BLACKWOOD ECOLOGICAL SERVICES

Preliminary Ecological Assessment
Monaltrie Investigation Area

Lismore, NSW
A Report to the Clarke, Munce & Piper Families
January 2016

NOTE

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Blackwood Ecological Services
PO Box 336
BANGALOW NSW 2479
www.blackwoodecology.com.au

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1 INTRODUCTION

1.1 Background

Blackwood Ecological Services have been engaged by the Clarke, Munce and Piper families to complete a Preliminary Ecological Assessment for an area of land known as the Monaltrie Investigation Area, Monaltrie, NSW. The area was identified by Lismore City Council in their Draft Growth Management Strategy as being "*an appropriate location to consider for satisfying demand for large lot residential housing*" with Council noting that "*it is also important that the potential for closer urban development is not 'sterilised' by large lot residential subdivision*".

The site is located within the Lismore Koala Planning Area and the Ecological Assessment is to consider LCC's Comprehensive Koala Plan of Management (KPoM) for south-east Lismore.

1.2 The Subject site

The Subject site refers to the area directly affected by the proposal. The Subject site consists of four parcels of land:

- Lot 4 DP 24529 (47.34 ha, south of Monaltrie Road)
- Lot 4 DP 789389 (34.05ha, north of Monaltrie Road)
- Lot 5 DP 774499 (40.5ha, north of Monaltrie Road)
- Lot 3 DP 1002771 (39.54ha, south of Durheim Road)

The Subject site is located along Wyrallah Road about 4km south-east of the Lismore CBD and is characterised by mostly cleared agricultural land with some scattered patches of sclerophyll forest and Camphor laurel dominated rainforest regrowth. Several low order watercourses and associated gullies are also present.

FIGURE 1 shows the location of the Subject site. **FIGURE 2** shows an aerial view of the Subject site.

1.3 The Study area

The Study area refers to the Subject site together with any additional areas which are likely to be affected by the proposal, either directly or indirectly. The Study area in this case includes adjoining areas of land and vegetation.

The Study area is characterised by mostly cleared agricultural land with scattered patchy growth of native vegetation and Camphor laurel forest in gully lines and some ridgetops. The Wilsons River, a tributary of the Richmond River, is located about 3.5km west of the Subject site. The Wilson Nature Reserve is located about 2.5km north-west of the Subject site.

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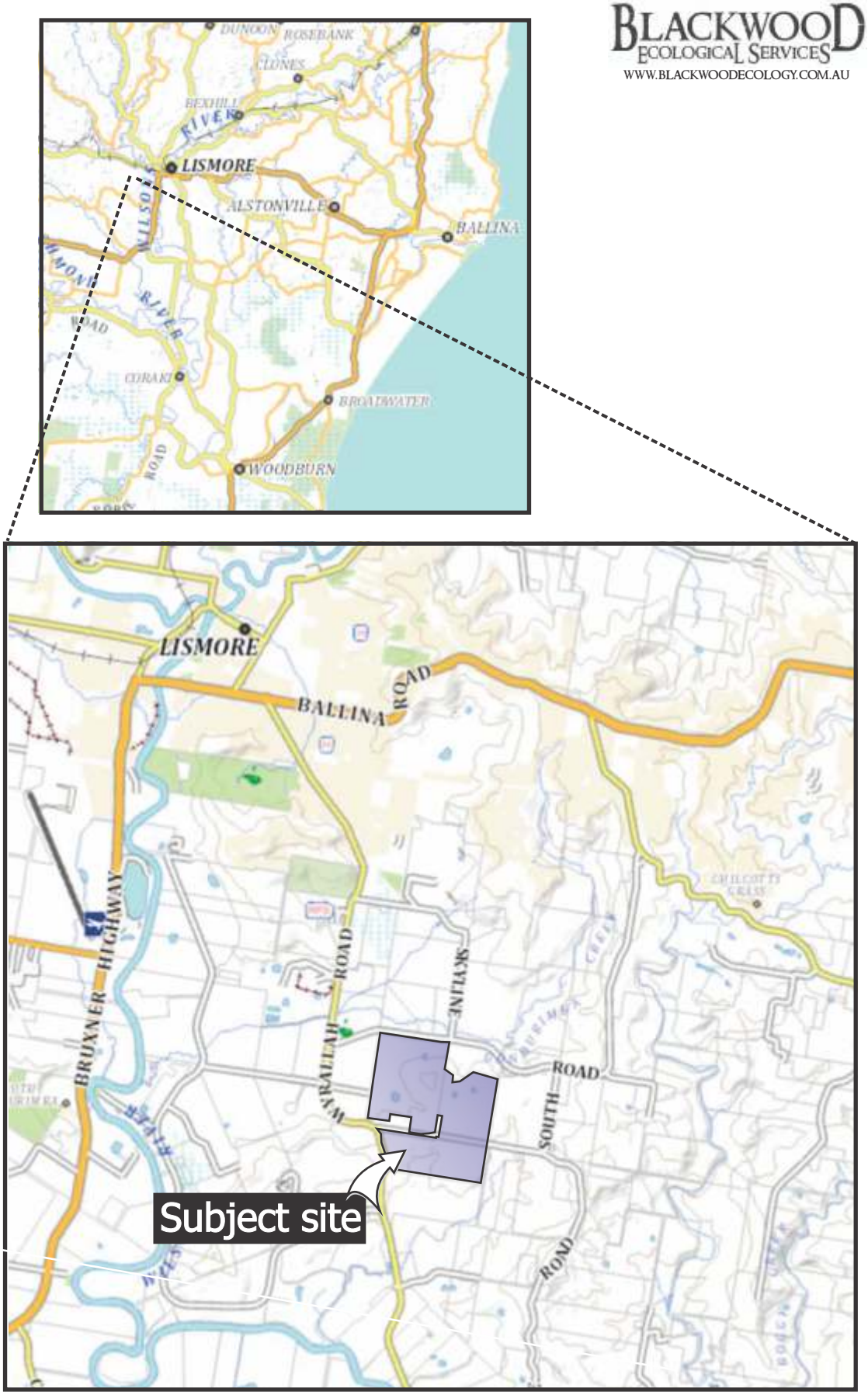

Project & Project No.
Monaltrie Investigation Area 1522

Author & Date	Source
MF 15/10/2015	NSW LPI SixViewer

Figure 1
Locality

Project	Project No.	Author & Date	Source
Monaltrie Investigation Area	1522	MF 15/10/2015	NSW LPI SixViewer

Figure 2
Subject site

2 FLORA

2.1 Introduction

This section discusses the methods used in the vegetation assessment and presents the results of the assessment. Relevant databases and reports were reviewed to identify records of locally occurring Threatened and Rare plant species, populations and communities.

2.2 Database searches

2.2.1 NPWS Database search

A search of the NPWS Database revealed records of a number of Threatened flora species within 5km of the Subject site. These species are shown in **TABLE 1**.

TABLE 1
NPWS DATABASE RECORDS OF THREATENED FLORA SPECIES WITHIN 5 KM OF THE SUBJECT SITE

Botanical name	Common name	NSW Status
Arthraxon hispidus	Hairy Jointgrass	V
Clematis fawcettii	Northern Clematis	V
Corchorus cunninghamii	Native Jute	E1
Desmodium acanthocladum	Thorny Pea	V
Doryanthes palmeri	Giant Spear Lily	V
Endiandra hayesii	Rusty Rose Walnut	V
Floydia praealta	Ball Nut	V
Geijera paniculata	Axe-Breaker	E1
Gossia fragrantissima	Sweet Myrtle	E1
Hicksbeachia pinnatifolia	Red Boppel Nut	V
Macadamia tetraphylla	Rough-shelled Bush Nut	V
Micromelum minutum		E4
Myrsine richmondensis	Ripple-leaf Muttonwood	E1
Oberonia complanata	Yellow-flowered King of the Fairies	E1
Ochrosia moorei	Southern Ochrosia	E1
Owenia cepiodora	Onion cedar	V
Randia moorei	Spiny Gardenia	E1
Rhynchosia acuminatissima	Pointed Trefoil	V
Sarcochilus dilatatus	Brown Butterfly Orchid	E1
Senna acclinis	Rainforest Cassia	E1
Syzygium hodgkinsoniae	Red Lilly Pilly	V
Thesium australe	Austral Toadflax	V
Tinospora smilacina	Tinospora Vine	E1
Tinospora tinosporoides	Arrow-head Vine	V
Triflorensia cameronii	Cameron's Tarenna	E1

KEY
E1 Endangered
E4 Extinct
V Vulnerable

2.2.2 Commonwealth EPBC Act (1999) Database search

A search of the Commonwealth EPBC Act (1999) Database revealed potential suitable habitat for a number of Threatened flora species within 5km of the Subject site. These species are shown in **TABLE 2**.

The Commonwealth EPBC Act Protected Matters Report is included in full in **APPENDIX A**.

TABLE 2
COMMONWEALTH EPBC ACT (1999) DATABASE OF THREATENED FLORA SPECIES WITH POTENTIAL SUITABLE HABITAT WITHIN 5 KM OF THE SUBJECT SITE

Botanical name	Common Name	Status
Allocasuarina defungens	Dwarf Heath Casuarina	E
Arthraxon hispidus	Hairy-joint Grass	V
Balogbia marmorata	Marbled Balogia	V
Bulbophyllum globuliforme	Miniature Moss-orchid	V
Clematis fawcettii	Northern Clematis	V
Corchorus cunninghamii	Native Jute	E
Cryptocarya foetida	Stinking cryptocarya	V
Desmodium acanthocladum	Thorny Pea	V
Diploglottis campbellii	Small-leaved Tamarind	E
Floydia praealta	Ball Nut	V
Gossia fragrantissima	Sweet Myrtle	E
Hicksbeachia pinnatifolia	Red bopple nut	V
Isoglossa eranthemoides	Isoglossa	E
Macadamia tetraphylla	Rough-shelled Bush Nut	V
Marsdenia longiloba	Clear milkvine	V
Myrsine richmondensis	Purple-leaf Muttonwood	E
Ochrosia moorei	Southern Ochrosia	E
Owenia cepiodora	Onionwood	V
Phaius australis	Lesser Swamp-orchid	E
Randia moorei	Spiny Gardenia	E
Streblus pendulinus	Siah's Backbone	E
Syzygium hodgkinsoniae	Red Lilly Pilly	V
Taeniophyllum muelleri	Minute orchid	V
Thesium australe	Austral Toadflax	V
Tinospora tinosporoides	Arrow-head Vine	V

KEY
E Endangered
V Vulnerable

2.3 Site assessment

2.3.1 Introduction

This section discusses flora species and vegetation on the Subject site and the ecological significance of this vegetation. Site surveys across the Subject site were undertaken on the 24th of September and the 1st and 2nd of October 2015.

The objectives of the site assessment were:

- To identify vegetation communities and flora species present in the area subject to the

proposed rezoning.

- To complete targeted searches for any significant flora species known from the locality and considered possible occurrences based on an assessment of site habitats.

2.3.2 Vegetation Communities

Six broad vegetation types were identified within the areas surveyed and are listed in **TABLE 3** below. Their location and extent across the survey area is shown in **FIGURE 3**. A list of plant species recorded on the site is included in **APPENDIX B.** A description and photo of each vegetation community is provided below.

TABLE 3
VEGETATION COMMUNITIES WITHIN THE SURVEY AREA

Community types
1 Camphor laurel/Sub-tropical rainforest communities
1a Sub-tropical rainforest regrowth with <40% Camphor laurel
1b Sub-tropical rainforest regrowth with 40-80% Camphor laurel
1c Sub-tropical rainforest regrowth with >80% Camphor laurel
2 Sclerophyll woodland communities (Brushbox/mixed species)
2a Tall mixed eucalypt woodland (Brushbox/Pink bloodwood/Grey ironbark/Forest red gum/Rainforest species)
2b Tall mixed eucalypt open woodland (Brushbox/Pink bloodwood/Rainforest species)
3 Sclerophyll woodland communities (Forest red gum dominant)
3a Tall eucalypt woodland (Forest red gum +/- Swamp turpentine & Pink bloodwood)
3b Tall eucalypt woodland (Forest red gum/Pink bloodwood/Rainforest species with <30% Camphor laurel)
3c Tall eucalypt woodland (Forest red gum/Camphor laurel)
4 Tall mixed forest (Eucalypt species/Rainforest species/Hoop pine/Camphor laurel)
5 Low grassland with scattered trees
6 Dams

2.3.2.1 Community 1 Camphor laurel/Sub-tropical rainforest communities

Description and Location

This community describes patches of vegetation that consist primarily of Camphor laurel and/or native regrowth rainforest species. These areas occur in drainage lines and lower slopes in the southern part of the Subject site as well as in smaller patches in the central part of the site. In most patches Camphor laurel occurs almost exclusively or in very high proportions, with Large-leaved privet dominant or co-dominant in patches along the eastern boundary of Lot 4 DP 24529. In general, areas of this community north of Monaltrie Road are in better condition with a lower proportion of Camphor laurel and greater native species diversity.

The diversity of native species present is relatively low, with common native regrowth species prevalent, including Red kamala, Guioa, Silky oak, Blackwood wattle, Sweet pittosporum, Brown kurrajong and Hard quandong. Higher quality patches typically include Small-leaved tuckeroo, Foambark, Native franjipani, Rough-leaved elm, Red ash, Sandpaper fig and Jackwood.

Larger strangling figs are sometimes present and occasional eucalypt species as well as Brushbox may occur, particularly on the fringes of this community type.

Conservation status

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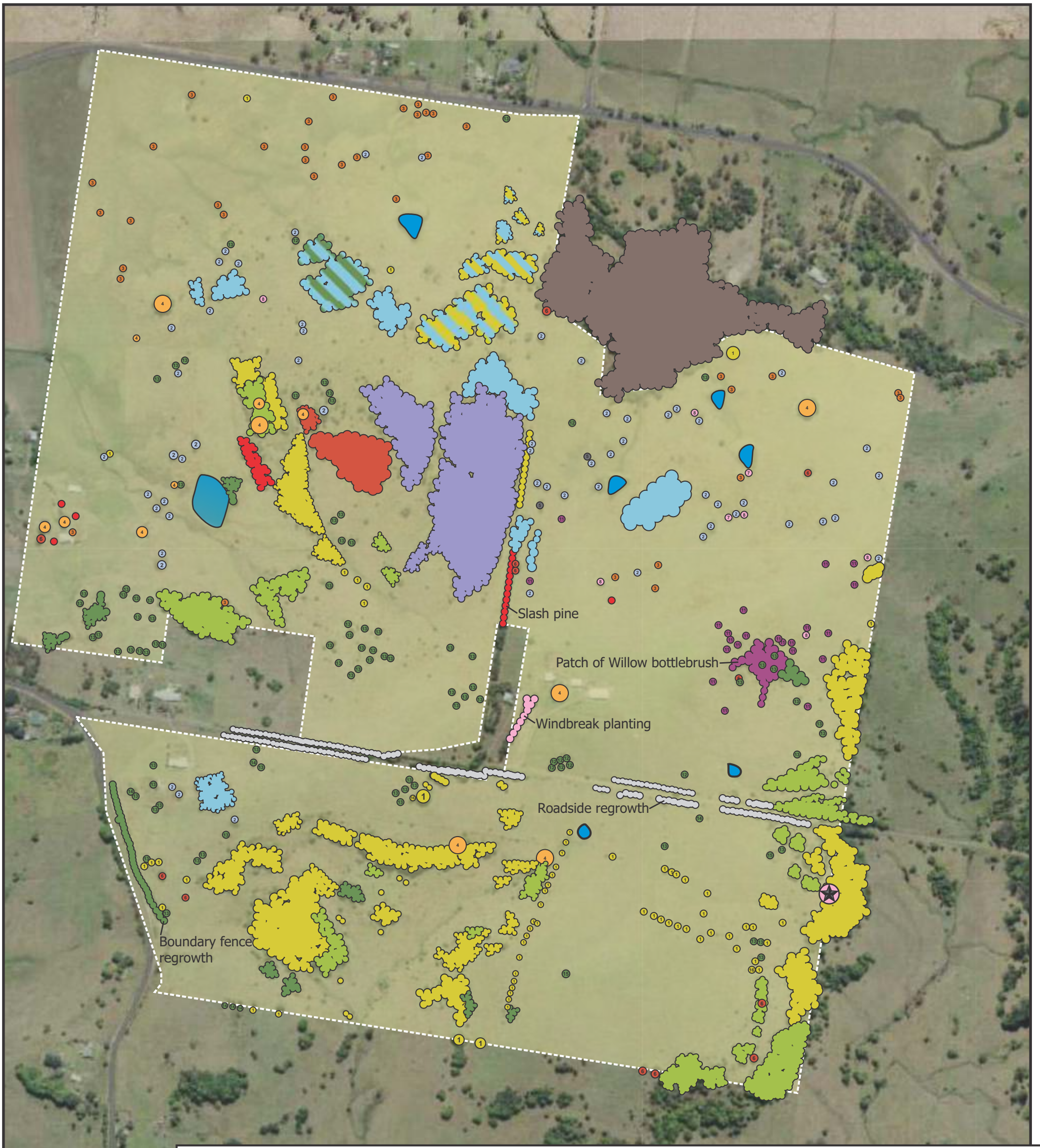


VEGETATION COMMUNITIES

- Community 1a Sub-tropical rainforest regrowth with <40% Camphor laurel
- Community 1b Sub-tropical rainforest regrowth with 40-80% Camphor laurel
- Community 1c Sub-tropical rainforest regrowth with >80% Camphor laurel
- Community 2a Tall mixed eucalypt woodland (Brushbox/Pink bloodwood/Grey ironbark/Forest red gum/Rainforest species)
- Community 2b Tall mixed eucalypt open woodland (Brushbox/Pink bloodwood/Rainforest species)
- Community 3a Tall eucalypt woodland (Forest red gum +/- Swamp turpentine & Pink bloodwood)
- Community 3b Tall eucalypt woodland (Forest red gum/Pink bloodwood/Rainforest species with <30% Camphor laurel)
- Community 3c Tall eucalypt woodland (Forest red gum/Camphor laurel)
- Community 4 Tall mixed forest (Eucalypt species/Rainforest species/Hoop pine/Camphor laurel)
- Rose-crowned fruit-dove (*Ptilinopus regina*) - approximate location (call)

1. Camphor laurel*
2. Forest red gum
3. Swamp turpentine
4. Figs (Ficus spp.)
5. Dead stag
6. Brushbox
7. Grey ironbark
8. Pink bloodwood
9. Guioa
10. Exotic species (various)*
11. Willow bottlebrush
12. Blackwood wattle
13. Native rainforest tree (various)
14. Silky oak
15. Teak
16. Large-leaved privet

Roadside vegetation

Project	Project No.	Author & Date	Source	Figure 3
Monaltrie Investigation Area	1522	MF 15/10/2015	NSW LPI SixViewer	Vegetation Communities

Higher quality patches of this community type (mapped as sub-communities 1a and 1b) are considered to be a degraded form of *Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion* EEC.

None of the patches of this community are of sufficient size/quality (>0.1ha for remnant patches, >1ha for predominantly regrowth patches with some residual trees, >2ha for non-remnant patches) to meet the condition thresholds required for it to be included in the definition of Lowland Rainforest of Subtropical Australia which is a federally listed threatened community under the EPBC Act (1999).

PLATE 1
View of Camphor laurel dominated patch along the eastern boundary

PLATE 2
A patch of predominantly native rainforest species.

2.3.2.2 Community 2 Sclerophyll woodland communities (Brushbox/mixed species)

Description and Location

This community type occurs on the ridgetop in the central part of the Subject site as well as the westerly facing hillside. It includes a mixed canopy of mature Brushbox, Pink bloodwood, Northern grey ironbark, Forest red gum and Strangling figs. The understorey is grazed and open with Blady grass and Swamp foxtail occurring amongst exotic and native pasture grasses.

Other species present include rainforest species such as Red kamala, Muttonwood, Foambark, Sweet pittosporum, Guioa, Red cedar and Hard quandong.

Further down the hillslope, areas mapped as Community 2b contain less Forest red gum and Northern grey ironbark, with Brushbox and Pink bloodwood occurring with figs, Hard quandong, Foambark and other rainforest regrowth.

Conservation status

This community type is not consistent with the definitions of any listed EEC. It contains elements of *Lowland rainforest* as well as *Sub-tropical coastal floodplain forest*. It is considered to have a moderate conservation value as a vegetation community, although it provides high quality habitat for Koalas.

PLATE 3
Area of Community 2

2.3.2.3 Community 3 Sclerophyll woodland communities (Forest red gum dominant)

Description and Location

This community type occurs in scattered patches of woodland and open forest throughout the site as well as in more widely scattered individual trees on the lower slopes and flats in the

northern part of the site. The dominant tree species are Forest red gum and Swamp turpentine. Pink bloodwood also occurs and there are occasional occurrences of drier rainforest trees such as Red ash and Hard quandong.

Conservation status

This community type is consistent with the definition of the Endangered Ecological Community *Sub-tropical coastal floodplain forest*. It is considered to have a moderate-high conservation value as a vegetation community and provides high quality habitat for Koalas. The relative conservation value varies, with some patches quite intact and others highly disturbed and/or infested with Camphor laurel.

PLATE 4
Area of Community 3

2.3.2.4 Community 4 Tall mixed forest (Eucalypt species/Rainforest species/Hoop pine/Camphor laurel)

Description and Location

This community describes vegetation on the adjoining property to the north of Lot 5 DP 774499 which extends onto the site a short distance from the eastern fenceline of Lot 3 DP 1002771. Vegetation on the neighbouring property has apparently been augmented with planting and includes a diversity of tree species including Forest red gum, Spotted gum, White mahogany, Tallowwood, Swamp mahogany, Brushbox, Flooded gum, Pink bloodwood, Grey gum with a component of rainforest species including large figs, Macaranga, Hoop pine, Silky oak, Sweet pittosporum as well as Camphor laurel.

Conservation status

This community type is not well described by any listed EEC. It has a moderate-high conservation value.

PLATE 5
Area of forest on the adjoining property to the north

2.3.2.5 Community 5 Low grassland with scattered paddock trees

Description and Location

The majority of the site comprises cleared grassland with scattered paddock trees. These paddock trees are derived from Communities 1-3 as described above and include Forest red gums, Swamp turpentine, several fig species, Brushbox, Pink bloodwood, Camphor laurel and native rainforest species including Red kamala, Teak, Silky oak, Native franjipani and others. Willow bottlebrush is common on the south-east facing hillside of Lot 5 DP774499.

Paddock areas are typically dominated by a diversity of grasses both native and exotic including Couch, Paspalum, Narrow-leaved carpet grass, Kikuyu, Buffalo, Setaria, Blady grass and Swamp foxtail. The exotic herbs Fireweed, Spear thistle, Ragweed, Cotton bush and Veined verbena are common across paddock areas.

Conservation Status

This community is highly modified and ongoing grazing prevents the development of a midstorey component. Areas with Forest red gum and Swamp turpentine are a degraded form of the *Sub-tropical coastal floodplain forest* EEC and some areas of scattered rainforest trees may form part of the *Lowland Rainforest on floodplain in NSW North Coast Bioregion* EEC.

PLATE 6
Paddock areas with scattered trees.

2.3.2.6 Community 6 Dams

Description and Location
Several dams are located within the Subject site with a number of smaller soaks also present. These are typically degraded as a result of cattle access which has limited the development of fringing vegetation. Small patches of Cumbungi occur with Cyperus exaltatus, Smartweed, Common rush, Frogsmouth and Water primrose common on most of the dams. Water lily is usually present on the water surface.

Conservation Status
This community is considered to be of low conservation value given its disturbed state and lack of native species diversity.

PLATE 7
Dam in the northern part of the Subject site.

2.3.3 Endangered and Threatened Ecological Communities

Vegetation communities on the Subject site were compared with descriptions of vegetation communities listed as Endangered Ecological Communities under the Threatened Species Conservation Act (1995) and Threatened Ecological Communities under the EPBC Act (1999).

The original native vegetation cover of the Subject site would have included large areas of sub-tropical rainforest vegetation. Areas of Community 1 comprise a highly degraded form of *Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion* EEC which is listed under the TSC Act. Areas mapped as sub-community 1a comprise the most intact form of this EEC with areas consisting largely of Camphor laurel considered to not form part of the EEC. Forest red gum and Swamp turpentine vegetation is consistent with the definition of the Endangered Ecological Community *Sub-tropical coastal floodplain forest*.

Vegetation communities within the site do not comply with the condition thresholds of any Threatened Ecological Communities listed under the EPBC Act.

2.3.4 Significant species recorded

No threatened flora species (NSW TSC Act 1995, Commonwealth EPBC Act 1999) were recorded during the site survey.

2.3.5 Potential occurrence of Threatened flora

One threatened species which was not detectable at the time of the survey is Hairy joint grass (*Arthraxon hispidus*) which is listed as Vulnerable under the TSC Act and EPBC Act. This species is known to be relatively widespread in the Study area and occurs in low-lying soaks and drainage lines amongst grasses, typically on the edge of rainforest. It is only readily detectable between late spring and autumn. The majority of core habitat for this species is confined to gully lines and low-lying wet areas within the Subject site.

2.3.6 Noxious Weeds

Six noxious weeds declared for the Lismore City LGA under the *Noxious Weeds Act 1993* were recorded within the study area during the survey. The status and distribution of these weeds at the site are summarised in **TABLE 4**.

TABLE 4
CONTROL CLASS AND DISTRIBUTION OF NOXIOUS WEEDS RECORDED WITHIN THE SUBJECT SITE

Species	Control Class
Camphor laurel *Cinnamomum camphora*	C4 - The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed.
Lantana *Lantana camara*	C4 - The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed.
Large-leaved Privet *Ligustrum lucidum*	C4 - The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its flowering and reproduction.
Annual ragweed *Ambrosia artemisiifolia*	C5 - The requirements in the *Noxious Weeds Act 1993* for a notifiable weed must be complied with.
Crofton weed *Ageratina adenophora*	C4 - The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction.

Species	Control Class
Mistflower *Ageratina riparia*	C4 - The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed.

3 FAUNA

3.1 Introduction

This section discusses the methods used in the fauna assessment and presents the results of the assessment. Relevant databases were reviewed to identify records of locally occurring Threatened fauna species, populations and communities.

The fauna assessment consisted of:

- A review of relevant databases and literature.
- An assessment of site fauna habitats.
- Koala searches and scat searches around Koala food trees within the Subject site.

Site habitats were assessed in terms of their value for native fauna species on the 24th September and the 1st and 2nd of October in conjunction with the flora survey. Areas of the Subject site were traversed on foot and by vehicle with a concentrated effort on patches of vegetation and bodies of water. The assessment focused on identifying habitat features associated with Threatened species known from the locality. Particular attention was paid to habitat features such as:

- The presence of mature trees with hollows, fissures and/or other suitable roosting/nesting places.
- Presence of hollow logs/debris and areas of dense leaf litter.
- The presence of preferred Koala food tree species. Scat searches were undertaken around all Koala food trees located within the Subject site.
- The presence of preferred Glossy black cockatoo feed trees.
- Condition, flow and water quality of drainage lines and bodies of water.
- Areas of dense vegetation.
- Presence of fruiting flora species and blossoming flora species, particularly winter-flowering species.
- Vegetation connectivity and proximity to neighbouring areas of vegetation.
- Presence of caves, hollow trees and/or man-made structures suitable as microchiropteran bat roost sites.

3.2 Database searches

3.2.1 NPWS Database search

A search of the NPWS Database revealed records for a number of Threatened fauna species within 5km of the Subject site. These species are shown in **TABLE 5**.

TABLE 5
NPWS DATABASE RECORDS OF THREATENED FAUNA SPECIES WITHIN 5 KM OF THE SUBJECT SITE

Common name	Scientific name	NSW Status
Black-necked Stork	*Ephippiorhynchus asiaticus*	E1
Comb-crested jacana	*Irediparra gallinacea*	V
Common Planigale	*Planigale maculata*	V
Eastern Bentwing-Bat	*Miniopterus schreibersii oceanensis*	V
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V

Common name	Scientific name	NSW Status
Eastern Long-eared Bat	*Nyctophilus bifax*	V
Freckled duck	*Sticnonetta naevosa*	V
Grey-headed Flying-fox	*Pteropus poliocephalus*	V
Koala	*Phascolarctos cinereus*	V
Little Bentwing-bat	*Miniopterus australis*	V
Little Eagle	*Hieraaetus morphnoides*	V
Marbled Frogmouth	*Podargus ocellatus*	V
Pale-vented Bush-hen	*Amaurornis moluccana*	V
Red-tailed Tropicbird	*Phaethon rubricauda*	V
Rose-crowned Fruit-Dove	*Ptilinopus regina*	V
Shorter Rainforest Ground-beetle	*Nurus brevis*	E1
Sooty Owl	*Tyto tenebricosa*	V
Spotted-tailed Quoll	*Dasyurus maculatus*	V
White-crowned snake	*Cacophis harriettae*	V
Wompoo Fruit-Dove	*Ptilinopus magnificus*	V

KEY

E1 Endangered
V Vulnerable

3.2.2 Commonwealth EPBC Act (1999) Database search

A search of the Commonwealth EPBC Act (1999) Database revealed potential suitable habitat for a number of Threatened fauna species within 5km of the Subject site. These species are shown in **TABLE 6**.

The Commonwealth EPBC Act Protected Matters Report is included in full in **APPENDIX A**.

TABLE 6
COMMONWEALTH EPBC ACT (1999) DATABASE OF THREATENED FAUNA SPECIES WITH POTENTIAL SUITABLE HABITAT WITHIN 5 KM OF THE SUBJECT SITE

Common Name	Scientific name	Status
Australasian Bittern	*Botaurus poiciloptilus*	E
Australian Painted Snipe	*Rostratula australis*	V
Black-breasted Button-quail	*Turnix melanogaster*	V
Brush-tailed Rock-wallaby	*Petrogale penicillata*	V
Coxen's Fig-Parrot	*Cyclopsitta diophthalma coxeni*	E
Eastern Bristlebird	*Dasyornis brachypterus*	E
Giant Barred Frog	*Mixophyes iteratus*	E
Grey-headed Flying-fox	*Pteropus poliocephalus*	V
Koala (combined populations of Qld, NSW and ACT)	*Phascolarctos cinereus*	V
Large-eared Pied Bat	*Chalinolobus dwyeri*	V
Long-nosed Potoroo (SE mainland)	*Potorous tridactylus tridactylus*	V
Red goshawk	*Erythrotriorchis radiatus*	V
Regent honeyeater	*Anthochaera phrygia*	E
Spotted-tailed Quoll	*Dasyurus maculatus*	V
Swift Parrot	*Lathamus discolor*	E

KEY

E Endangered
V Vulnerable

3.3 Site assessment

3.3.1 Site habitats

Amphibians

Several intermittent drainage lines and dams occur within the Subject site. These drainage lines were generally dry at the time of survey and include areas of grassy and of muddy substrate. Dams and drainage line areas provide some habitat value for amphibians, although the lack of connectivity and absence of dense riparian vegetation, reeds, rushes and leaf litter is likely to limit the diversity of species likely to occur. Common species such as *Litoria peronii*, *Litoria dentata, Litoria nasuta, Limnodynastes peronii* and *Crinia signifera* are likely to occur, as is the Cane toad.

Reptiles

Patchy areas of dense vegetation cover within the Subject site provide moderate habitat for common reptile species although the diversity of reptile species which may occur is likely to be low. Forest patches on the site are not highly structurally complex and there is a lack of understorey and leaf litter development, due in part to cattle grazing across the site. Reptile species that are likely to occur include the Green tree snake; Carpet python; Red-bellied black snake; Brown snake; Yellow-faced whip snake; Eastern water dragon and a number of smaller skinks.

Birds

In general, the site is highly modified and contains a limited diversity of microhabitats due to the lack of vegetation cover and structural and floristic diversity. Flowering Eucalypts, Callistemons and garden plantings provide some foraging habitat for nectar seeking birds. Camphor laurel and rainforest patches provide habitat for rainforest birds that tolerate more open habitat types, but rainforest dwellers such as Catbirds, fruit-doves and the Noisy pitta are unlikely. Grassland birds such as wrens and finches occur in taller grassland, particularly along drainage lines or steeper slopes.

Mammals

Mammal diversity is likely to be low in the Study area due to the disturbance history and highly modified landscape. The Short-beaked echidna and Northern brown bandicoot and Common brushtail and Ringtail possum are considered likely to occur in the Study area. Introduced species including the House mouse, Black rat, Cat and Dog are all likely occurrences.

The Subject site supports some mature trees with large hollows suitable for hollow-dwelling mammals. Flying-foxes will occur in the vicinity from time to time and several species of microchiropteran bat are likely.

The Subject site contains a large number of Koala food trees, occurring in patches of mixed forest, of open forest dominated by Forest red gum and as scattered Forest red gums and other trees. Koalas (including a mother with joey) were present at several locations throughout the site during the site visit and evidence of Koala use is widespread across the site.

3.3.2 Significant fauna species

Two Threatened (TSC Act 1995, EPBC Act) fauna species, the Koala and the Rose-crowned fruit-dove, were recorded during the site assessment. Koalas were present at several locations throughout the site during the site visit and evidence of Koala use is widespread across the site.

The Rose-crowned fruit-dove was recorded along the eastern boundary in Camphor laurel/Large-leaved privet dominated regrowth.

3.3.3 Wildlife corridors and habitat connectivity

3.3.3.1 Site assessment

The investigation area occurs within a highly cleared landscape retaining only fragments of the original native vegetation cover. West and south west toward the Wilson River and north toward Lismore the floodplain contains only widely scattered trees and small patches of native vegetation and landscaping. To the east and north-east the lower slopes of the Alstonville plateau support denser patches of vegetation on steeper slopes and drainage lines. Movement opportunities for fauna through this highly disturbed landscape are limited. Riparian corridors are compromised by the patchiness of riparian vegetation but do serve to connect some of the larger patches. Scattered trees across the site provide stepping stones for birds and bats. Arboreal mammals including the Common brushtail and Ringtail possums as well as the Koala may move between scattered trees, but the distances between trees leaves animals susceptible to predation from cats, dogs, foxes and birds.

3.3.3.2 Lismore City Council Key Habitats & Corridors Mapping

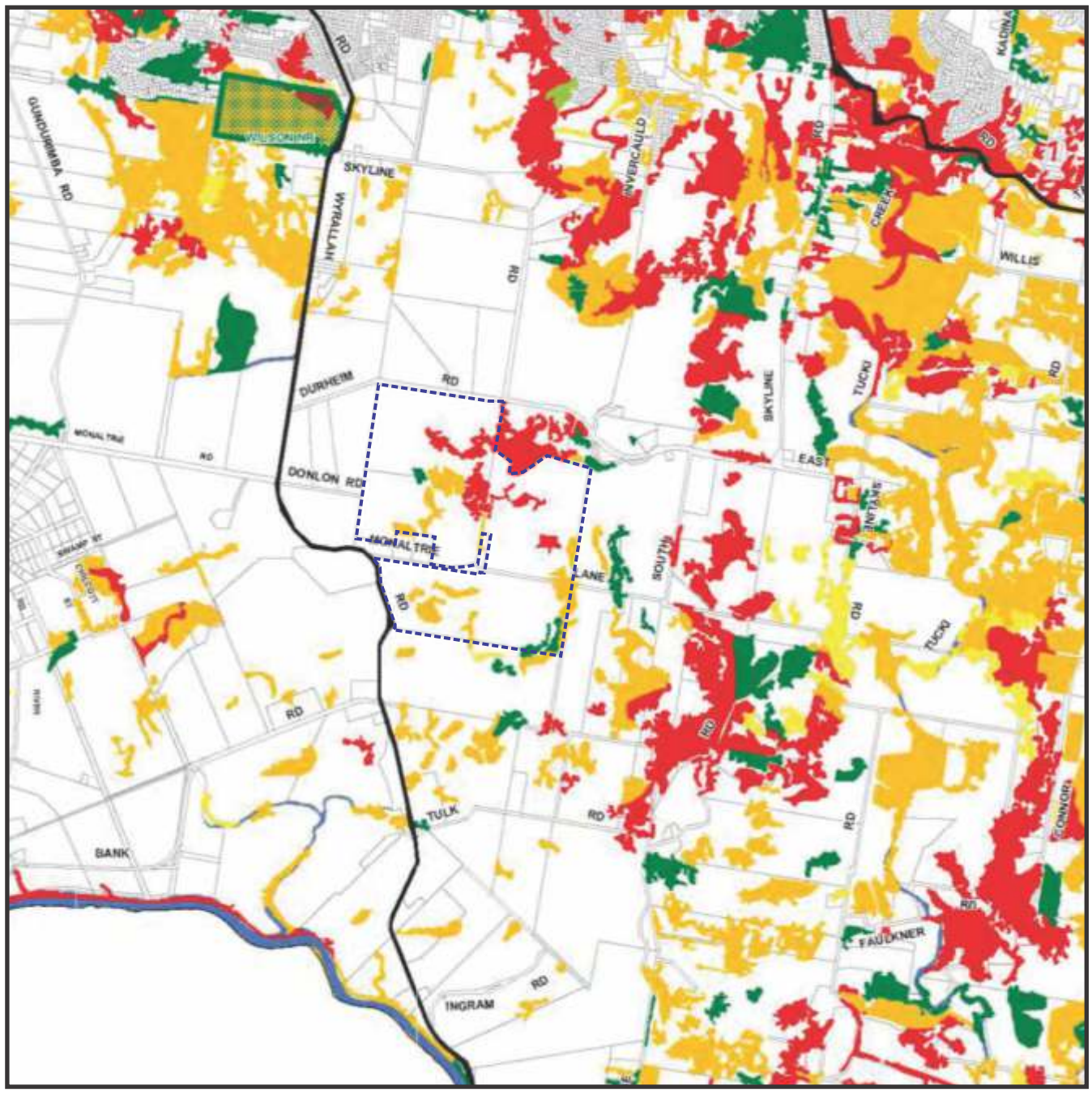
FIGURE 4 includes a mapping extract from the Lismore City Council GIS Key Habitats and Corridors system. This shows a broad conceptual wildlife corridor passing through the majority of the site in an east-west direction. This corridor takes in the majority of land on the Subject site north of Monaltrie Lane.

3.3.4 Potential occurrence of Threatened fauna

APPENDIX C lists the threatened fauna species known from the locality and considers the likelihood of these species occurring on the site. This Table includes species from the NPWS and EPBC databases as well as several other species known from other sources. Some of these species, particularly birds and bats, may be occasional or regular visitors to the site depending on seasonal migrations, availability of forage resources and other factors.

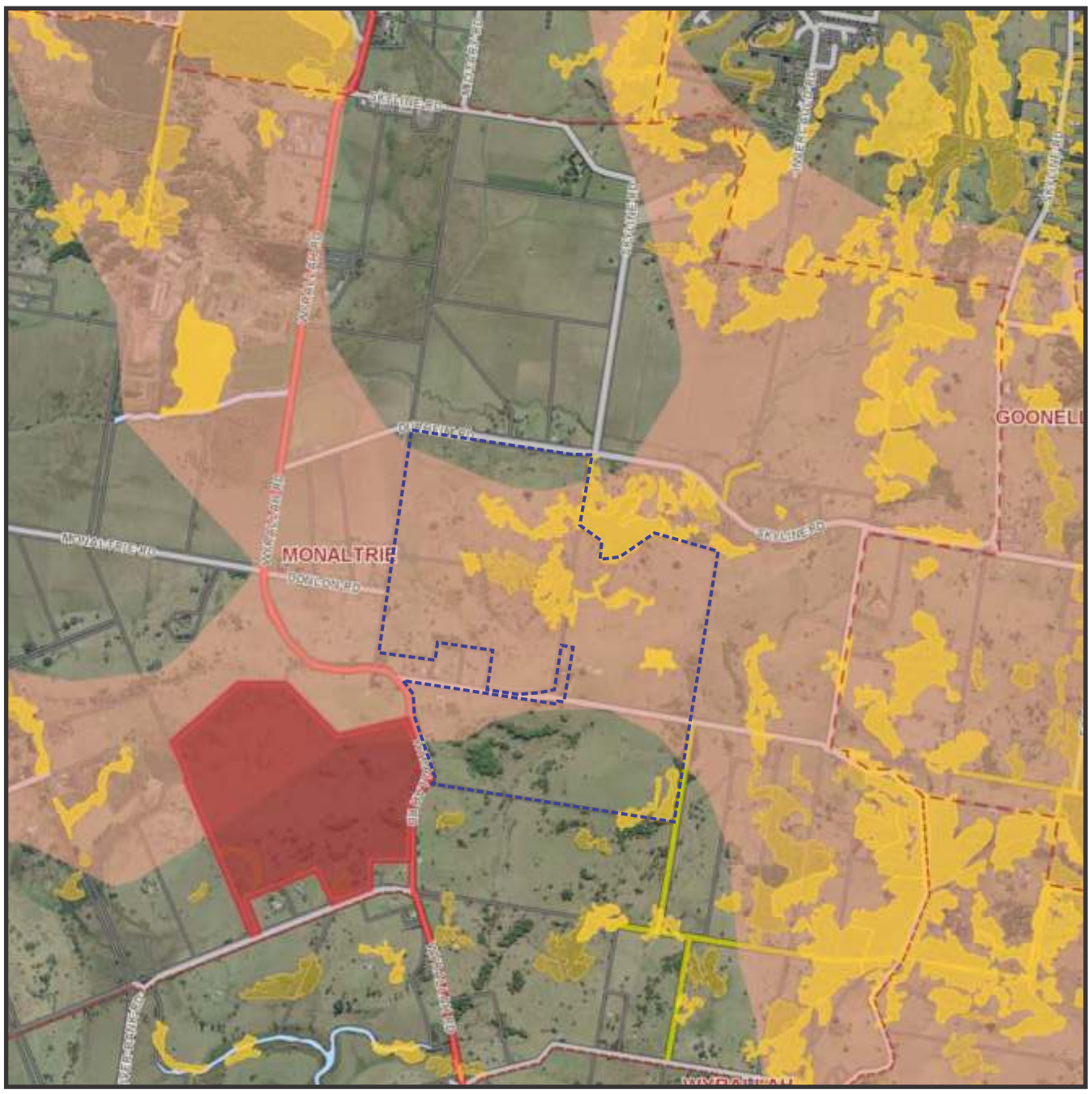
Based upon this assessment the following threatened fauna species have some limited potential to occur within the Subject site and surrounding study area:

- Koala
- Little eagle
- Rose-crowned fruit dove
- Black-necked stork
- Eastern false pipistrelle
- Eastern long-eared bat
- Grey-headed flying-fox
- Little bent-wing bat



COMPREHENSIVE KOALA PLAN OF MANAGEMENT INDICATIVE PREFERRED KOALA HABITAT

- Primary
- Secondary A
- Secondary B
- Other vegetation
- Unknown



LISMORE GIS
HIGH CONSERVATION VALUE VEGETATION & HABITATS PRIORITY HABITATS & CORRIDORS

- HCV Vegetation & Habitats
- Priority 2-1 Habitats & Corridors

Project	Project No.	Author & Date	Source	Figure 4
Monaltrie Investigation Area	1522	MF 15/10/2015	CKPoM South-East Lismore (2013) Lismore Intramaps Accessed 23/10/15	Koala Habitat and HCV Vegetation

4 CONSTRAINTS AND OPPORTUNITIES

4.1 Introduction

This section considers the ecological constraints to future development based on the preliminary site investigations as well as opportunities for future development of the site. **APPENDIX D** contains a Draft preliminary development layout for the site outlining a potential future development concept for the site.

FIGURE 5 shows the relative ecological values of areas of vegetation on the Subject site.

4.2 Discussion of constraints and opportunities

Overall, the Investigation area supports only fragments of the original native vegetation cover and occurs within a highly modified landscape with generally limited movement and breeding opportunities for most native fauna. The Investigation area provides opportunities for future residential subdivision provided that existing ecological values are maintained, protected and enhanced where appropriate.

The major constraint to development is the existing Koala population in the Study area. Koalas occur regularly on the site and the presence of a mother with joey indicates that the site is breeding habitat. The following section discusses considerations for future Koala management on the site, including retention and creation of habitat and management of other threats.

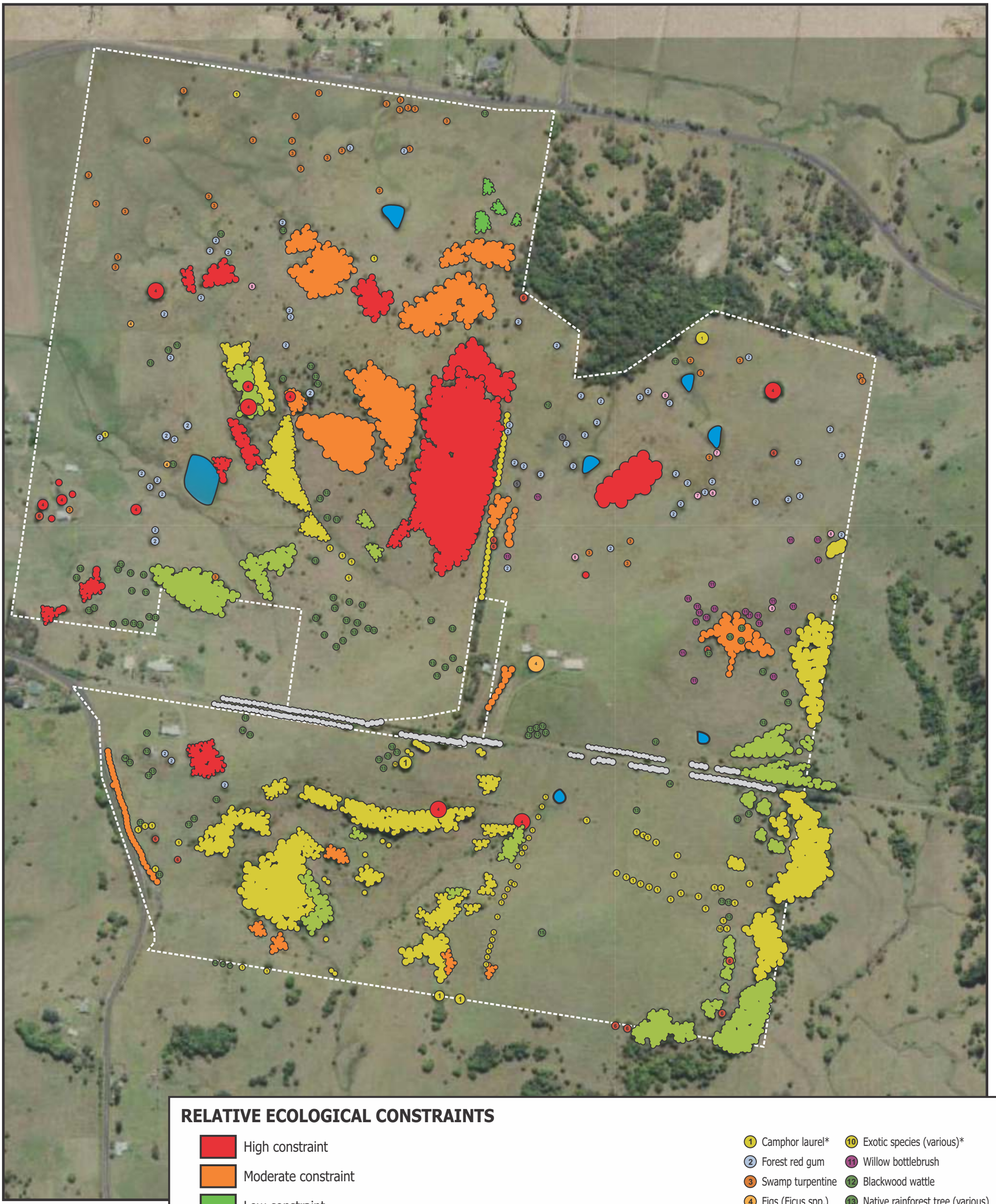
The Threatened Rose-crowned fruit-dove was recorded by call along the eastern boundary of the site (see **FIGURE 3**). This species forages amongst closed forest patches and is likely to occur throughout the site at times in figs and patches with a more substantial component of native rainforest species. Several large figs occur throughout the site, as isolated paddock trees or amongst closed forest patches.

Other vegetation on the site contains elements of several Endangered Ecological Communities known from the locality, with varying degrees of disturbance. Areas of closed forest in gully lines and lower slopes are generally heavily dominated by Camphor laurel and the ecological values of these areas are compromised, although native rainforest species do occur. No Threatened (TSC Act 1995, EPBC Act 1999) flora species were recorded, although Hairy joint grass is considered a possible occurrence and targeted survey should be completed during the growth season of this species.

4.3 Design considerations

A number of design considerations are recommended and detailed below:

- Future development should consider the location of native forest patches and paddock trees and retain these wherever possible.
- Future development should retain the majority of existing Koala habitat on the site including forest patches and areas of scattered feed trees, protect this habitat using a suitable land use protection mechanism and enhance this habitat by weed control, assisted natural regeneration and/or embellishment plantings.
- Opportunities for Koala movement through the site needs to be generally maintained, although individual areas of the site may be fenced in a way that restricts Koala access.



Project	Project No.	Author & Date	Source	Figure 5
Monaltrie Investigation Area	1522	MF 15/10/2015	NSW LPI SixViewer	Ecological constraints

Koala friendly fencing is to be utilised around rural residential lots which contain mature Koala feed trees.

- Dogs should be confined to fenced yards and kept on leashes when in public areas.
- Traffic speeds should be restricted to 50km/hr or less and Koala signage should be located in areas where Koalas are likely to cross roads.
- Future design should retain and improve east-west movement opportunities through the site in general accordance with the conceptual wildlife corridor shown in **FIGURE 4** and create additional Koala habitat and movement corridors by planting of feed trees (and other species) along drainage lines and/or other suitable areas.
- Large figs should be retained.
- Higher quality areas of rainforest regrowth should be retained and embellished, particularly along drainage lines.
- Stormwater detention systems and treatment measures should be designed to minimise impacts on riparian habitats and maintain hydrological flows, particularly on lower slopes that provide potential habitat for Hairy joint grass.
- The preliminary layout plan indicates that a water reservoir may be located near to the central forested part of the site (Community 2a/2b). Initial investigations indicate that a suitable location can be identified in this area without the requirement to remove Koala habitat trees.
- The preliminary layout plan indicates that a sewer rising main may be located through closed forest vegetation along the eastern boundary. Vegetation in this area is dominated by Camphor laurel and Large-leaved privet and a sewer rising main can be located in this area with minimal impact on native vegetation.

4.4 Proposed mitigation measures for future construction works

In addition to the design considerations above, a number of mitigation measures are proposed to manage ecological impacts associated with the future development of the site:

- The extent of clearing areas, including trees to be removed, should be clearly identified and marked prior to the commencement of any construction works. Orange barrier mesh or similar should be used to delineate the edge of the clearing area and protect areas of retained native vegetation nearby.
- Sediment fencing and other sediment control measures should be installed on the downslope edge of construction areas to prevent sedimentation of gully lines. Erosion and sedimentation control measures should not be removed until disturbed areas have stabilised.
- Future assessment for the removal of Koala feed trees and any hollow bearing trees should stipulate the requirement for a suitably qualified and experienced fauna spotter-catcher to be present on site to inspect larger trees and hollow bearing trees prior to removal.

4.5 Further ecological investigations

Further survey for Hairy joint grass may need to be completed should future proposed development of the site have the potential to affect suitable areas of habitat for this species. This survey would need to be completed when this species is readily detectable, typically March-May. A stadiametric survey of all Koala feed trees greater than or equal to 100mm dbh within the development footprint would need to be completed and any tree loss identified.

5 STATUTORY AND PLANNING ASSESSMENT

5.1 Introduction

Any future development of the Subject site will need to consider impacts of the proposed development with regard to:

- Section 5A of the Environment Protection & Assessment Act (1979) (7 part tests);
- The Commonwealth Environment Protection and Biodiversity Conservation Act (1999).
- State Environmental Planning Policies (SEPP)
    - SEPP 14 Coastal wetlands
    - SEPP 26 Littoral rainforests
- The South-East Lismore Comprehensive Koala Plan of Management

5.2 Section 5A Assessment of Significance

Section 5A of the NSW Environmental Planning and Assessment Act (1979) requires a number of factors to be taken into account in determining the significance of impact of a development on threatened species, populations or ecological communities, or their habitats. The seven factors to be taken into account under the Assessment of Significance are known as the Seven Part Test.

Assessments of Significance for the Investigation area will need to be undertaken in association with any development application and should include consideration of the EECs *Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion, Lowland Rainforest on floodplain in NSW North Coast Bioregion* and *Subtropical coastal floodplain forest in the NSW North Coast bioregion* as well as the following Threatened fauna species recorded on site or considered possible occurrences in the Study area. These species are:

- Hairy joint grass
- Koala
- Little eagle
- Rose-crowned fruit dove
- Black-necked stork
- Eastern false pipistrelle
- Eastern long-eared bat
- Grey-headed flying-fox
- Little bent-wing bat

5.3 Commonwealth EPBC Act (1999)

5.3.1 Introduction

Under the environmental assessment provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance are subject to a rigorous assessment and approval process. An action includes a project, development, undertaking, activity, or series of activities. An action will require approval from the Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

The Act identifies seven matters of national environmental significance:

- World Heritage properties
- National heritage places

- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining)

The EPBC Act Policy Statement 1.1 Significant Impact Guidelines (DEH 2006) outline an assessment process, including detailed criteria, to assist in deciding whether or not referral to the Minister is required. These guidelines replace the EPBC Act Administrative Guidelines of July 2000.

A Commonwealth EPBC Act (1999) assessment should be completed in association with any future development of the site to determine whether referral to the Commonwealth government is required. This assessment should consider impacts on matters of national environmental significance including the Koala, Grey-headed flying-fox and Hairy joint grass.

5.4 SEPP 14 Coastal Wetlands and SEPP 26 Littoral Rainforests

The Subject site does not occur within or adjacent to any areas of SEPP 14 Coastal wetlands or SEPP 26 Littoral Rainforests and the proposed development will not have any impact on any of these areas in the locality.

5.5 South-east Lismore Koala Plan of Management

5.5.1 Introduction

Lismore City Council and the State Government have approved and adopted the Comprehensive Koala Plan of Management for South-East Lismore ('KPoM'). The provisions and guidelines of the KPoM are required to be met for any Development Application on land located within the Koala planning area for a land use that requires development consent under the Lismore Local Environment Plan (LEP).

The KPoM aims *to ensure that the current extent of preferred koala habitat is maintained in the koala planning area, to mitigate processes which threaten the koala population and to encourage the recognition of koalas as one of Lismore's natural assets.* The KPoM provides the following information and guidelines which have been reviewed as part of this ecological assessment:

- List of preferred koala food tree species likely to be found in the area;
- Maps of preferred koala habitat in the area;
- Provision of a clear development application assessment pathway, assessment guidelines and performance criteria;
- Provision of minimum standard guidelines for koala habitat assessments; and
- Provision of guidelines on how to compensate for the loss of preferred koala food trees and preferred koala habitat.

5.5.2 Koala habitat mapped for the subject site

The Subject site is located within the Koala planning area as outlined under the KPoM. **FIGURE 4** shows areas of mapped Koala habitat on and around the site. Several areas of 'Primary' habitat are mapped for the Subject site north of Monaltrie Lane. The area of eucalypt

forest immediately adjacent to the site to the north-east is also mapped as Primary habitat. Areas of Secondary A habitat are mapped in the south-east corner and in the central part of the site.

Vegetation mapping presented in **FIGURE 3** of this report has been undertaken at a finer scale than Council's Koala habitat mapping and provides a more accurate reflection of Koala habitat on the site.

5.5.3 Assessment and compensation under the Plan

5.5.3.1 Introduction

It is likely that any future development of the Investigation area would be considered a *large impact development* under the KPoM. Future development of the site is likely to result in some loss of (or isolation of) Koala habitat trees on the site. A stadiametric survey of all Koala feed trees greater than or equal to 100mm dbh within the development footprint would need to be completed and any tree loss identified.

As the site contains "preferred Koala habitat" the Habitat Compensation Policy outlined in Appendix 5 of the KPoM would apply. An area of receiving land subject to compensation works must be afforded additional protection by a land use protection mechanism. There are two acceptable land use protection mechanisms:

1. Positive covenants (Section 88E, Conveyancing Act 1919) or equivalent instrument; and/or
2. Rezoning within the Lismore LEP to Zone 7(a) Environmental Protection (Natural Vegetation and Wetlands), Zone 7(b) Environmental Protection (Habitat), Zone 6(a) Recreation Zone or Zone 5 Special Use Zone (EP&A Act).

Part of the Development Assessment Pathway detailed in the KPoM requires that all options to avoid, minimise and/or mitigate the impact of the development on food trees and/or Koala habitat have been exhausted. The KPoM notes: *Council may grant approval for clearing of food trees or koala habitat only if it is satisfied that:*

i. the intended measures to avoid, minimise and mitigate likely and potential impacts of the development activity are documented and presented with the DA, and

ii. sound and logical reasons are provided as to why the retention of food trees or koala habitat is not feasible and clearing of food trees is proposed as a last resort.

5.5.3.2 Compensation policy and requirements

Habitat compensation works would need to include either protection, enhancement or creation of Koala habitat. The area required to be compensated is calculated by multiplying the 'compensation multiplier' by the area of habitat to be impacted (for clumps of vegetation and/or forested areas) together with the Crown/root area of individual trees that are likely to require removal and/or may become inaccessible to Koalas following development of the site. The 'compensation multiplier' varies according to the class of Koala habitat being affected.

The area of compensation required would depend upon the compensation multiplier, i.e. whether the loss of this habitat would be compensated through the protection, enhancement or creation of Koala habitat. The compensation options for a nominal 1ha loss or isolation of habitat are listed below:

- 4 hectares of Koala habitat would require protection; or
- 8 hectares of Koala habitat would require enhancement; or

- 12 hectares of Koala habitat would require need to be created.

There are opportunities for protection and enhancement of existing areas of Koala habitat on the site, however it is likely that to ensure that any impacts on Koalas associated with future development of the site are minimised, the proposed development will need to:

- Retain the majority of existing Koala habitat on the site including forest patches and areas of scattered feed trees.
- Protect this habitat using a suitable land use protection mechanism and enhance this habitat by weed control, assisted natural regeneration and/or embellishment plantings.
- Retain Koala movement opportunities throughout the site and particularly between areas of habitat.
- Create additional Koala habitat and movement corridors by planting of feed trees (and other species) along drainage lines and/or other suitable areas.
- Retain and improve east-west movement opportunities through the site in general accordance with the conceptual wildlife corridor shown in **FIGURE 4**.
- Manage other impacts on Koalas, including vehicle strike, dog attack and drowning in swimming pools.

6 SUMMARY & CONCLUSIONS

Blackwood Ecological Services have been engaged by the Clarke, Munce and Piper families to complete a Preliminary Ecological Assessment for an area of land known as the Monaltrie Investigation Area, Monaltrie, NSW. The area was identified by Lismore City Council in their Draft Growth Management Strategy as being "*an appropriate location to consider for satisfying demand for large lot residential housing*" with Council noting that "*it is also important that the potential for closer urban development is not 'sterilised' by large lot residential subdivision*". The Subject site consists of four parcels of land:

- Lot 4 DP 24529 (47.34 ha, south of Monaltrie Road)
- Lot 4 DP 789389 (34.05ha, north of Monaltrie Road)
- Lot 5 DP 774499 (40.5ha, north of Monaltrie Road)
- Lot 3 DP 1002771 (39.54ha, south of Durheim Road)

The Subject site is located along Wyrallah Road about 4km south-east of the Lismore CBD and is characterised by mostly cleared agricultural land with some scattered patches of sclerophyll forest and Camphor laurel dominated rainforest regrowth. Several low order watercourses and associated gullies are also present.

Site surveys across the Subject site were undertaken on the 24th of September and the 1st and 2nd of October 2015. Six broad vegetation types were identified within or immediately adjacent to the Subject site: Camphor laurel/Sub-tropical rainforest communities; Sclerophyll woodland communities (Brushbox/mixed species); Sclerophyll woodland communities (Forest red gum dominant); Tall mixed forest (Eucalypt species/Rainforest species/Hoop pine/Camphor laurel); Low grassland with scattered trees and Dams.

Vegetation communities on the Subject site were compared with descriptions of vegetation communities listed as Endangered Ecological Communities under the Threatened Species Conservation Act (1995) and Threatened Ecological Communities under the EPBC Act (1999). The original native vegetation cover of the Subject site would have included large areas of sub-tropical rainforest vegetation. Areas of closed forest comprise a highly degraded form of *Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion* EEC which is listed under the TSC Act. Areas of Forest red gum and Swamp turpentine vegetation are consistent with the definition of the Endangered Ecological Community *Sub-tropical coastal floodplain forest*. Vegetation communities within the site do not comply with the condition thresholds of any Threatened Ecological Communities listed under the EPBC Act.

No threatened flora species (NSW TSC Act 1995, Commonwealth EPBC Act 1999) were recorded during the site survey. One threatened species which was not detectable at the time of the survey is Hairy joint grass (*Arthraxon hispidus*) which is listed as Vulnerable under the TSC Act and EPBC Act. This species is known to be relatively widespread in the Study area and occurs in low-lying soaks and drainage lines amongst grasses, typically on the edge of rainforest. It is only readily detectable between late spring and autumn. The majority of core habitat for this species is confined to gully lines and low-lying wet areas within the Subject site.

Two Threatened (TSC Act 1995, EPBC Act) fauna species, the Koala and the Rose-crowned fruit-dove, were recorded during the site assessment. The Rose-crowned fruit-dove was recorded along the eastern boundary in Camphor laurel/Large-leaved privet dominated regrowth. The Subject site contains a large number of Koala food trees, occurring in patches of

mixed forest, of open forest dominated by Forest red gum and as scattered Forest red gums and other trees. Koalas (including a mother with joey) were present at several locations throughout the site during the site visit and evidence of Koala use is widespread across the site.

Overall, the Investigation area supports only fragments of the original native vegetation cover and occurs within a highly modified landscape with generally limited movement and breeding opportunities for most native fauna. The Investigation area provides opportunities for future residential subdivision provided that existing ecological values are maintained, protected and enhanced where appropriate.

The major constraint to development is the existing Koala population in the Study area. It is likely that any future development of the Investigation area would be considered a *large impact development* under the South-East Lismore KPoM. Future development of the site is likely to result in some loss of (or isolation of) Koala habitat trees on the site. There are opportunities for protection and enhancement of existing areas of Koala habitat on the site, however it is likely that to ensure that any impacts on Koalas associated with future development of the site are minimised, the proposed development will need to:

- Retain the majority of existing Koala habitat on the site including forest patches and areas of scattered feed trees.
- Protect this habitat using a suitable land use protection mechanism and enhance this habitat by weed control, assisted natural regeneration and/or embellishment plantings.
- Retain Koala movement opportunities throughout the site and particularly between areas of habitat. Individual areas of the site may be fenced in a way that restricts Koala access. Koala friendly fencing is to be utilised around rural residential lots which contain mature Koala feed trees.
- Create additional Koala habitat and movement corridors by planting of feed trees (and other species) along drainage lines and/or other suitable areas.
- Retain and improve east-west movement opportunities through the site in general accordance with the conceptual wildlife corridor shown in Council mapping.
- Manage other impacts on Koalas, including vehicle strike, dog attack and drowning in swimming pools.

A number of additional design considerations are recommended:

- Future development should consider the location of native forest patches and paddock trees and retain these wherever possible.
- Dogs should be confined to fenced yards and kept on leashes when in public areas.
- Traffic speeds should be restricted to 50km/hr or less and Koala signage should be located in areas where Koalas are likely to cross roads.
- Higher quality areas of rainforest regrowth should be retained and embellished, particularly along drainage lines.
- Large figs should be retained.
- Stormwater detention systems and treatment measures should be designed to minimise impacts on riparian habitats and maintain hydrological flows, particularly on lower slopes that provide potential habitat for Hairy joint grass.
- The preliminary layout plan indicates that a water reservoir may be located near to the central forested part of the site (Community 2a/2b). Initial investigations indicate that a suitable location can be identified in this area without the requirement to remove Koala habitat trees.

- The preliminary layout plan indicates that a sewer rising main may be located through closed forest vegetation along the eastern boundary. Vegetation in this area is dominated by Camphor laurel and Large-leaved privet and a sewer rising main can be located in this area with minimal impact on native vegetation.
- Further survey for Hairy joint grass may need to be completed should future proposed development of the site have the potential to affect suitable areas of habitat for this species. This survey would need to be completed when this species is readily detectable, typically March-May. A stadiametric survey of all Koala feed trees greater than or equal to 100mm dbh within the development footprint would need to be completed and any tree loss identified.

Assessments of Significance for the Investigation area will need to be undertaken in association with any development application and should include consideration of the EECs *Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion, Lowland Rainforest on floodplain in NSW North Coast Bioregion* and *Subtropical coastal floodplain forest in the NSW North Coast bioregion* as well as the following Threatened fauna species recorded on site or considered possible occurrences in the Study area. These species are:

- Hairy joint grass
- Koala
- Little eagle
- Rose-crowned fruit dove
- Black-necked stork
- Eastern false pipistrelle
- Eastern long-eared bat
- Grey-headed flying-fox
- Little bent-wing bat

The Subject site does not occur within or adjacent to any areas of SEPP 14 Coastal wetlands or SEPP 26 Littoral Rainforests and the proposed development will not have any impact on any of these areas in the locality.

7 REFERENCES

Blackwood Ecological Services (2010) Preliminary Ecological Investigation. Proposed Repair Works, Lismore Club Levee.

Blackwood Ecological Services (2011) Ecological assessment. Lismore Southern Water Main. A Report to NSW Public Works.

CRA Unit, Northern Zone NPWS (1999). Forest Ecosystem Classification and Mapping for Upper and Lower North East CRA Regions. A project undertaken for the Joint Commonwealth NSW Regional Forest Agreement Steering Committee as part of the NSW Comprehensive Regional Assessments project number NA35/EH.

Department of Environment & Conservation (2007). **Threatened species, populations and ecological communities**. www.threatenedspecies.environment.nsw.gov.au

Floyd, A. (1990) **Australian rainforests in New South Wales, Volumes 1 & 2**. Surrey Beatty & Sons.

Higgins, P.J. (Ed.) (1999) **Handbook of Australian, New Zealand and Antarctic Birds.** Oxford University Press, Melbourne.

Lismore City Council (2013) **Comprehensive Koala Plan of Management for South-East Lismore.**

NPWS (2002) Threatened Species of the Upper North Coast of NSW – Flora. NPWS Northern Directorate, Coffs Harbour.

APPENDIX A

COMMONWEALTH EPBC DATABASE PROTECTED MATTERS SEARCH RESULTS

Australian Government
Department of the Environment

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.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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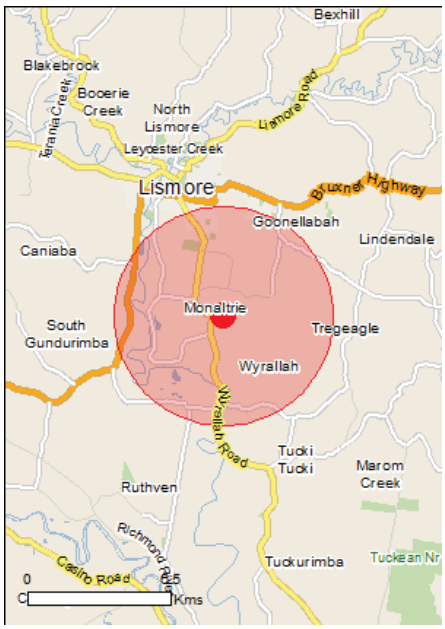

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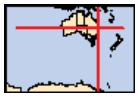

Summary

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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	34
Listed Migratory Species:	13

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. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

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.

Commonwealth Land:	4
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	1
Regional Forest Agreements:	1
Invasive Species:	40
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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.

Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
Insects		
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Breeding may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat known to occur within area
Baloghia marmorata		
Marbled Balogia, Jointed Baloghia [8463]	Vulnerable	Species or species habitat likely to occur within area
Bulbophyllum globuliforme		
Miniature Moss-orchid, Hoop Pine Orchid [6649]	Vulnerable	Species or species habitat may occur within area
Clematis fawcettii		
Stream Clematis [4311]	Vulnerable	Species or species habitat likely to occur within area
Corchorus cunninghamii		
Native Jute [14659]	Endangered	Species or species habitat likely to occur within area
Cryptocarya foetida		
Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat likely to occur within area
Desmodium acanthocladum		
Thorny Pea [17972]	Vulnerable	Species or species habitat likely to occur within area
Diploglottis campbellii		
Small-leaved Tamarind [21484]	Endangered	Species or species habitat likely to occur within area
Floydia praealta		
Ball Nut, Possum Nut, Big Nut, Beefwood [15762]	Vulnerable	Species or species habitat likely to occur within area
Gossia fragrantissima		
Sweet Myrtle, Small-leaved Myrtle [78867]	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 [21189]	Vulnerable	Species or species habitat likely to occur within area
Marsdenia longiloba		
Clear Milkvine [2794]	Vulnerable	Species or species habitat likely to occur within area
Myrsine richmondensis		
Purple-leaf Muttonwood, Lismore Muttonwood [83888]	Endangered	Species or species habitat likely to occur within area
Ochrosia moorei		
Southern Ochrosia [11350]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Owenia cepiodora Onionwood, Bog Onion, Onion Cedar [11344]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Randia moorei Spiny Gardenia [10577]	Endangered	Species or species habitat likely to occur within area
Syzygium hodgkinsoniae Smooth-bark Rose Apple, Red Lilly Pilly [3539]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Defence - LISMORE GRES DEPOT ; 41 RNSWR LISMORE

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Cuculus saturatus		
Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Wilson	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead		Species or species

Name	Status	Type of Presence
[68483]		habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

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 and National Heritage properties, Wetlands of International and National 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 following provisions of the EPBC Act have been mapped:

- migratory and
- marine

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.

Coordinates

-28.8575 153.30062

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-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
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

APPENDIX B

FLORA SPECIES LIST

Flora species list
Monaltrie Investigation Area

The following table presents a list of all flora species recorded within the Subject site during the survey. Where uncertainty exists due to the unavailability of reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only. Botanical nomenclature follows G.J. Harden (ed) (1990-2002) Flora of New South Wales, UNSW Press, except where recent changes have occurred.

Notes:

* Denotes an introduced species as well as non-local native species.

BOLD Species of conservation significance are bolded.

Noxious weeds declared for the Lismore City Council control area under the *Noxious Weeds Act 1993* are indicated with a 'N' followed by their control class:

(3) Regionally controlled weeds
(4) Locally controlled weeds
(5) Restricted plants

Family	Botanical name	Common name	Notes
Ferns and fern allies			
ADIANTACEAE	*Adiantum aethiopicum*	Common Maidenhair	
ASPLENIACEAE	*Asplenium australasicum*	Bird's nest fern	
BLECHNACEAE	*Doodia aspera*	Prickly rasp fern	
DAVALLIACEAE	*Nephrolepis cordifolia**	Fishbone fern	
DENNSTAEDTIACEAE	*Pteridium esculentum*	Bracken fern	
DICKSONIACEAE	*Calochlaena dubia*	Rainbow fern	
POLYPODIACEAE	*Platycerium superbum*	Staghorn fern	
	Pyrrosia rupestris	Rock felt fern	
SALVINIACEAE	*Azolla pinnata*	Ferny azolla	
Gymnosperms			
PINACEAE	*Pinus elliotii**	Slash pine	
Monocotyledons			
ARECACEAE	*Calamus muelleri*	Lawyer vine	
ASPARAGACEAE	*Asparagus aethiopicus**	Asparagus fern	
ASTELIACEAE	*Cordyline rubra*	Red fruited palm lily	
COMMELINACEAE	*Commelina cyanea*	Native wandering jew	
CYPERACEAE	*Cyperus exaltatus*		
FLAGELLARIACEAE	*Flagellaria indica*	Whip vine	
JUNCACEAE	*Juncus usitatus*	Common rush	
LOMANDRACEAE	*Lomandra longifolia*	Spiny-headed matrush	
PHILYDRACEAE	*Philydrum lanuginosum*	Frogsmouth	
POACEAE	*Chloris gayana**	Rhodes grass	
	*Paspalum dilatatum**	Paspalum	
	*Pennisetum clandestinum**	Kikuyu	
	*Sporobolus africanus**	Parramatta Grass	

Family	Botanical name	Common name	Notes
	Cynodon dactylon	Couch grass	
	Imperata cylindrica	Blady grass	
	*Melinis minutiflora**	Molasses grass	
	Pennisetum alopecuroides	Swamp foxtail	
	Oplismenus aemulus	Basket grass	
	Oplismenus imbecillis	Basket grass	
SMILACACEAE	*Smilax australis*	Austral sarsparilla	
TYPHACEAE	*Typha orientalis*	Cumbungi	
Dicotyledons			
ANACARDIACEAE	*Mangifera indica**	Mango	
APIACEAE	*Centella asiatica*	Centella	
APOCYNACEAE	*Alyxia ruscifolia*	Prickly alyxia	
ASCLEPIADACEAE	*Asclepias curassavica**	Redhead cotton bush	
	*Gomphocarpus physocarpus**	Balloon cotton bush	
ASTERACEAE	*Ageratina adenophora**	Crofton weed	N4
	*Ageratina riparia**	Mistflower	N4
	*Ageratum houstonianum**	Blue billygoat weed	
	*Ambrosia artemisiifolia**	Annual ragweed	N5
	*Bidens pilosa**	Farmer's friends	
	*Conyza albida**	Fleabane	
	*Ageratum houstonianum**	Blue billygoat weed	
	*Erechtites valerianifolia**	Brazilian fire weed	
	*Hypochaeris radicata**	Cats ear	
	*Onopordum acanthium**	Scotch thistle	
	*Senecio madagascariensis**	Fireweed	
	Taraxacum officinale	Dandelion	
BIGNONIACEAE	*Jacaranda mimosifolia**	Jacaranda	
	Pandorea jasminoides	Bower vine	
	Pandorea pandorana	Wonga vine	
CAESALPINIOIDEAE	*Senna pendula* var. *glabrata**	Winter senna	
ELAEOCARPACEAE	*Elaeocarpus obovatus*	Hard quandong	
EUPHORBIACEAE	*Alchornea ilicifolia*	Native holly	
	Breynia oblongifolia	Coffee bush	
	Glochidion ferdinandi	Cheese tree	
	Macaranga tanarius	Macaranga	
	Mallotus philippensis	Red kamala	
FABACEAE	*Callerya megasperma*	Native wistaria	
	Derris involuta	Native derris	
	*Desmodium uncinatum**	Silver-leaved desmodium	
	*Erythrina crista-galli**	Cockspur coral tree	
	*Trifolium repens**	White clover	
LAURACEAE	*Cinnamomum camphora**	Camphor laurel	N4
	Cryptocarya glaucescens	Jackwood	
LOBELIACEAE	*Pratia purpurascens*	Pratia	
LUZURIAGACEAE	*Eustrephus latifolius*	Wombat berry	
MALVACEAE	*Sida rhombifolia**	Paddy's lucerne	
	*Eriobotrya japonica**	Loquat	
	*Sida rhombifolia**	Paddy's lucerne	
MELIACEAE	*Dysoxylum mollissimum*	Red bean	

Family	Botanical name	Common name	Notes
	Toona ciliata	Red cedar	
MIMOSACEAE	*Acacia melanoxylon*	Blackwood wattle	
	Pararchidendron pruinosum var. *pruinosum*	Snow wood	
MORACEAE	*Ficus coronata*	Creek sandpaper fig	
	Ficus fraseri	Sandpaper fig	
	Ficus macrophylla	Moreton bay fig	
	Ficus obliqua	Small-leaf fig	
	Ficus superba var. *henneana*	Deciduous fig	
	Ficus watkinsiana	Strangler fig	
	Maclura cochinchinensis	Cockspur	
	Streblus brunonianus	Whalebone tree	
	Trophis scandens	Burny vine	
MYRSINACEAE	*Myrsine variabilis*	Muttonwood	
MYRTACEAE	*Callistemon salignus*	Willow bottlebrush	
	Callistemon sp.	Landscape species	
	Corymbia intermedia	Pink bloodwood	
	Eucalyptus siderophloia	Northern grey ironbark	
	Eucalyptus tereticornis	Forest red gum	
	Lophostemon confertus	Brushbox	
	Lophostemon suaveolens	Swamp turpentine	
	*Psidium guajava**	Common guava	
NYMPHAECEAE	*Nymphaea* sp.	Waterlily	
OCHNACEAE	*Ochna serrulata*	Ochna	
OLEACEAE	*Ligustrum lucidum**	Large-leaved privet	N4
ONAGRACEAE	*Ludwigia peploides*	Water primrose	
PASSIFLORACEAE	*Passiflora suberosa**	Corky passionfruit	
PHYTOLACACEAE	*Phytolacca octandra**	Inkweed	
PITTOSPORACEAE	*Hymenosporum flavum*	Native frangipani	
	Pittosporum undulatum	Sweet pittosporum	
PLANTAGINACEAE	*Plantago sp.*	Plantains	
POLYGONACEAE	*Persicaria* sp.	Smartweed	
PROTEACEAE	*Grevillea robusta*	Silky oak	
	Stenocarpus sinuatus	Firewheel tree	
RHAMNACEAE	*Alphitonia excelsa*	Red ash	
ROSACEAE	*Rubus rosifolius*	Native raspberry	
RUTACEAE	*Acronychia oblongifolia*	Common acronychia	
	*Citris limon**	Lemon bush	
	Flindersia schottiana	Cudgerie	
	Flindersia australis	Teak	
	*Murraya paniculata**	Mock orange	
SAPINDACEAE	*Alectryon tomentosus*	Hairy alectryon	
	Arytera distylis	Twin–leaf coogera	
	Cupaniopsis anacardioides	Tuckeroo	
	Cupaniopsis parvifolia	Small-leaved Tuckeroo	
	Elattostachys xylocarpa	White tamarind	
	Guioa semiglauca	Guioa	
	Harpulia hillii	Blunt-leaved tulip	
	Harpulia pendula	Tulipwood	
	Jagera pseudorhus	Foambark	

Family	Botanical name	Common name	Notes
	*Koelreuteria paniculata**	Golden rain tree	
SOLANACEAE	*Solanum mauritianum**	Wild tobacco tree	
	*Solanum nigrum**	Black-berry nightshade	
STERCULIACEAE	*Commersonia bartramia*	Brown kurrajong	
THYMELAEACEAE	*Wikstroemia indica*	Wikstromeia	
ULMACEAE	*Aphananthe philippinensis*	Rough–leaved elm	
URTICACEAE	*Urtica incisa**	Stinging nettle	
VERBENACEAE	*Clerodendrum floribundum*	Smooth clerodendrum	
	*Lantana camara**	Lantana	
	*Verbena bonariensis**	Purple top	
VITACEAE	*Cissus antarctica*	Water vine	

APPENDIX C

LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES

TABLE C1
LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES

Species	Notes	Likelihood of occurrence on site
Amphibians		
Giant barred frog	Giant Barred Frogs forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer.	Unlikely. Not recorded within 10km of the subject site.
Reptiles		
Three-toed snake-tooth skink	The Three-toed Snake-tooth Skink occurs in the coast and ranges from the Macleay valley in NSW to south-eastern Queensland. It is very uncommon south of Grafton. Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. The Three-toed Snake-tooth Skink lives in loose soil, leaf litter and rotting logs, and feeds on earthworms and beetle grubs.	Unlikely. Not recorded within 10km of the subject site.
Forest and woodland birds		
Black-breasted button-quail	There are few reliable records of this species in NSW. It prefers drier rainforests and viney scrubs, often in association with a deep moist leaf-litter layer.	Unlikely. Not recorded within 10km of the subject site.
Coxen's Fig-Parrot	Limited to about five populations scattered between Bundaberg in Queensland and the Hastings River in NSW. Usually recorded from drier rainforests and adjacent wetter eucalypt forest.. Also found in the wetter lowland rainforests that are now largely cleared in NSW. The bird shows a decided preference for fig trees, but also feeds on other fruiting rainforest species.	Unlikely. Species has not been recorded within a 10km area around the site on the NSW Atlas database.
Eastern bristlebird	Occurs in vegetation with a dense ground cover, typically high elevation open forest or woodland with a dense tussock-grass or sedge understorey adjacent to rainforest or wet eucalypt forest.	Unlikely. Not recorded within 10km of the subject site.
Little eagle	Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	**Possible**
Marbled frogmouth	On the east coast of NSW, this species is restricted to lower altitude sub-tropical rainforests.	Unlikely
Masked owl	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Unlikely

Species	Notes	Likelihood of occurrence on site
Red goshawk	Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	Unlikely
Regent honeyeater	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. In NSW the distribution is very patchy and mainly confined to the two main breeding areas (at Capertee Valley and the Bundarra-Barraba region) and surrounding fragmented woodlands. In some years non-breeding flocks converge on flowering coastal woodlands and forests where they prefer Swamp mahogany and Spotted gum forests.	Unlikely. Not recorded within 10km of the subject site.
Rose-crowned fruit-dove	The Rose-crowned fruit dove prefers tall tropical and subtropical evergreen or semi-deciduous rainforest, especially with a dense regrowth of vines.	**Recorded on site.** Species was recorded along the eastern boundary in Camphor laurel/Large-leaved privet dominated regrowth.
Spotted harrier	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptiles, occasionally insects and rarely carrion.	Unlikely
Swift parrot	This migratory species is very rarely recorded in the locality.	Unlikely. Not recorded within 10km of the subject site.
Sooty Owl	The Sooty owl occurs in rainforests, particularly rainforest gullies overtopped by eucalypts, along the eastern scarp of the Great Dividing Range.	Unlikely
Wompoo fruit dove	This species is primarily associated with large undisturbed patches of tropical or subtropical evergreen rainforest.	Unlikely
Wetland birds		
Australasian Bittern	The Australasian bittern generally prefers freshwater habitats although it may also use dense saltmarsh vegetation in estuaries and flooded grasslands.	Unlikely. Not recorded within 10km of the subject site.
Australian painted snipe	This species prefers the fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Unlikely. Not recorded within 10km of the subject site.
Black bittern	This species occupies forested fresh rivers, tidal creeks and coastal inlets.	Unlikely

Species	Notes	Likelihood of occurrence on site
Black-necked stork	The Black-necked stork is an occasional visitor to the area uses grassland and wetland habitats in the locality during periods of inundation.	**Possible.** This species is known to occur in the Lismore Lake and may occur on site during times of inundation.
Pale-vented bush hen	The Bush hen is normally associated with moist stands of deep rank grass along permanent running streams	Unlikely
Oceanic and coastal birds		
Eastern osprey	Ospreys forage in coastal rivers and streams. They prefer to nest closer to coastal waterbodies. Ospreys are likely to forage along the nearby beach and at Taylors Lake but are unlikely to have any degree of reliance on site habitats.	Unlikely
Terrestrial mammals		
Brush-tailed rock wallaby	Typically occupy north-facing cliffs in dry eucalypt forest and woodland. The species is highly territorial and remain in the same site permanently.	Unlikely. Not recorded within 10km of the subject site.
Common planigale	This species occupies a wide range of habitats including rainforest, sclerophyll forest, grasslands, marshlands, rocky areas and even some suburban areas.	Unlikely
Koala	There is a well known Koala population resident in the surrounding area.	**Recorded on site**.
Long-nosed potoroo	This species occurs in coastal heathland habitats at several locations along the Far North Coast.	Unlikely. Not recorded within 10km of the subject site.
Spotted-tail quoll	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Quolls are rarely recorded in the locality.	Unlikely. Suitable habitat is not present.
New Holland Mouse	Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Unlikely. No suitable habitat is present and species has not recorded within 10km of the subject site.
Bats		
Eastern false pipistrelle	This bat prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	**Possible,** species may use the Study area for foraging.
Eastern long-eared bat	This species typically roosts in old growth trees with hollows. It may occasionally roost in dense forested vegetation and dead rainforest foliage. The Study area may be used for foraging by this species.	**Possible,** species may use the Study area for foraging.

Species	Notes	Likelihood of occurrence on site
Grey-headed flying fox	This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Urban gardens and cultivated fruit crops also provide habitat for this species.	**Likely** to forage throughout the Study area during flowering and fruiting of site vegetation. No roost sites were observed within the Subject site or immediate vicinity.
Large-eared pied bat	This species is found in well-timbered areas containing gullies. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin, frequenting low to mid-elevation dry open forest and woodland close to these features.	Unlikely. This species was not recorded on the Atlas of NSW Wildlife and the site contains no roost sites and only marginal forage habitat.
Little bent-wing bat	This species generally roosts in caves and tunnels during the day and forages for insects beneath the canopy of forested habitats at night.	**Possible.** The Little bent-wing bat may utilise the site as forage habitat.
Invertebrates		
Shorter rainforest ground beetle	Low elevation rainforest, predominantly drier rainforests. Little is known of its detailed habitat requirements apart from the fact that adults live in burrows.	Unlikely. Currently the only known populations occur in very isolated patches of forest near Mallanganee, west of Casino. The Rotary Park (Lismore) population is now believed to be extinct.

APPENDIX D

PRELIMINARY DEVELOPMENT LAYOUT (NDC 2015)

Legend	Notes :	Design :	Revisions	Newton Denny Chapelle Surveyors Planners Engineers Email: office@newtondennychapelle.com.au	Lismore Suite 1 31 Carrington St. Lismore 2480 T: 66 221011 F: 66 224088 Casino 100 Barker St. Casino 2470 T & F : 66 625000	Client: CLARK, MUNCE & PIPER LOT 4 DP 24529, LOT 4 DP 789389, LOT 5 DP 774499 & LOT 3 DP 1002771 MONALTRIE ROAD MONALTRIE	Project : DRAFT URBAN INVESTIGATION AREAS EXTERNAL INFRASTRUCTURE PLAN	Date 30 January 2015	Ref No. 02/560 B
		Survey :							Sheet P3
		Drawn :							
		Approved:							
		Datum :	Scale 1:3000@A1 - 1:6000@A3			Dwg File: K:\Jobs\2002\02560 - Clark\Plans\Prelim Layout - Rev -.dwg - P3 EXTERNAL INFRASTRUCTURE			