

**Appendix F:**  
**Flora and fauna environmental  
assessment for Gondwana  
Sanctuary**  
**Community title development  
application**

Compiled by Dianne Trussell, BSc Hons (Biology)  
with assistance from Nadia Pietramale, TAFE Bush  
Regeneration Certificate 2 & 4



## 1.0 introduction

### purpose

This document is an environmental assessment of flora and fauna under Section 5a of the Environmental Planning and Assessment Act, with respect to the development application by Gondwana. It has 3 major aims:

1. To examine the status of potential threatened species in the area and their habitats, and whether there would be any negative impact on these species by the proposed development.
2. To document the flora and fauna existing on the property.
3. To recommend strategies for enhancement of the survival of species of indigenous flora and fauna, with particular reference to threatened species.

### site description

The development site is situated on 40 hectares of rural land at Tyagarah, 6 km North of Byron Bay. The development has occurred since 1987 on about 5 Ha on the eastern side of the property on the top of a slight rise (approx. 5 degrees) with a western aspect. The rest of the property is mainly flat. The property contains two main soil types: basaltic and alluvial. The area has a sub-tropical climate with an average annual rainfall of about 1700-mm with the heaviest falls usually occurring in January and February. The site lies amidst a diverse mosaic of ecosystems including farms, coastal scrub, paperbark and other wetland, Eucalypt forests and rainforest. It was initially a cleared and over-grazed dairy farm dominated by Setaria Grass with small quantities of weeds such as Broadleaf Privet, Camphor Laurel and Lantana species.

The development of the Gondwana community in 16 years has resulted in a substantial improvement in the environment, including rainforest natural regeneration areas and actively re-vegetated areas. The Flats area, subject to seasonal flooding, has been planted with a *Eucalyptus grandis* (Flooded Gum) plantation of 6,000 trees. Along with the increase in vegetation, the property now provides a safe habitat for many native species, for the following reasons:

1. A complete ban on cats and dogs and most other exotic animals.
2. Discouragement of the use of poisons and baits for pests. Encouragement of the use of live traps for vermin to avoid fatalities of native rodents.
3. Planting of many fruit trees, which provide food for native animals.
4. The mixture of planted gardens, grasslands, indigenous trees, rainforest revegetation areas, wood- and rock-piles, ponds, creek and wild areas, makes for a patchy, high-biodiversity environment.
5. An attitude that the flora and fauna are welcome and essential components of a sustainable community.
6. Gondwana was voluntarily registered as a wildlife sanctuary with National Parks and Wildlife Service.

### outline of proposal

The development is currently a Multiple Occupancy. The community is applying to convert to Community Title. Whilst the development already exists it must undertake assessments to comply with the Environmental Planning and Assessment Act 1979, the Rural Fires Act 1997, the Byron Rural Settlement Strategy 1998, the Noxious Weeds Act 1993, the Threatened Species Conservation Act 1995, and the State Environmental Planning Policy (SEPP) 44, 1995.

## 2.0 flora survey

### methods

A qualified local bush regenerator was employed to survey the flora. The survey was carried out as follows:

- walked the entire site in winter and spring
- identified species in the field
- collected specimens for final identification
- assessed the status of associations and populations
- noted quantity and quality of plant species
- measured areas and noted characteristics of revegetation zones
- compared the list with assessments compiled for other nearby Tyagarah properties
- looked specifically for threatened species that occur within the local area

### results

See the list of all regenerating indigenous flora species recorded at Gondwana, at the end of Appendix F and see Map 3 for main areas of vegetation.

There were no threatened or regionally significant species of flora found on Gondwana. Gondwana is being naturally colonized by flora species from predominantly rainforest habitats, given the abundance of young plants from fruit-bearing species whose seeds are dispersed by birds and bats. There are a very small number of isolated mature fig trees and single, well-grown individuals of other rainforest species, which can be used as seed sources for re-vegetation.

Apart from grasses, weed species are present but not excessive dominant, and are providing habitat for native fauna as well as assisting natural rainforest regeneration.

However that regeneration needs to be managed to prevent weed species from becoming dominant and suppressing the development of the native plants.

### implications/significance

Although none of the species or habitats on Gondwana is threatened or regionally significant, there is a great potential to develop habitats for such species by active management and enhancement. This potential is due to the large areas available on the property, the variety of microclimates, the low level of land use for human purposes, and the policy on exclusion of exotic animals.

The main habitat type which, at this early stage, seems to be developing on Gondwana is mixed rainforest. However the types of habitat which could be developed are: riparian; swamp sclerophyll; wet and dry subtropical rainforest on basaltic and alluvial soils; Flooded Gum/Swamp Mahogany koala forest; and Forest Red Gum/Tallowood koala forest.

The whole Tyagarah area is considered to be core vegetation, and many significant remnants exist in the area. As Gondwana is part of the Tyagarah Wildlife and Vegetation Corridor Proposal, which aims to link all these remnants, Gondwana will be a valuable link and sanctuary for many rare species of flora and fauna.

## 3.0 fauna survey

### methods

Fauna species on Gondwana have been observed, identified and formally recorded over the last three years at different times of day and night and at different seasons by a qualified biologist. Community members have also been asked to bring to attention any unrecorded species for identification and photography. Night time spotlighting has been conducted to observe nocturnal species, particularly frogs and mammals. Characteristic sand scraping by tracks have been used to identify some species. Playback of a CD of frog calls was used to induce responses by frog species to assess their presence. A dossier of species lists and photos, "The Natural History of Gondwana Sanctuary", is kept by the community and updated as new information is obtained.

### results

See the list of all fauna species recorded on Gondwana, at the end of Appendix F.

Gondwana is being colonized by fauna species from a variety of habitats, including riparian, wetland, rainforest, open woodland and scrubland environments. The recent first appearance of koalas on Gondwana is one example of how the maturing plant life of the property is becoming increasingly attractive to local native fauna.

Among the species sighted on Gondwana, there are three vulnerable mammal species: Grey-headed flying fox, Black flying fox and Koala. There are nine regionally significant species. Five are birds: Regent bower bird, Crested hawk (Pacific Baza), White-breasted sea eagle, Great (White) Egret, Spangled drongo; three

are reptiles: Dwarf-crowned snake, Rough-Scaled Snake and Carpet python; and one is amphibian: Rocket frog.

As at August 2003, a comparison of the fauna species definitely recorded on Gondwana with those recorded in the nearby Tyagarah Nature Reserve, revealed that a significant percentage of native species in the nature reserve are now represented on Gondwana. This indicates a recognition of the Gondwana Community as viable habitat by much of the local native fauna.

Percentages by Class:

Mammals:	38% (terrestrial)
Birds:	36% (non-seabirds)
Reptiles:	50%
Amphibians:	22%

### implications/significance

The bulk of the species on Gondwana are not threatened, but represent the species normally expected to move into areas where a mixture of vegetation is being established and the habitat is suitable. However twelve of the animal species recorded so far are either vulnerable or regionally significant, which indicates that the style of development practised on Gondwana is of benefit in supporting and encouraging the colonization and survival of such species.

## 4.0 statement of environmental effects

### SEPP 44 koala assessment for Gondwana

The SEPP 44 Policy "aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:

- (a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and
- (b) by encouraging the identification of areas of core koala habitat, and
- (c) by encouraging the inclusion of areas of core koala habitat in environment protection zones."

Schedule 2 of the National Parks and Wildlife Act defines potential koala habitat as "areas of native vegetation where the trees of types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component."

The Schedule 2 Feed Tree species indigenous to the Tyagarah area are:

- Eucalyptus tereticornis - Forest red gum
- Eucalyptus microcorys - Tallowwood
- Eucalyptus robusta - Swamp mahogany
- Eucalyptus signata - Scribbly gum

Shareholder's records were examined to obtain estimates of the number of trees planted on Gondwana since the start of its development as a MO in 1987. The trees, which existed prior to this development, were a few large figs in predominantly weed species, such as Camphor Laurel.

Except for the large stand of *Eucalyptus grandis* (Flooded Gum) planted on the Flats (seasonally flooded area), very few Eucalyptus trees were planted.

Of the approximately 11,000 trees planted on Gondwana, there are 10 Tallwoods and 24 Swamp Mahoganys. No other species of koala food trees have been planted.

Thus the koala food trees represent considerably less than the 15% required for definition as potential koala habitat. Thus "no further provisions of the policy apply to the DA."

#### implications

No Koala management plan needs to be undertaken by Gondwana under the Community Title proposal.

## 5.0 the eight point test for flora

potential threatened species which could potentially occur on the site, recorded for the Tyagarah and Anderson hill areas are:

Arrow-head Vine, *Tinospora tinoporoides*  
Basket Fern, *Drynaria rigidula*  
Corokia, *Corokia whiteana*  
Durobby (Coolamon), *Syzigium moorei*  
Red Lilly Pilly, *Syzigium hodgkinsoniae*  
Stinking Cryptocarya, *Cryptocarya foetida*

POINT 1: "In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction."

#### COMMENT:

Arrow-head Vine - There is a recording of this species at Andersons Ridge north of Gondwana, but it is not known whether it is a viable population. It is not found on Gondwana. Since Gondwana is disconnected from the required subtropical rainforest habitat in the coastal vegetation corridor of which Andersons Ridge is a part, there will be no disruption or risk to the life cycle of the potential population.

Basket Fern - There is a recording of this species at Andersons Ridge north of Gondwana, but it is not known whether it is a viable population. It is not found on Gondwana. Since Gondwana is disconnected from the required rainforest habitat in the coastal vegetation corridor of which Andersons Ridge is a part, there will be no disruption or risk to the life cycle of the potential population.

Corokia - There is a recording of this species at Andersons Ridge north of Gondwana, but it is not known whether it is a viable population, however the distribution at this coastal site is sparse. It is not found on Gondwana. Since Gondwana is disconnected from the required wet sclerophyll/temperate rainforest boundary habitat in the coastal vegetation corridor of which Andersons Ridge is a part, there will be no disruption or risk to the life cycle of the potential population.

Durobby - Scattered trees are recorded in the Brunswick and Mullumbimby areas and at Andersons Ridge, which do not have a suitable habitat connection (riverine and gully rainforest) to Gondwana. It is not found on Gondwana. Thus there will be no disruption or risk to the life cycle of the population.

Red Lilly Pilly - The viable local population at Brunswick River is on a separate catchment from Gondwana at a considerable distance away, unconnected by the required habitat of the species, which is riverine rainforest on rich alluvial soils. It is not found on Gondwana. Thus there will be no disruption or risk to the life cycle of the population.

Stinking Cryptocarya - There is a recording of this species at Andersons Ridge north of Gondwana, but it is not known whether it is a viable population. It is not found on Gondwana. However the suitable sites for its establishment along the coast are very limited, so this record is unlikely to represent a viable population. Since Gondwana is disconnected from the required habitat of littoral rainforest in the coastal vegetation corridor of which Andersons Ridge is a part, there will be no disruption or risk to the life cycle of the potential population.

POINT 2: "In the case of an endangered population, whether the life cycle of the species that constitutes the endangered

population is likely to be disrupted such that the viability of the population of the species is likely to be significantly compromised."

COMMENT:

There are no populations of endangered species on Gondwana.

POINT 3: "In relation to the regional distribution of the habitat of a threatened species, population or ecological community whether a significant area of known habitat is to be modified or removed."

COMMENT:

Gondwana does not contain the rainforest or sclerophyll/rainforest habitats required by the threatened species, therefore there will be no modification or removal of known habitat.

POINT 4: "Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community."

COMMENT:

All areas of known habitat for the listed threatened species are not currently interconnecting or proximate with any vegetation on Gondwana, therefore there is no likelihood of such habitat becoming isolated.

POINT 5: "Whether critical habitat will be affected."

COMMENT:

Gondwana contains no critical habitat, as per the listing of pending and final critical habitat in NSW by the NPWS.

POINT 6: "Whether a threatened species population or ecological community or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region."



COMMENT:

There are three relevant nature reserves (NR) in the region of Gondwana: Tyagarah Nature Reserve, Brunswick Heads Nature Reserve and Broken Head Nature Reserve, which together form the "Byron Coast Group of Nature Reserves".

The coastal reserves are considered to be small, isolated remnants of high conservation significance, and thus would not generally provide adequate representation of any threatened species or its habitat.

Given this limitation, littoral rainforest, which is considered a rare sub-formation of rainforest and which supports the Stinking Cryptocarya and the Basket Fern, is well-represented in Broken Head NR and Brunswick Heads NR.

Reservation status is either inadequate or unknown for all the species. Records of the threatened species in the reserves are as follows:

Arrow-head Vine, *Tinospora tinosporoides*

Not recorded in the Coast Group of reserves. Requires wetter subtropical rainforest. Adequacy of reservation unknown.

Basket Fern, *Drynaria rigidula*

The Basket Fern is recorded in littoral rainforest in the Broken Head NR and the Tyagarah NR. It is also conserved in Cape Byron NR. However it is considered inadequately reserved and extensions of existing habitats have been recommended.

Corokia, *Corokia whiteana*

Not recorded in the reserves. It requires the boundaries between wet Eucalypt forest and warm temperate rainforest on rhyolite soils, which are uncommon in the Coast reserves. Its reservation status is therefore presumed inadequate.

Durobby (Coolamon), *Syzigium moorei*

The Durobby is recorded in lowland rainforest in the Brunswick Heads NR and the Broken Head NR. It requires well-drained riverine and gully rainforest and therefore its reservation is considered inadequate.

Red Lilly Pilly, *Syzigium hodgkinsoniae*

The Red Lilly Pilly is recorded in rainforest in the Brunswick Heads NR. It requires riverine rainforest on rich alluvial soils, which are now mostly under agriculture or residences. Adequacy of its reservation status is not known.

Stinking Cryptocarya, *Cryptocarya foetida*

The Stinking Cryptocarya is recorded in littoral rainforest in all three of the Coast Group of reserves. It requires well-drained littoral rainforest and is considered inadequately reserved.

POINT 7: "Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process."

COMMENT:

Under "key threatening processes" listed by NPWS for NSW, the ones of most relevance to Gondwana flora, and comments on whether the proposed development contains threatening processes, are:

(a) Invasion of native plant communities by exotic perennial grasses - the whole of Gondwana was covered by such grasses prior to purchase and

settlement, and there were no remaining native plant communities to invade. Future invasion of planted native communities will be controlled under the Weed Management plan (see Appendix H: Environmental Management and Enhancement Plan).

(b) Alteration to natural flow regimes of rivers, streams, floodplains and wetlands - one creek flows through Gondwana and it is being restored as a natural riparian zone as part of the Environmental Management and Enhancement Plan.

(c) Clearing of native vegetation – no native vegetation is to be removed by the current proposal.

(d) Ecological consequences of high frequency fires - fires have not been used on Gondwana for management of the areas of native vegetation, and alternate methods will be used according to the Environmental Management and Enhancement Plan. Additionally the Fire Management Plan lists the Riparian Zone and the Rainforest Natural Regeneration Areas as Fire Exclusion Zones.

None of the developments or activities proposed on Gondwana is classified as a threatening process.

POINT 8: "Whether any threatened species, population or ecological community is at the limit of its known distribution."

COMMENT:

Basket Fern is at the southern limit of its distribution in Byron Shire, and present only in small numbers. The core of Corokia's distribution is in the high altitude forests well inland from Tyagarah, so the coastal part of the range could be said to be its limit. Neither of these species was found on Gondwana.

## 6.0 the eight point test for fauna

### Classification of species status:

RS = Regionally Significant

V = Vulnerable

### Other Abbreviations:

CT = Community Title

NR = Nature Reserve

NPWS = National Parks and Wildlife Service

### potential threatened species

Threatened species, which could be found in the area under consideration for the Tyagarah and Anderson Hill areas are:

Brolga, *Grus rubicunda*

Powerful Owl, *Ninox strenua*

Koala, *Phascolarctos cinereus*

Common Blossom Bat, *Syconycteris australis*

Yellow-bellied Sheath-tail Bat, *Saccoliamus flaviventris*

Little Bentwing Bat, *Miniopterus australis*

Greater Broad-nosed Bat, *Scoteanax rueppellii*

Large-footed Myotis, *Myotis adversus*

Common Planigale, *Planigale maculata*

Wallum Tree Frog, *Litoria olongburensis*

Wallum Froglet, *Crinia tinnula*

Green and Golden Bell Frog, *Litoria aurea*

Vulnerable Species Recorded On Gondwana

Black Flying Fox, <i>Pteropus alecto</i>	V
Grey-headed flying fox, <i>Pteropus poliocephalus</i>	V
Koala, <i>Phascolarctos cinerea</i>	V

Regionally Significant Species Recorded On Gondwana:

Regent bowerbird, <i>Sericulus chrysocephalus</i>	RS
White-breasted Sea Eagle, <i>Haliaeetus leucogaster</i>	RS
Crested hawk/Pacific Baza, <i>Aviceda subcristata</i>	RS
Great/White egret, <i>Egretta alba</i>	RS
Spangled Drongo, <i>Dicrurus hottentottus</i>	RS
Carpet Python, <i>Morelia spilota</i>	RS
Dwarf-Crowned Snake, <i>Cacophis krefftii</i>	RS
Rough Scaled Snake, <i>Tropidechis carinatus</i>	RS
Rocket Frog, <i>Litoria freycineti</i>	RS

POINT 1: "In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction."

Comment:

No Endangered species (Schedule 1) has been recorded on Gondwana. However several species are Vulnerable.

In the case of the Koala it has been suggested that the two individual sightings were young adults dispersing, as no koalas seem to have stayed or taken up residence in the planted specimens of *Eucalyptus robusta* or *E. microcorys*, although this may change in future.

There are no dogs permitted on Gondwana, so this source of threat to potential dispersing or colonizing koalas is absent. There are suitable food trees, *Eucalyptus tereticornis* (Forest Red Gum) and *E. robusta* (Swamp Mahogany) for koalas at the intersection

of Grays Lane and Old Brunswick Road, but this stand is not contiguous with *Eucalyptus* species on Gondwana.

Small koala groups exist in West Tyagarah, in vegetation that is not currently contiguous with Gondwana. There is no risk of extinction or disruption of this group's life cycle due to proposed developments on Gondwana.

In view of the above, there will be no negative impact of the CT development on the life cycle of the Koala.

The vulnerable Black Flying Fox is present in reasonable numbers on Gondwana, coming in each evening to feed on the many fruit-bearing trees. Some of them also roost during the day in the planted Bangalow Palms.

There has only been one individual sighting of the vulnerable Grey Headed Flying Fox on Gondwana. The habitat provided enhances the life cycle of both species of Flying Foxes.

All of the regionally significant species recorded on Gondwana are likely to be similarly unaffected or benefited by the proposed CT.

POINT 2: "In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population of the species is likely to be significantly compromised."

Comment:

There are no populations of endangered species on Gondwana.

POINT 3: "In relation to the regional distribution of the habitat of a threatened species, population or ecological community whether a significant area of known habitat is to be modified or removed."

Comment:

Known habitat for the potential and recorded threatened species listed above are:

Brolga - shallow swamps and their margins and islands, floodplains, grasslands and pastoral lands. The floodplain on Gondwana is not to be significantly modified or removed, as it is designated not for any building or other development but for continued restoration to its original ecological condition.

Powerful Owl - large unfragmented patches of mature wet and dry Eucalypt forest. None of this habitat exists on Gondwana.

Koala - mature forests of Tallowwood, Swamp and Red Mahoganys, Forest Red Gum and Flooded Gum. None of this habitat exists on Gondwana, but will exist in future as the plantings on the Flats mature. For further information regarding koala habitat, see SEPP 44 Koala Assessment.

Common Blossom Bat - littoral rainforest adjacent to heathland and paperbark swamp. None of this habitat exists on Gondwana.

Yellow-bellied Sheathtail Bat - mature trees with hollows, in a variety of habitats. The trees on Gondwana are too young to be suitable.

Little Bentwing Bat - dense forest and shrublands containing hollow. None of this habitat exists on Gondwana.

Greater Broad-nosed Bat - open forests, woodlands and small rainforest patches. This habitat is being formed on Gondwana by planting and care of natural regeneration sites, and will not be removed or negatively modified, but enhanced. This will increase the habitat availability for this species of bat.

Large-footed Myotis - bodies of water within or near forests. The riparian zone on Gondwana will not be removed or negatively modified, but enhanced. This will increase the habitat availability for this species of bat.

Common Planigale - rocky and forested areas with surface cover, near water. The riparian zone on Gondwana will not be removed or negatively modified, but enhanced. This will increase the habitat availability for this species of mammal in future.

Frogs - Wallum habitat is required by all three threatened frog species. The only part of Gondwana that may have once been such habitat was cleared long before the purchase by the current owners, thus this habitat does not exist on Gondwana.

Black Flying Fox - this species requires coastal subtropical rainforest and swamp forest, comprising Eucalypts, paperbarks and banksias, but will also take fruit from orchards. The forest habitats do not yet exist on Gondwana, but orchards, which provide food for the flying foxes will not be modified or removed.

Grey-headed Flying Fox - this species requires lowland rainforest, swamp forest and Eucalypt forest, but will also take fruit from orchards. The forest habitats do not yet exist on Gondwana, but orchards, which provide food for the flying foxes will not be modified or removed.

POINT 4: "Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community."

Comment:

Since the Gondwana community structures were put in place originally on bare land, there were no interconnected or proximate

habitat areas, and thus there is no likelihood of any habitat areas becoming isolated by the current development proposal.

POINT 5: "Whether critical habitat will be affected."

Comment:

Gondwana contains no critical habitat, as per the listing of pending and final critical habitat in NSW by the NPWS.

POINT 6: "Whether a threatened species, population or ecological community or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region."

Comment:

There are three relevant nature reserves (NR) in the region of Gondwana:

Tyagarah Nature Reserve, Brunswick Heads Nature Reserve, Broken Head Nature Reserve, which together form the "Byron Coast Group of Nature Reserves". The coastal reserves are considered to be small, isolated remnants of high conservation significance, and thus would not provide adequate representation of any threatened species or its habitat.

Given this limitation, littoral rainforest, which is considered a rare sub-formation of rainforest and supports the bat species, is well-represented in Broken Head NR and Brunswick Heads NR. Common habitats which support threatened fauna species occur as follows: swamp sclerophyll, mangroves and salt-marsh are all well-represented in Tyagarah NR and Brunswick Heads NR; wet and dry heath are well-represented in Tyagarah NR.

Records of the threatened species in the reserves are as follows, but no clear information is available on whether the population is adequately represented.

Brolga

Not recorded in the reserves. Habitat conserved in the reserves, but adequacy not known.

Powerful Owl

Not recorded in the reserves. Habitat not conserved in large quantities in the reserves.

Koala

Koalas are recorded in the Coast Group of reserves. There are stands of two koala food trees, Swamp Mahogany (*Eucalyptus robusta*) and Forest Red Gum (*Eucalyptus tereticornis*) classed as "open Eucalypt forests and woodlands" in the north-western section of Tyagarah Nature Reserve and the western section of Brunswick Heads Nature Reserve.

However all Koala food Eucalypts are considered to be inadequately conserved in Byron Shire. Although Paperbark is not considered core habitat it is sometimes used by Koalas as food and is adequately reserved in the Coast Group of reserves.

Common Blossom Bat

The Common Blossom Bat is recorded in the Coast Group of reserves, and specifically in Tyagarah NR. The littoral rainforest habitat of this species is well conserved in Broken Head NR and Brunswick Heads NR, but there are only isolated patches in Tyagarah NR.

Yellow-bellied Sheathtail Bat

Not recorded in the reserves. This species requires mature trees with hollows, in a variety of habitats. There are "only a few scattered records of this species in NSW" implying that it is either poorly conserved or not naturally common in this area.

Little Bentwing Bat

The Little Bentwing Bat is recorded in Tyagarah NR. As it uses a wide diversity of habitats, all of which are represented in Tyagarah NR, this species and its habitat is as well represented as is currently possible in the reserves of the region.

Greater Broad-nosed Bat

Not recorded in the reserves. Habitat is relatively well conserved in the reserves.

Large-footed Myotis

The Large-footed Myotis is recorded in Tyagarah NR. Habitat is relatively well conserved in the reserves.

Common Planigale

The Common Planigale is recorded in the Coast Group of reserves, and specifically in Tyagarah NR. Habitat is relatively well conserved in the reserves.

Wallum Tree Frog, Wallum Froglet and Green and Golden Bell Frog

These three species of frogs are recorded in the Coast Group of reserves in the wet, acidic "Wallum habitat" of wallum banksia heathland which is reserved within Tyagarah NR, although the adequacy is not stated. This habitat is also classified as endangered ecological community in the Cibum Margil Swamp near Byron Bay, but this area is not reserved. The frog species have a restricted distribution due to their highly specific habitat requirements, which are uncommon outside the above-mentioned areas in this region.

Black Flying Fox

Not recorded in the reserves. Habitat is relatively well conserved in the reserves.

Grey-headed Flying Fox

This species is recorded only in the Tyagarah NR. Habitat is relatively well conserved in the reserves.

POINT 7: "Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process."

Comment:

Under "key threatening processes" listed by NPWS for NSW, the ones of most relevance to Gondwana fauna, and comments on whether the proposed development contains threatening processes, are:

- (a) Invasion of native plant communities by exotic perennial grasses - the whole of Gondwana was covered by such grasses prior to purchase and settlement, and there were no remaining native plant communities to invade. Future invasion of planted native communities will be controlled under the Weed Management Plan (see Appendix H: Environmental Management and Enhancement Plan).
- (b) Removal of dead wood, dead trees and logs - no dead wood, trees or logs will be removed under the proposed development.
- (c) Alteration to natural flow regimes of rivers, streams, floodplains and wetlands - one creek flows through Gondwana and it is being restored as a natural riparian zone as part of the Environmental Management and Enhancement Plan.
- (d) Bushrock removal - bushrocks are present on areas of Gondwana that are not to be affected by the proposed development, as they are in the Landcare management units, not in the domestic areas around houses and buildings.

(e) Clearing of native vegetation – no native vegetation is to be removed, as the development already exists.

(f) Ecological consequences of high frequency fires - fires have not been used on Gondwana for management of the areas of native vegetation, and alternate methods will be used according to the Environmental Management and Enhancement Plan. Additionally the Fire Management Plan lists the Riparian Zone and Rainforest Natural Regeneration Areas as Fire Exclusion Zones.

(h) Predation by feral cats - the proposed development presents no increase in the risk of predation by feral cats, and cats will continue to be banned from Gondwana.

None of the developments or activities proposed on Gondwana is classified as a threatening process.

POINT 8: "Whether any threatened species, population or ecological community is at the limit of its known distribution."

Comment:

The Koala is the only threatened species of fauna recorded on Gondwana, and it is not at the limit of its known distribution in the Tyagarah area.

## 7.0 summary

The proposed development is not considered likely to have any negative impact on any threatened or regionally significant species of flora and fauna for the following reasons:

1. The land upon which the MO was originally developed had been cleared for dairy pasture and heavily grazed, and thus most native habitats had been removed.

2. The bulk of development on the property has already been carried out under its former classification as an MO, and so no significant site works or modification of indigenous vegetation are expected to be carried out as a result of the proposed conversion to Community Title.

Of the species of animals recorded on Gondwana up to August 2003, three are vulnerable and nine are regionally significant (for details see the fauna survey results). There are no threatened or regionally significant species of flora.

It is clear that not only local native plants and exotic garden plants, but also weed species such as Lantana, Camphor Laurel and Privet are providing valuable food and habitat for native fauna, including migratory birds.

The large camphors, whether alive or standing dead, are used by many species of birds for food, shelter, gathering, territorial calling, reconnaissance for predators, etc. Patches of planted and naturally regenerating forest support Whip Birds, Noisy Pittas, Swamp Wallabies and several breeding pairs of Brush Turkeys.

The Lantana thickets provide habitat for many birds such as banded rails, wrens, robins, finches, the unfledged young of Pheasant Coucals, and for ground-dwelling mammals such as Echidnas and Bandicoots. Many species eat Privet berries, including Black Flying Foxes.

The weed trees are also enhancing the natural regeneration of indigenous plant species, which find it difficult to penetrate grassland. A variety of local native plant species are appearing in the wild and less-maintained areas, partly because of seed brought in by birds and dropped from weed trees, and partly because the areas are not mowed, burned or disturbed and have a mixture of heavy shade (that suppresses grass growth) and light shade (that

protects rainforest seedlings) therefore allowing native plant species formerly absent from the site to become established.

The Gondwana Community plays an active part in the vegetation and wildlife corridor proposal from the Tyagarah Sustainable Community Alliance, which aims at connecting areas of remnant native vegetation through the revegetation and restoration activities of Tyagarah landowners, with support from Council, local environmental organizations and funding bodies. A large area of Gondwana has been added to the proposed Tyagarah Wildlife Corridor.

Thus not only will the proposed conversion from MO to CT have no negative impacts on threatened or regionally significant species or their habitats, but the current and future management plans associated with this proposal provide for greatly increased and enhanced habitat for all local native species.

## 8.0 recommendations

It is recommended that:

1. a gradual replacement of exotic weed species by local indigenous flora be undertaken throughout the property, such that the habitat structure and composition and the diversity of habitat types is preserved while the transition from exotic to native species is carried out.
2. observation be made over a variety of times of the large camphor laurels and weed areas to determine whether they are being used as habitat by any threatened or regionally significant species of fauna, before implementing the replacement strategy.

3. all plans concerning building works, planting, and weed control and other vegetation removal, be undertaken consistent with the goals of constructing vegetation and wildlife corridors to connect and restore remnant habitat areas.

4. the Landcare areas of indigenous rainforest being planted on Gondwana are increased in size.

5. the naturally regenerating areas are carefully managed to promote the establishment of the new native plants.

6. the ban on dogs, cats and poisons be continued, as it has proved to be a very successful encouragement for native species.

7. local seed of the indigenous plants known to support threatened and other significant fauna species is collected and propagated for planting on Gondwana.

general

See Appendix H: "Environmental Management and Enhancement Plan" for details of recommendations for the different vegetation areas on Gondwana.

koalas

Since dispersing koalas have been sighted twice on Gondwana, and anecdotal reports from other parts of Tyagarah indicate that koalas may be colonizing Tyagarah, it is recommended that suitable food trees for koalas be planted on Gondwana to enhance the future of this species in the region. Tree species recommended are:

- Tallowwood, *Eucalyptus microcorys*
- Swamp Mahogany, *Eucalyptus robusta*
- Forest Red Gum, *Eucalyptus tereticornis*



All three species of Eucalypts are present locally and seed can therefore be taken from local trees. The Swamp Mahogany and Forest Red Gum are suitable for the area known as "The Flats". See the "Environmental Management and Enhancement Plan" for details of recommendations for this area of Gondwana.

#### flying foxes

While there is no specific evidence to support the claim that Cocos palm (*Syagrus romanzoffiana*) fruits are toxic to flying foxes, it is recommended that all Cocos palms remaining on the property be removed, especially as these are known or potential environmental weeds.

Cocos palms should be replaced with the locally native Bangalow Palm, *Archontophoenix cunninghamiana*, which provides a safe food source and roosting places for flying foxes and other fauna. There are fruiting individuals of this species in the remnant rainforest on the property of Russell Groves in West Tyagarah. This is a potential source of seed, as Mr Groves is also involved in the Tyagarah Vegetation and Wildlife Corridor Proposal.

#### roads

It is recommended that the cane toad control program continue to be applied on a regular basis.

#### hydrology

More use could be made of wet season water flows in producing naturally-landscaped swales and stepped ponds of indigenous vegetation, rocks and litter. This would have several benefits:

- promote colonization of endangered species of frogs and mammals
- provide a specialized micro-habitat for a different community of fauna and flora
- reduce the force of runoff and thus reduce the loss of topsoil and the damage to roads, tracks and gardens
- enhance the landscape value of the property



## 9.0 references

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### private publications:

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### audio CDs:

- "Frog Calls of Warringah" and "Frog Calls of Sydney" by the Warringah Council

## attachment 1 - flora species (indigenous) recorded on Gondwana

This is a list of species, which are naturally regenerating. None of the species are classified as Threatened.

### TREES

#### Euphorbiaceae

Alchornea ilicifolia	Native Holly
Macaranga tanarius	Macaranga
Mallotus discolor	White Kamala
Mallotus philipensis	Red Kamala
Omalanthus populifolius	Bleeding Heart

#### Fabaceae (Mimosoideae)

Acacia melanoxylon	Blackwood, Sally Wattle
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#### Meliaceae

Dysoxylum mollissimum	Red Bean
Toona ciliata	Red Cedar

#### Moraceae

Ficus coronata	Creek Sandpaper Fig
Ficus fraseri	Sandpaper Fig
Ficus Watkinsiana	Strangling Fig

#### Pittosporaceae

Pittosporum undulatum	Sweet Pittosporum
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#### Rutaceae

Melicope elleryana	Pink Euodia
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Sapindaceae

Cupaniopsis anacardioides	Tuckeroo
Guioa semiglauca	Guioa Northern
Jagera pseudorhus	Foambark Tree

Sterculiaceae

Commersonia bartramia	Brown Kurrajong
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Ulmaceae

Aphananthe philippinensis	Rough-Leaved Elm
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VINESAreaceae

Calamus muelleri	Lawyer Vine
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Apocynaceae

Parsonsia straminea	Common Silkpod
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Bignoniaceae

Pandorea pandora	Wonga Wonga Vine
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Dilleniaceae

Hibbertia scandens	Twinging Guinea Flower
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Dioscoreaceae

Dioscorea transversa	Native Yam
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Luzuriacaceae

Eustrephus latifolius	Wombat Berry
Geitonoplesium cymosum	Scrambling Lily

Menispermaceae

Stephanea aculeata	Prickly Snake Vine
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Smilacaceae

Smilax australis	Smilax
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UNDERSTOREY SPECIESShrubs

Cordyline rubra	Walking Steak
Breynia oblongifolia	Breynia
Eupomatia bennettii	Small Bolwarra
Rubus rosifolius	Rose-leaf Bramble
Zieria smithii	Sandfly Zieria
Austromyrthus dulcis	Midgenberry

GROUND COVERSFerns

Asplenium australasicum	Bird's Nest Fern
Platyterium bifurcatum	Elk Horn
Pteridium esculentum	Bracken
Pyrosia rupestris	Rock Felt-fern

Herbs

Centella asiatica	Gota Cola
Commelina cyanea	Native Wandeing Jew
Geranium homeanum	Creeping Christian
Pratia purpurascens	Geranium
	Cumbungi, Whiteroot

Grasses/GrassesLike Plants

Gahnia sieberana	Red-fruit Saw Sedge
Gahnia sp.	Gahnia
Microlaena stipoids	Weeping Grass
Oplismenus aemulus	Basket/Beard Grass
Oplismenus imbecillis	Creeping Beard Grass
Typha domingensis	Cumbungi

## attachment 2 - fauna species found on Gondwana

MAMMALS

Common ringtail possum	Pseudocheirus peregrinus
Common brush-tailed possum	Trichosurus vulpecula
Mountain brushtail possum	Trichosurus caninus
Echidna	Tachyglossus aculeatus
Grey-headed flying fox	Pteropus poliocephalus
Black flying fox	Pteropus alecto
Long-nosed bandicoot	Perameles nasuta
Northern brown bandicoot	Isodon macrourus
Koala	Phascolarctos cinereus
Swamp wallaby	Wallabia bicolor

BIRDSGround Birds

Brush turkey	Alectura lathami
Buff-banded rail	Rallus philippensis
Water/Lewin's rail	Rallus pectoralis
Masked plover/lapwing	Vanellus miles
Noisy pitta	Pitta versicolor
Regent bower bird	Sericulus chrysocephalus

Honeyeaters

Blue-faced honeyeater	Entomyzon cyanotis
Lewin's honeyeater	Meliphaga lewinii
Noisy miner	Manorina melanocephala
Little wattlebird	Anthochaera chrysoptera
White-cheeked honeyeater	Phylidonyris nigra

Kingfishers

Laughing kookaburra      Dacelo gigas

Parrots

Eastern rosella      Platycercus eximius  
 Galah      Cacatua roseicapilla  
 Rainbow lorikeet      Trichoglossus haematodus  
 Scaly-breasted lorikeet      Trichoglossus chlorolepidotus  
 Yellow-tailed black cockatoo      Calyptorhynchus funereus  
 Sulphur-crested cockatoo      Cacatua galerita

Pigeons and Doves

Bar-shouldered dove      Geopelia humeralis  
 Brown pigeon      Macropygia amboinensis  
 Common bronzewing      Phaps chalcoptera  
 Crested pigeon      Ocyphaps lophotes  
 Emerald dove      Chalcophaps indica  
 White-headed pigeon      Columba leucomela

Raptors, Owls and Other Predators

Black-shouldered kite      Elanus axillaris  
 Crested hawk/Pacific Baza      Aviceda subcristata  
 Whistling kite      Haliastur sphenurus  
 Tawny frogmouth      Podargus strigoides  
 Wedge-tailed eagle      Aquila audax  
 White-breasted sea eagle      Haliaeetus leucogaster  
 Grey butcherbird      Cracticus torquatus  
 Pied butcherbird      Cracticus nigrogularis  
 Magpie      Gymnorhina tibicen  
 Pied currawong      Strepera graculina  
 Torresan crow      Corvus orru

Water Birds

White-faced heron      Ardea novaehollandiae  
 Great/White egret      Egretta alba

Cattle egret

White ibis      Ardea ibis  
 Pelican      Threskiornis molucca  
 Swamp hen      Pelecanus conspicillatus  
 Black duck      Porphyrio porphyrio  
                                          Anas superciliosa

Wrens, Robins, Fantails and Finches

Red-browed firetail finch      Emblema (or Neochmia)  
                                          temporalis  
 Grey fantail      Rhipidura fuliginosa  
 Willie wagtail      Rhipidura leucophrys  
 Superb blue wren      Malurus cyaneus  
 Scarlet wren      Malurus melanocephalus  
 Rufous whistler      Pachycephala rufiventris  
 Chestnut-breasted mannikin      Lonchura castaneothorax

Other

Black-faced cuckoo-shrike      Coracina novaehollandiae  
 Eastern whipbird      Psophodes olivaceus  
 Fig bird      Sphecotheres viridis (or  
                                          vieillotti)  
 Murray magpie      Grallina cyanoleuca  
 Pheasant coucal      Centropus phasianus  
 Rainbird (Indian/Common Koel)      Eudynamys scolopacea  
 Silvereye      Zosterops lateralis  
 Spangled drongo      Dicrurus hottentottus  
 Pacific/fork-tailed swift      Apus pacificus  
 Welcome swallow      Hirundo neoxena

REPTILESLizards

Burton's snake lizard	<i>Lialis burtonis</i>
Eastern water dragon	<i>Physignathus lesueurii</i>
Eastern blue-tongued lizard	<i>Tiliqua scincoides</i>
Pink-tongued lizard	<i>Tiliqua gerrardii</i>
small skink	<i>Lampropholis delicata</i>
small skink	<i>Lampropholis guichenotti</i>
Lace monitor	<i>Varanus varius</i>

Snakes

Bandy bandy	<i>Vermicella annulata</i>
Black-bellied swamp snake	<i>Hemiaspis signata</i>
Blind snake	<i>Ramphotyphlops nigrescens</i>
Brown tree snake	<i>Boiga irregularis</i>
Carpet python	<i>Morelia spilota</i>
Green tree snake	<i>Dendrelaphis punctulatus</i>
Eastern brown	<i>Pseudonaja textilis</i>
Red-bellied black snake	<i>Pseudechis porphyriacus</i>
Yellow-faced whip snake	<i>Demansia psammophis</i>
Dwarf-crowned snake	<i>Cacophis krefftii</i>
Rough-Scaled Snake	<i>Tropidechis carinatus</i>

AMPHIBIANS

Cane toad	<i>Bufo marinus</i>
Green tree frog	<i>Litoria coerulea</i>
Peron's tree frog	<i>Litoria peronii</i>
Striped marsh frog	<i>Limnodynastes peroni</i>
Rocket frog	<i>Litoria freycineti</i>
Eastern dwarf tree frog	<i>Litoria fallax</i>

BUTTERFLIES

Blue triangle	<i>Graphium sarpedon choredon</i>
Blue tiger	<i>Danaus hamatus hamatus</i>
Caper white	<i>Anaphaeis java teutonia</i>
Lemon migrant	<i>Catopsilia pomona pomona</i>
Orchard swallowtail	<i>Papilio aegus aegus</i>
Wanderer/Monarch	<i>Danaus plexippus plexippus</i>
Common eggfly	<i>Hypolimnas bolina nerina</i>
Chequered swallowtail	<i>Papilio demoleus sthenelus</i>
Pale green triangle	<i>Graphium eurypylus lycaon</i>
Common albatross	<i>Appias paulina ega</i>
Orange palmdart	<i>Cephrenes augiades sperthias</i>
Evening brown	<i>Melanitis leda bankia</i>
Australian crow	<i>Euploea core corinna</i>
Macleay's swallowtail	<i>Graphium macleayanum</i>
	<i>Elodina species</i>

