habitat for any threatened fish or invertebrate species. Furthermore, features likely to provide fish habitat such as overhanging vegetation, rocky areas and snags were limited. Therefore it is unlikely that the waterways within the study area would provide habitat for threatened fish species although these creeks and drainage lines would provide dispersal routes for some fish and invertebrates during flood events. As a precautionary measure and to cater for native fish species that may be present within the waterways, it is recommended that all watercourse crossings be designed and established in accordance with *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterways* (Fairfull & Wetheridge 2003).

**Table 5 Aquatic Habitat Descriptions**

Code	Location	Appearance of Water	Dominant Riparian Vegetation	Habitat features	Current disturbance
C1	South of Possum Brush Road	No water present	Exotic species including Lantana ( <i>Lantana camara</i> ) and Wild Tobacco ( <i>Solanum mauritianum</i> ).	Pebble and cobble substrate	Two box culverts.
C2	South of Failford Road.	Clear	Mixture of native and exotic vegetation. Swamp Oak ( <i>Casuarina glauca</i> ), <i>Mealeuca quiquenervia</i> , Blady Grass, <i>Chloris</i> , Purpletop ( <i>Verbena bonariensis</i> ).  Exotic species more prominent close to road.	Artificial habitat features such as boulders near culverts  Pools downstream  Dammed downstream  Bullrush ( <i>Typha orientalis</i> ) and other macrophytes instream	Box culverts.  Pugging from cattle.
C3	North of Failford Cemetery	Milky, flowing	Native canopy of Blue Gum and Grey Gum. Exotic understorey of Privett ( <i>Ligustrum sinense</i> ), Lantana, Bracken and Cobblers Peg ( <i>Bidens pilosa</i> ).		Piped culvert.
C4	South of Bullocky Way (western side)	Milky	Turpentines ( <i>Syncarpia glommulifera</i> ). Understorey exotic including Wild Tobacco, Cobblers Peg, Privett and Lantana.	Instream exotic macrophytes.	Piped culvert.  Bank erosion.
C5	North of C4. South of Bullocky Way (western side)		Lantana infestation adjacent to the road.  Blue Gums.	Rocky substrate.	Gross pollutant trap.  Box culvert.

Code	Location	Appearance of Water	Dominant Riparian Vegetation	Habitat features	Current disturbance
D1	South of Possum Brush Road	No water present	Blue Gum ( <i>Eucalyptus saligna</i> ), Grey Gum ( <i>Eucalyptus propinqua</i> ) and Lantana.		Piped culvert.
D2	North of Bullocky Way	No water present	Exotic species.		Artificial drainage line. Piped culvert.
D3	South of Bullocky Way	Turbid	Primarily native – Grey Ironbark ( <i>Eucalyptus siderophloia</i> ), Blady Grass ( <i>Imperata cylindrica</i> ), Kangaroo Grass ( <i>Themeda australis</i> ), Spiny Mat Rush ( <i>Lomandra longifolia</i> ), Bracken ( <i>Pteridium esculentum</i> ).	Snag <i>Eleocharis</i> instream Pools present	Culvert.
D4	South of Bullocky Way		Black She-oak ( <i>Allocasuarina littoralis</i> ), Lantana infestation but other parts support native understorey.  Blue Gums on eastern side of highway.		Piped culvert and gabion.
D5	South of Bullocky Way	Milky	Grey Ironbark, Grey Gum.  Grassy understorey of Kangaroo Grass, Blady Grass, Weeping Grass ( <i>Microlaena stipoides</i> ), <i>Aristida</i> sp.	Pool  <i>Cyperus</i> instream on edge	
D6	South of Bullocky Way (eastern side)		Highly modified.  Cabbage Palm ( <i>Livistona australis</i> ), Silky Oak ( <i>Grevillea robusta</i> ), Brushbox ( <i>Lophostemon confertus</i> ).		Culvert.



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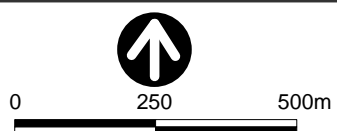


Figure 1

Aquatic Habitat Survey  
Locations  
NSW Roads & Traffic Authority



### 3.6 Key Threatening Processes, Recovery Plans and Threat Abatement Plans

#### Key Threatening Processes

A number of Key Threatening Processes are relevant to the proposal. Those listed in the *Review of Flora and Fauna - Pacific Highway Upgrade Failford Road to Tritton Road* included:

- Clearing of native vegetation / land clearance (TSC & EPBC Acts);
- Invasion of native plant communities by exotic perennial grasses (TSC Act); and
- Removal of dead wood and dead trees (TSC Act).

Other Key Threatening Processes considered relevant to the proposal include:

- Alteration of natural flow regimes in rivers and streams and their floodplains and wetlands (TSC Act) – through the installation of culverts and clearing of riparian vegetation;
- Predation by *Gambusia holbrooki* (Plague Minnow) (TSC Act) – recorded within the watercourse within the swamp forest in the south of the study area and may occur in other watercourses throughout the study area; and
- Loss of hollow-bearing trees (TSC Act – pending finalisation).

In order to minimise or mitigate the potential for the proposal to result in the following Key Threatening Processes it is recommended that culverts are designed in accordance with the fisheries guidelines *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterways* (Fairfull & Wetheridge 2003) and to minimise the channelling effect on water caused by the culverts.

It is unlikely that the proposed works would spread Plague Minnow but efforts should be made to design waterway crossings to minimise the creation of habitat conducive to the establishment of Plague Minnow.

Hollow-bearing tree removal should be avoided where possible.

#### Recovery Plans

The following recovery plans have been finalised and are relevant to species with the potential to be impacted by the proposal:

- Large Forest Owls; and
- Yellow-bellied Glider.

A number of other recovery plans are also relevant to the proposal but are pending finalisation. These include:

- Barking Owl;
- Koala; and
- Green and Golden Bell Frog.

### **Threat Abatement Plans**

A threat abatement plan has been prepared for *Predation by Plague Minnow*. This plan is relevant to the proposal as Plague Minnow were recorded within some of the watercourses within the study area and the study area supports potential habitat for the threatened Green and Golden Bell Frog. Green and Golden Bell Frog Tadpoles are known to be susceptible to predation by Plague Minnow.

### **3.7 Connectivity & Corridors**

The proposed road widening may further fragment areas of habitat for some species and may isolate others if connectivity is not maintained. Impacts due to fragmentation from the road are likely to be greatest on arboreal and ground dwelling mammals. The culverts would enable some amphibians to pass between habitats on the eastern and western sides of the road and the highly mobile nature of birds and bats means that a road would not necessarily obstruct their movement pathways although road kill is still a serious threat to such species.

In the *Review of Flora and Fauna - Pacific Highway Upgrade Failford Road to Tritton Road* three main wildlife corridors were identified and overhead crossings recommended in these areas. Species such as Koalas and Possums would require the overhead crossings to enable them to move between habitats on the eastern and western sides of the road and gliders may also utilise these structures. However in addition to overhead crossings, attempts should also be made to maintain as many tall trees either side of the road and within the median strip to provide alternate crossing locations for gliders.

The location of the overhead crossing would need to be in close proximity to larger stands of vegetation as these are the areas most likely to be used by fauna. The northern and southern crossing locations appear to be the most suitable options for those areas. However, it may be useful to shift the crossing in the central part of the study area slightly to the south to encompass the central stand of vegetation currently between the two carriageways to provide an additional refuge and prevent the need for an extensive overhead crossing at the interchange.



#### 4 RECOMMENDATIONS

- Tall trees should be maintained either side of the road and within the road reserve where possible to enable gliders to glide across the road. The Sugar Glider and Squirrel Glider can glide about 50 m whereas the larger Yellow-bellied Glider can cover distances of up to 140 m (DECC 2006);
- Sediment detention basins and similar structures should be installed during construction to trap runoff;
- All watercourses should be protected from indirect impacts through installation of sediment detention structures and placing soils that may contain seeds of exotic species well away from watercourses;
- Clearing of hollow-bearing trees should be undertaken outside the breeding season of the Eastern Freetail-bat (*Mormopterus norfolkensis*) to minimise potential impacts on breeding;
- All watercourse crossings should be designed and established in accordance with *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterways* (Fairfull & Wetheridge 2003); and
- No evidence of breeding activities (eg. pellets or wash) of large forest owls was recorded during the site inspection. However, undertaking construction near areas providing potential nesting habitat for owls (i.e. vegetated section between northern and southern carriageways) outside the winter breeding period for most owl species is recommended as a precautionary measure.
- Investigate the potential for fauna mitigation measures within the study area. The exact number and nature of the mitigation measures would be subject to further investigation and expert advice, in addition to consultation with DECC and DPI (Fisheries), during the detailed design stage.
- Undertake additional investigations during the detailed design phase to assess the potential use of tree hollows within the study area, and identify potential mitigation measures to implement during construction activities and operation.
- Develop and implement a weed and soil pathogen (including phytophthora) management strategy prior to the commencement of earth earthworks.
- Develop measures to avoid the importation and transportation of weeds and soil borne pathogens.
- Revegetate using seed sourced from local Eucalyptus sp. and shrubs, particularly species that have abundant nectar and pollen.
- Develop a map showing the sensitive environmental areas in and adjacent to the construction site as part of the CEMP.

## 5 REFERENCES

HLA Envirosiences Pty Ltd 2006 **Review of Flora and Fauna – Pacific Highway Upgrade Failford Road to Tritton Road**. Prepared for NSW Roads and Traffic Authority, Parramatta.

NPWS 2004 **Gliding Possums**. NSW National Parks & Wildlife Service, Hurstville.

DECC 2007a **Threatened Species Database Records**. Department of Conservation and Climate Change, Hurstville.

DECC 2007b **Narrow-leaved Red Gum population in the Greater Taree LGA – profile**. Department of Conservation and Climate Change, Hurstville.

DEW 2006 **EPBC Act Policy Statement 1.1 – Significant Impact Guidelines**. Department of Environment and Heritage, ACT.

DEW 2007 **Protected Matters Search Tool – Matters of National Environmental Significance**. Online: <http://www.environment.gov.au/erin/ert/epbc/index.html>. Department of Environment and Water Resources, Canberra, ACT.

Fairfull S and Witheridge G 2003 **Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings**. NSW Fisheries, Cronulla.

GTCC 2000 **Greater Taree City Council Vegetation Mapping**. Greater Taree City Council, Taree, NSW.

NSW Scientific Committee 2004. **Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions Endangered Ecological Community Listing – Final Determination**. NSW National Parks and Wildlife Service, Hurstville.



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