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COASTAL GROVE

RESIDENTIAL DEVELOPMENT

FLORA AND FAUNA REPORT

Prepared for the

NSW Department of Planning

on behalf of

DM and RD Dossor

September 2006

Certification

The following report has been prepared by Peter Parker of Peter Parker, Environmental Consultants Pty Ltd.

The results of this report are a true and accurate record in the opinion of the author.

Surveys undertaken with respect to this report have been carried out in accordance with the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation, November 2004).

The results of this survey are available to the public for future use and threatened species records have been supplied to the Department of Environment and Conservation for inclusion in the Atlas of NSW Wildlife database.

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GLOSSARY

Assessment guidelines means assessment guidelines issued and in force under section 94A of the *Threatened Species Conservation Act 1995* or, subject to section 5C, section 220ZZA of the *Fisheries Management Act 1994*

Conservation status: is the degree of representation of a species or community in formal conservation reserves

Ecological community: an assemblage of species occupying a particular area

Endangered ecological community: an ecological community specified in Part 1 of Schedule 1 of the *Threatened Species Conservation Act 1995*

Endangered species: a species listed under Schedule 1 of the *Threatened Species Conservation Act 1995*

EPA Act: *Environmental Planning and Assessment Act, 1979*

Habitat: an area or areas occupied, or periodically or occasionally occupied by a species, population or ecological community and includes any abiotic component

NPW Act: *National Parks and Wildlife Act 1974*

SEPP: State Environmental and Planning Policy

Study area: is the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly

Site: the area which is proposed for development or activity

Threatened species: a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2 of the *Threatened Species Conservation Act 1995*

TSC Act: *Threatened Species Conservation Act 1995*

Vulnerable species: a species listed under Schedule 2 of the *Threatened Species Conservation Act 1995* or when a fish, listed under the *Fisheries Management Act 1994*

SUMMARY

- This flora and fauna report has been prepared on behalf of D. M. and R. D. Dossor to accompany a project application to be submitted to the Department of Planning for a subdivision at 1 Survey Street, Lennox Head.
- A flora survey was previously undertaken at the site on 6 March 2003. The site was revisited with respect to this proposal on 1 June 2006 where a survey concentrated on the banks of the unnamed creek for the vulnerable hairy-joint grass, *Arthraxon hispidus.* Intensive surveys were undertaken on 14 August for 5.5 hours and on 15 August 2006 for 5 hours.
- Six vegetation associations in four communities were recorded during the flora survey. An additional association comprising of rainforest reafforestation plantings was also mapped.
- A number of threatened vertebrate species have been recorded in the locality in recent years. Species which may periodically occur at the site are addressed in this report.
- In an assessment of the potential impact of the proposal, it was concluded that there would be no significant effect on threatened species, populations or ecological communities or their habitats due to the conservation and management of their habitats. For hairy-joint grass, this includes the management and monitoring of its habitat. For other species, e.g., coastal fontainea, rough-shelled bush-nut and durobby an existing planted buffer of littoral rainforest species will be enhanced by additional plantings, weed control and monitoring for a two year period.

1.0 INTRODUCTION AND SITE DESCRIPTION

This flora and fauna report has been prepared on behalf of D. M. and R. D. Dossor to accompany a project application to be submitted to the Department of Planning ("DoP") for a subdivision of 1 Survey Street, Lennox Head ("the site"). The Minister for Planning has determined that the subdivision of the site is a Major Project pursuant to s.3A of the *Environmental Planning and Assessment Act, 1979*.

The 14.71 ha site has been named the Coastal Grove Estate and has the real property description Lot 2 in DP 622475. It has a maximum north-south dimension of 570 m and an average east-west dimension of 195 m. The site includes the main developable area which is accessed from Survey Street and the northern escarpment which supports littoral rainforest and is of high conservation value (refer to Fig. 1).

The developable part of the site has a high point of RL 55 which is located near the ridge on its eastern boundary. The land slopes westward from this point and drains into a small unnamed creek. Several springs arise mid-way down the slope and surface water drains into the unnamed creek. Vegetation within this overland flow path is characterised by sedges.

Project: Coastal Grove Residential Development, Lennox Head — Client: DM and RD Dossor

Fig. 1: Development proposal

North

Photo: Ballina Shire Council — Date: August 2006 — Scale (m) 0 — 50

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Urban development abuts the northern and western boundaries of the site and urban drainage enters the site and travels overland into the unnamed creek. This drainage pattern has introduced a number of significant environmental weeds which have gained a stranglehold along the creek and have been transported by the creek into littoral rainforest south of the site. No stormwater quality or quantity control measures currently exist. Thus, stormwater management combined with weed control is a major issue for the development of the site.

2.0 PREVIOUS STUDIES

Previous studies which relate to flora and fauna assemblages in the general vicinity of the site include:

- Byron Shire Council 1999 *Byron flora and fauna study.* A report prepared by Landmark Ecological Services Pty Ltd, Ecograph and Terafocus Pty Ltd;
- Kooyman, R. 2006 *Management and rehabilitation plan for the State Environment Protection Plan (SEPP 26) littoral rainforest habitat and population of coastal fontainea, Fontainea oraria.* A report prepared for Kris Newton;
- NPWS 1995 *Vertebrates of upper north-east NSW.* A report by the NSW National Parks and Wildlife Service to the Natural Resources Audit Council;
- NPWS and Environment Australia 1999 *Draft plan of management for Fontainea oraria (Jessup and Guymer). Amber Drive Public Reserve, Lennox Head,*

NSW. A report prepared by Leza Bennetts for the NSW National Parks and Wildlife Service and Environment Australia, Project No. 155;

- Department of Environment and Conservation 2004, Draft recovery plan for *Fontainea oraria* (Coastal fontainea). NSW Department of Environment and Conservation, Hurstville;
- Parker, P. 2003 *A flora and fauna survey of Coastal Grove Estate, Survey Street Lennox Head.* A report prepared for S. J. Connelly Pty Ltd; and
- Sheringham P., and J. Westaway 1995 *Significant vascular plants of upper north-east NSW.* A report by the NSW National Parks and Wildlife Service for the Natural Resources Audit Council. This report identifies significant flora species and vegetation communities in the North Coast Region.

3.0 FIELD SURVEYS

A flora survey was previously undertaken at the site on 6 March 2003. This survey was conducted over approximately five hours and extended into the adjoining littoral rainforest to the south.

The site was revisited with respect to this proposal on 1 June 2006 where a survey was concentrated along the banks of the unnamed creek for the vulnerable hairy-joint grass, *Arthraxon hispidus.* This perennial species tends to die back in winter (NPWS 2002) and accordingly, further survey effort was considered necessary later in the year.

More intensive surveys were undertaken on 14 August for 5.5 hours and on 15 August 2006 for 5 hours. These surveys included traversing the site and adjoining areas of conservation interest, including the Amber Drive Public Reserve, the littoral rainforest fronting Lennox Head, the littoral rainforest south of the site and areas at the site which had been reafforested with littoral rainforest species.

A considerable survey effort (> 5 hours) was undertaken for hairy-joint grass. This involved walking in meandering transects along the creek banks and areas adjacent to the sedgelands and littoral rainforest.

An intensive survey was undertaken for hairy-joint grass within a quadrat of approximately 10 m x 10 m where this species was recorded in the transect survey (Figs. 2, 3 and 4). The quadrat survey was conducted approximately 1 hour on 15 August 2006.

The fauna survey relied primarily on database records due to the depauperate nature of habitats recorded. However, an inventory of vertebrate species encountered during the flora transects was complied and is included at Appendix 2 of this report.

3.1 Vegetation

3.1.1 Air photo interpretation and field surveys

Vegetation was mapped over a coloured aerial photograph, supplied by Ballina Shire Council (Fig. 3: Vegetation).

3.1.2 Vegetation classification, structure and floristics

The vegetation classification system adopted for this survey is based on a modified version of Walker and Hopkins (1990). A less complex version was adopted due to the nature of vegetation associations, which included landscape species. This classification system describes the components of the association in the following order:

- the first species is usually the most abundant in the tallest stratum;
- a second species is chosen when it is always present in the tallest stratum. In the absence of a tallest stratum species, the most abundant species in the next most conspicuous stratum is chosen. For those associations where several species dominate, these are listed in order of abundance;
- a third species is chosen from any stratum, usually a ground cover or shrub layer. It is used as an indicator species;
- the forest type refers to the distances between the crowns of adjacent trees (refer to Table 1); and
- the height of the tallest stratum is defined by the terms 'low', 'mid-high', or 'tall' (refer to Table 2).

3.1.3 Vegetation transects

Vegetation associations were surveyed by walking in meandering transects throughout the site. Four transects were spaced at approximately 2 m intervals along each side of the unnamed creek and on each side of the sedgeland (eight transects in total for each vegetation association).

Transect spacing was increased to approximately 10 m on the hillslopes. This wider spacing was adequate to detect hairy-joint grass, although this species was not considered likely to occur in these drier habitats.

The following features of the vegetation were noted during the survey:

- dominant trees, shrubs and ground covers in each strata;
- major plant species in the association;
- tree heights and foliage cover; and
- any threatened species.

Vegetation transect

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Project: Coastal Grove Residential Development, Lennox Head

Client: DM and RD Dossor

Fig. 2: Vegetation survey

North

Photo: Ballina Shire Council

Date: August 2006

Scale (m) 0 ——— 100

3.1.4 Survey limitations

The flora survey concentrated on the development site and its immediate environs (i.e. the creek and adjoining littoral rainforest) rather than the northern escarpment in which no development is proposed. Consequently, it is likely that a number of threatened plant species would occur, but were not identified, within the escarpment, particularly as part of this littoral rainforest has been mapped under State Environmental and Planning Policy No. 26 as Littoral Rainforest and is therefore of recognised conservation significance.

Table 1: Structural formation classes of vegetation defined by growth form and crown separation (after Walker and Hopkins 1990)

Crown Separation	Closed or dense	Mid-dense	Sparse	Very sparse	Isolated plants	Isolated clumps
Field criteria	Touching-overlapping	Touching-slight separation	Clearly separated	Well separated	Isolated	Isolated
Growth form						
Tree	Closed forest	Open forest	Woodland	Open woodland	Isolated trees	Isolated clumps of heath shrubs
Heath shrub	Closed heathland	Heathland	Open heath	Sparse heath	Isolated heath shrubs	Isolated clump of heath shrubs
Sedge	Closed sedgeland	Sedgeland	Open sedgeland	Sparse sedgeland	Isolated sedges	Isolated clump of sedges
Sod grass	Closed sod grassland	Sod grassland	Open sod grassland	Sparse sod grassland	Isolated sod grasses	Isolated clumps of sod grasses

Table 2: Height classes and names of various growth forms for non-rainforest vegetation associations (after Walker and Hopkins 1990)

Height (m)	Trees, vines	Shrubs, heath shrubs, chenopod shrubs, mallee (tree or shrub form)	Tussock and hummock grasses, forbs, rushes, sedges, ferns	Sod grasses, mosses, lichens, liverworts
20.01-35.01	Extremely tall	NA	NA	NA
12.01-20	Tall	NA	NA	NA
6.01-12	Mid-high	Extremely tall	NA	NA
3.01-6	Low	Very tall	Extremely tall	NA
1.01-3	Dwarf	Tall	Tall	Extremely tall
0.51-1	NA	Low	Mid-high	Tall
0.26-0.5	NA	Low	Mid-high	Tall
<0.25	NA	Dwarf	Low	Low

3.2 Fauna

A fauna trapping survey was not undertaken due to the development footprint being located in depauperate habitat comprising of mowed and grazed grassland and the availability of suitable fauna database records. Moreover, the proposal is located in degraded grassland where little impact on fauna is anticipated.

Threatened species which have previously been recorded in the locality and which may occur at the site are listed in Table 3. These threatened species are discussed in more detail in Section 6 of this report.

Table 3: Threatened species recorded in the vicinity of the site

Plants – Common name	**Scientific name**	**Location and typical habitat requirements**
Arrow-head vine	*Tinospora tinosporoides*	Littoral and subtropical rainforest, recorded south of site and in Amber Drive Public Reserve
Coastal fontainea	*Fontainea oraria*	Littoral rainforest, recorded west of site in Amber Drive Public Reserve and to the south of the site
Durobby	*Syzgium moorei*	Littoral and subtropical rainforest, used in reafforestation plantings at site
Hairy-joint grass	*Arthraxon hispidus*	Wetland fringes and rainforest margins, recorded in riparian zone at site and south of site in Newton land
Queensland xylosma	*Xylosma terrae-reginae*	Littoral and subtropical rainforest, recorded south of site in Newton land
Rough-shelled bush-nut	*Macadamia tetraphylla*	Littoral and subtropical rainforest, recorded in reafforestation plantings at site and in littoral rainforest west of site in Amber Drive Public Reserve
Stinking cryptocarya	*Cryptocarya foetida*	Littoral and subtropical rainforest, recorded south of site
White lace-flower	*Archidendron hendersonii*	Littoral and subtropical rainforest, recorded north-west of site in Henderson land
Mammals		
Black flying-fox	*Pteropus alecto*	Likely to forage on flowering landscape species, recorded in Byron and Ballina Shires
Grey-headed flying-fox	*Grey-headed flying-fox*	Likely to forage on flowering landscape species, recorded in Byron and Ballina Shires
Common blossom bat	*Syconycteris australis*	Likely to forage on flowering landscape species, recorded in Byron and Ballina Shires
Little bent-wing bat	*Miniopterus australis*	Likely to forage on insects when flying over the site, recorded in Byron and Ballina Shires

Vegetation associations

Littoral rainforest

Guioa semiglauca (guioa), *Cupaniopsis anarcardioides* (tuckeroo), mid-high simple microphyll littoral rainforest

Sedgeland

Eleocharis equisitina (a spike-rush), *Persicaria decipiens* (slender knotweed), low to mid-high sedgeland

Grassland

Stenotaphrum secundatum (buffalo grass), low closed grassland

Pennisetum clandestinum (kikuyu), *Paspalum dilatatum* (paspalum) low closed grassland

Axonopus affinis (broad-leaved carpet grass), *Chloris gayana*, (Rhode's grass), *Digitaria dactylon*, (Queensland blue couch) low closed sod grassland

Riparian complex

Wedelia trilobata (Singapore daisy), *Eleocharis equisitina* (a spike-rush), *Paspalum distichum* (water couch) +/- low to mid-high closed grassland

Reafforestation

Littoral rainforest plantings emphasising locally sourced rainforest species along the western boundary and rainforest species in combination with coast banksia along the eastern boundary

Escarpment views and bitou bush

Coastal fontainea and revegetation

Location of hairy-joint grass

Hairy joint-grass

Riparian complex

Kikuyu grass

Sedgeland

Bufallo grass

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Project: Coastal Grove Residential Development, Lennox Head

Client: DM and RD Dossor

Fig. 3: Vegetation

North

Photo: Ballina Shire Council

Date: August 2006

Scale (m) 0 ——— 100

4.0 RESULTS

4.1 Vegetation associations and communities

Six vegetation associations in four communities were recorded and mapped (refer to Fig. 3). An additional association comprising of rainforest reafforestation plantings, which was planted approximately five years ago, was also recorded and mapped.

Table 4: Vegetation associations

Littoral rainforest

- *Guioa semiglauca* (guioa), *Cupaniopsis anarcardioides* (tuckeroo), mid-high simple microphyll littoral rainforest

Riparian Complex

- *Wedelia trilobata* (Singapore daisy), *Eleocharis equisitina* (a spike-rush), *Paspalum distichum* (water couch) +/- low to mid-high closed grassland

Sedgeland

- *Eleocharis equisitina* (a spike-rush), *Periscaria decipiens* (slender knotweed) low to mid-high closed sedgeland

Grassland

- *Stenotaphrum secundatum* (buffalo grass), low closed grassland
- *Pennisetum clandestinum* (kikuyu), *Paspalum dilatatum* (paspalum) low closed grassland
- *Axonopus affinis* (broad-leaved carpet grass), *Chloris gayana* (Rhode's grass), *Digitaria dactylon* (Queensland blue couch) low closed sod grassland

Reafforestation

- Littoral rainforest plantings emphasising locally sourced rainforest species along the western boundary and rainforest species in combination with coast banksia along the eastern boundary

4.1.1 Littoral rainforest

Guioa semiglauca (guioa), *Cupaniopsis anarcardioides* (tuckeroo), mid-high simple microphyll littoral rainforest

Two major areas of littoral rainforest were recorded at the site. The most significant of these is the escarpment littoral rainforest which contains an area mapped under SEPP 26. There is no development proposed for the escarpment site, although a single dwelling house is proposed on grassland west of this association. Littoral rainforest in the south of the site is dominated by tuckeroo and guioa. This area was subject to considerable reafforestation works some 5 years ago and the success of this program in closing canopy gaps was reported in Parker (2003). However, some dieback has subsequently occurred and a number of environmental weeds (eg Singapore daisy, *Wedelia trilobata* and groundsell, *Baccharis halimifolia*) are well established thus limiting natural regeneration. A remnant area of littoral rainforest known as the Amber Drive Public Reserve (Lot 63 DP 793489) adjoins the site mid-way along its western boundary (Fig. 1). Botanically, this Reserve is particularly significant in containing the endangered littoral rainforest species coastal fontainea, *Fontainea oraria*. Other threatened species located within this reserve include the vulnerable rough-shelled bush-nut, *Macadamia tetraphylla*. Substantial reafforestation works buffer the proposed development from this rainforest remnant (Fig. 3). Tree within the reafforestation works are now well

established (> 5 years old) although further weed control is required for some species (e.g., madeira vive, *Anredera cordifolia*) in the vicinity of the Reserve.

Upper storey:

Tuckeroo, guioa and camphor laurel

Understorey and ground cover:

Lantana, para grass and Singapore daisy

4.1.2 Riparian Complex

Wedelia trilobata (Singapore daisy), *Eleocharis equisitina* (a spike-rush), *Paspalum distichum* (water couch) +/- low to mid-high closed grassland

A small unnamed creek flows through the site. The upper extent of this creek contains flowing water during or shortly after rain events, whereas the lower one third of the creek contains standing or slowly flowing water during most of the year. This creek is charged from a number of sources which include overland drainage and springs. Floristic variation along the length of the creek is reflected in the change in soil moisture conditions (Plate 4 in Fig. 3).

Overland drainage has created two significant environmental perturbations. The first of these is substantial gully erosion where drainage waters from Survey Street are concentrated. The second environmental disturbance is the transportation of environmental weeds into and through the site. Singapore

daisy is one of the most significant of these weeds and was reported in 2003 as a major component of the riparian vegetation (Parker 2003). Over the past three years, Singapore daisy has invaded the littoral rainforest remnant and reafforestation plantings as well as completely smothering the waterway in the south of the site. Its spread within the riparian zone of the site has been curtailed somewhat by cattle grazing.

The vulnerable hairy-joint grass, *Arthraxon hispidus,* was recorded in the riparian complex on the western bank of the unnamed creek in the south of the site (Fig. 3). This species occupied a small ecotone between the grassland and the sedgeland where the soil was damp but not saturated. The quadrat survey, discussed previously, recorded 24 stems in an area measuring 3.6 m by 3.3 m. This location was plotted by survey. An additional area around hairy-joint grass was also plotted to ensure that a suitable separation was maintained between any proposed drainage or landscape works and this grass species (Fig. 2). The proposed management of hairy-joint grass is further discussed in section 5 of this report.

Ground cover:

Singapore daisy, para grass, sedges, spike rush, water couch, kikuyu (in upper reaches), woolly frogmouth, river buttercup, lantana and slender knotweed

4.1.3 Sedgeland

Eleocharis equisitina (a spike-rush), *Periscaria decipiens* (slender knotweed) low to mid-high closed sedgeland

A small area of sedgeland was recorded where the unnamed creek formed a gently sloping pool in the south of the site (Fig. 3). Sedgeland extends up-slope to the east where a continuous supply of spring-fed water provided suitable soil-moisture conditions (Plate 2 in Fig. 3).

Ground cover:

Spike-rush, slender knotweed, water couch, woolly frogmouth, para grass, river buttercup and Singapore daisy (on drier margins)

4.1.4 Grassland

Stenotaphrum secundatum (buffalo grass), low closed grassland

Buffalo grass characterised the drier upper slopes of the site. This exotic pasture species forms a thick dense canopy which retards the regenerative ability of other native or exotic plants. It is of little conservation value (refer to Plate 1 in Fig. 3).

Ground cover:

Buffalo grass, fire weed, lantana and emergent camphor laurel, tuckeroo and guioa

Pennisetum clandestinum (kikuyu), *Paspalum dilatatum* (paspalum) low closed grassland

Kikuyu dominated the slopes where soil-moisture levels were adequate. The kikuyu grassland benefits from relatively high soil fertility levels combined with down-slope soil moisture.

Ground cover:

Kikuyu, paspalum, white clover, fireweed, hairy commelina, tussock rush, broad-leaved carpet grass, blue billygoat weed, Singapore daisy and lantana

Axonopus affinis (broad-leaved carpet grass), *Chloris gayana* (Rhode's grass), *Digitaria dactylon* (Queensland blue couch) low closed sod grassland

Broad-leaved carpet grass was recorded as an ecotonal association between buffalo grass and kikuyu. This association was more prevalent in up-slope locations in 2003 (Parker 2003) but its spatial extent appears to have been constrained by the more aggressive buffalo grass. This association is of little conservation value.

4.1.5 Reafforestation and landscape species

Littoral rainforest plantings emphasising locally sourced rainforest species along the western boundary and rainforest species in combination with coast banksia along the eastern boundary

Extensive reafforestation plantings of littoral rainforest origin have been undertaken at the site (Fig. 3). These are now well

advanced (> 5 years in age) and contain a species mix which is characteristic of local rainforest remnants. Several vulnerable species were included in the plantings (e.g., durobby, *Syzgium moorei,* and rough-shelled bush-nut) and these specimens are now approximately 2 m in height.

Environmental weeds (e.g. madeira vine, wandering dew, *Tradescantia albiflora,* Singapore daisy and groundsel) are well established where plantings adjoin residential areas. It is intended that further reafforestation works will increase the area of littoral rainforest at the site and buffer proximal areas of high conservation value. Furthermore, weed control within rainforest remnants and in the vicinity of hairy-joint grass will be undertaken by trained bush regenerators as part of this proposed development. The rainforest plantings are illustrated in a report provided by Hassell Landscape Consultants which accompanies this application.

4.2 Fauna

4.2.1 Reptiles and frogs

A number of skinks were noted during the field survey which were identified as the eastern grass skink, *Lampropholis delicata*. This species was recorded in the rainforest remnants. A single snake, the eastern brown snake, *Pseudonaja textiles,* was recorded in the riparian corridor

although a number of other common reptiles are expected based on the suitability of habitat.

Snake species which may potentially occur include the yellow-faced whip snake, *Demansia psammophis,* the green tree snake, *Dendrelaphis punctulata*, the carpet python, *Morelia spilota* and the dwarf crowned snake, *Cacophis krefftii.*

Two frog species were recorded. These were the common froglet, *Crinia signifera* and the cane toad, *Bufo marinus.* The cane toad was previously predicted (Parker 2003) but not recorded at the site.

Other species which may seasonally occur and which have been recorded in the vicinity of the site are the green tree frog, *Litoria caerulea*, the rocket frog, *L. nasuta*, the striped marsh frog, *Limnodynastes peroni* and the eastern dwarf tree frog, *L. fallax* (per. recs.). Vulnerable species (e.g., Wallum froglet, *Crinia tinnula,* or Wallum sedge-frog, *Litoria olongburensis),* are unlikely to occur due to the unfavourable nature of habitat at the site.

4.2.2 Birds

Bird assemblages were previously reported in Parker (2003) as follows:

> *"Species-richness was the highest in the reafforestation areas which extended to over 3 m in height. The diversity of rainforest species in the*

> *revegetation areas is likely to contribute to bird species-richness over time. Conspicuous species noted in the revegetation plots included the eastern rosella, Platycercus eximius, the rainbow lorikeet, Trichoglossus haematodus, and the scaly-breasted lorikeet, Trichoglossus chlorolepiotus.*
>
> *Species recorded in the grassland included the grey butcherbird, Cracticus torquatus, the pied butcherbird, Cracticus nigrogularis, and the torresian crow, Corvus orru."*

Bird assemblages are known to vary throughout the year and correspond to the migration patterns of the particular species or the flowering periods of trees and shrubs. For example, species such as the rainbow lorikeet and the scaly-breasted lorikeet are opportunistic blossom feeders and were noted during both the 2003 and the 2006 surveys.

Other ubiquitous species, which were recorded during both surveys included the torresian crow, *Corvus orru*, the pied currawong, *Strepera graculina*, the Australian magpie, *Gymnorhina tibicen,* and the grey butcherbird, *Cracticus torquatus*.

Open country species recorded in the 2006 survey but not in 2003 included the cattle egret, *Egretta ibis,* and the straw-necked ibis, *Threskiornis spinicollis.*

4.2.3 Mammals

Few mammals are expected to occur at the site due to the depauperate nature of the habitat and continual maintenance e.g., slashing and grazing.

However, flying foxes are expected to periodically utilise flowering trees and shrubs and insectivorous microbats are expected to forage over the site opportunistically. Based on local records, vulnerable bats which may occur at the site include the grey-headed flying fox, the black flying-fox, the common blossom bat and the little bent-wing bat. These species are discussed below in section 6.

5.0 DISCUSSION

5.1 Threatened flora and mitigation measures

A number of threatened plant species were recorded both at the site and in the immediate environs. Those recorded at the site include hairy-joint grass, rough-shelled bush-nut, and durobby whereas those recorded in adjoining lands include coastal fontainea, hairy-joint grass, rough-shelled bush-nut, xylosma, stinking cryptocarya and arrowhead vine (Fig. 4).

5.1.1 Coastal fontainea

A buffer of over 50 m will be provided between coastal fontainea known from Amber Reserve and the closest

proposed house on Lot 1 (Fig. 1). This buffer will meet the Director General's requirements with respect to this proposal. Currently 10 m of littoral rainforest plantings (> 5 years in age) adjoin Amber Reserve on the northern side (Fig. 3). It is proposed that additional littoral rainforest plantings of approximately 20 m in width will be added to this area (Fig. 5).

Invasion by environmental weeds poses the major impact on the vegetation within Amber Reserve and the long-term viability of rainforest plantings. This proposal incorporates a two year program of bushland maintenance and weed control using trained personnel to manage invasions of species such as madeira vine, Singapore daisy, callisia, *Callisia fragrans,* and White's passionflower, *Passiflora subpeltata*.

5.1.2 Hairy-joint grass

A small area of hairy-joint grass containing 24 stems was recorded in the riparian corridor at the site (Figs. 3, 4 and 5). This species has also been recorded in the same drainage system on the Newton land located to the south-east of the site (Kooman 2006, Fig. 4).

There is no development proposed, other than reafforestation, in proximity to the hairy-joint grass. However, livestock will be removed from the site if the development proceeds and this action could provide greater opportunity for the spread of

exotic grasses and weeds (e.g., Singapore daisy). Therefore, the following is proposed:

- The current mowing regime will be maintained in the 5 m grassed strip located between hairy-joint grass and the littoral rainforest plantings and all mulch will be removed from the vicinity of hairy-joint grass;
- That a bushland management team will control by hand weeding any infestation of aggressive grasses and weeds within the habitat of hairy-joint grass. It is proposed that monitoring of this population be undertaken for two years at three monthly intervals (8 visits) and that an annual report be provided to Council. This monitoring program commenced with the stems of hairy-joint grass being tagged with survey tape.

5.1.3 Rough-shelled bush-nut and durobby

Rough-shelled bush-nut and durobby were planted at the site some 5 years ago as part of the littoral rainforest reafforestation works. They are confined to the planted area which will be buffered by further littoral rainforest plantings as identified in the landscape plan (Fig. 5). Rough-shelled bush-nut was also located in the Amber Reserve.

Vegetation within this reserve is well buffered both spatially and by reafforestation plantings.

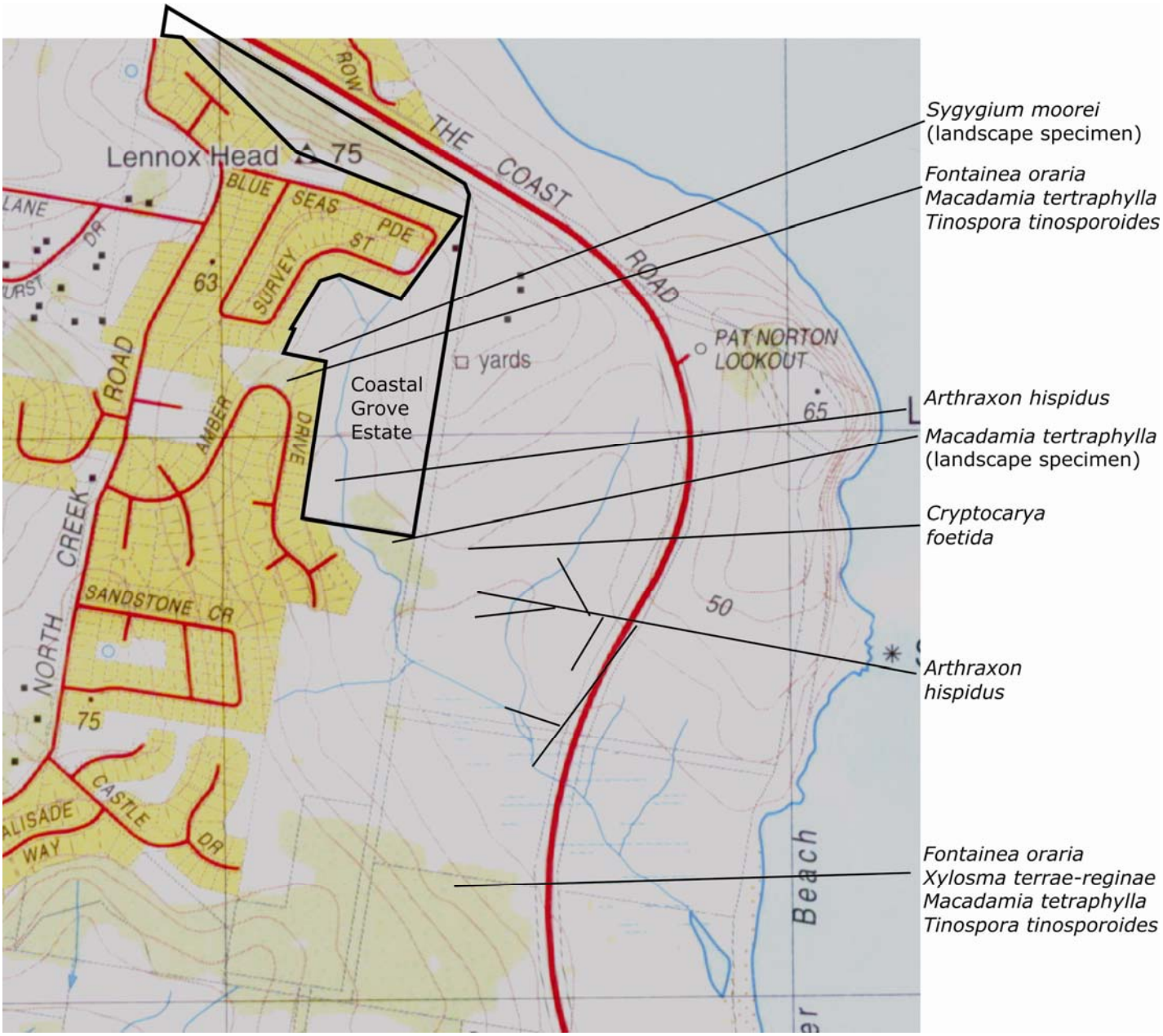

Fig. 4: Threatened plant species locations (Map source: Ballina sheet, 9640-3N Third Edition, GDA Grid)

(Records on Newton land to the south-east of Coastal Grove Estate from Kooyman 2006, records on Amber Drive Public Reserve from NPWS and Environment Australia)

Additional littoral rainforest species will be densely planted and weed control will be undertaken by experienced bushland regenerators to further protect this rainforest remnant.

5.2 Threatened fauna

It is unlikely that threatened terrestrial fauna would occur at the site due to the depauperate grassland habitats available. However, a number of vulnerable bat species may opportunistically utilise the flowering trees and shrubs which have been planted at the site as part of the littoral rainforest reafforestation works, some five years ago. An assessment with respect to the potential impact on these species is included in Section 6 of this report.

5.3 Koala habitat and State Environmental and Planning Policy No. 44

State Environmental and Planning Policy No. 44 - Koala Habitat Protection ("SEPP 44") does not apply to the site as the site primarily contains grassland with littoral rainforest remnants and reafforestation plantings. No koala food trees were recorded and a koala plan of management is not required.

5.4 Landscaping and reafforestation

Extensive reafforestation with littoral rainforest species was undertaken some 5 years ago. The success of these plantings

was referred to in a 2003 flora and fauna report (Parker 2003) which noted that the reafforestation plantings provided the best bird habitat at the site. This proposal will build on the success of the earlier plantings and further buffer and link littoral rainforest remnants (Fig. 5). This is of particular relevance in this northern NSW coastal environment where littoral rainforest areas have been fragmented by past clearing and subsequent land management.

A small strip of the reafforestation plantings undertaken some 5 years ago will need to be removed along the eastern boundary of the site to allow for road construction (Fig. 3). The species planted in this strip are dominated by coast banksia, *Banksia integrifolia* var. *integrifolia*, sweet pittosporum, *Pittosporum undulatum*, blue lilly pilly, *Syzygium oleosum,* tuckeroo, lantana, bitou bush, *Chrysanthemoides monilifera* subsp*. rotundata* and kikuyu. These are listed in Appendix 1. Compensatory plantings will utilise all of the littoral rainforest species proposed for removal.

5.5 Weed control

A fundamental component of this proposal is the control of weeds which have gained a stranglehold in some areas including the creek-lines, the littoral rainforest remnants and where reafforestation has been completed. With respect to weed control, it is proposed that:

INDICATIVE PLANT LIST FOR OPEN SPACE PLANTING

PLANT SCHEDULE	PSL3394_Coastal Grove	Height
Proposed street tree and verge tree species		
Cupaniopsis anacardioides	Tuckeroo	21m
Lophostemon confertus	Brush Box	20m
Melaleuca quinquenervia	Broad Leaved Paperbark	18m
Waterhousia floribunda	Weeping Lilly Pilly	18m
Crown road reserve small tree and shrub planting in verge		
Acmena hemilampra	Broad leaved Lilly Pilly	5-10m
Acmena smithii	Lilly Pilly	15m
Banksia integrifolia var. integrifolia	Coastal Banksia	15m
Callistemon salignus	Pink tipped bottlebrush	9m
Cordyline petiolaris	Broad-leaved palm lily	5m
Dichelachne crinita	Long-Hair Plume Grass	0.7m
Guioa semiglauca	Guioa	5-8m
Hibbertia scandens	Climbing Guinea Flower	0.5m
Lomandra hystrix	Small Mat Rush	0.7m
Lomandra longifolia	Lomandra	1m
Macaranga tanarius	Macaranga	6m
Microlaena stipoides	Microlaena	0.4m
Rhodomyrtus psidioides	Native Guava	12m
Syzygium oleosum	Blue Lilly Pilly	10m
Proposed dense trees and shrubs		
Trees		
Acacia irrorata	Wattle	12m
Acmena hemilampra	Broad leaved Lilly Pilly	5-10m
Acmena smithii	Lilly Pilly	15m
Acronychia imperforata	Logan Apple	9m
Allocasuarina littoralis	Black She-Oak	10m
Alphitonia excelsa	Red ash	21m
Archontophoenix cunninghamiana	Bangalow Palm	14m
Banksia integrifolia	Coastal Banksia	15m
Callistemon salignus	Pink tipped bottlebrush	9m
Cupaniopsis anacardioides	Tuckeroo	3-10m
Drypetes deplanchei	Yellow Tulip	20m
Elaeocarpus reticulatus	Blueberry Ash	12m
Eupomatia laurina	Native Bolwarra	5m
Euroschinus falcata var. falcata	Ribbonwood	20m
Glochidion ferdinandi	Cheese Tree	15m
Guioa semiglauca	Guioa	5-8m
Harpullia pendula	Tulipwood	15m
Hymenosporum flavum	Native Frangipani	10m
Livistona australis	Cabbage Tree Palm	30m
Melaleuca quinquenervia	Broad Leaved Paperbark	18m
Polyscias elegans	Celerywood	10m
Podocarpus elatus	Plum Pine	40m
Syzigium australe	Brush Cherry	18m
Syzigium oleosum	Blue Lilly Pilly	10m
Tristaniopsis laurina	Water Gum	12m
Waterhousia floribunda	Weeping Lilly Pilly	18m
Shrubs		
Alocasia brisbanensis	Cunjevoi	1.5m
Alpinia caerulea	Native Ginger	1.5m
Asplenium australasicum	Bird's Nest Fern	1m
Pittosporum revolutum	Hairy Pittosporum	3m
Groundcovers		
Adiantum aethiopicium	Common Maindenhair	0.8m
Dianella caerulea	Coastal Flax Lily	0.7m
Dianella revoluta	Black Anther Flax Lily	1m
Dichondra repens	Guinea Weed	0.2m
Doodia aspera	Rasp Fern	0.4m
Hibbertia scandens	Climbing Guinea Flower	0.5m
Pandorea pandorea	Wonga Vine	0.3m
Viola hederacea	Native Violet	0.2m
Proposed open trees and grasses		
Trees		
Same as above		
Shrubs		
Banksia robur	Swamp Banksia	2m
Callistemon sp.	Callistemon	1.5m
Crinum pedunculatum	Swamp Lily	1m
Melaleuca pulchella	Claw Honey Myrtle Flower	0.7m
Groundcovers/grasses		
Dianella caerulea	Coastal Flax Lily	0.7m
Dianella revoluta	Black Anther Flax Lily	1m
Dichelachne crinita	Long-Hair Plume Grass	0.7m
Hibbertia scandens	Climbing Guinea Flower	0.5m
Lomandra hystrix	Small Mat Rush	0.7m
Lomandra longifolia	Lomandra	1m
Microlaena stipoides	Microlaena	0.4m

Proposed riparian edge planting and bio-retention swales		
Carex apressa	Tall sedge	1m
Dianella caerulea	Coastal Flax Lily	0.7m
Imperata cylindrica	Blady Grass	1m
Isolepis nodosa	Isolepis	0.6m
Juncus usitatus	Juncus	0.8m
Lobelia trigonocaulis	Forest Lobelia	0.5m
Lomandra longifolia	Lomandra	1m
Lomandra hystrix	Small Mat Rush	0.7m
Schoenoplectus validus	River Club Rush	1.2m
Proposed turf		
Pennisetum clandestinum	Kikuyu	n/a

0 20M 40M 80M
1:1000 @ A1

Fig. 5: Proposed landscaping and reafforestation

- qualified bush regenerators be commissioned for two years to undertake weed control along the creek-lines, the littoral rainforest remnants and where reafforestation has been completed; and
- the bush regenerators will provide an annual report to Council on their progress.

5.6 State Environmental and Planning Policy 26 (Littoral Rainforests)

State Environmental and Planning Policy 26 applies to the site. The proposal has been carefully designed to avoid any area of littoral rainforest and to provide substantial buffer plantings between the littoral rainforest remnants and the proposed development. Moreover, the proposal includes active weed control for a two year period during which it is anticipated that buffer plantings will reach approximately 2 m in height and canopy closure will be attained.

6.0 STATUTORY CONSIDERATIONS

6.1 "Seven-part test"

The Threatened Species Conservation Act 1995 ("TSC Act") commenced on 1 January 1996. This Act, *inter alia,* amended s 4, s 110, s 111 and s 112 of the *Environmental Planning and Assessment Act*, 1979 ("EPA Act") with regard to the protection of plants and animals.

For the purposes of the EPA Act and, in particular, in the administration of sections 78A, 79B, 79C, 111 and 112, the following must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- the Department of Environment and Conservation's *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities*; and
- each of the factors listed in sections 5A a-g as detailed below.

S.5A (a)

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

The following factors have been considered in assessing the likelihood *that a viable local population of the species is likely to be placed at risk of extinction* from this proposal:

- the proposal's likely impact upon the key habitat components essential to the species' lifecycle; and
- the size of the local population in comparison with that which is proposed to be removed/modified.

A local population is considered to be the population contained within interconnected suitable habitat within a 5 km radius of the study site.

Flora

Three threatened plant species, hairy-joint grass, durobby and rough-shelled bush-nut, were recorded at the site.

The durobby and rough-shelled bush-nut were part of previous reafforestation plantings and are well separated from any proposed development. Hairy-joint grass was located in the riparian zone and is known from other populations south of the site in the same drainage system. It is proposed that stock will be removed from the site and that the hairy-joint grass population be monitored for two years. Moreover, a bushland management team will hand remove any aggressive grasses or exotic species which may impact on the survival of this species. Thus, it is not anticipated that hairy-joint grass will be affected by the proposal. Accordingly, the proposal is unlikely to have an *adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

Another five species, arrow-head vine, coastal fontainea, Queensland Xylosma, stinking cryptocarya and white lace-flower have been recorded in the proximity of the site (Fig. 4). The proposed development is quite remote from these species and they will not be affected.

Fauna either recorded at the site or those species which have essential habitat components at the site

A number of threatened bat species are considered likely to periodically occur amongst the landscape species planted at the site, or in the case of the little bent-wing bat, forage opportunistically over the site. These species are included in the following s.5A assessment.

Little bent-wing bat

The little bent-wing bat is characterised by an exceptionally long terminal segment of the third finger. This placental flying mammal is greyish black to fawn-brown above and paler below.

This species occurs in a wide variety of forest types ranging from rainforests to warm temperate wet and dry sclerophyll forests. It forages on small insects below the tree canopy of well timbered habitat and relies on a limited number of caves for maternity and hibernation roosts (Dwyer 1983). With the onset of spring, adult females move from widely scattered roosts to specific nursery caves. These sites are often shared with the common bent-wing bat. The little bent-wing bat relies on large numbers of common bent-wing bats to increase cave temperatures to that necessary to raise young (Dwyer 1983; Baudinette *et al.* 1994).

Distribution

Australia

The little bent-wing bat frequents forests and woodlands of the coastal ranges of eastern Australia from the central coast of NSW to Cape York. This species utilises caves, old mines and a variety of structures such as buildings and stormwater drains as diurnal roosts. It is considered abundant nationally (Dwyer 1995) but in NSW it is restricted to the north of the State and is present in much lower numbers.

NSW, northern rivers and the site

It occurs in north-eastern coastal areas of NSW, extending from the Queensland border to the central coast. However, its distribution becomes increasingly coastal towards the southern extreme of its range. It has been recorded at Tweed Heads, Cudgen (NPWS 1995), Tumbulgum (pers. rec.), Brunswick Heads (NPWS 1995), Broken Head (pers. rec.), Lennox Head, Broadwater, Tuckean, Ellangowan, Evans Head, Bundjalung, Iluka-Woombah (NPWS 1995) Corindi (pers. rec.) and Grafton (NPWS 1995). It was recorded in most State Forest management areas in northern NSW (State Forests 1996). This species is likely to occur at the site due to the number of local records.

Impact of proposal

The major threat to the survival of the little bent-wing bat is the disturbance of maternity sites. Maternity caves may be

threatened by mining, recreational cavers and vandalism. However, this species may be indirectly threatened through a drop in bat density and the resultant variation in cave microclimate. Loss of foraging resources by clearing of native forest is likely to impose an increasing threat to the survival of this species. This species will not be impacted by the proposal as no potential habitat (forest types ranging from rainforests to warm temperate wet and dry sclerophyll forests) will be removed or disturbed.

Black flying-fox

The black flying-fox feeds on the blossom of eucalypts, paperbarks, coast banksia, turpentines and native and introduced fruits. It often congregates during the day with the grey-headed flying fox on islands or in swamps or rainforests.

Distribution

Australia

This species is distributed along the Australian coastline from approximately Shark Bay in Western Australia across northern Australia to approximately Grafton on the NSW coast (Strahan 1992).

NSW, northern rivers and the site

The black flying-fox has a limited distribution along the NSW coastal zone from the Queensland border to approximately

Grafton. It has been recorded in camps at Susan Island in Grafton and Curry Park at Lismore. Camps of this species have also been recorded at North Ocean Shores (Gilmore *et. al.,* 1986) and at Booyong (per. rec.). This species is commonly recorded in Byron Shire (per. recs.) and it may forage on blossoming plants at the site.

Impact of proposal

Clearing of native forests has reduced foraging resources while mortality from powerlines and shooting of bats raiding orchards may pose additional pressures on populations. This species will not be impacted by the proposal as no potential littoral rainforest will be removed or disturbed and reafforestation with littoral rainforest species will enhance local habitat values.

Common blossom bat

The common blossom bat is a small winged placental mammal that feeds on nectar. It has a long thin brush-like tongue and a slim pointed muzzle. Its long soft reddish-brown fur extends to the ankle. It is paler below and flecked with white (Cronin 1991). In suitable environmental conditions, this species can be quite common reaching a density of between one and 17.5 bats/ha. However, the species' density is commonly associated with the density of the *Banksia* inflorescence (Law 1994).

The common blossom bat forages extensively in coastal heaths and coast banksia woodland and usually roosts in proximity to these feeding sites. In NSW feeding sites, it is considered a strict nectivore, whereas in north-east Queensland it is a facultative frugivore and to a lessor extent a folivore (Law and Spencer 1995).

Distribution

Australia

This species has been recorded east of the ranges from Cape York in Queensland to the mid-north coast of NSW.

NSW, northern rivers and the site

The common blossom bat occurs along the coastal region east of the Great Dividing Range from the Queensland border to approximately Taree where littoral rainforest and heath occur in close proximity. Rainforests, unlike more open habitats, are important for roosting purposes enabling bats to maintain a stable body temperature (Law 1993). The common blossom bat has been recorded at Wooyung (Hoye 1994), Kingscliff (pers. record), Cudgen, Brunswick Heads (NPWS 1995), Byron Bay, Broken Head (pers. recs), Lennox Head (NPWS 1995), Iluka Bluff, Bundjalung National Park, Yuraygir National Park (Law 1994), Yamba and Brooms Head (NPWS 1995). It is commonly recorded in Byron Shire and has been recorded at Lennox Head, in the vicinity of the site (per. rec.).

Impact of proposal

The dominant threat to this species is the clearing of foraging and roosting habitats (e.g. littoral rainforest). Clearing removes essential habitat and places movement barriers between local populations. This species will not be impacted by the proposal as no littoral rainforest habitat will be removed or disturbed and reafforestation with littoral rainforest species will enhance local habitat values. Flowering plants in the littoral rainforest may serve as foraging sites for the grey-headed flying-fox, the black flying-fox and the common blossom bat.

Grey-headed flying fox

The grey-headed flying fox feeds on the blossom of eucalypts, paperbarks, turpentines as well as native and introduced fruits.

Distribution

Australia

This species is distributed along the eastern Australian coastline from Gladstone in Queensland to south Gippsland and Melbourne in Victoria. It rarely travels more than 200 km inland.

NSW, northern rivers and the site

The grey-headed flying fox has a distribution along the NSW coastal zone from the Queensland to the Victorian borders.

Large camps occur at Susan Island in the Clarence River and at Wigham Brush, Taree. It is commonly recorded in the Byron and Ballina Shires (per. recs.) and has been recorded in the vicinity of the site (per. rec.).

Impact of proposal

Clearing of native forests has reduced foraging resources while mortality from powerlines and the shooting of bats raiding orchards may pose additional pressures on populations. Flowering plants in the littoral rainforest and reafforestation areas may serve as foraging sites for the grey-headed flying-fox, black flying-fox and common blossom bat. This species will not be impacted by the proposal as no potential habitat will be removed or disturbed.

S5A (a) conclusion

The proposal is unlikely to significantly effect any of the threatened species listed above as no area of suitable habitat is proposed to be modified or cleared. Thus, the proposal is unlikely to *have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

S.5A (b)

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the

endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No endangered populations listed under Part 2 of Schedule 1 of the TSC Act occur within the vicinity of the site. Thus, the action proposed is unlikely *to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

S.5A (c)

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

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

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

Littoral rainforest is listed as an Endangered Ecological Community and occurs on the coastal escarpment, to the west and to the south of the site. Littoral rainforest to the south

and west of the site is currently buffered by reafforestation plantings, which will be expanded as part of this proposal. The escarpment littoral rainforest is in a different catchment to the proposal and will not be developed. Thus, Endangered Ecological Communities will not be adversely affected.

S.5A (d)

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

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

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

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

Hairy-joint grass

There will be no change in hydrology (see Patterson and Britton engineering plans), no reshaping of the creek banks, no landscape plantings or any other activity which may impact on hairy-joint grass. Moreover, all individual stems located

have been tagged and this species will be monitored for two years along with any works which may be needed to hand remove aggressive grasses or weeds. Thus, the habitat of hairy-joint grass will not be *modified as a result of the action proposed*.

Coastal fontainea, durobby and rough-shelled bush-nut and other threatened plants recorded in the locality

The threatened plant species arrow-head vine, coastal fontainea, durobby, Queensland Xylosma, rough-shelled bush-nut, stinking cryptocarya and white lace-flower are located in sites remote from any proposed development and are buffered by considerable reafforestation plantings. Moreover, additional reafforestation plantings will further protect the coastal fontainea located in the Amber Street Public Reserve west of the site. Thus, the habitat of the above-listed threatened plant species will not be *modified as a result of the action proposed*.

Fauna

Bats are considered to be the only threatened fauna species which would use resources that occur at the site. Flowering plants in the littoral rainforest may serve as foraging sites for the grey-headed flying-fox, black flying-fox and common blossom bat. These forested remnants will not be removed or disturbed. Thus, the habitat of macrobats will not be *modified*

as a result of the action proposed. The little bent-wing bat and a number of common microbats are likely to periodically forage over the site. However, habitat of these species will not be *modified as a result of the action proposed*.

Habitat isolation or fragmentation

A key feature of this proposed development is further reafforestation of littoral rainforest edges to enhance corridor function and viability. Thus, *an area of habitat is* not *likely to become fragmented or isolated from other areas of habitat as a result of the proposed action*.

The proposal will not result in the removal or modification of threatened species habitat or any Endangered Ecological Community. In addition, it will not result in habitat fragmentation. Thus, the habitat of a threatened species, population or ecological community will not be modified, fragmented or isolated.

Habitat removal

The proposed development will be located in a paddock of grassland dominated by exotic species of little ecological value. This area is currently grazed by stock resulting in damage to and the nutrification of an unnamed creek. Thus, *the importance of the* grassland *habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality*

is negligible. A small area of reafforestation plantings located along the site's eastern boundary will be removed to facilitate road access. These will be compensated for by extensive reafforestation and landscaping adjacent to the littoral rainforest remnants. *The importance of the* eastern reafforestation plantings as *habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality* is negligible.

The long-term survival of the species, population or ecological community in the locality

Section 5A(d)(iii) requires an assessment with respect to *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.* While this proposal will not require habitat *to be removed, modified, fragmented* for any of the threatened species addressed, the removal of stock may conceivably create a different set of circumstances regarding the nature of the hairy-joint grass habitat. In order to maintain the status quo, it is proposed to mow the grassland west of the location of hairy-joint grass and to hand weed any aggressive grasses and weeds which may potentially impact on this species. Monitoring and reporting on the effectiveness of this program is proposed for two years. Thus, it is unlikely that the

proposal will affect *the long-term survival of the* hairy-joint grass or any other threatened species.

S.5A (e)

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

The site does not contain any area which has been identified and declared as critical habitat under Part 3 of the TSC Act. Therefore, critical habitat will not be affected by the proposal.

S.5A (f)

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

A recovery plan has been prepared for coastal fontainea (Department of Environment and Conservation 2004). This draft recovery plan lists current threats and management issues as habitat destruction, habitat fragmentation and isolation, habitat degradation (exotic weed infestation), weed control activities, stormwater management and erosion control, cattle grazing, ocean wind sheer, increased pressure from adjacent developments, lack of knowledge of biological and ecological requirements of coastal fontainea, inbreeding, dieback, fire, physical and mechanical damage and collection of propagules. Nothing in this development proposal is in

conflict with the provisions of the coastal fontainea draft recovery plan.

S.5A (g)

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

Threatening processes gazetted in the most recent amendment of the TSC Act on 21 July 2006 are as follows:

- Alteration of habitat following subsidence due to longwall mining;
- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands;
- Anthropogenic climate change;
- Bushrock removal;
- Clearing of native vegetation. Clearing is defined as the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long-term modification, of the structure, composition and ecological function of a stand or stands;
- Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus;*
- Competition from feral honey bees, *Apis mellifera*;
- Death or injury to marine species following capture in shark control programs on ocean beaches;

- Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments;
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition. High frequency fire is defined as two or more successive fires close enough together in time to interfere with or limit the ability of plants or animals to recruit new individuals into a population, or for plants to build up a seed-bank of sufficient size to maintain the population through the next fire;
- Importation of Red Imported Fire Ants, *Solenopsis invicta*;
- Infection by *Psittacine Circoviral* (beak and feather) disease affecting endangered psittacine species and populations;
- Infection of frogs by amphibian chytrid causing the disease, chytridiomycosis;
- Infection of native plants by the fungus, *Phytophthora cinnamomi;*
- Introduction of the Large Earth Bumblebee, *Bombus terrestris*;
- Invasion and establishment of exotic vines and scramblers;
- Invasion and establishment of the Cane Toad, *Bufo marinus*;
- Loss or degradation (or both) of sites used for hill-topping by butterflies. Hill-topping in butterflies is a complex behaviour that often facilitates mating between sexes. Many butterfly species appear to congregate on hill-tops or ridges that are usually higher than the surrounding landscape. These sites may range in area from a few square metres to several hectares;

- Invasion of native plant communities by bitou bush, *Chrysanthemoides monilifera.* The ability of bitou bush to become the overwhelming dominant in invaded ecological communities threatens all plant communities within its distribution;
- Invasion of native plant communities by exotic perennial grasses;
- Predation by the mosquito fish, *Gambusia holbrooki;*
- Predation by the European red fox, *Vulpes vulpes*;
- Predation by the feral cat, *Felix cattus.* Predation by the feral cat has been implicated in the extinction and decline of many species of birds on islands around Australia and in the early extinction of up to seven species of small mammals on the Australian mainland;
- Predation by the ship rat, *Rattus rattus*, on Lord Howe Island;
- Predation, habitat degradation, competition and disease transmission by feral pigs, *Sus scrofa*; and
- Removal of dead wood and dead trees.

None of the above-listed threatening processes is likely to increase as a result of the proposed development.

6.2 *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act)

A search of the Department of Environment and Heritage data base has produced a protected matters report for a 5 km x 5 km area surrounding the site (Appendix 3).

This report provides a listing of species listed under the EPBC Act in the vicinity of the site. Although hairy-joint grass is not included in the protected matters report, it is listed under the EPBC Act.

6.2.1 Impact assessment

A significant impact under the EPBC Act is an impact which is described in the EPBC Act guidelines as *"an impact which is important, notable, or of consequence, having regard to its context or intensity. To be likely, it is …sufficient if a significant impact….is a real or not remote chance or possibility."*

The following matters have been considered with respect to the threatened species listed under the EPBC Act (e.g., durobby, coastal fontainea, hairy-joint grass, grey-headed flying-fox etc, Appendix 3):

- The sensitivity of the environment;
- The timing, duration and frequency of the proposal;
- Potential on-site and off-site impacts;
- Potential direct impacts;
- Cumulative impacts considered over time;
- Fragmentation effects; and
- Invasive weeds.

The following matters of national environmental significance are not relevant to this proposal:

- World Heritage properties;
- RAMSAR wetlands of international importance;
- Migratory species protected under international agreements;
- Nuclear actions; and
- The Commonwealth marine environment.

6.2.2 Conclusion

On an review of the EPBC Act guidelines, it was considered that the Coastal Grove Estate proposal does not significantly affect World Heritage properties, wetlands of international importance, listed threatened or endangered species, any endangered community, any listed migratory species, any Commonwealth land and any bilateral agreement between the State and Commonwealth. Thus, the proposal does not need referral to the Commonwealth.

7.0 DIRECTOR GENERAL'S ADDITIONAL REQUIREMENTS

7.1 Flora and fauna impacts

The following Director General's requirements are addressed below:

- *Section 3.1: Ensure that areas of Littoral Rainforest are protected in accordance with the Lennox Head*

Structure Plan, particularly in relation to buffers and wildlife corridors;

Substantial reafforestation planting has been undertaken at the site. This has been well maintained for the past 5 years. This proposal includes weed control and additional littoral rainforest plantings which will widen the existing wildlife corridors and further buffer threatened species such as coastal fontainea (see landscape plans in Fig. 5).

- *Section 3.2: Address impacts on threatened species having regard to the draft Guidelines for Threatened Species Assessment, 2005 prepared by the Department of Environment and Conservation (DEC) and the Department of Primary Industries (DPI) and the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities 2004 prepared by DEC;*

This matter has been addressed in the body of the flora and fauna and in the section 5A considerations.

- *Address measures to protect Coastal Fontainea which is listed as an Endangered species. In particular, a field survey of the site should be conducted and documented in accordance with the draft "Guideline for Threatened Species Assessment" and the "Species Profile and Environmental Impact Assessment Guidelines for the Coastal Fontainea Fontainea oraria" in the Recovery Plan for the Coastal Fontainea. This should specifically address considerations and thresholds set out in Step 3 and Step 5 of the draft guideline;*

A flora survey conducted in accordance with step 3 of the Guidelines (Survey and assessment requirements and process) was undertaken at the site and on adjoining lands (Fig. 2 Survey Methods).

Step 5 of the Guidelines relates to the assessment of the nature and impact of the proposal. This assessment program commenced in the early planning stages with the identification of wildlife corridors and buffer plantings and was continued throughout the preparatory stages with the survey of hairy-joint grass and mitigation proposals.

- *Section 3.4: Consult with the DEC with regard to an appropriate buffer from the proposed housing lots 38 & 39. Currently DEC recommends that a buffer of at least 50m be provided to protect the Coastal Fontainea and be in accordance with Council's draft Plan of Management for Bush Regeneration for Amber Creek Reserve, however it is noted that the proposed buffer is shown to be 15m;*

Consultation was undertaken with the DEC with respect to this matter. The DEC confirmed by email on 29 May 2006 that the Applicant should address matters such as bushfire protection, stormwater and hydrology as relevant to coastal fontainea in order to ensure its conservation in this application. A 50 m buffer between the proposed development and coastal fontainea was required by the DEC. This buffer is illustrated in Fig. 1.

- *Section 3.5: Address any proposed native vegetation clearing and responsibilities under the Native Vegetation Act 2003;*

It is anticipated that an area of planting which was undertaken some 5 years ago along the site's eastern boundary will be substantially removed during road construction. Consent is not required to remove this vegetation pursuant to the *Native Vegetation Act 2003* as this vegetation falls under the definition of "regrowth" which is exempt.

- *Section 4.1: Consult with the DPI regarding appropriate buffers to the watercourse. Currently DPI recommends, in accordance with Policy and Guidelines – Aquatic Habitat Management and Fish Conservation, that buffer be at least 50m;*

Consultation was undertaken with Mr Patrick Dwyer of NSW Fisheries. This included a site inspection on 1 June 2006 with Patrick Dwyer from Department of Primary Industries (Fisheries) and key members of the Coastal Grove project team including Peter Parker from Peter Parker Environmental Consultants (flora/fauna), Richard Baker from Patterson Britton (stormwater management) and Sarah Kelly from SAKE Development (overall management and town planning). Sarah Kelly noted the Director General's requirements had been issued for the Project Application and that the Department of Primary Industries ("DPI") had recommended a 50 m buffer from the watercourse. Mr Dwyer responded that

this is generally the standard requirement issued by his Department but that it is unlikely that a 50 metre buffer would be required in this case.

Other key issues raised by Mr Dwyer are as follows:

- Illustrate SEPP 14 wetlands on a site plan or location plan (to demonstrate they are not in close proximity to the proposed development). The nearest SEPP 14 wetlands are located south of the site near the Coast Road;
- Upstream at the northern end of the site (near allotment 10), the 20 m riparian corridor buffer is adequate, and the buffer may need to increase further to the south (say to 25 m). The buffer downstream is not so descriptive;
- Minor reshaping of the creek line to provide conveyance and stormwater treatment measures would be satisfactory;
- Maintain a low flow channel to allow conveyance of any groundwater that discharges to the surface; and
- Provide dry basins instead of wetlands; and
- A series of pipes is satisfactory for crossing the un-named creek.

Following the site inspection and the listing of the above issues, the field survey identified hairy-joint grass (see location in Fig. 2). A buffer to hairy-joint grass has been identified where no works are proposed.

- *Section 4.2: If appropriate address any requirements under the Fisheries Management Act 1994;*

The *Fisheries Management Act 1994* (FM Act) lists threatened species, marine vegetation and threatening processes. These are as follows:

Endangered species:

Austrocordulia leonardi	Sydney Hawk dragonfly
Carcharias Taurus	grey nurse shark
Craterocephalus fluviatilis	Murray hardyhead
Maccullochella ikei Rowland	eastern freshwater cod
Maccullochella macquariensis	trout cod
Nannoperca oxleyana Whitley	Oxleyan pygmy perch
Notopala sublineata	river snail
Pristis zijsron	Green sawfish
Thunnus maccoyii	southern bluefin tuna

Endangered populations:

- *Ambassis agassizii*, olive perchlet, in western NSW; and
- *Mogurnda adspersa*, purple spotted gudgeon, in western NSW

Endangered ecological communities:

- The aquatic ecological community in the natural drainage system of the lower Murray River catchment;
- The aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River; and
- The aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River.

Vulnerable species and marine vegetation:

Archaeophya adamsi	Adams emerald dragonfly
Bidyanus bidyanus	silver perch
Branchinella buchananensis	Buchanans fairy shrimp
Carcharodon carcharias	great white shark
Epinephelus daemelii	black cod
Macquaria australasica	Macquarie perch
Nannoperca australis	southern pygmy perch

Marine vegetation

Nereia lophocladia	marine brown alga

Key threatening processes:

- Degradation of native riparian vegetation along New South Wales water courses;
- Hook and line fishing in areas important for the survival of threatened fish species;
- Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams;
- Introduction of fish to waters within a river catchment outside their natural range;
- Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales;
- Removal of large woody debris from New South Wales rivers and streams; and
- The current shark meshing program in New South Wales waters.

The proposed development will not affect any of the above-listed threatened species or result in an increase in any of the listed threatening processes.

- *Section 11.2: Prepare a tree assessment report for those trees to be removed and those retained;*

An area which was reafforested along the site's eastern boundary will be impacted during the construction of the proposed road (Fig. 3 Vegetation). The vegetation survey identified the trees, shrubs and grasses at this location:

Scientific name	**Common name**
Acronychia imperforate	Beach acronychia
Alphitonia excelsa	Red ash
Banksia integrifolia var. integrifolia	Coast banksia
Chrysanthemoides monilifera subsp. *rotundata*	Bitou bush
Cinnamomum camphora	Camphor laurel
Cordyline petiolaris	Broad-leaved palm lilly
Cryptocarya triplinervis var. *triplinervis*	Three-veined laurel
Cupaniopsis anarcardioides	Tuckeroo
*Eragrostis curvula (*complex)	Love grass
Ficus elastica	Rubber tree
Ficus watkinsiana	Strangler fig
Lantana camara	Lantana
Macaranga tanarius	Macaranga
Passiflora subpeltata	White's passionflower
Pennisetum clandestinum	Kikuyu
Pittosporum undulatum	Sweet pittosporum
Podocarpus elatus	Plum pine
Rhodomyrtus psidioides	Native guava
Rhynchelytrum repens	Red Natal grass
Stenocarpus sinuatus	Firewheel tree
Syzygium oleosum	Blue lilly pilly

Substantial compensatory planting is proposed as illustrated in Fig. 5 and described in the landscape report by Hassell.

- *Section 11.3: Provide proposed rehabilitation measures and management measures to be adopted with regard to protection of littoral rainforest from Bitou Bush and other threatening processes.*

The following management proposals with respect to the protection of littoral rainforest have been included in this report:

- Extensive littoral rainforest plantings will adjoin and buffer the littoral rainforest in Amber Drive Public Reserve (Fig. 5). This is in addition to the littoral rainforest plantings undertaken some five years ago;
- Weed control will be undertaken by trained bush regenerators for two years. This team will initially concentrate on environmental weeds such as madeira vine and Singapore daisy which currently threaten vegetation within the Amber Drive Public Reserve and reafforestation plantings;
- The bushland regenerators will control bitou bush where it occurs within their project area; and
- Monitoring will be undertaken for two years to demonstrate the effectiveness of the reafforestation and weed control program. Monitoring will include hairy-joint grass.

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APPENDIX 1:

VEGETATION

Scientific name	**Common name**	Littoral rainforest	Sedgeland	Grassland	Riparian complex	Reafforestation
** introduced or naturalised*						
Sheringham and Westaway classification with ROTAP (in parenthesis) and TSC schedule after plant name if applicable. GDA location provided for threatened species, rough-shelled bush-nut and hairy-joint grass						
FERNS						
DENNSTAEDTIACEAE						
Pteridium esculentum	Bracken	x				
DICKSONIACEAE						
Calochlaena dubia	common ground fern					x
GYMNOSPERMS (Conifers)						
PODOCARPACEAE						
Podocarpus elatus	plum pine					x
ANGIOSPERMS (Flowering plants)						
Monocotyledons						
(palms, palm-lilies and cycads)						
AGAVACEAE						
Cordyline petiolaris	broad-leaved palm lily					x
ARECACEAE						
**Syagrus romanzoffianum*	queen or cocos palm					x
ASPARAGACEAE						
**Protasparagus aethiopicus*	ground asparagus	x				x
CANNACEAE						
**Canna indica*	Indian shot					x
COMMELINACEAE						
**Callisia fragrans*	callisia	x				x
**Commelina bengalensis*	hairy commelina	x		x	x	x
**Tradescantia albiflora*	wandering dew	x		x	x	x
CYPERACEAE						
Cyperus exaltatus	tall flat sedge				x	
Cyperus polystachos	bunchy flat sedge		x	x	x	
Cyperus stradbrokensis	a sedge				x	
Eleocharis equisetina	a spike-rush		x		x	
FLAGELLARIACEAE						
Flagellaria indica	whip vine	x				
IRIDACEAE						
**Watsonia bulbillifera*	wild watsonia	x				
JUNCACEAE						
Juncus prismatocarpus	a rush		x	x	x	
Juncus usitatus	tussock rush		x	x	x	
PHILYDRACEAE						
Philydrum lanuginosum	woolly frogmouth		x		x	
POACEAE						
Arthraxon hispidus (Sch. 2, EPBC Act)	hairy-joint grass				558085, 6812889	
**Axonopus affinis*	broad-leaved carpet grass					

Scientific name	**Common name**	Littoral rainforest	Sedgeland	Grassland	Riparian complex	Reafforestation
** introduced or naturalised*						
Sheringham and Westaway classification with ROTAP (in parenthesis) and TSC schedule after plant name if applicable						
**Chloris gayana*	Rhode's grass			x		x
Digitaria dactyla	Queensland blue couch			x		x
**Eragrostis curvula* (complex)	love-grass			x		x
Imperata cylindrica var. *major*	bladey grass			x		x
**Paspalum dilatatum*	paspalum			x		
**Paspalum distichum*	water couch		x		x	
**Paspalum urvillei*	paspalum			x		x
**Paspalum wettsteinii*	broad-leaved paspalum (warrel grass)					x
**Pennisetum clandestinum*	kikuyu		x	x		x
**Rhynchelytrum repens*	red Natal grass			x		x
**Sporobolus indicus* var. *capensis*	Parramatta grass			x		
**Stenotaphrum secundatum*	buffalo grass			x		x
**Urochloa mutica*	para grass	x	x	x	x	x
Dicotyledons						
APIACEAE						
**Hydrocotyle bonariensis*	Hydrocotyle	x		x		x
ASCLEPIADACEAE						
**Asclepias curvassica*	redhead cotton bush			x		x
ASTERACEAE						
**Ageratum houstonianum*	blue billygoat weed	x		x	x	x
**Baccharis halimifolia*	groundsell bush	x				x
**Biddens pilosa*	cobbler's pegs	x		x		x
**Cirsium vulgare*	spear thistle			x		
**Chrysanthemoides monilifera* spp. *rotundata*	bitou bush	x				x
**Conyza albida*	tall fleabane					x
**Erechtites valerianifolia*	Brazilian fireweed	x				
**Senecio lautus*	fireweed			x		x
**Wedelia trilobata*	Singapore daisy	x	x	x	x	x
BASELLACEAE						
**Anredera cordifolia*	madiera vine					x
CRASSULACEAE						
**Bryophyllum delagoense*	mother-of-millions	x				
EUPHORBIACEAE						
Macaranga tanarius	macaranga	x				x
FABACEAE						
Subfamily FABOIDEAE						
**Trifolium repens*	white clover			x	x	x
LAURACEAE						
**Cinnamomum camphora*	camphor laurel	x				x
Cryptocarya triplinervis var. *pubens*	three-veined cryptocarya	x				x
MIMOSOIDEAE						
Acacia melanoxylon	blackwood	x				
Acacia sophorae	beach sally wattle			x		x

Scientific name	**Common name**	Littoral rainforest	Sedgeland	Grassland	Riparian complex	Reafforestation
** introduced or naturalised*						
Sheringham and Westaway classification with ROTAP (in parenthesis) and TSC schedule after plant name if applicable						
MORACEAE						
**Ficus elastica*	rubber tree					x
Ficus watkinsiana	strangler fig	x				x
MYRTACEAE						
Acmena smithii	lilly pilly	x				
Rhodomyrtus psidioides	native guava	x				x
Syzygium leuhmannii	riberry					x
Syzygium moorei 1(2VCi) 8S Act Sch. 2	durobby					x
Syzygium oleosum	blue lilly pilly					x
ONAGRACEAE						
Ludwigia peploides ssp. *montevidensis*	water primrose		x		x	
PASSIFLORACEAE						
**Passiflora subpeltata*	White's passionflower	x				x
PITTOSPORACEAE						
Pittosporum undulatum	sweet pittosporum					x
POLYGONACEAE						
Periscaria decipiens	slender knotweed		x			
PROTEACEAE						
Banksia integrifolia var. *integrifolia*	coast banksia					x
Macadamia tetraphylla 1(2VC-) 8S	rough-shelled bush nut	558250; 6812868				x
Stenocarpus sinuatus	firewheel tree					x
RANUNCULACEAE						
Ranunculus inundatus	river buttercup		x		x	
RHAMNACEAE						
Alphitonia excelsa	red ash					x
RUTACEAE						
Acronychia imperforata	beach acronychia	x				x
SAPINDACEAE						
Cupaniopsis anarcardioides	tuckeroo	x		x		x
Guioa semiglauca	guioa	x		x		x
Sarcopteryx stipata	steelwood	x				
VERBENACEAE						
** Lantana camara*	lantana	x		x	x	x

APPENDIX 2:

FAUNA

Scientific name	**Common name**	Recorded	Expected to occur
* introduced species; # threatened species (TSC Act or EPBC Act)			
MAMMALS			
CANIDAE			
*Canis familaris**	dog	x	
*Vulpes vulpes**	red fox	x	
FELIDAE			
*Felis catus**	feral cat		x
LEPORIDAE			
*Oryctolagus cuniculus**	rabbit		x
MACROPODIDAE			
Wallabia bicolor	swamp wallaby		x
MOLOSSIDAE			
Tadarida australis	white-striped mastiff bat		x
MURIDAE			
Hydromys chrysogaster	water rat		x
*Mus musculus**	house mouse		x
PERAMELIDAE			
Isoodon macrourus	northern brown bandicoot		x
PETAURIDAE			
Pseudocheirus peregrinus	common ringtail possum		x
PHALANGERIDAE			
Trichosurus vulpecula	common brushtail possum		x
PTEROPODIDAE			
Pteropus alecto# Sch. 2 TSC	black flying-fox		x
Pteropus poliocephalus# Sch. 2 TSC; Vuln. EPBC	grey-headed flying-fox		x
Syconycteris australis # Sch. 2 TSC	Common blossom-bat		x
TACHYGLOSSIDAE			
Tachyglossus aculeatus	short-beaked echidna		x
VESPERTILIONIDAE			
sub-family MINIOPTERINAE			
Miniopteris australis# Sch. 2 TSC	little bent-wing bat		x
sub-family NYCTOPHILINAE			
Nyctophilus gouldi	Gould's long-eared bat		x
sub-family VESPERTILIONINAE			
Chalinolobus gouldii	Gould's wattled bat		x
Vespadelus pumilus	the eastern forest bat		x
BIRDS			
ACCIPITRIDAE			
Accipiter novaehollandiae	grey goshawk		x
Aquila audax	wedge-tailed eagle		x
Aviceda subcristata	pacific baza		x
Circus approximans	swamp harrier		x
Elanus axillaris	black-shouldered kite		x
Haliaeetus leucogaster	white-bellied sea-eagle		x
Haliastur indus	brahminy kite		x
Haliastur sphenurus	whistling kite		x
ALCEDINIDAE			
Dacelo novaeguineae	laughing kookaburra	x	

Scientific name	**Common name**	Recorded	Expected to occur
* introduced species; # threatened species (TSC Act or EPBC Act)			
ARDEIDAE			
Egretta ibis	cattle egret	x	
Egretta novaehollandiae	white-faced heron		x
ARTAMIDAE			
Cracticus nigrogularis	pied butcherbird	x	
Cracticus torquatus	grey butcherbird	x	
Gymnorhina tibicen	Australian magpie	x	
Strepera graculina	pied currawong	x	
CAMPEPHAGIDAE			
Coracina novaehollindiae	black-faced cuckoo-shrike		x
Coracina tenuirostris	cicadabird		x
Lalage leucomela	varied triller		x
CHARADRIIDAE			
Vanellus miles	masked lapwing	x	
COLUMBIDAE			
Columba leucomela	white-headed pigeon		x
Columba livia *	feral pigeon		x
Geopelia humeralis	bar-shouldered dove		x
Lopholaimus antarcticus	topknot pigeon		x
Macropygia amboinensis	brown cuckoo-dove		x
*Streptopelia chinensis**	spotted turtle-dove		x
CORACIIDAE			
Eurystomus orientalis	dollarbird		x
CORVIDAE			
Corvus orru	torresian crow	x	
CUCULIDAE			
Cacomantis flabelliformis	fan-tailed cuckoo		x
Centropus phasianinus	pheasant coucal		x
Eudynamys scolopacea	common koel		x
Scythrops novaehollandiae	channel-billed cuckoo		x
DICAEIDAE			
Dicaeum hirundinaceum	mistletoe bird		x
HIRUNDINIDAE			
Hirundo ariel	fairy martin		x
Hirundo neoxena	welcome swallow	x	
MALURIDAE			
Malurus cyaneus	superb fairy-wren	x	
Malurus lamberti	variegated fairy-wren		x
Malurus melanocephalus	red-backed fairy-wren		x
MEGAPODIIDAE			
Alectura lathami	Australian brush-turkey	x	
MELIPHAGIDAE			
Acanthorhynchus tenuirostris	eastern spinebill		x
Anthochaera chrysoptera	brush (little) wattlebird	x	
Lichmera indistincta	brown honeyeater	x	
Manorina melanocephala	noisy miner		x
Meliphaga lewinii	Lewin's honeyeater	x	
Phylidonyris nigra	white-cheeked honeyeater		x

Scientific name	**Common name**	Recorded	Expected to occur
* introduced species; # threatened species (TSC Act or EPBC Act)			
MEROPIDAE			
Merops ornatus	rainbow bee-eater		x
MONARCHIDAE			
Dicrurus bracteatus	spangled drongo	x	
Grallina cyanoleuca	Australian magpie-lark		x
Rhipidura fuliginosa	grey fantail		x
Rhipidura leucophrys	willie-wagtail	x	
Rhipidura rufifrons	rufous fantail		x
ORIOLIDAE			
Oriolus sagittatus	olive-backed oriole		x
Sphecotheres viridis	figbird	x	
ORTHONYCHIDAE			
Psophodes olivaceus	eastern whipbird	x	
PACHYCEPHALIDAE			
Colluricincla harmonica	grey shrike-thrush	x	
Eopsaltria australis	eastern yellow robin		x
Pachycephala pectoralis	golden whistler		x
Pachycephala rufiventris	rufous whistler		x
PARDALOTIDAE			
Acanthiza lineata	striated thornbill		x
Sericornis frontalis	white-browed scrubwren		x
PLATALEIDAE			
Threskiornis spinicollis	straw-necked ibis	x	
PLOCEIDAE			
Neochmia temporalis	red-browed finch		x
PODARGIDAE			
Podargus strigoides	tawny frogmouth		x
PSITTACIDAE			
Alisterus scapularis	Australian king parrot		x
Cacatua galerita	sulphur-crested cockatoo		x
Cacatua roseicapilla	galah		x
Trichoglossus chlorolepiotus	scaly-breasted lorikeet	x	
Trichoglossus haematodus	rainbow lorikeet	x	
ZOSTEROPIDAE			
Zosterops lateralis	silvereye		x
REPTILES			
AGAMIDAE			
Physignathus lesueurii	eastern water dragon		x
Pogona barbata	bearded dragon		x
BOIDAE			
Morelia spilota	carpet python		x
COLUBRIDAE			
Boiga irregularis	brown tree snake		x
Dendrelaphis punctulata	green tree snake		x
ELAPIDAE			
Cacophis krefftii	dwarf crowned snake		x
Rhinoplocephalos nigrescens	eastern small-eyed snake		x

Scientific name	**Common name**	Recorded	Expected to occur
* introduced species; # threatened species (TSC Act or EPBC Act)			
Demansia psammophis	yellow-faced whip snake		x
Pseudonaja textilis	eastern brown snake	x	
SCINCIDAE			
Lampropholis delicata	eastern grass skink	x	
Lampropholis guichenoti	garden skink		x
Tiliqua scincoides	eastern blue-tounged lizard		x
AMPHIBIANS			
BUFONIDAE			
*Bufo marinus**	cane toad	x	
HYLIDAE			
Litoria caerulea	green tree frog		x
L. fallax	eastern dwarf tree frog		x
L. gracilenta	dainty green tree frog		x
MYOBATRACHIDAE			
Crinia signifera	common eastern froglet	x	
Limnodynastes peronii	brown-striped frog		x
L. tasmaniensis	spotted grass frog		x

APPENDIX 3:

EPBC ACT MATTERS REPORT

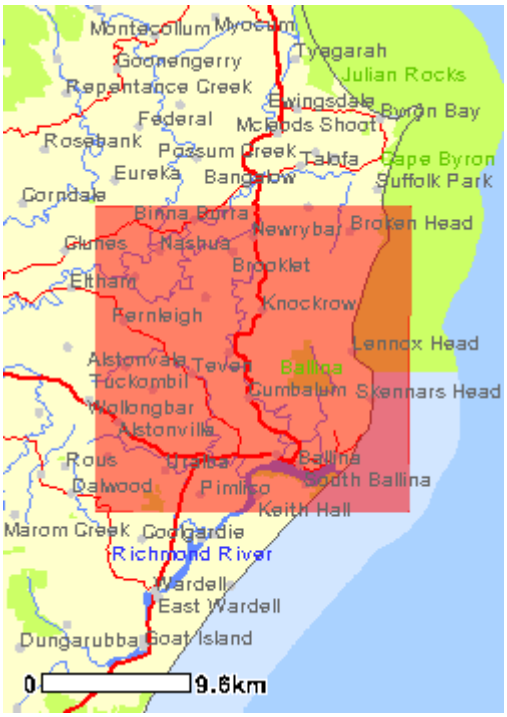
14 August 2006 09:33

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.deh.gov.au/epbc/assessmentsapprovals/index.html



Search Type: Area

Buffer: 5 km

Coordinates: -28.70160,153.42681, -28.70227,153.63258, -28.90063,153.63123, -28.9013,153.42681

Report Contents:

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	Relevant
Threatened Ecological Communities:	None
Threatened Species:	51
Migratory Species:	30

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth

Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.deh.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	13
Listed Marine Species:	60
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	10
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Commonwealth Marine Areas [Dataset Information]

Approval may be required for a proposed activity that is likely to have a significant impact on the environment in a Commonwealth Marine Area, when the action is outside the Commonwealth Marine Area, or the environment anywhere when the action is taken within the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Within 12 Nautical Mile Limit

Within 3 Nautical Mile Limit

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
*Cyclopsitta diophthalma coxeni** Coxen's Fig-Parrot	Endangered	Species or species habitat likely to occur within area
Diomedea dabbenena * Tristan Albatross	Endangered	Foraging 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
*Poephila cincta cincta** Black-throated Finch (southern)	Endangered	Species or species habitat likely to 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 impavida * Campbell Albatross	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster * Black-breasted Button-quail	Vulnerable	Species or species habitat likely to occur within area
Xanthomyza phrygia * Regent Honeyeater	Endangered	Species or species habitat likely to occur within area
Frogs		
Litoria aurea * Green and Golden Bell Frog	Vulnerable	Species or species habitat may occur within area
Litoria olongburensis * Wallum Sedge Frog	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus * Southern Barred Frog, Giant Barred Frog	Endangered	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus * Blue Whale	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri * Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE	Endangered	Species or species habitat likely to

*mainland population)** Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)		occur within area
Eubalaena australis * Southern Right Whale	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae * Humpback Whale	Vulnerable	Congregation or aggregation known to occur within area
*Potorous tridactylus tridactylus** Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus * Grey-headed Flying-fox	Vulnerable	Roosting known to occur within area
Reptiles		
Caretta caretta * Loggerhead Turtle	Endangered	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Vulnerable	Species or species habitat may occur within area
Coeranoscincus reticulatus * Three-toed Snake-tooth Skink	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Vulnerable	Breeding known to occur within area
Sharks		
*Carcharias taurus (east coast population)** Grey Nurse Shark (east coast population)	Critically Endangered	Species or species habitat may occur within area
Carcharodon carcharias * Great White Shark	Vulnerable	Species or species habitat may occur within area
Rhincodon typus * Whale Shark	Vulnerable	Species or species habitat may occur within area
Snails, slugs		
Thersites mitchellae * Mitchell's Rainforest Snail	Critically Endangered	Species or species habitat likely to occur within area
Plants		
Acronychia littoralis * Scented Acronychia	Endangered	Species or species habitat likely to occur within area
Austromyrtus fragrantissima * Scale Myrtle, Sweet Myrtle	Endangered	Species or species habitat likely to occur within area
Baloghia marmorata * Marbled Balogia, Jointed Baloghia	Vulnerable	Species or species habitat likely to occur within area
Cryptocarya foetida * Stinking Cryptocarya, Stinking Laurel	Vulnerable	Species or species habitat likely to occur within area
Davidsonia sp. Mullumbimby-Currumbin Ck	Endangered	Species or species habitat likely to

(A.G.Floyd 1595) *		occur within area
Desmodium acanthocladum * Thorny Pea	Vulnerable	Community likely to occur within area
Diploglottis campbellii * Small-leaved Tamarind	Endangered	Species or species habitat likely to occur within area
Endiandra floydii * Floyd's Walnut	Endangered	Species or species habitat likely to occur within area
Endiandra hayesii * Rusty Rose Walnut, Velvet Laurel	Vulnerable	Species or species habitat likely to occur within area
Floydia praealta * Ball Nut, Possum Nut, Big Nut, Beefwood	Vulnerable	Species or species habitat likely to occur within area
Fontainea oraria * Coastal Fontainea	Endangered	Species or species habitat likely to occur within area
Hicksbeachia pinnatifolia * Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak	Vulnerable	Species or species habitat likely to occur within area
Isoglossa eranthemoides *	Endangered	Species or species habitat likely to occur within area
Macadamia tetraphylla * Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut	Vulnerable	Species or species habitat likely to occur within area
Ochrosia moorei * Southern Ochrosia	Endangered	Species or species habitat likely to occur within area
Owenia cepiodora * Onionwood, Bog Onion, Onion Cedar	Vulnerable	Species or species habitat likely to occur within area
Phaius australis * Lesser Swamp-orchid	Endangered	Species or species habitat likely to occur within area
Randia moorei * Spiny Gardenia	Endangered	Species or species habitat likely to occur within area
Symplocos baeuerlenii * Small-leaved Hazelwood, Shrubby Hazelwood	Vulnerable	Species or species habitat likely to occur within area
Syzygium hodgkinsoniae * Smooth-bark Rose Apple, Red Lilly Pilly	Vulnerable	Species or species habitat likely to occur within area
Syzygium moorei * Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple	Vulnerable	Species or species habitat likely to occur within area
Tinospora tinosporoides * Arrow-head Vine	Vulnerable	Species or species habitat likely to occur within area

Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot	Migratory	Species or species habitat likely to occur within area
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		
Charadrius mongolus Lesser Sand Plover, Mongolian Plover	Migratory	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover	Migratory	Species or species habitat likely to occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
Diomedea dabbenena Tristan Albatross	Migratory	Foraging may occur within area
Macronectes giganteus Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel	Migratory	Species or species habitat may occur within area
Puffinus leucomelas Streaked Shearwater	Migratory	Species or species habitat may occur within area
Thalassarche impavida	Migratory	Species or species habitat may

Campbell Albatross		occur within area
Migratory Marine Species		
Mammals		
Balaenoptera edeni Bryde's Whale	Migratory	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Migratory	Species or species habitat may occur within area
Dugong dugon Dugong	Migratory	Species or species habitat likely to occur within area
Eubalaena australis * Southern Right Whale	Migratory	Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin	Migratory	Species or species habitat may occur within area
Megaptera novaeangliae * Humpback Whale	Migratory	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca	Migratory	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Migratory	Species or species habitat may occur within area
Reptiles		
Caretta caretta * Loggerhead Turtle	Migratory	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Migratory	Species or species habitat may occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Migratory	Breeding known to occur within area
Sharks		
Carcharodon carcharias Great White Shark	Migratory	Species or species habitat may occur within area
Rhincodon typus Whale Shark	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
Apus pacificus	Listed -	Species or species habitat may occur

Fork-tailed Swift	overfly marine area	within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Breeding likely to occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Breeding likely to 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
Charadrius mongolus Lesser Sand Plover, Mongolian Plover	Listed	Species or species habitat likely to occur within area
Diomedea dabbenena Tristan Albatross	Listed	Foraging may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
Lathamus discolor Swift Parrot	Listed - overfly marine area	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel	Listed	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel	Listed	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Listed - overfly	Breeding may occur within area

	marine area	
Monarcha trivirgatus Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
Pluvialis fulva Pacific Golden Plover	Listed	Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Sterna albifrons Little Tern	Listed	Species or species habitat may occur within area
Thalassarche chlororhynchos Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross	Listed	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross	Listed	Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong	Listed	Species or species habitat likely to occur within area
Ray-finned fishes		
Acentronura tentaculata Hairy Pygmy Pipehorse	Listed	Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish	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
Halicampus grayi Mud Pipefish, Gray's Pipefish	Listed	Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted 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 kelloggi Kellogg's Seahorse	Listed	Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse	Listed	Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse	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
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
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish	Listed	Species or species habitat may occur within area
Micrognathus brevirostris Thorn-tailed Pipefish	Listed	Species or species habitat may occur within area
Microphis manadensis Manado River Pipefish, Manado 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 hardwickii Pipehorse	Listed	Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse	Listed	Species or species habitat may occur within area
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	Listed	Species or species habitat may occur within area

Pipefish		
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		
Astrotia stokesii Stokes' Seasnake	Listed	Species or species habitat may occur within area
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	Breeding known to 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
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	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	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	Cetacean	Species or species habitat may occur within area

Commonwealth Lands [Dataset Information]

Places on the RNE [Dataset Information]
Note that not all Indigenous sites may be listed.

Historic

Richmond River Lighthouse NSW

Indigenous

Lennox Head Aboriginal Area NSW

Two Sister Rocks (Cocked Hat Rocks) NSW

Natural

Allansby Area NSW

Ballina Nature Reserve (1977 boundary) NSW

Broken Head Nature Reserve (1977 boundary) NSW

Davis Scrub Nature Reserve NSW

Duck Creek Scrub Extended Area NSW

Duck Creek Scrub NSW

Glendower Scrub NSW

Lennox Head Littoral Rainforest NSW

Uralba Nature Reserve NSW

Victoria Park Nature Reserve NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. Environment Australia acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals