

5.1

POTENTIAL IMPACTS AND MITIGATION MEASURES

Potential direct and indirect impacts considered in preparation of the proposed residential development on native flora and fauna include the following.

- Removal of threatened species foraging and nesting habitat in the form of mature trees and shrubs.

The proposal will result in the removal of potential habitat for the Squirrel Glider and Brush-tailed Phascogale. Although the proposal will result in the removal of foraging habitat for the threatened species recorded within the site, feed trees will be retained within the development and there is sufficient foraging habitat within adjacent areas of vegetation. Therefore the proposal is unlikely to cause changes in foraging behaviour for any of the threatened species recorded on the site.

- Removal of nine hollow-bearing trees.

The proposal will result in the removal of approximately nine hollow-bearing trees from the site. As part of this proposal nest boxes and bat boxes for the threatened species that have been recorded on the site will be installed in trees to be retained prior to any vegetation removal. This will provide alternative potential habitat for species that may currently utilise the hollow-bearing trees on site. There are no other key habitat features within the site.

- Removal of foraging and nesting resources for native bird species.

The proposal will result in the removal of some foraging and nesting resources for native bird species. However, the amount of vegetation to be removed is small considered to similar habitat and vegetation within adjacent Hat Head National Park and other neighbouring areas. Therefore bird species within the locality are unlikely to be reliant on the site for foraging or nesting resources.

- Increased light, noise and predation from domestic animals associated with residential development.

Cats will be banned from the proposed residential development, landscaping will use endemic species, residents will be educated regarding the use of native species and the planting of species considered to be environmental weeds and Weeds of National Significance will not be permitted.

- Reduction in the area of habitat available for movement of species through the site.

The site has not been included in the regional or subregional corridors that have been identified in the locality (*Figure 3.3*), nor has it been identified as key habitat for any of the fauna assemblages assessed as part of that strategy. In addition, canopy trees retained within the development will be at a maximum distance of 30 m apart, which is unlikely to affect the ability of the Squirrel Glider to move between individual trees if it was to use the site.

Given the limited mobility of the Brush-tailed Phascogale, it is unlikely the species would use the site as a dispersal route once development has occurred.

The proposed development is considered unlikely to impact on the dispersal or migration of the mobile microchiropteran bats or Grey-headed Flying-fox recorded on site, given the sites small size and limited resources.

- Increased pressure on habitat resources within surrounding areas from the potential displacement of fauna species from the site.

It is unknown whether the proposal will result in the displacement of resident species. However, given the amount of similar habitat in adjacent areas, it is likely that there will be adequate resources available to support displaced individuals, as well as resident populations.

- Potential impacts on retained trees from construction activities and increased pedestrian movement.

This can be mitigated through appropriate tree protection measures being implemented during the construction phase.

- Cumulative loss of native habitat from the locality and direct loss of flora species.

The proposal will result in the removal of native flora species. However most of the species recorded were common species that are not unique to the site within the South West Rocks locality. The area of trees to be removed as part of the proposal is considered to contribute only marginally to the cumulative loss of native habitat within the locality.

The following management and mitigation measures will be implemented as part of the development of the site to mitigate and manage the potential impacts on native fauna and flora as detailed in *Section 5.1*.

Retention of as many trees as possible. Retaining trees within the development footprint will maintain some potential foraging and shelter habitat for the gliders and phascogales that utilise the site. It will also maintain the 'stepping stone' link of vegetation with the National Park and to existing vegetation to the north and north east of the site. Appropriate tree protection measures will be implemented during the construction phase.

Retention of hollow-bearing trees. Retaining hollow-bearing trees as shown on the tree retention plan will maintain some potential habitat for native birds, bats and, potentially, the gliders and phascogales recorded on the site.

Installation of habitat boxes in retained trees. Installation of habitat boxes in retained trees will provide potential habitat for gliders, phascogale, microchiropteran bats and small parrots. Habitat boxes will be installed prior to any construction works or removal of vegetation. The provision of habitat boxes in these areas would reduce the potential impacts of increased competition for resources on resident fauna within the National Park from any fauna species that may be displaced from the site.

Removal of vegetation outside of key breeding times of threatened species. Vegetation will only be removed outside of the key breeding times for those threatened species recorded within the site. This will reduce the impacts to the lifecycle and breeding cycles of those species. Key breeding times are provided in *Table 6.1*.

Table 5.1 Breeding times of threatened species recorded on site

Species	Reproductive stage											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Squirrel Glider	[Yellow bar from Jan to Dec]											
Brush-tailed Phascogale	[Red bar from Jan to Dec]											
Grey-headed Flying-fox	[Yellow bar Jan-Mar]						[Red bar Jul-Sep]			[Orange bar Oct-Dec]		
<i>Myotis macropus</i>				[Red bar Apr-May]							[Orange bar Nov-Dec]	
<i>Mormopterus nofolkensis</i>	[Red bar Jan-Feb]		[Red bar Mar-Apr]									[Orange bar Dec]
<i>Miniopterus australis</i>							[Yellow bar Jul-Aug]					
<i>Miniopterus schreibersii</i>					[Yellow bar May-Jun]							[Orange bar Dec]
	[Orange bar Jan]		[Red bar Mar-Apr]									[Orange bar Dec]
Mating	[Yellow bar Jan-Feb]											
Young Born	[Orange bar Jan-Feb]											
Weaning	[Red bar Jan-Feb]											

As the Squirrel Glider can reproduce at any time of the year in response to resources it is recommended that the Brush-tailed Phascogale be used as the key species in determining the best time to undertake vegetation clearance. Therefore it is recommended that clearance be avoided between the months of late April to early October. This period will also avoid any potential impacts to the reproduction of the bats. If nesting Squirrel Gliders are observed during clearance activities then works should cease and DEC be contacted.

From the tree retention plan it appears that the tree containing the Brahminy Kite nest is to be removed. Therefore this should be done between December and early April to avoid the nesting season and to prevent the pair of Kites from returning to the nest to rebuild it.

Banning of cats from the residential development. Banning of cats is an important part of the proposal, given the proximity of the site to Hat Head National Park and the presence of threatened mammals in the immediate area. Methods to prevent any cats in the area from climbing retained trees, such as installing chicken wire or tree collars on the lower sections of tree trunks could also be considered as a method of reducing the potential impacts of increased predation that often result from increased urbanisation.

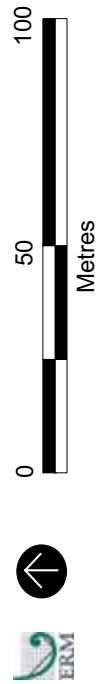
Pre-clearance surveys will be undertaken prior to any removal of trees. Conducting pre-clearance surveys will ensure fauna are not injured when felling trees. Qualified personnel should also be on site to capture any fauna that are displaced during tree removal. The relocation of any fauna captured during vegetation removal should be discussed with DEC prior to tree removal. If any fauna are injured during vegetation clearance then they should be taken to the nearest veterinary clinic for treatment.

Education of residents. It is recommended that future residents are educated through media such as information pamphlets regarding the types of fauna they might encounter on the site or in adjacent vegetation. This will increase awareness and appreciation of the sensitivity of the surrounding environment and the need to adhere to recommended mitigation measures.

Planting of endemic species in landscaped areas. Endemic species will be used in any landscaped areas and residents will be discouraged from planting exotic garden species that may escape into surrounding native vegetation. No environmental weeds or Weeds of National Significance (WONS) will be permitted for planting within the development.



Figure 5.1 Proposed Development Footprint and Results of the Ecological Assessment (ERM 2006)



The Draft Guidelines for Threatened Species Assessment (DEC and DPI 2005) identify important factors and/or heads of consideration that must be considered by proponents and consultants when assessing potential impacts on threatened species, populations, or ecological communities, or their habitats for development applications assessed under Part 3A of the EP & A Act.

Assessment of impacts to the threatened fauna species known from the site and those threatened species considered to have the potential to occur within the site using the Draft Guidelines for Threatened Species Assessment (DEC & DPI 2005) are provided as *Annex E* to this report. Measures to mitigate against the potential impacts of the proposal on native flora and fauna are provided as *Section 5.2* and are incorporated into the Statement of Commitments that form part of the development proposal.

5.3.1

Summary of Assessments

The assessments of impact on threatened species found that:

- the Squirrel Glider and Brush-tailed Phascogale are likely to be disturbed by the proposal, but it is unknown whether any individuals will be displaced;
- the proposed development is considered unlikely to impact on the dispersal or migration of the mobile microchiropteran bats or Grey-headed Flying-fox;
- the site is unlikely to provide a major dispersal corridor for threatened fauna or flora known from the locality and therefore dispersal mechanisms should not be impacted by the proposal; and
- the life cycles of threatened species are unlikely to be impacted by the proposal.

The assessments of impact (*Annex E*) for threatened species considered likely to be impacted by the proposal found that there is likely to be some restriction in movement through the site for the Squirrel Glider and Brush-tailed Phascogale, but that the movement and dispersal of the microbats and Grey-headed Flying-fox will not be impacted. There will also be some removal of potential nesting and roosting habitat for the Squirrel Glider, Brush-tailed Phascogale and the microbats, which will be mitigated to some extent by the installation of nest and bat boxes within retained vegetation.

Despite the potential identified impacts, the current nature of the site means that it is unlikely to constitute habitat that can sustain viable populations of the threatened species recorded there.

In conclusion, suitable protected habitat is available in close proximity to the site, as well as alternative movement corridors, and if the management and mitigation measures detailed in *Chapter 6* are implemented, then the proposal is considered unlikely to result in significant adverse impacts to the threatened species recorded at the site.

REFERENCES

CANRI website. **Key habitats and corridors mapping:**

www.canri.nsw.gov.au

Connell Wagner (2005) **Preliminary Ecological Investigation 'Rosarii' 334-356 Gregory Street South West Rocks** prepared by Connell Wagner Pty Ltd for Nambucca Heads Development Co NSW.

DEC (2006) **Wildlife Atlas Database** (February 2006).

DEC (2005a) **Fishing Bat (*Myotis adeversus/macropus*) Threatened Species Profile** Department of Environment and Conservation NSW.

DEC (2005b) **Eastern Freetail Bat (*Mormopterus norfolkensis*) Threatened Species Profile** Department of Environment and Conservation NSW.

DEC (2005c) **Little Bent-wing Bat (*Miniopterus australis*) Threatened Species Profile** Department of Environment and Conservation NSW.

DEC (2005d) **Large Bent-wing Bat (*Miniopterus schreibersii*) Threatened Species Profile** Department of Environment and Conservation NSW.

DEC & DPI (2005) **Draft Guidelines for Threatened Species Assessment** Department of Environment and Conservation and Department of Primary Industries NSW.

NPWS (1999a) **Squirrel Glider *Petaurus norfolcensis*** NSW National Parks and Wildlife Service Hurstville NSW.

NPWS (1999b) **Brush-tailed Phascogale *Phascogale tapoatafa* Species Profile** NSW National Parks and Wildlife Service Hurstville NSW.

Annex A

Photographs of the Site



Photograph 1

Hollow-bearing tree flagged with blue flagging tape (ERM 2006)



Photograph 2

Vegetation structure of the site (Arakoon Road in the background)



Photograph 3

Area of Banksia integrifolia at the west of the site along Gregory Street



Photograph 4

Ground cover species at base of trees



Photograph 5

South western corner of the site –junction of Arakoon Road and Gregory Street



Photograph 6

Area to be conserved north eastern boundary of the site – no slashing has occurred recently in this area.

Annex B

EPBC Protected Matters Search

Species	Status	Type of Presence
Birds		
Diomedea amsterdamensis * Amsterdam Albatross	Endangered	Species or species habitat may occur within area
Diomedea antipodensis * Antipodean Albatross	Vulnerable	Species or species habitat may occur within area
Diomedea dabbenena * Tristan Albatross	Endangered	Foraging may occur within area
Diomedea exulans * Wandering Albatross	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni * Gibson's Albatross	Vulnerable	Species or species habitat may occur within area
Lathamus discolor * Swift Parrot	Endangered	Species or species habitat may occur within area
Macronectes giganteus * Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
Macronectes halli * Northern Giant-Petrel	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera* Gould's Petrel	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta* Kermadec Petrel (western)	Vulnerable	Species or species habitat may occur within area
Rostratula australis * Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri * Buller's Albatross	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta * Shy Albatross	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida * Campbell Albatross	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris * Black-browed Albatross	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi * White-capped Albatross	Vulnerable	Species or species habitat may occur within area
Xanthomyza phrygia * Regent Honeyeater	Endangered	Species or species habitat likely to occur within area
Frogs		
Litoria aurea *	Vulnerable	Species or species habitat likely to occur within area

Species	Status	Type of Presence
Green and Golden Bell Frog		
Mixophyes iteratus *	Endangered	Species or species habitat likely to occur within area
Southern Barred Frog, Giant Barred Frog		
Mammals		
Balaenoptera musculus *	Endangered	Species or species habitat may occur within area
Blue Whale		
Chalinolobus dwyeri *	Vulnerable	Species or species habitat may occur within area
Large-eared Pied Bat, Large Pied Bat		
Dasyurus maculatus maculatus (SE mainland population)*	Endangered	Species or species habitat may occur within area
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)		
Eubalaena australis *	Endangered	Species or species habitat likely to occur within area
Southern Right Whale		
Megaptera novaeangliae *	Vulnerable	Species or species habitat known to occur within area
Humpback Whale		
Potorous tridactylus tridactylus*	Vulnerable	Species or species habitat may occur within area
Long-nosed Potoroo (SE mainland)		
Pteropus poliocephalus *	Vulnerable	Roosting known to occur within area
Grey-headed Flying-fox		
Reptiles		
Caretta caretta *	Endangered	Species or species habitat may occur within area
Loggerhead Turtle		
Chelonia mydas *	Vulnerable	Species or species habitat may occur within area
Green Turtle		
Dermochelys coriacea *	Vulnerable	Species or species habitat may occur within area
Leathery Turtle, Leatherback Turtle, Luth		
Sharks		
Carcharias taurus (east coast population)*	Critically Endangered	Congregation or aggregation known to occur within area
Grey Nurse Shark (east coast population)		
Carcharodon carcharias *	Vulnerable	Species or species habitat may occur within area
Great White Shark		
Rhincodon typus *	Vulnerable	Species or species habitat may occur within area
Whale Shark		
Plants		
Acronychia littoralis *	Endangered	Species or species habitat likely to occur within area
Scented Acronychia		
Cryptostylis hunteriana *	Vulnerable	Species or species habitat may occur within area
Leafless Tongue-orchid		

Species	Status	Type of Presence
Cynanchum elegans * White-flowered Wax Plant	Endangered	Species or species habitat likely to occur within area
Marsdenia longiloba * Clear Milkvine	Vulnerable	Species or species habitat likely to occur within area
Thesium australe * Austral Toadflax, Toadflax	Vulnerable	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area
Xanthomyza phrygia Regent Honeyeater	Migratory	Species or species habitat likely to occur within area
Migratory Wetland Species		
Birds		
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
Diomedea amsterdamensis Amsterdam Albatross	Migratory	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross	Migratory	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross	Migratory	Foraging may occur within area
Diomedea exulans Wandering Albatross	Migratory	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross	Migratory	Species or species habitat may occur within area
Macronectes giganteus	Migratory	Species or species habitat may occur within area

Species	Status	Type of Presence
Southern Giant-Petrel		
Macronectes halli	Migratory	Species or species habitat may occur within area
Northern Giant-Petrel		
Pterodroma leucoptera leucoptera	Migratory	Species or species habitat may occur within area
Gould's Petrel		
Puffinus leucomelas	Migratory	Species or species habitat may occur within area
Streaked Shearwater		
Puffinus pacificus	Migratory	Breeding known to occur within area
Wedge-tailed Shearwater		
Thalassarche bulleri	Migratory	Species or species habitat may occur within area
Buller's Albatross		
Thalassarche cauta	Migratory	Species or species habitat may occur within area
Shy Albatross		
Thalassarche impavida	Migratory	Species or species habitat may occur within area
Campbell Albatross		
Thalassarche melanophris	Migratory	Species or species habitat may occur within area
Black-browed Albatross		
Thalassarche steadi	Migratory	Species or species habitat may occur within area
White-capped Albatross		
Migratory Marine Species		
Mammals		
Balaenoptera edeni	Migratory	Species or species habitat may occur within area
Bryde's Whale		
Balaenoptera musculus *	Migratory	Species or species habitat may occur within area
Blue Whale		
Caperea marginata	Migratory	Species or species habitat may occur within area
Pygmy Right Whale		
Eubalaena australis *	Migratory	Species or species habitat likely to occur within area
Southern Right Whale		
Lagenorhynchus obscurus	Migratory	Species or species habitat may occur within area
Dusky Dolphin		
Megaptera novaeangliae *	Migratory	Species or species habitat known to occur within area
Humpback Whale		
Orcinus orca	Migratory	Species or species habitat may occur within area
Killer Whale, Orca		
Reptiles		
Caretta caretta *	Migratory	Species or species habitat may occur within area
Loggerhead Turtle		
Chelonia mydas *	Migratory	Species or species habitat may occur within area

Species	Status	Type of Presence
		within area
Green Turtle		
Dermochelys coriacea *	Migratory	Species or species habitat may occur within area
Leathery Turtle, Leatherback Turtle, Luth		
Sharks		
Carcharodon carcharias	Migratory	Species or species habitat may occur within area
Great White Shark		
Rhincodon typus	Migratory	Species or species habitat may occur within area
Whale Shark		
Other Matters Protected by the EPBC Act		
Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
	Listed - overfly marine area	Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift		
	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret		
	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis		
Cattle Egret		
	Listed	Species or species habitat may occur within area
Calonectris leucomelas		
Streaked Shearwater		
	Listed	Species or species habitat may occur within area
Catharacta skua		
Great Skua		
	Listed	Species or species habitat may occur within area
Diomedea amsterdamensis		
Amsterdam Albatross		
	Listed	Species or species habitat may occur within area
Diomedea antipodensis		
Antipodean Albatross		
Diomedea dabbenena	Listed	Foraging may occur within area
Tristan Albatross		
	Listed	Species or species habitat may occur within area
Diomedea exulans		
Wandering Albatross		
	Listed	Species or species habitat may occur within area
Diomedea gibsoni		
Gibson's Albatross		
	Listed - overfly marine area	Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe		
Haliaeetus leucogaster	Listed	Species or species habitat likely to

Species	Status	Type of Presence
White-bellied Sea-Eagle		occur within area
Hirundapus caudacutus	Listed - overfly marine area	Species or species habitat may occur within area
White-throated Needletail		
Lathamus discolor	Listed - overfly marine area	Species or species habitat may occur within area
Swift Parrot		
Macronectes giganteus	Listed	Species or species habitat may occur within area
Southern Giant-Petrel		
Macronectes halli	Listed	Species or species habitat may occur within area
Northern Giant-Petrel		
Merops ornatus	Listed - overfly marine area	Species or species habitat may occur within area
Rainbow Bee-eater		
Monarcha melanopsis	Listed - overfly marine area	Breeding may occur within area
Black-faced Monarch		
Monarcha trivirgatus	Listed - overfly marine area	Breeding likely to occur within area
Spectacled Monarch		
Myiagra cyanoleuca	Listed - overfly marine area	Breeding likely to occur within area
Satin Flycatcher		
Puffinus pacificus	Listed	Breeding known to occur within area
Wedge-tailed Shearwater		
Rhipidura rufifrons	Listed - overfly marine area	Breeding may occur within area
Rufous Fantail		
Rostratula benghalensis s. lat.	Listed - overfly marine area	Species or species habitat may occur within area
Painted Snipe		
Sterna albifrons	Listed	Breeding may occur within area
Little Tern		
Thalassarche bulleri	Listed	Species or species habitat may occur within area
Buller's Albatross		
Thalassarche cauta	Listed	Species or species habitat may occur within area
Shy Albatross		
Thalassarche chlororhynchos	Listed	Species or species habitat may occur within area
Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross		
Thalassarche impavida	Listed	Species or species habitat may occur

Species	Status	Type of Presence
		within area
Campbell Albatross		
Thalassarche melanophris Black-browed Albatross	Listed	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross	Listed	Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri New Zealand Fur-seal	Listed	Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal	Listed	Species or species habitat may occur within area
Ray-finned fishes		
Acentronura tentaculata Hairy Pygmy Pipehorse	Listed	Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish	Listed	Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish	Listed	Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish	Listed	Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish	Listed	Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish	Listed	Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse	Listed	Species or species habitat may occur within area
Histiogamphelus briggsii Briggs' Crested Pipefish, Briggs' Pipefish	Listed	Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish	Listed	Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish	Listed	Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse	Listed	Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny	Listed	Species or species habitat may occur within area

Species	Status	Type of Presence
Pipehorse		
Solenostomus cyanopterus Blue-finned Ghost Pipefish, Robust Ghost Pipefish	Listed	Species or species habitat may occur within area
Solenostomus paradoxus Harlequin Ghost Pipefish, Ornate Ghost Pipefish	Listed	Species or species habitat may occur within area
Stigmatopora nigra Wide-bodied Pipefish, Black Pipefish	Listed	Species or species habitat may occur within area
Syngnathoides biaculeatus Double-ended Pipehorse, Alligator Pipefish	Listed	Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bend Stick Pipefish, Short-tailed Pipefish	Listed	Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish	Listed	Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish	Listed	Species or species habitat may occur within area
Reptiles		
Caretta caretta * Loggerhead Turtle	Listed	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Listed	Species or species habitat may occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Listed	Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake	Listed	Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [Dataset Information]	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Cetacean	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale	Cetacean	Species or species habitat may occur within area

Species	Status	Type of Presence
Delphinus delphis Common Dolphin	Cetacean	Species or species habitat may occur within area
Eubalaena australis * Southern Right Whale	Cetacean	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin	Cetacean	Species or species habitat may occur within area
Megaptera novaeangliae * Humpback Whale	Cetacean	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area
Tursiops aduncus Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin Commonwealth Lands [Dataset Information]	Cetacean	Species or species habitat may occur within area
Places on the RNE [Dataset Information] Note that not all Indigenous sites may be listed. Historic Smokey Cape Lighthouse Group NSW Smoky Cape Lighthouse (Commonwealth) NSW Trial Bay Gaol NSW Indigenous Clybucca Aboriginal Area NSW South West Rocks Midden Site NSW Stuarts Point Area NSW Natural Arakoon State Recreation Area NSW Hat Head National Park (1977 boundary) NSW		
Extra Information		
State and Territory Reserves [Dataset Information]		
Fishermans Bend Nature Reserve, NSW Hat Head National Park, NSW		

Species	Status	Type of Presence
Regional Forest Agreements [Dataset Information] Note that all RFA areas including those still under consideration have been included. Lower North East NSW RFA, New South Wales		

Annex C

Consideration Of Threatened Species Occurrence

Table C.1 Consideration of threatened species occurrence within the site

Species Name	Common Name	Conservation Status	Habitat Requirements	Likely to Occur?	Assessment of Significance Required?
Flora					
<i>Acronychia littoralis</i>	Scented Acronychia	TSC Act	Occurs between Fraser Island in Queensland and Port Macquarie on the north coast of NSW.	No	No
Mammals					
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	Dry sclerophyll open forest with sparse ground cover or leaf litter. May also inhabit heathland, swamps, rainforest and wet sclerophyll forest. Nest and shelters in small tree hollows.	Yes - recorded on site.	Yes
<i>Syconycteris australis</i>	Common Blossom-bat	V	Coastal areas of north-east NSW and eastern Queensland. Common Blossom-bats often roost in littoral rainforest and feed on flowers in adjacent heathland and paperbark swamps (DEC 2005).	Potential foraging habitat but site unlikely to be a significant resource.	No
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. populations disperse within about 300 km range of maternity caves (DEC 2005).	Yes Recorded on site	Yes

Species Name	Common Name	Conservation Status	Habitat Requirements	Likely to Occur?	Assessment of Significance Required?
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V	Cave-roosting and usually found in dry open forest and woodland, near cliffs or rocky overhangs. Also recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Found on both sides of the Great Dividing Range from Cape York to Kempsey, including New England Tablelands and the upper north coast of NSW. Occasionally found along cliff-lines in wet eucalypt forest and rainforest (DEC 2005).	Potential foraging habitat but site unlikely to be a significant resource,	No
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	Found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest and woodland east of the Great Dividing Range and Roost mainly in tree hollows but will also roost under bark or in man-made structures (DEC 2005).	Yes Recorded on site	Yes
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	Roosts in tree hollows. Habitat requirements poorly known. Records more frequent in sclerophyll forests and woodland habitats. Varied insectivorous and carnivorous diet.	Potential habitat available but site unlikely to be a significant resource.	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox	V	Subtropical and temperate rainforests, tall sclerophyll and woodlands, heaths and swamps. Forages on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia and fruits of rainforest trees and vines (Menkhorst and Knight 2001).	Yes - Recorded on site. Foraging habitat available but no roost sites present.	Yes

Species Name	Common Name	Conservation Status	Habitat Requirements	Likely to Occur?	Assessment of Significance Required?
<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat	V	Dry open eucalypt forests dominated by Spotted Gum, boxes and ironbarks and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Forests with naturally sparse understorey layers may provide the best habitat. In north east NSW from the lower Clarence and Richmond River areas, from near Murwillumbah in the north to between Grafton and Coffs Harbour in the south (DEC 2005). Inhabits eucalypt forest and woodland. In NSW preferred food species include Forest Red Gum, Grey Gum, Monkey Gum and Ribbon Gum.	Potential habitat available but site unlikely to be a significant resource.	No
<i>Phascogale cinerea</i>	Koala	V		No	No
<i>Miniopterus australis</i>	Little Bentwing-bat	V	Caves for breeding; a range of eucalypt forest and woodland for foraging. Woodlands and forest with abundant tree hollows for breeding; a mix of eucalypts, acacias and banksias that provide nectar, pollen, flowers, acacia gum, and insects (particularly caterpillars) for foraging.	Yes Recorded on site	Yes
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		Yes Recorded on site	Yes
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	Roost in tree hollows and have been found in abandoned nests of Sugar gliders and occasionally hanging from the outside walls of buildings. Habitat includes wet and dry sclerophyll forest, open woodlands, Acacia shrubland, mallee, grasslands and deserts. Feed on a variety of beetles and horned grasshoppers, shield bugs and flying ants.	Yes Potential habitat but site unlikely to be a significant resource	No

Species Name	Common Name	Conservation Status		Habitat Requirements	Likely to Occur?	Assessment of Significance Required?
Birds		TSC	EPBC			
		Act	Act			
				Rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. They are usually seen in pairs or small flocks foraging among foliage of trees for insects and fruit. Found in coastal eastern Australia from Cape York to the Manning River in NSW.	Potential foraging habitat but site unlikely to be a significant resource.	No
<i>Coracina lineata</i>	Barred Cuckoo-shrike	V	-			No
<i>Tyto novaehollandiae</i>	Masked Owl	V	-	Occurs in forest, woodland and caves on Nullarbor Plain, in south-western, northern and eastern Australia. Roost in hollows or caves. Prefers heavier forested eucalypt country.	Heard during call Playback (Connell Wagner 2005). However no suitable roosting or breeding habitat on site.	No
<i>Irediparra gallinacea</i>	Comb-crested Jacana	V	-	Northern and eastern Australia, this species is an uncommon resident in lagoons and ponds with floating vegetation. Nests on low pile of floating vegetation (Slater <i>et. al</i> 2001).	No	No
<i>Anseranas semipalmata</i>	Magpie Goose	V	V	Sub-coastal wetlands	No	No
<i>Ixobrychus flavicollis</i>	Black Bittern	V	-	Wetlands and mangroves	No	No
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	-	Large open terrestrial wetlands and swamps, permanent pools, lagoons, estuarine mudflats and mangrove swamps for breeding and foraging.	No	No
<i>Limosa limosa</i>	Black-tailed Godwit	V	-	Primarily found along the coast on sand spits, lagoons and mudflats. Also inland on mudflats where water is less than 10 cm depth	No	No

Species Name	Common Name	Conservation Status	Habitat Requirements	Likely to Occur?	Assessment of Significance Required?
<i>Calyptorhynchus lathami</i>	Glossy Black-cockatoo	V	Forest with tree hollows for breeding; key Allocasuarina species for foraging. Marine. Widely distributed in the southern Pacific Ocean, breeding on oceanic islands including Lord Howe Island (DEC 2005).	No	No
<i>Procelsterna cerulea</i>	Grey Ternlet	V	-	No	No
<i>Sterna albifrons</i>	Little Tern	E	Almost exclusively coastal, preferring sheltered environments. Nests in small scattered colonies on sandy beaches. Have also been recorded in harbours, inlets and rivers (NPWS 1999).	No	No
<i>Pandion haliaetus</i>	Osprey	V	Uncommon to rare on south-eastern and southern coasts. Also recorded on rivers and large dams (Slater et al. 2001)	Seen Flying over site. No habitat on site.	No
<i>Haematopus longirostris</i>	Pied Oystercatcher	V	Common on sandy beaches, mudflats and estuaries around Australia (Slater et al. 2001)	No	No
<i>Ninox strenua</i>	Powerful Owl	V	Range of vegetation types including woodland, open forest, tall open forest and rainforest. Tree hollows essential for nesting and providing arboreal marsupials as main diet component. Occurs in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. Feed entirely on fruit from vines, shrubs, large trees and palms. Can be migratory in response to food availability (DEC 2005).	No	No
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove	V	-	No	No
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V	Uncommon - found on rocky shores. Builds nest in soil among rocks, pigface or shells (Slater et al 2001).	No	No

Species Name	Common Name	Conservation Status	Habitat Requirements	Likely to Occur?	Assessment of Significance Required?
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	No	No
<i>Ptilinopus magnificus</i>	Wompoo Fruit-dove	V	-	No	No
Amphibians					
<i>Litoria aurea</i>	Green and Golden Bell Frog	TSC Act	EPBC Act	No	No
<i>Crinia tinnula</i>	Wallum Froglet	V	-	No	No

Annex D

Species Lists

Table D.1 Flora Species

Species	Community			
	Forest Red Gum	Scribbly Gum	Blackbutt	Banksia Scrub
<i>Acacia implexa</i>		x	x	x
<i>Acacia linifolia</i>		x		
<i>Acacia longifolia</i> var. <i>sophorae</i>		x		
<i>Acacia longifolia</i>		x		
<i>Acacia</i> sp.	x		x	
<i>Allocasuarina littoralis</i>		x		
<i>Amyema congener</i> subsp. <i>congener</i>		x		
<i>Andropogon virginicus</i> *	x	x		
<i>Araujia hortorum</i> *		x		
<i>Aristida ramosa</i>			x	
<i>Banksia integrifolia</i>	x	x	x	x
<i>Bidens pilosa</i> *	x	x		
<i>Billardieria scandens</i>		x		
<i>Breynia oblongifolia</i>				x
<i>Burchardia umbellata</i>		x	x	
<i>Cheilanthes seiberi</i>		x		
<i>Chloris gayana</i> *	x			
<i>Commelina cyanea</i>	x	x		x
<i>Conyza</i> sp.*			x	x
<i>Cymbopogon refractus</i>	x	x		
<i>Cyndon dactylon</i> *	x			x
<i>Cyperus brevifolius</i> *	x			
<i>Cyperus congestus</i> *	x			
<i>Desmodium rhytidophyllum</i>		x	x	
<i>Desmodium varians</i>	x	x		
<i>Dianella</i> sp.		x		
<i>Dodonaea triquetra</i>		x	x	
<i>Echinopogon</i> sp.		x		
<i>Entolasia marginata</i>		x	x	
<i>Entolasia</i> sp.		x		
<i>Eragrostis brownii</i>				x
<i>Eucalyptus haemostoma</i>				x
<i>Eucalyptus pilularis</i>			x	
<i>Eucalyptus microcorysd</i>		x		
<i>Eucalyptus terteticornis</i>	x			x
<i>Eucalyptus intermedia</i>				x
<i>Eustrephus latifolius</i>	x		x	x
<i>Exocarpus cupressiformis</i>	x	x	x	
<i>Exocarpus strictus</i>		x		
<i>Geranium</i> sp.				x
<i>Glochidion ferdinandi</i>	x	x		
<i>Glycine clandestina</i>			x	
<i>Grevillea longifolia</i>			x	
<i>Hardenbergia violacea</i>		x	x	
<i>Hibbertia scandens</i>				x
<i>Hydrocotyle</i> sp.	x	x	x	x
<i>Hydrocotyle peduncularis</i>			x	
<i>Hypochaeris radicata</i> *	x	x	x	x
<i>Imperata cylindrica</i>			x	
<i>Juncus</i> sp.	x			

Species		Community			
<i>Kennedia rubicunda</i>				x	
<i>Lantana camara</i> *	x	x	x		x
<i>Leptospermum polyanthemos</i>	x				
<i>Leucopogon lanceolatus</i>		x			x
<i>Lomandra longifolia</i>			x		x
<i>Lomandra multiflora</i> subsp. <i>multiflora</i>		x			
<i>Lomatia silaifolia</i>		x	x		
<i>Melaleuca quinquenervia</i>		x			
<i>Melia azederach</i>	x				
<i>Microlaena stipoides</i> var. <i>stipoides</i>	x	x			x
<i>Morus</i> sp.		x			
<i>Ochna serrulata</i> *	x	x			
<i>Oplismenus aemulus</i>	x		x		
<i>Oplismenus</i> sp.		x			
<i>Oxalis</i> sp.	x	x	x		
<i>Pandorea pandorana</i>	x				
<i>Panicum</i> sp.		x	x		x
<i>Paspalum dilatatum</i> *	x	x	x		
<i>Persoonia levis</i>	x	x	x		
<i>Persoonia</i> sp.		x			x
<i>Phyllanthus similis</i>	x				
<i>Pimelea linifolia</i>		x	x		
<i>Pittosporum undulatum</i>		x			
<i>Platysace</i> sp.			x		
<i>Pratia purpurascens</i>	x	x	x		
<i>Pseuderanthemum variable</i>		x	x		
<i>Pteridium esculentum</i>	x	x	x		x
<i>Rubus fruticosus</i> *	x	x	x		
<i>Rubus parvifolius</i>			x		
<i>Rumex</i> sp.	x				
<i>Senecio</i> sp.*		x			
<i>Senna</i> sp.*		x			
<i>Setaria gracilis</i> *	x		x		
<i>Sida rhombifolia</i> *	x				
<i>Smilax australis</i>					x
<i>Smilax glycophylla</i>		x	x		
<i>Solanum nigrum</i> *					x
<i>Sporobolus</i> sp.	x				
<i>Stephania</i> sp.		x			
<i>Taraxacum officinale</i> *	x				
<i>Tetratheca thymifolia</i>		x	x		
<i>Trachymene incisa</i>			x		
<i>Trifolium</i> sp.*			x		
<i>Schefflera actinophylla</i> *	x	x			
<i>Vernonia cinerea</i> var. <i>cinerea</i>			x		
<i>Violacea hederacea</i>		x			
<i>Wahlenbergia gracilis</i>			x		
<i>Watsonia meriana</i> *					

* = Exotic Species

Table D.2 *Mammal Species Recorded at the Site*

Scientific Name	Common Name	Method of Observation
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	T
<i>Pseudochaeris peregrinus</i>	Ring-tailed Possum	O
<i>Trichosurus vulpecula</i>	Brush-tailed Possum	O
<i>Petaurus norfolcensis</i>	Squirrel Glider	O, T
<i>Petaurus breviceps</i>	Sugar Glider	O, T
<i>Mus musculus</i>	House Mouse	T
<i>Vulpis vulpes</i>	Fox	O
<i>Canis familiaris</i>	Dog	O
<i>Equus caballus</i>	Horse	O
T: Trapped		
O: Observed		

Annex E

Assessments Of Significance

Identifying potential effects of the proposal on threatened species, populations or ecological communities, or their habitats.

The following threatened species have been recorded on the site and have the potential to be impacted by development of the site:

Squirrel Glider (*Petaurus norfolcensis*). The Squirrel Glider is listed as Vulnerable under the NSW TSC Act. The species was recorded within the east, northeast and northern parts of the site and was most active in the northeast of the site. Squirrel Gliders are nocturnal and arboreal, and can glide up to 50 m. They construct leaf nests in hollows of trees for breeding, and feed on arboreal arthropods, nectar, pollen, manna and sap (Menkhorst and Knight 2001). Home ranges have been estimated between 0.65 hectares and 8.5 hectares. The species lives in family groups of between 2 and 10 individuals. Young may be born at any time of year dependent on available resources and remain in the nest for six months (NPWS 1999a).

Brush-tailed Phascogale (*Phascogale tapoatafa*). The Brush-tailed Phascogale is listed as Vulnerable under the NSW TSC Act. The species was recorded in the western portion of the site. The species is nocturnal and feeds on invertebrates amongst the bark of trees. It builds a nest of bark, feathers and fur in hollow branches and stumps. Suitable hollows for nesting are between 25 to 40 mm wide. Mating occurs between May and July with males dying after the mating period. Gestation is 30 days. The species inhabits dry sclerophyll forest and monsoonal forest and woodland. Females inhabit territories between 20 and 60 hectares with male territories up to 100 hectares (NPWS 1999b).

Grey-headed Flying-fox (*Pteropus poliocephalus*). The Grey-headed Flying-fox is listed as Vulnerable on both the NSW TSC Act and the Commonwealth EPBC Act. The species was recorded foraging within the site. The Grey-headed Flying-fox feeds mostly on eucalypt and *Melaleuca* nectar and also fruit. The species forms large breeding colonies called camps during October to November, with the camp dispersing in March to April before birthing.

Fishing Bat (*Myotis adversus/macropus*). The Fishing Bat is listed as Vulnerable under the NSW TSC Act and was recorded by Anabat detection at the site. The species is more commonly a cave-dweller but may roost in tree hollows. They usually select roosts close to water where they can forage. They commonly roost in groups of 10 to 15 and forage on insects and small fish that they catch by raking their feet across the water surface. They also prey on insects in the air. In NSW one young is born in November to December (Churchill 1998).

Eastern Freetail Bat (*Mormopterus norfolkensis*). The Eastern Freetail Bat is listed as Vulnerable under the NSW TSC Act. The species occurs in dry sclerophyll forest and woodland east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures (DEC 2005b). Nothing is known of the species reproduction (Churchill 1998).

Little Bent-wing Bat (*Miniopterus australis*). Little Bentwing-bats is listed as Vulnerable under the NSW TSC Act. The species roosts in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Large Bentwing-bat and, in winter, the two species may form mixed clusters (DEC 2005c). The species forms large maternal colonies in the summer months and disperse in winter. Mating occurs in July and August with births occurring in December (Churchill 1998).

Large Bent-wing Bat (*Miniopterus schreibersii*). The Large Bent-wing Bat is listed as Vulnerable under the NSW TSC Act. Caves are the primary roosting habitat for the Large Bent-wing Bat, but the species also uses derelict mines, storm-water tunnels, buildings and other man-made structures. They form discrete populations centered on a maternity cave that is used annually in spring and summer for the birth and rearing of young and hunt in forested areas, catching moths and other flying insects above the tree tops (DEC 2005d).

The following section addresses the significance of impacts on threatened species according to criteria set out in the draft guidelines for threatened species assessment (DEC and DPI 2005)

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

- a) displaces or disturbs threatened species and/or populations

Squirrel Glider

The proposal is likely to disturb the Squirrel Glider but it is not known whether resident individuals will be displaced from the site. The proposal will result in the removal of approximately three hectares of potential habitat for the Squirrel Glider. However, mature trees that do not require removal for the development, for safety purposes or for asset protection, will be retained. It is unknown whether there are Squirrel Glider dens within the site or whether the species uses the site for foraging only. If there are resident individuals, the ongoing use of the site by this species once the site has been developed for residential purposes is unpredictable. As many mature trees as possible are to be retained within the development and these trees will be protected and will not be able to be removed by residents. The tree retention plan for the site is shown in *Figure 4.2*. Suitable nest boxes will be placed within trees that are retained to provide potential habitat for any displaced gliders.

Brush-tailed Phascogale

The brush-tailed Phascogale was recorded within the west of the site. The proposal is likely to disturb the Brush-tailed Phascogale but it is not known whether resident individuals will be displaced from the site. The proposal will result in the removal of approximately three hectares of potential habitat for the Brush-tailed Phascogale.

Grey-headed Flying-fox

The site provides potential foraging habitat for the Grey-headed Flying-fox and is not a known camp site for this species. Therefore the proposal is unlikely to displace any Grey-headed Flying-foxes.

Fishing Bat

The Fishing Bat generally roosts in groups of 10 – 15, close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage (DEC 2005a). The proposal will remove potential habitat for this species in the form of hollow-bearing trees. However it is unknown whether the species currently roosts on site. 'Bat boxes' will therefore be placed within trees that are retained to reduce the potential impacts of hollow-bearing tree removal and displacement of individuals.

Eastern Freetail Bat

The Eastern Freetail bat occurs in dry sclerophyll forest and woodland east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures (DEC 2005b). The proposal will remove potential roost sites for this species in the form of mature trees and hollows. However it is unknown whether the species currently roosts on site. 'Bat boxes' will be placed within trees that are retained to reduce the potential impacts of hollow-bearing tree removal from the site and to provide potential habitat for any displaced bats.

Little Bent-wing Bat

Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Large Bentwing-bat and, in winter, the two species may form mixed clusters (DEC 2005c). The proposal will remove potential roost sites for this species. However it is unknown whether the species currently roost on site. 'Bat boxes' will be placed within trees that are retained to reduce the potential impacts of hollow-bearing tree removal from the site and to provide potential habitat for any displaced bats.

Large Bent-wing Bat

Caves are the primary roosting habitat for the Large Bent-wing Bat, but the species also uses derelict mines, storm-water tunnels, buildings and other man-made structures. They form discrete populations centered on a maternity cave that is used annually in spring and summer for the birth and rearing of young and hunt in forested areas, catching moths and other flying insects above the tree tops (DEC 2005d). It is unknown whether the species currently roost on site. 'Bat boxes' will be placed within trees that are retained to reduce the potential impacts of hollow-bearing tree removal from the site and to provide potential habitat for any displaced bats.

b) disrupts the breeding cycle

To reduce the likelihood of disrupting the breeding cycle of threatened species recorded on the site nest and habitat boxes will be placed in vegetation to be retained as part of the proposal prior to any vegetation removal from the site. In addition removal of vegetation will be undertaken outside of critical nesting and breeding times. The key time to avoid removal of vegetation from the site has been identified as being between late April to early October (see *Chapter 6*).

c) disrupts roosting behaviour

To reduce the likelihood of disrupting the roosting behaviour of threatened species recorded on the site bat boxes will be placed in vegetation to be retained as part of the proposal, and possibly in adjacent areas, prior to any vegetation removal from the site and removal of vegetation will be undertaken outside of nesting and breeding times. The key time to avoid removal of vegetation from the site has been identified as being late April to early October (see *Chapter 6*).

d) changes foraging behaviour

Although the proposal will result in the removal of foraging habitat for the threatened species recorded within the site, feed trees will be retained within the development and there is sufficient foraging habitat within adjacent areas of vegetation. Therefore the proposal is unlikely to cause changes in foraging behaviour for any of the threatened species recorded on the site.

e) affects migration and dispersal ability

The development proposal will retain some connectivity with vegetation to the south of the site in Hat Head National Park and areas of vegetation to the north of the site through retention of mature trees. However, it is unknown whether the Squirrel Glider or Brush-tailed Phascogale utilise the vegetation on site to disperse from other areas such as the national park and it is unknown whether they would continue to do so once development occurs, given the proximity to an increased density of residential development on the site. If the precautionary principle is adopted and it is assumed that the species would no longer have the site as a dispersal mechanism, then alternative routes for movement of fauna within the locality are available (see *Figure 3.x*). The site has not been included in the regional or subregional corridors that have been identified in the locality (*Figure 3.3*), nor has it been identified as key habitat for any of the fauna assemblages assessed as part of that strategy. In addition, canopy trees retained within the development will be at a maximum distance of 30 m apart, which is unlikely to affect the ability of the Squirrel Glider to move between individual trees if it was to use the site to disperse.

Given the limited mobility of the Brush-tailed Phascogale, it is unlikely the species would use the site as a dispersal route once development has occurred.

The proposed development is considered unlikely to impact on the dispersal or migration of the mobile microchiropteran bats or Grey-headed Flying-fox recorded on site, given the sites small size and limited resources.

f) disrupts pollination cycle;

NA

g) disturbs seedbanks;

NA

h) disrupts recruitment (ie. germination and establishment of plants);

NA

i) affects the interaction between threatened species and other species in the community (eg. pollinators, host species, mycorrhizal associations).

It is unlikely that the loss of habitat for the threatened species recorded within the site will result in impacts to any other species that those species may interact with.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

a) disturbs any permanent, semi-permanent or ephemeral water bodies;

There are no permanent, semi-permanent or ephemeral waterbodies on site.

b) degrades soil quality;

The proposal will result in hardstand development. However, indirect impacts to soil quality in adjacent areas from development on the site are unlikely given that roads surround the property.

c) clears or modifies native vegetation;

Approximately three hectares of native vegetation in the form of mature trees and some native shrubs and ground cover species will be removed as a result of the development. This vegetation has been described in greater detail in *Chapter 3*

d) introduces weeds, vermin or feral species or provides conditions for them to increase and/or spread;

Cats will be banned from the proposed residential development, landscaping will use endemic species, residents will be educated regarding the use of native species and the planting of species considered to be environmental weeds and Weeds of National Significance will not be permitted. In addition, to discourage vermin, residents will be encouraged to cover all garbage and compost. Therefore the proposal should not result in the increase of weeds, vermin or feral species within the area.

e) removes or disturbs key habitat features such as trees with hollows, caves and rock crevices, foraging habitat;

The proposal will result in the removal of approximately ten hollow-bearing trees from the site. As part of this proposal nest boxes and bat boxes for the threatened species that have been recorded on the site will be installed in trees to be retained prior to any vegetation removal. This will provide alternative potential habitat for species that currently utilise the hollow-bearing trees on site. There are no other key habitat features within the site.

- f) affects natural revegetation and recolonisation of existing species following disturbance; and

The areas of vegetation to be retained within the development will be managed primarily as APZs within resident's backyards. Therefore there is unlikely to be natural revegetation within these areas. The proposal will not impact on natural revegetation and recolonisation in adjacent areas such as the national park.

- g) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

None of the threatened species recorded at the site are at the limits of their known distribution at the site.

How is the proposal likely to affect current disturbance regimes?

- a) modifies the intensity and frequency of fires;

The site has been actively managed as cleared land (apart from the canopy tree species) and is currently open to public access. APZs will be maintained within the development and therefore the proposal is unlikely to modify the current fire regimes at the site or within the adjacent Hat Head National Park.

- b) modifies flooding flows.

As the site is already surrounded by roads and rural residential development, flooding flows are not considered to be a significant ecological component of the site and the development is therefore unlikely to modify any natural flooding flows in the area.

How is the proposal likely to affect habitat connectivity?

- a) creates a barrier to fauna movement;

The proposal will result in the narrowing of currently connected canopy species through the site and may create a further barrier to movement for fauna such as the Brush-tailed Phascogale. Other native ground-dwelling species are unlikely to use the site in its current form due to the lack of ground cover and the presence of foxes and domestic animals such as dogs. Trees will be retained in the east of the site and within Lot 1, which will retain some connectivity to vegetation to the north and south for the Squirrel Glider. Existing potential movement corridors of fauna through the site are depicted in *Figure 3.2*. However, the site has not been identified as key habitat, or part of a subregional or regional corridor for the locality (*Figure 3.3*) and alternative routes of movement around the site are available.

- b) removes remnant vegetation or wildlife corridors;

The proposal will result in the removal of some remnant native vegetation (predominantly trees) that has been subject to ongoing disturbances including slashing and noxious weed invasion. There are no major wildlife corridors identified through the site (*Figure 3.3*) that are likely to be impacted by the proposal.

- c) modifies remnant vegetation or wildlife corridors.

Some removal of vegetation will occur at the site and retained vegetation will be managed as an APZ. Vegetation within the site is currently slashed and shrub species only exist close to the base of trees. Therefore the maintenance of APZs will not result in the further modification of vegetation at the site. However, some of these resources will become unavailable if they are located within backyards.

How is the proposal likely to affect critical habitat?

There is no critical habitat that will be directly or indirectly affected by the proposal.

- a) removes or modifies key habitat features;
- b) affects natural revegetation or recolonisation of existing species following disturbance;
- c) introduces weeds, vermin or feral species
- d) generates or disposes of solid, liquid or gaseous waste;
- e) uses pesticides, herbicides, other chemicals.

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