



Appendix C
Ecological Assessment

Champions Quarry

Proposed Quarry Expansion
1586 Wyrallah Road,
Tuckurimba NSW

Ecological Assessment

November 2009

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Champions Quarry

Proposed Quarry Expansion
1586 Wyrallah Road,
Tuckurimba NSW
Ecological Assessment

November 2009

Reference:

For and on behalf of:
Environmental Resources Management
Australia

Approved by: Murray Curtis



Signed:

Position: Managing Partner

Date: 24 November 2009

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GLOSSARY OF TERMS

arboreal	Adapted for living in and/or moving around in trees.
Biometric	Microsoft Excel-based tool for assessing terrestrial biodiversity in particular threatened species, soils, water quality and salinity in preparation of Property Vegetation Plans under the <i>Native Vegetation Act 2003</i> .
bioregion	Region in which the boundaries are primarily determined by (or reflect) similarities in geology, climate and vegetation.
cleared land	Where the native over-storey has been cleared, there is no native mid-storey and less than 50% of the groundcover vegetation is native species or greater than 90% of the groundcover (dead or alive) is cleared.
clearing	Clearing of native vegetation is defined in the <i>Native Vegetation Act 2003</i> as any one or more of the following: <ul style="list-style-type: none">• cutting down, felling, thinning, logging or removal; and• killing, destroying, poisoning, ringbarking, uprooting or burning.
community	The recognisable association of species that regularly occur together in similar environments.
critical habitat	Habitat declared to be critical in relation to that species or ecological community under the <i>Threatened Species Conservation Act 1995</i> or the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
ecological community	An assemblage of native species that inhabits a particular area.
endangered	A species, population or ecological community that is likely to become extinct or is in immediate danger of extinction.
endangered ecological community	Ecological community specified as endangered under Part 3 of Schedule 1 of the <i>Threatened Species Conservation Act 1995</i> or under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
endangered population	Population identified as endangered under Part 2 of Schedule 1 of the <i>Threatened Species Conservation Act 1995</i> .
endangered species	Species identified in Part 1 of Schedule 1 of the <i>Threatened Species Conservation Act 1995</i> or under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
exotic species	A non-indigenous species.
floristics	Species composition of a plant community.
grasslands	Vegetation community generally dominated by perennial tussock grasses, a lack of woody plants and the presence of broad-leaved herbs.
groundcover	Structural layer closest to the ground containing grasses, forbs, ferns, sub-shrubs, and sedges.
habitat	An area or areas occupied or periodically occupied by a species, population or ecological community and includes any biotic or abiotic component necessary to sustain survival and reproduction.
hollow-bearing tree	Tree where the base, trunk or limbs contain hollows, holes or cavities that have formed as a result of decay, injury or other damage.
indigenous	Native to, or originating in, a particular region or country.
key threatening process	Threatening process identified as such in Schedule 3 of the <i>Threatened Species Conservation Act 1995</i> or under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
life cycle	The series or stages of reproduction, growth, development, ageing and death of an organism.
local population	The population that exists in the study area as well as any individuals occurring in the adjoining areas known or likely to utilise habitats in the study area.
locality	Within 10km radius of the <i>Project Area</i> .
myrtaceous	Trees and shrubs of the Myrtaceae family. This includes eucalypts, paperbarks and bottlebrushes.
native groundcover or understorey	Is where at least 50% of the perennial vegetation cover in the groundcover strata or understorey is made up of native species and not less than 10% of the area is covered

	with vegetation (dead or alive).
native or indigenous	Species that existed in NSW before European settlement.
offset (biodiversity)	One or more appropriate actions put in place in an appropriate location to counterbalance or offset an impact on biodiversity values.
population	A group of animals or plants of the same species, potentially capable of interbreeding and sharing the same habitat in a particular area at a particular time.
Ramsar Wetland	A wetland listed under the Ramsar Convention on Wetlands of International Importance.
regeneration	Where native vegetation is allowed to return naturally to an area generally by removing existing impacts such as grazing or slashing.
regrowth vegetation	Defined in the <i>Native Vegetation Act 2003</i> as any native vegetation that has regrown since 1 January 1990 (or 1 January 1983 Western Division). Excluding regrowth after illegal clearing or natural events such as bushfire, floods and drought.
remnant vegetation	Any native vegetation that is not regrowth.
revegetation	Use of methods such as planting of tubestock and direct seeding to return native vegetation to an area.
riparian	Associated with drainage lines.
risk of extinction	The likelihood that the local population will become extinct either in the short term or long term as a result of direct or indirect impacts on the viability of that population.
stratum (singular)	An arbitrary horizontal layer of plants within a vegetation community used to describe the vegetation community structure.
strata (plural)	
threatened species	A plant or animal identified in the <i>Threatened Species Conservation Act 1995</i> or <i>Environment Protection and Biodiversity Conservation Act 1999</i> as extinct, critically endangered, endangered, or vulnerable. This term may be extended to encompass threatened species, populations or ecological communities.
threatening process	A process that threatens, or may threaten the survival, abundance or evolutionary development of species, populations or ecological communities.
understorey	Collective term for vegetation which grows below the canopy of a forest or woodland.
viable	The capacity to successfully complete each stage of the life cycle under normal conditions.
vulnerable	A species or ecological community that is rare, not presently endangered but likely to become endangered unless the circumstances and factors threatening its survival or evolutionary development cease to operate.
vulnerable ecological community	Ecological community specified as vulnerable under Part 2 of Schedule 2 of the <i>Threatened Species Conservation Act 1995</i> .
vulnerable species	Species identified in Part 1 of Schedule 2 of the <i>Threatened Species Conservation Act 1995</i> or under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
woodland	Vegetation community dominated by an open or sparse layer of trees.

ABBREVIATIONS

CAMBA	China - Australian Migratory Birds Agreement
CMA	Catchment Management Authority
DA	Development Application
DEC	Department of Environment and Conservation (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW) including the Parks and Wildlife Division, Cultural Heritage Division, Environment Protection and Regulation Division and Office of Water
DEWHA	Department of Environment, Water Heritage and Arts (Commonwealth)
DNR	Department of Natural Resources (NSW)
DoP	Department of Planning (NSW)
DPI	Department of Primary Industries
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act, 1979
EP&A Regulation	Environmental Planning and Assessment Regulation, 2000
EPA	Environment Protection Authority (NSW)
EPBC Act	Environment Protection and Biodiversity Conservation Act, 1999
EPI	Environmental Planning Instrument
ERM	Environmental Resources Management Australia Pty Ltd
ESD	Ecologically Sustainable Development
ha	hectares
JAMBA	Japan - Australian Migratory Bird Agreement
km	kilometres
LEP	Local Environmental Plan
LGA	Local Government Area
m	metres
mm	millimetres
mm/m	millimetres per metre
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NV Act	<i>Native Vegetation Act, 2003</i>
ROTAP	Rare or Threatened Australian Plant
SEPP	State Environmental Planning Policy
sp.	species
subsp.	sub-species
tpa	tonnes per annum
TSC Act	<i>Threatened Species Conservation Act, 1995</i>

EXECUTIVE SUMMARY

Environmental Resources Management Pty Ltd (ERM) was commissioned by Reavill Farm Pty Ltd and Tucki Hills Pty Ltd to prepare an ecological assessment of land at 1586 Wyrallah Road, Tuckurimba NSW for the purpose of a proposed expansion of the Champions Quarry on the New South Wales Far North Coast.

Champions Quarry is located on Wyrallah Road, Tuckurimba approximately 16 kilometres south of Lismore (see Figure 1.1). The proposal is located within a rural area and occupies an area of approximately 187 hectares (herein referred to as the 'Project Site'). The existing sandstone quarry currently operates under an approval from Lismore City Council. It is proposed to expand the existing quarry from two hectares (ha) to 16 ha. The footprint of the proposed quarry expansion (herein referred to as the 'Project Area') occupies several allotments owned by the proponent. The landholdings incorporating the Project Site is zoned 1(a) – General Rural and 1(r) – Riverlands under the Lismore Local Environmental Plan, 2000.

Champions Quarry currently operates in the Central Section of the Project Area. Vegetation communities within the remainder of the Project Area are shown on Figure 3.1. Grassland comprising a mixture of exotic pasture grasses and herbaceous weeds covers approximately 90% of the Project Area. Two areas of vegetation described as regenerating Pink Bloodwood/Forest Oak Woodland occur in the west of the Project Area. These areas have recently been cleared of regrowth and provide minimal conservation value given its highly modified state. An area of vegetation described as Wet Sclerophyll Forest occurs in the south west of the Project Area.

Areas of higher quality vegetation described as Dry Rainforest and Wet Sclerophyll Forest adjoin the Project Area to the west and south west. These areas will be retained and managed to maintain and improve habitat values as part of the proposal.

For the purpose of this assessment it is assumed that all vegetation within the Project Area will be removed as part of the proposal.

Background literature reviews, database searches and habitat assessments identified that 11 threatened species had the potential to utilise habitat within and contiguous to the Project Area. Targeted field investigations and an impact assessment were undertaken in relation to these species.

*Targeted surveys identified the Grey-headed Flying Fox (*Pteropus poliocephalus*) and Large-footed Myotis (*Myotis macropus*) within areas of vegetation adjacent to the Project Area. A likely roosting site (rocky overhang) was also identified which will be retained. Further assessment will be undertaken to confirm if this potential roosting site relates to the Large-footed Myotis. In addition, the Koala (*Phascolarctos cinereus*) has been recorded to the north east of the Project Site in habitat along Hazelmount Lane during the assessment and other records indicate previous sightings within the Project Site and adjoining lands. These species are listed as Vulnerable under the NSW Threatened Species Conservation Act 1995 and the Grey-headed Flying Fox is also listed as Vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*

An unconfirmed recording of a Long-eared Bat (Nyctophilus spp.) was also detected in an area of vegetation adjacent to the Project Area using ultrasonic bat detection (Anabat). Two species of this genus are known to occur in the wider area however the call characteristics are very similar making it difficult to distinguish between the Eastern Long-eared Bat (N.bifax, listed as Vulnerable under the TSC Act) and Gould's Long-eared Bat (N. gouldi – not listed). Therefore a precautionary approach was adopted and the assessment was made on the assumption it was the threatened species N. bifax.

Given the small size and fragmented nature of the remnant rainforest vegetation stands adjoining the Project Area, it is considered unlikely that the Atlas Rainforest Ground-beetle (Nurus atlas) would be present on-site due to the inherent difficulty for small isolated populations to survive. The proponent will however undertake to further investigate the potential presence of N. atlas prior to gaining consent. It is noted that the Dry Rainforest areas are to be retained and managed and vibration impacts are not expected to be significant.

The impact assessment was undertaken for the threatened species recorded in the Project Site and assessed as having a moderate to high likelihood of occurrence, while also considering the other ecological impacts of the proposal.

It was concluded that whilst the Koala has the potential to occasionally traverse the Project Site as part of their home range, the absence of suitable feed trees precludes the quarry area from supporting a socially stable Koala population. Likewise, whilst the Grey-headed Flying Fox and Eastern Long-eared Bat may occasionally utilise an area of vegetation in the Project Area as a potential feeding resource, the absence of suitable roosting habitat in the Project Area and the presence of higher quality more suitable vegetation on areas adjacent to the west and south west of the Project Area suggests that the Project Area is unlikely to be significant for local populations of these species. The Large-footed Myotis forages over water and is therefore unlikely to be dependent on habitats within the Project Area as foraging habitat however it may be roosting in the dense foliage of the Dry Rainforest/Wet Sclerophyll Forest adjacent to the Project Area. The quarry area itself is expected to only provide marginal roosting habitat given the disturbed and open nature of habitat within the Project Area.

In summary the proposal is not expected to impact on the life cycle of any of the assessed species. Avoiding and managing the adjoining Dry Rainforest and Wet Sclerophyll Forest habitat will ensure that suitable habitat is retained and enhanced through management measures including weed management and regular inspections. These areas are to be retained and managed under a Vegetation Management Plan and it is proposed to enhance these areas by the provision of biodiversity offsets. These offsets have been identified within the Project Site and would be expected to improve habitat connectivity and reduce edge effects. In addition, land on the northern boundary of the Project Site is proposed to be established with Koala feed trees which would be expected to significantly enhance habitat value of this area through provision of additional movement corridors..

The proponent is committed to the protection of these areas within the proponent's land holding and to undertake management to maintain and improve biodiversity

values of these areas through weed management in accordance with a Vegetation Management Plan. In addition, the proponent will commit to the protection and management of the offset area secured through legal enforcement of the offset strategy via a voluntary conservation agreement under the National Parks and Wildlife Act 1974 or Section 88B-E covenant of the Conveyancing Act 1919 to be negotiated by the proponent and the DoP and DECCW.

INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by *Reavill Farm Pty Ltd and Tucki Hills Pty Ltd* to prepare an Environmental Assessment Report to seek project approval under Part 3A of the *Environmental Planning and Assessment Act 1979 (EP&A Act)* for a proposed expansion of Champions Quarry at 1586 Wyrallah Road, Tuckurimba NSW.

This report presents the results of an ecological assessment of the *Project Site* and operational *Project Area* undertaken by ERM as part of the Environmental Assessment. This report assesses the significance of potential ecological impacts resulting from the proposal and provides mitigation measures for any possible impacts. The assessment has been prepared based on the Guidelines for Threatened Species Assessment under Part 3A prepared by the Department of Environment, Climate Change and Water (DECCW) and Department of Primary Industries (DPI).

1.1

AIMS AND OBJECTIVES

The aim of this study was to assess the ecology of the *Project Site* and operational *Project Area* and the potential environmental impacts resulting from the proposal in accordance with relevant local, State and Commonwealth legislation.

Specifically this report aims to:

- identify flora and fauna species, habitats and communities in the *Project Area* and describe them in a broader environmental context;
- assess the potential of the site to significantly contribute to the conservation value of the surrounding area;
- assess the potential for rare or threatened species, populations or ecological communities as listed under relevant legislation to occur in the *Project Area*;
- identify and assess the potential impacts resulting from the proposed works on species, populations, ecological communities or their habitats; and
- identify mitigation measures to reduce any potential impacts identified.

The field methodology undertaken for the assessment was tailored to meet a level deemed appropriate given the highly disturbed nature of the *Project Area* (i.e. cleared grazing land, pasture improvement, existing motocross track and the existing quarry).

1.2 PROJECT AREA DESCRIPTION

1.2.1 Location

Champions Quarry is located at 1586 Wyrallah Road, Tuckurimba NSW, approximately 16 kilometres south of Lismore and eight kilometres south of Wyrallah (see *Figure 1.1*). The existing quarry and proposed expanded quarry footprint is located on land described as:

- Lot 5 - DP 857530 - Hazelmount Lane, Tuckurimba
- Lot 1 - DP 729118 - Wyrallah Road, Tuckurimba
- Lot 4 - DP 588125 - Wyrallah Road, Tuckurimba
- Lot 183 - DP 1013042 - Wyrallah Road, Tuckurimba
- Lot 1 - DP 127550 - Wyrallah Road, Tuckurimba
- Lot 101 DP 755746 Wyrallah Road, Tuckurimba

The land the subject of this application (the '*Project Site*') occupies an area of approximately 187 ha and is zoned 1(a) - General Rural and 1(r) - Riverlands under the *Lismore Local Environmental Plan (LEP) 2000*.

Champions Quarry currently operates within the *Project Site* with access via an unsealed road along a ridgeline from Wyrallah Road (see *Figure 1.2*). The footprint of the proposed quarry expansion area (the '*Project Area*') occupies approximately 16 ha of the *Project Site*. The *Project Site* extends from Wyrallah Road on elevated north south ridgeline eastward to low lying land on the Richmond River floodplain. The *Project Site* is largely cleared of native vegetation with remnant and regenerating vegetation to the south west and south of the *Project Area* and existing quarry.

The *Project Site* occurs within the North Coast Bioregion (Thackway and Cresswell, 1995) and the Richmond River catchment within the Northern Rivers Catchment Management Authority area.

The locality being a 10 kilometre radius of the *Project Area* extends to the southern outskirts of Lismore in the north, east to beyond the Tuckean Nature Reserve, south to the Richmond River near Woodburn and west of Coraki. The locality is dominated by the Wilson and Richmond River floodplains and the lowlands have been largely cleared of remnant vegetation.

Conservation reserves in the locality include the Tuckean Nature Reserve and Tucki Tucki Nature Reserve. The Tuckean Nature Reserve covering approximately 919 ha of coastal wetland habitats is approximately 4.5 km to the east of the *Project Area* while the two portions of Tucki Tucki Nature Reserve are located approximately 2km to the north and 1.5km to the south of the *Project Area*. Tucki Tucki Nature Reserve has been specifically planted to provide Koala habitat.

1.2.2

Land Use

The *Project Site* is used for cattle grazing with the existing sandstone quarry (refer *Photograph 1.1*) currently operating in the *Central Section* in the north of the *Project Area*. In the *Southern Section* of the *Project Area* is a disused quarry which has been used as a Motocross track since the 1960's (see *Figure 1.2*).



Photograph 1.1 View West - Existing Quarry in Central Section

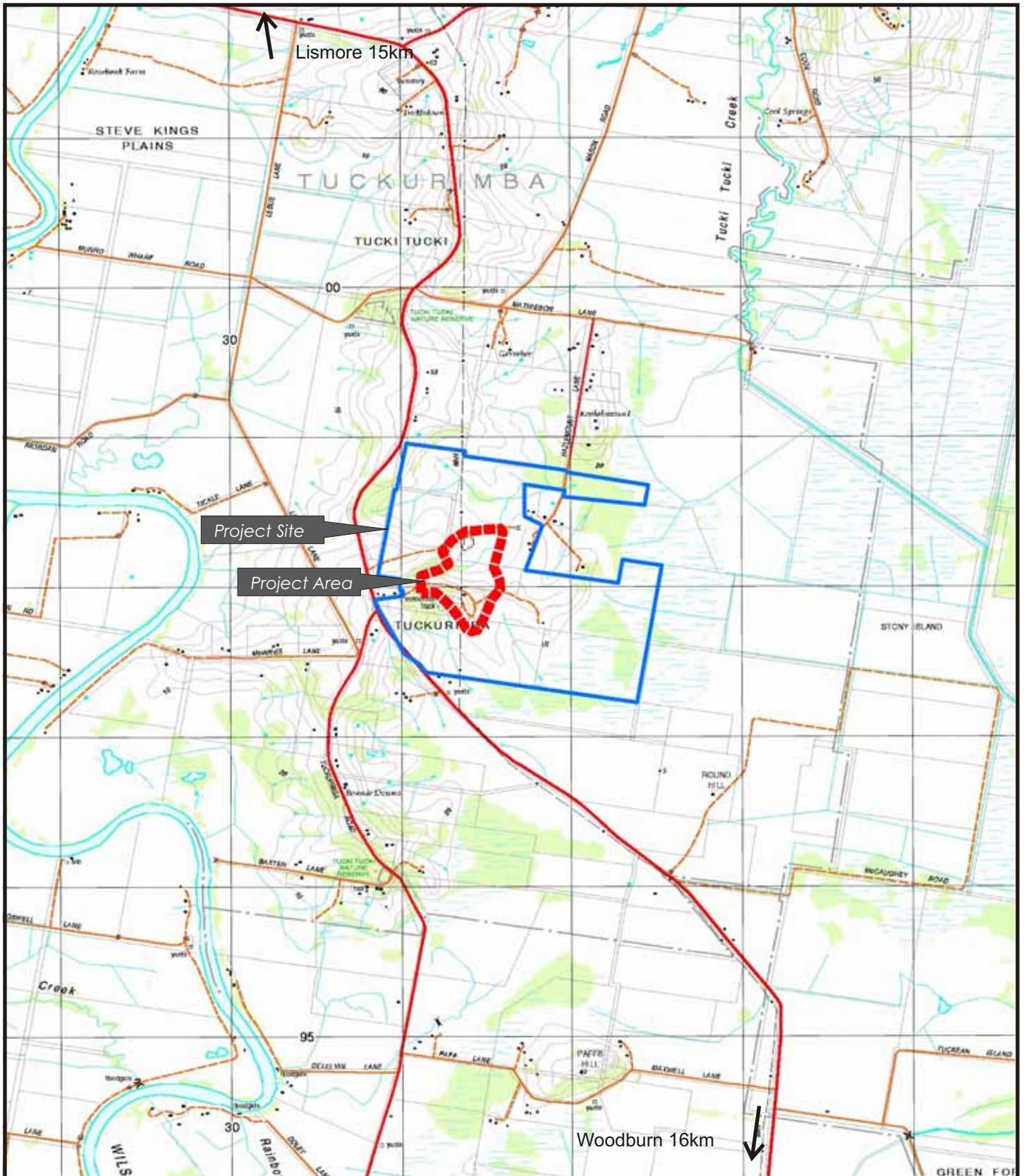
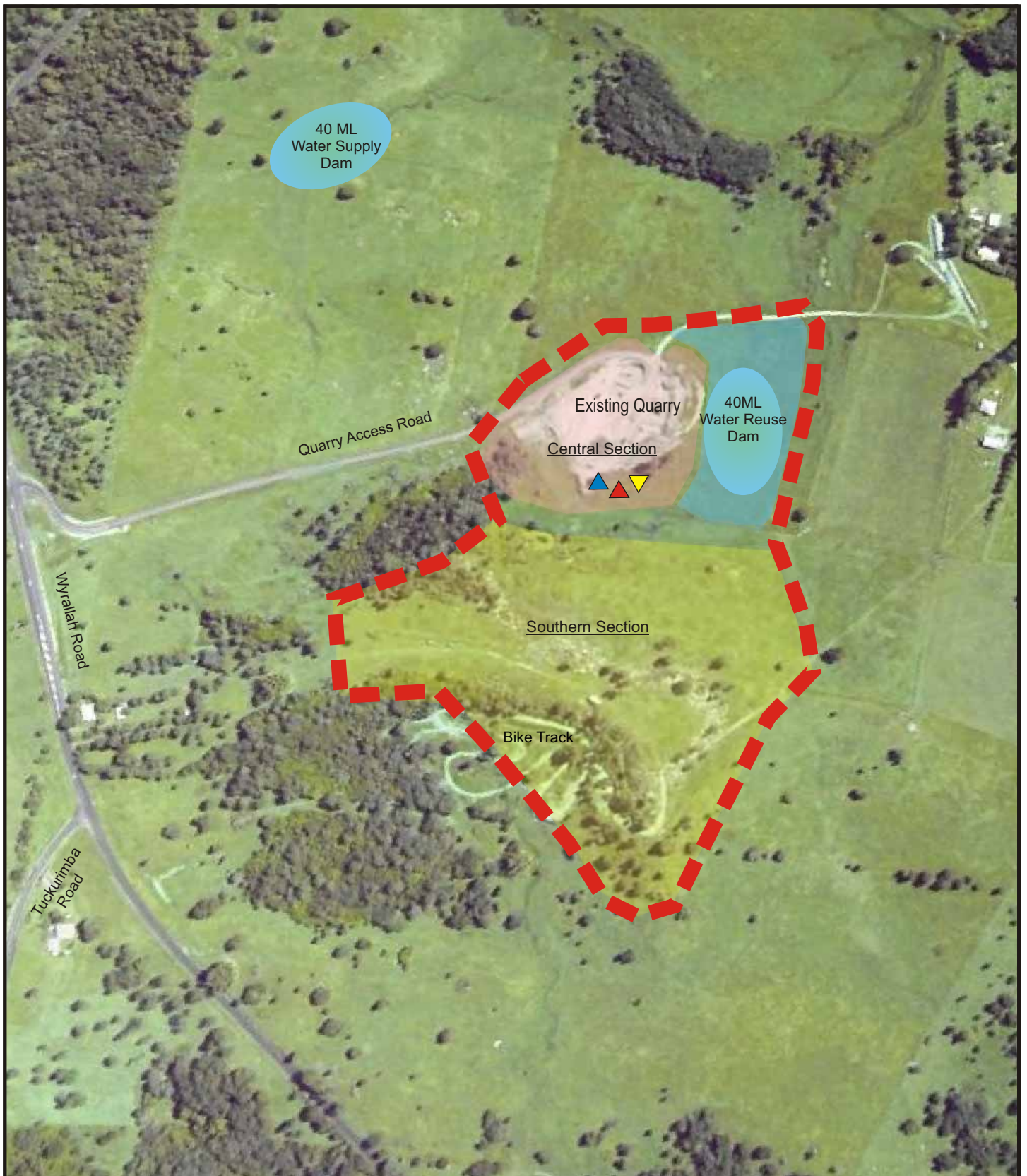


Figure 1.1
Project Locality Plan

Client:	Champions Quarry	
Project:	Champions Quarry Expansion	
Drawing No:	0098287pm_01	
Date:	12/08/09	Drawing size: A4
Drawn by:	AM	Reviewed by: WW
Source:	Department of Lands	
Scale:	Refer to Scale Bar	

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- Legend**
- - - Extent of Quarry Extraction and Operations (Project Area)
 - ▲ Washing Plant
 - ▲ Processing Plant
 - ▼ Service Area and Temporary Stockpile Holding Area
 - Water Management Dam
 - Central Section
 - Southern Section
 - Water Management (Non-quarrying area)

Client:	Champions Quarry		
Project:	Champions Quarry Expansion		
Drawing No:	0098287pm_03	Suffix No:	V4
Date:	25/11/09	Drawing size:	A4
Drawn by:	AM	Reviewed by:	WW
Source:	-		
Scale:	Refer to Scale Bar		

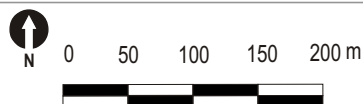


Figure 1.2

Proposed Layout of Project Area

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1.2.3 *Topography*

The *Project Area* has an altitude ranging between 4 to 50 metres (m) Australian Height Datum (AHD) and slopes from the south west to the north east and south east.

1.2.4 *Drainage*

Surface drainage falls towards the north east and south east. An un-named intermittent watercourse drains the *Project Area*, which eventually flows through the proponents property into the Tucki Tucki Creek located approximately three kilometres to the east of the *Project Area* (see *Figure 1.3*).

1.2.5 *Geology and Soil*

The *Project Area* is underlain by Jurassic Kangaroo Creek Sandstone (comprised of quartz sandstone and conglomerate) with the higher elevations (≥ 50 m AHD) of the *Project Site* overlain by Tertiary Lismore Basalt and lower lying areas (< 10 m AHD) comprising Quaternary alluvial soils derived from flood plain sedimentation (Coffey Geotechnics, 2007).

1.3 *PROPOSED PROJECT DESCRIPTION*

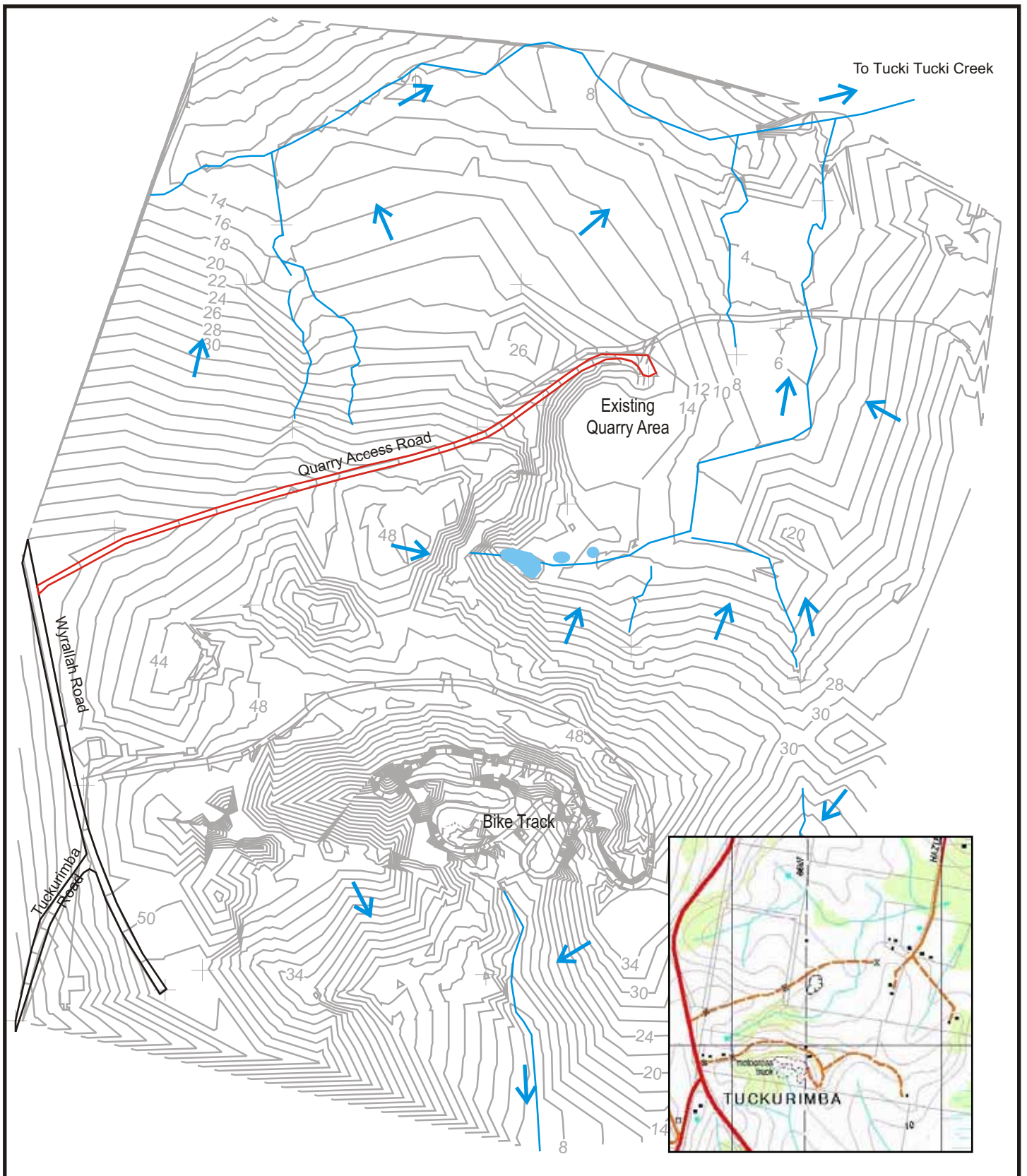
The proposed development involves lateral and vertical expansion of the existing sandstone quarry from an area of two hectares (ha) to a staged development of approximately 16 ha. The existing consent for the quarry limits production to 29,000 m³ (approximately 64,000 tonnes) per annum over a period of up to 15 years. Champions Quarry proposes to increase this rate to 250,000 tonnes per annum for a total extraction of 6.25 million tonnes of the sandstone material over 25 years.

The proposed expansion will involved establishment of two quarry sections being the *Central Section* including the existing quarry and future materials process areas, and the *Southern Section*. These sections are shown in *Figure 1.2*.

Quarrying operations will consist of clearing of vegetation, topsoil and overburden removal, overburden stockpiling, winning of materials, and material processing and stockpiling. The existing quarry floor is at approximately 12 m AHD. Initially, extraction is planned to take place to a floor level between 8 m AHD and 10 m AHD within the *Central Section*, allowing access to approximately 300,000 tonnes of raw material. The remainder of the materials will be won within the *Southern Section*, with extraction expected to take place to a floor level between 8 m AHD and 10 m AHD.

Given the 'soft' nature of the resource it can be extracted by excavators and/or dozers without the need to undertake blasting. A rock saw and/or nitrogen fed jackhammer may occasionally be utilised to assist in the extraction of dimensioned sandstone.

Following the initial extraction of material from the *Central Section*, the area will be used as a banded processing area and for other related infrastructure while the *Southern Section* is quarried.



Legend

- ▭ Access & Haul Rds
- Ephemeral Creeks
- ➔ Direction of Surface Drainage
- 2 metre contours
- Existing dams

Client:	Champions Quarry	
Project:	Champions Quarry Expansion	
Drawing No:	0098287pm_05_ecology	
Date:	25/11/09	Drawing size: A4
Drawn by:	AM	Reviewed by: WW
Source:	Inset - Department of Lands (2006)	
Scale:	Refer to Scale Bar	

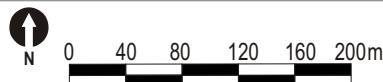


Figure 1.3

Catchment Characteristics

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2 RELEVANT LEGISLATION

2.1 COMMONWEALTH

2.1.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* streamlines the national environmental assessment and approvals process, protects Australian biodiversity and integrates management of important natural and cultural places. Under the *EPBC Act*, an assessment and approvals process has been developed for actions that significantly impact matters of national environmental significance (MNES) as listed under the Act.

Implications for the Proposal

MNES in relation to the *Project Area* and the proposed works are addressed in *Table 2.1*.

Table 2.1 *Relationship of the Project to Matters of National Environmental Significance*

Matters of National Environmental Significance	Application to the Project	Relevant Sections
World Heritage Properties	Not identified within the locality.	Not Applicable
National Heritage Places	Not identified within the locality.	Not Applicable
Wetlands of International Significance (RAMSAR)	Not identified within the locality.	Not Applicable
Commonwealth Marine Areas	Not identified within the locality.	Not Applicable
Threatened Ecological Communities	Not identified within the locality.	Not Applicable
Threatened Species	The proposed development will not significantly impact upon nationally listed threatened species.	<i>Section 4.1.1, 4.2.3, Annex A</i>
Migratory Species	The proposed development will not significantly impact upon nationally listed migratory species.	<i>Section 4.2.4, Annex A</i>

There are no World Heritage Areas, National Heritage Places, Ramsar wetlands or Commonwealth marine areas on or near the proposed *Project Area* and the proposal does not involve a nuclear action. Threatened and migratory species listed under the provisions of the Act are discussed in *Sections 4.1.1, 4.2.3 and 4.2.4*. The proposal is not expected to impact on any MNES and therefore the proposal does not require Commonwealth approval under the provisions of the *EPBC Act*.

2.2 STATE

2.2.1 *Environmental Planning and Assessment Act 1979*

The *Environmental Planning and Assessment Act 1979 (EP&A Act)* institutes a system of environmental planning and assessment in NSW and is administered by the Department of Planning (DoP).

Part 3A of the EP&A Act details the approval process of major infrastructure and other significant 'projects' as defined under State Environmental Planning Policy (SEPP) Major Projects 2005 or as determined by the Minister. SEPP Major Projects 2005 defines certain developments that are major projects under Part 3A of the EP&A Act and to be determined by the Minister for Planning.

Under Section 75R of the EP&A Act, environmental planning instruments other than SEPPs do not apply to a Major Project. However, in accordance with Section 75J, the Minister, when deciding whether or not to approve the carrying out of a project, may take into account the provisions of any environmental planning instrument (EPI). In this regard, the Minister is not bound by environmental planning instruments other than SEPPs but is obliged to consider such instruments.

Implications for the Proposal

The development is considered as major infrastructure development and the development application will be assessed under Part 3A of the *EP&A Act*. The Environmental Assessment Report will be submitted with the development application for consideration under Part 3A. This report is designed to accompany the Project Application.

2.2.2 *State Environmental Planning Policy No. 14 – Coastal Wetlands*

State Environmental Planning Policy No. 14 (SEPP 14) aims to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the State. Where a proposal occurs within a *SEPP 14* wetland area, an ecological assessment is required to assess the impact of the development.

Implications for the Proposal

The site does not contain any areas mapped as *SEPP 14* coastal wetland. Consequently *SEPP 14* does not apply.

2.2.3 State Environmental Planning Policy No. 26 – Littoral Rainforest

State Environmental Planning Policy No. 26 (SEPP 26) aims to preserve areas identified as littoral rainforest and provides a mechanism for the assessment of development that is likely to impact upon these areas. Where a proposal occurs within a *SEPP 26* littoral rainforest area, an ecological assessment is required to assess the impact of the development.

Implications for the Proposal

The site does not contain any areas mapped as *SEPP 26* littoral rainforest. Consequently *SEPP 26* does not apply.

2.2.4 State Environmental Planning Policy No. 44 – Koala Habitat Protection

State Environmental Planning Policy No. 44 (SEPP 44) aims to encourage the conservation and management of areas of natural vegetation which provide habitat to the Koala. The practical effect of *SEPP 44* is that in consideration of a development application, the consent authority must ensure that approval is not issued without prior investigation of *potential* and *core* Koala habitat. This policy applies to all local government areas within the known statewide distribution of the Koala, including the Lismore local government area.

SEPP 44 provides a mechanism for assessing whether an area is *core* or *potential* Koala habitat and determining any impacts resulting from the proposal.

Implications for the Proposal

An assessment of the site in accordance with *SEPP 44* was undertaken during field investigations. Details of this assessment are located in *Sections 3.2.5 and 4.2.2* of this report.

2.2.5 Threatened Species Conservation Act 1995

Developments requiring approval from a statutory authority of the NSW State Government are required to be assessed in accordance with Part 3A of the *EP&A Act*, as amended by the *Threatened Species Conservation Act 1995 (TSC Act)*.

Implications for the Proposal

An assessment for threatened species that have potential habitat on-site has been undertaken in accordance with the guidelines for threatened species assessments of development applications being assessed under Part 3A of the *EP&A Act*. The threatened species assessments are located at *Section 5.5*.

2.2.6 *Fisheries Management Act 1994*

The *Fisheries Management Act 1994 (FM Act)* includes provision to declare and list threatened species of fish and marine vegetation, endangered populations and ecological communities and key threatening processes. Where the proposal involves the disturbance to aquatic or marine areas, assessment of the impact in relation to aquatic habitats and threatened fish species is required.

Implications for the Proposal

The proposed development will not impact upon aquatic habitats or threatened fish species.

2.2.7 *Native Vegetation Act 2003*

The *Native Vegetation Act 2003 (NV Act)* provides mechanisms for management of native vegetation in non-urban areas of regional NSW. The *NV Act* aims to provide flexibility and incentives for farmers to manage native vegetation, end broad scale clearing (unless it improves or maintains environmental outcomes) and encourage healthy and productive landscapes.

Clause 12 of the *NV Act* states *native vegetation must not be cleared except in accordance with:*

- (a) *a development consent granted in accordance with this Act, or*
- (b) *a property vegetation plan'.*

Implications for the Proposal

The proposed site occupies land zoned 1(a) – *General Rural* and 1(r) – *Riverlands*. The *NV Act* applies to land zoned as rural however, in accordance with Section 75U of the *EP&A Act*, an authorisation to clear native vegetation under Section 12 of the *NV Act* is not required for projects approved under Part 3A of the *EP&A Act*. Consequently the *NV Act* does not apply to the proposal.

2.3 LOCAL

2.3.1 *Lismore Development Control Plan Part A: Tree Preservation Order*

The *Lismore Development Control Plan (DCP) – Part A Tree Preservation Order* aims to promote the retention of trees within urban, village and rural residential areas so as to conserve remnant natural ecosystems.

Implications for the Proposal

Section 14.5 of the *Lismore DCP – Part A* states that the Tree Preservation Order (TPO) does not apply to land zoned 1(a) – General Rural or 1(r) – Riverlands under the Lismore LEP. Consequently, the TPO does not apply to the proposal.

3.1

DESKTOP SEARCH

Background literature reviews and database searches on threatened flora and fauna species, populations, communities and habitats known to occur within the *Project Area* and the surrounding local area were conducted to inform field investigations.

Background information used in the assessment process was collected via:

- a literature review of site-specific (Baverstock; 2005a, 2005b and 2007) and regional studies; and
- map, aerial photograph and Geographic Information System (GIS) interpretations including:
 - Lismore City Council vegetation mapping 2007; and
 - Lismore City Council Koala Study including mapping of sightings, vegetation communities and habitat categories mapping.

A search of the NSW Department of Environment, Climate Change and Water (DECCW, 2009a) Wildlife Atlas database was conducted for all recent records of threatened flora and fauna within the locality being a 10 km radius of the *Project Area*. A search of the on-line database maintained by the Commonwealth Department of Environment, Water, Heritage and Arts (DEWHA) was also conducted to identify the likely presence of nationally listed threatened and migratory species in the locality.

The number of records on the DECCW database of species recorded within the locality and within five kilometres of the *Project Area* are provided in *Table 3.1* (DEWHA, 2009). It should be noted, that the DEWHA database search is a prediction of occurrence (as indicated in *Table 3.1*) based on habitat requirements and known distribution rather than actual records.

Table 3.1 Database Search Results Threatened Species

Scientific Name	Common Name	Conservation Status		Records in Locality	
		EPBC Act	TSC Act	10km	5km
<i>Amaurornis olivaceus</i>	Bush-hen	-	V	2 records	0 records
<i>Anseranas semipalmata</i>	Magpie Goose	-	V	2 records	0 records
<i>Calyptrorhynchus lathamii</i>	Glossy Black-Cockatoo	-	V	4 records	0 records
<i>Coracina lineata</i>	Barred Cuckoo-shrike	-	V	1 record	0 records
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig Parrot, Double-eyed Fig-parrot	E, M	CE	Predicted, 0 records	Predicted, 0 records
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	-	E	81 records	17 records
<i>Erythroriorchis radiatus</i>	Red Goshawk	V	CE	1 record	0 records
<i>Grus rubicunda</i>	Brolga	-	V	2 records	0 records
<i>Irediparra gallinacea</i>	Comb-crested Jacana	-	V	6 records	0 records
<i>Ixobrychus flavicollis</i>	Black Bittern	-	V	2 records	0 records
<i>Lathamus discolor</i>	Swift Parrot	E	E	Predicted, 0 records	Predicted, 0 records
<i>Menura alberti</i>	Albert's Lyrebird	-	V	7 records	0 records
<i>Monarcha leucotis</i>	White-eared Monarch	-	V	2 records	0 records
<i>Pandion haliaetus</i>	Osprey	-	V	4 records	0 records
<i>Poephila cincta cincta</i>	Black-throated Finch (southern subspecies)	E	E	Predicted, 0 records	Predicted, 0 records
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	-	V	23 records	1 record
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	-	V	46 records	3 records
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	-	V	86 records	1 record
<i>Rostratula benghalensis australis</i>	Painted Snipe (Australian Subspecies)	V	E	Predicted, 0 records	Predicted, 0 records
<i>Stictonetta naevosa</i>	Freckled Duck	-	V	1 record	0 records
<i>Turnix maculosa</i>	Red-backed Button-quail	-	V	1 record	1 record
<i>Turnix melanogaster</i>	Black-breasted Button-quail	V	CE	Predicted, 0 records	Predicted, 0 records
<i>Tyto capensis</i>	Grass Owl	-	V	1 record	0 records
<i>Tyto tenebricosa</i>	Sooty Owl	-	V	1 record	0 records
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E, M	E	Predicted, 0 records	Predicted, 0 records
<u>Frogs</u>					
<i>Crinia tinnula</i>	Wallum Froglet	-	V	1 record	0 records
<i>Litoria alongburensis</i>	Wallum Sedge Frog,	V	V	Predicted, 0 records	Predicted, 0 records
<i>Mixophyes iteratus</i>	Southern Barred Frog, Giant Barred Frog	E	E	Predicted, 0 records	Predicted, 0 records

<i>Scientific Name</i>	<i>Common Name</i>	<i>Conservation Status</i>		<i>Records in Locality</i>	
		<i>EPBC Act</i>	<i>TSC Act</i>	<i>10km</i>	<i>5km</i>
<u>Mammals</u>					
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat	V	V	Predicted, 0 records	Predicted, 0 records
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	E	V	Predicted, 1 record	Predicted, 0 records
<i>Miniopterus australis</i>	Little Bentwing-bat	-	V	5 records	2 records
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat	-	V	1 record	0 records
<i>Myotis adversus</i>	Large-footed Myotis	-	V	1 record	1 record ¹
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	-	V	7 records	0 records
<i>Petaurus norfolcensis</i>	Squirrel Glider	-	V	2 records	0 records
<i>Phascolarctos cinereus</i>	Koala	-	V	Numerous records	105 records
<i>Planigale maculata</i>	Common Planigale	-	V	2 records	0 records
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	V	Predicted, 2 records	Predicted, 0 records
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Predicted, 27 records	Predicted, 4 records
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	-	V	1 record	0 records
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	-	V	4 records	1 record
<i>Thylogale stigmatica</i>	Red-legged Pademelon	-	V	7 records	0 records
<u>Reptiles</u>					
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	V	V	Predicted, 0 records	Predicted, 0 records
<u>Insects</u>					
<i>Nurus atlas</i>	Atlas Rainforest Ground- beetle	-	E	1 record	0 records
<u>Plants</u>					
<i>Acronychia littoralis</i>	Scented Acronychia	E	E	Predicted, 0 records	Predicted, 0 records
<i>Arthraxon hispidus</i>	Hairy Jointgrass		V	3 records	0 records
<i>Baloghia marmorata</i>	Jointed Baloghia	V	V	Predicted, 24 records	Predicted, 0 records
<i>Clematis fawcettii</i>	Northern Clematis	V	V	Predicted, 0 records	Predicted, 0 records
<i>Corchorus cunninghamii</i>	Native Jute	E	E	Predicted, 0 records	Predicted, 0 records
<i>Cryptocarya foetida</i>	Stinking Cryptocarya	V	V	Predicted, 5 records	Predicted, 0 records
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	Predicted, 0 records	Predicted, 0 records
<i>Desmodium acanthocladum</i>	Thorny Pea	V	V	Predicted, 19 records	Predicted, 10 records
<i>Diploglottis campbellii</i>	Small-leaved Tamarind	E	E	Predicted, 0 records	Predicted, 0 records
<i>Endiandra hayesii</i>	Rusty Rose Walnut	V	V	Predicted, 6 records	Predicted, 0 records

<i>Scientific Name</i>	Common Name	Conservation Status		Records in Locality	
		EPBC Act	TSC Act	10km	5km
<i>Floydia praealta</i>	Ball Nut	V	V	Predicted, 4 records	Predicted, 0 records
<i>Geijera paniculata</i>	Axe-Breaker	-	E	6 records	0 records
<i>Gossia fragrantissima</i>	Sweet Myrtle	E	E	Predicted, 40 records	Predicted, 27 records
<i>Hicksbeachia pinnatifolia</i>	Monkey Nut	V	V	Predicted, 0 records	Predicted, 0 records
<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V	Predicted, 3 records	Predicted, 0 records
<i>Marsdenia longiloba</i>	Slender Marsdenia	V	E	Predicted, 0 records	Predicted, 0 records
<i>Myrsine richmondensis</i> (syn <i>Rapanea</i> sp. Richmond River)	Ripple-leaf Muttonwood	E	E	Predicted, 4 records	Predicted, 0 records
<i>Ochrosia moorei</i>	Southern Ochrosia	E	E	Predicted, 6 records	Predicted, 0 records
<i>Owenia cepiodora</i>	Onion Cedar	V	E	Predicted, 0 records	Predicted, 0 records
<i>Randia moorei</i>	Spiny Gardenia	E	E	Predicted, 0 records	Predicted, 0 records
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	V	V	Predicted, 2 records	Predicted, 0 records
<i>Tinospora tinosporoides</i>	Arrow-head Vine	V	V	Predicted, 3 records	Predicted, 0 records

Sources: DECCW wildlife database Lismore 1:100,000 Map Sheet 9540 and DEWHA Online database search.

Conservation Status: CE= Critically Endangered; E = Endangered; V= Vulnerable; M= Migratory.

Notes: 1 = The Large-footed Myotis record is from investigations undertaken for this proposal.

All flora and fauna database records were analysed to determine the likelihood that threatened flora and fauna could occur within habitats in the *Project Area* (see *Annex A, Table A.1*).

3.2

FIELD SURVEYS

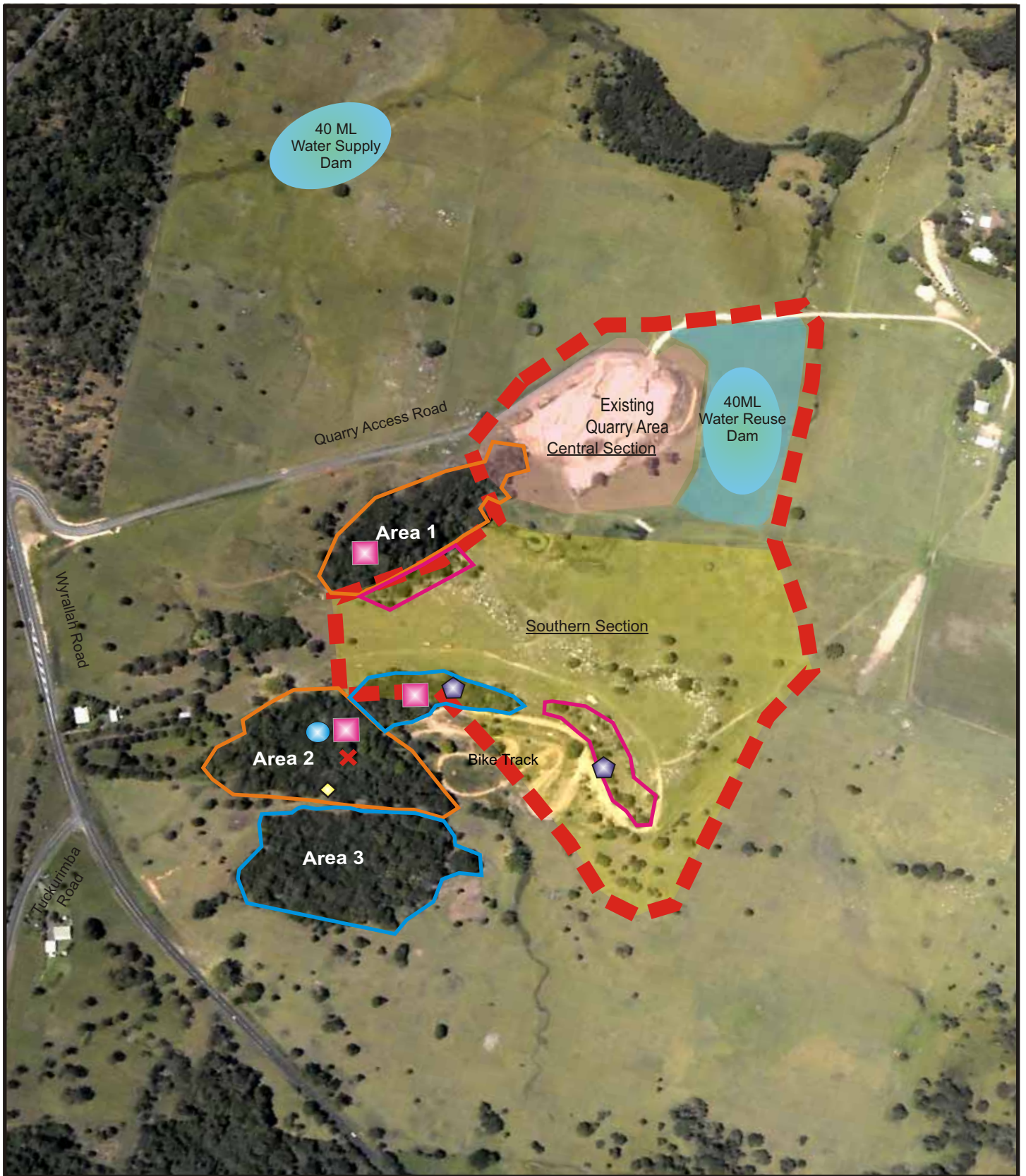
Field surveys of the *Project Site* and operational *Project Area* were conducted by ERM on the 16th and 17th January 2008. The weather was cloudy and humid with a minimum temperature of 21 degrees Celsius (°C) and a maximum temperature of 28 °C (BOM, 2008). All flora and fauna species identified at the site were recorded.

Details of flora and fauna survey methods are outlined below with field survey locations shown on *Figure 3.1*.

3.2.1 *Field Survey Rationale*

Due to the highly disturbed nature of the *Project Area* (i.e. grazing land, pasture improvement, existing motocross track and the existing quarry), this study was not intended to detect every species that may periodically occur in the *Project Area*. Instead, this study was designed to identify flora and fauna communities and assess the potential of the *Project Area* to significantly contribute to the conservation value of the surrounding area. Nonetheless, the presence or absence of threatened species was specifically targeted during the survey.

Database searches and literature reviews have been undertaken in recognition of the inherent difficulties in identifying all potential species occurrence that may only be detected with variations in seasonality, lunar cycle and climatic conditions. As such, a precautionary approach has been adopted and species have been assessed based on likelihood of occurrence based on records and habitat type.



Legend

- Extent of Quarry Extraction and Operations (Project Area)
- Dry Rainforest
- Remnant Regenerating Pink Bloodwood/Forest Oak Woodland
- Wet Sclerophyll Forest
- Owl Call Playback
- Quadrat
- Anabat
- X Unidentified Long-eared Bat
- Grey-headed Flying Fox
- Central Section
- Southern Section
- Water Management (Non-quarrying area)

Client:	Champions Quarry	
Project:	Champions Quarry Expansion	
Drawing No:	0098287pm_03_ecology_V2	
Date:	24/11/09	Drawing size: A4
Drawn by:	AM	Reviewed by: WW
Source:	-	
Scale:	Refer to Scale Bar	

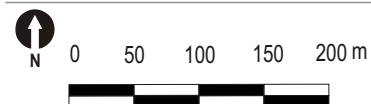


Figure 3.1

Vegetation Communities and Survey Locations

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3.2.2

Flora

Previous investigations of the *Project Area* have been undertaken in 2005 and 2007 (Baverstock 2005a, 2005b and 2007). These reports are provided in full in *Annex B*. In addition broad scale vegetation mapping of the *Project Area* has been provided by Lismore City Council (see *Annex C*).

Vegetation assessments were conducted by ERM for approximately five hours to verify and supplement the site specific surveys undertaken by Lismore City Council in 2007 and Baverstock in 2005 and 2007. Vegetation survey methodology included quadrat sampling and random meander searches.

Vegetation community structure and composition was determined using 20 m x 20 m sampling quadrats in two targeted location. These locations in the *Southern Section* of the *Project Site*, as shown on *Figure 3.1*, were selected as at the time of the field works they represented the least disturbed areas (note: both areas are characterised by as being either significantly disturbed and/or regrowth) with the clearing of native vegetation stands. All vascular plant species within the quadrat were identified and recorded, as well as the height and percentage cover of the dominant species within each structural layer. Plant species names follow Harden (1992, 1993, 2000 and 2002). The disturbance history was noted to determine the severity and timing of fire, grazing, logging/clearing, dumping and weeds. The locations of the quadrats are shown on *Figure 3.1*. It is noted that the small areas of vegetation in the east and south of *Area 1* that proposed to be cleared were previously assessed as regrowth (Baverstock, 2005, refer *Annex B*) and subsequently field survey quadrats were not undertaken. However, these areas were inspected and opportunistic sightings were recorded.

Random-meander searches (Cropper 1993) were also used to identify any additional species not recorded in the quadrats. This method involves traversing all vegetation communities and topographical features within the site, recording plants as they are encountered. This method was also used to identify vegetation communities and characteristic species occurring in vegetated areas directly to the west and south west of the *Project Area*.

State and/or Commonwealth listed Endangered Ecological Communities (EECs) known to be occurring in the locality (i.e. within a 10km radius of the *Project Area*) were determined as occurring in the *Project Area* by considering the dominant plant species and soils.

In addition to the above, the proponent has undertaken a detailed count of all mature trees that are to be removed within the *Project Area*. These have been marked to differentiate them from weeds species, and recent regrowth. Further details are provided in *Section 5.1* and *Annex E*.

Diurnal Bird Surveys

Birds were identified from calls and direct observations opportunistically throughout the two day field survey. This included observation for evidence of habitation and/or presence of utilisation of vegetation feed species (i.e. such as cracked cones).

Nocturnal Bird Surveys

Nocturnal call playback surveys were conducted at the site to illicit response calls from the Sooty Owl and Grass Owl. Call playback for each of these species was conducted on the 16th January 2008.

Pre-recorded calls of each species were played through a megaphone at a number of locations (*Figure 3.1*) within the first hour of darkness. Playback was undertaken for periods of five minutes followed by two minutes of quiet listening for each species and spotlighting surveys.

Spotlighting

Spotlighting was undertaken by ERM personnel using handheld spotlights on the 16th January 2008. Spotlighting was undertaken across the entire *Project Area* (and areas immediately adjacent to the *Project Area*) for approximately 2.5 hours and included inspection of all potential habitat areas. Spotlighting was also conducted after each call playback to detect any owl species that may have flown into the area during the survey period.

Ultrasonic Bat Detection

Ultrasonic bat detection was used to detect microchiropteran bat species that may be utilising the *Project Area* (and areas immediately adjacent to the *Project Area*). An ANABAT detector was left at the site for one night at the locations shown on *Figure 3.1*. Data obtained was then sent to Glenn Hoyer of Fly By Night Bat Surveys Pty Ltd for analysis.

Rocky Overhang Inspection

All rocky overhangs within *Area 1* and *Area 2* (*Figure 3.1*) were inspected on 13 November 2009 for evidence of potential Microbat habitat. Mistnets and/or harpnets were not deployed for bats as per the methods outlined in the DECCW (2004) draft *Threatened Biodiversity Survey and Assessment* guidelines as the Project was not expected to have significant impacts on bats given the proposal to retain and manage potential habitat areas. Other means to

identify bats within the *Project Site* have included an Anabat survey and inspection of potential roosting sites (i.e. sandstone rock overhangs).

Opportunistic Sightings

Fauna species noted opportunistically during the two day survey were also recorded. Indirect evidence of the presence of fauna such as tracks, scats, chewed Casuarina cones, scratches on and around trees was also considered and recorded.

Reptiles

Targeted reptile surveys were not undertaken as part of the field works as no endangered reptile species have been recorded within a 10 km radius of the *Project Area*.

3.2.4 *Fauna Habitat*

An assessment of the habitat value of the *Project Area* (and areas immediately adjacent to the *Project Area*) for threatened fauna was undertaken using the following criteria:

- the presence of nesting/sheltering sites such as tree hollows, litter, fallen timber and logs, caves and rocks;
- the cover/abundance of ground, shrub and canopy layers;
- the presence of free water or waterbodies;
- the presence of rocks and basking sites for reptiles;
- the presence of sandstone rock overhangs for bats; and
- connectivity of habitats within and adjacent to the *Project Area*.

The presence of flowering eucalypts and other plants was recorded as these may provide foraging resources for threatened species such as flying foxes and honeyeaters.

3.2.5 *Koala Habitat Assessment*

A Koala habitat assessment was conducted to determine whether the *Project Area* and *Project Site* provide *core* or *potential* Koala habitat as defined under SEPP 44. This involved identifying Koala habitat trees as listed under Schedule 2 of the policy and determining whether they constituted greater than 15 % of the tree cover.

Targeted searches for evidence of Koala habitation was also undertaken and involved searches for scats and scratch (“poc”) marks on trees. A recent

search of the DECCW Atlas of NSW Wildlife database (DECCW, 2009a) identifies that six recorded sightings of Koala have been recorded on the *Project Site* (see *Figure 3.2*). None of the sightings were recorded within the *Project Area*.

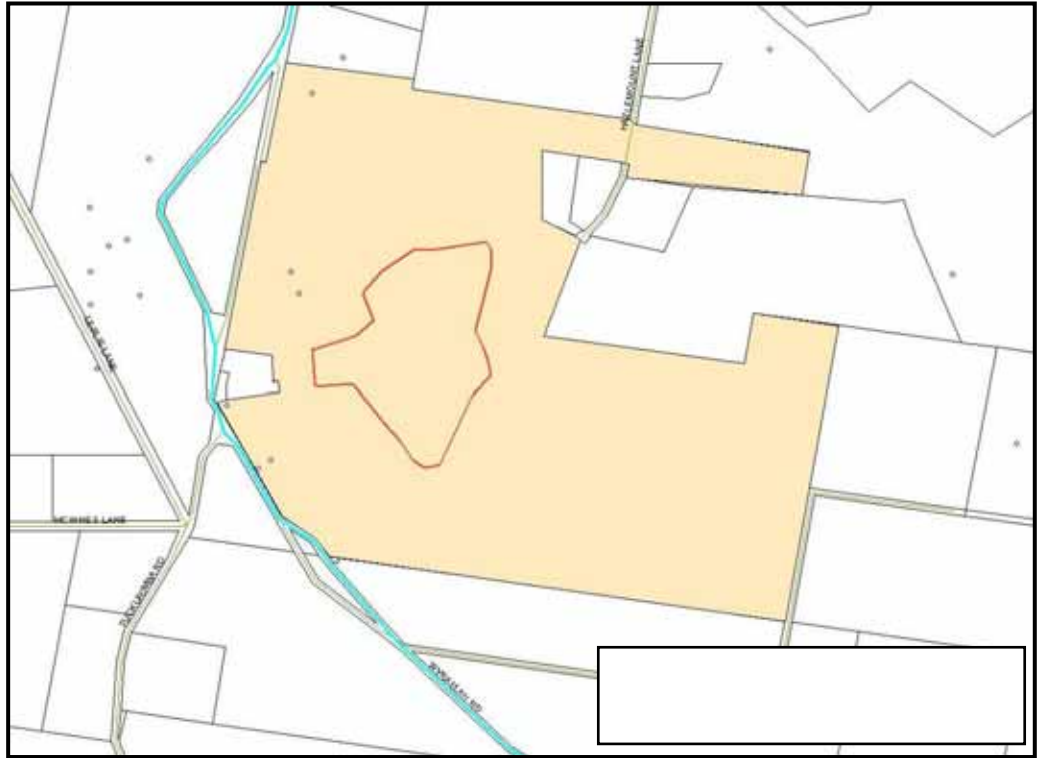


Figure 3.2 DECCW Wildlife Atlas - Koala records

4 RESULTS

4.1 FLORA

Plant species recorded within the *Project Area* and contiguous vegetation within the *Project Site* are listed in *Annex D*. A total of 67 flora species were identified of which 18 (27%) were exotic.

4.1.1 *Threatened Flora Species*

No threatened flora species as listed under the *TSC Act* or *EPBC Act* were recorded in the *Project Area* and contiguous vegetation communities.

A search of the DECCW Atlas of NSW Wildlife database (DECCW, 2009a) identified 13 threatened flora species that had previously been recorded within the locality of which only *Desmodium acanthocladum* (Thorny Pea) and *Gossia fragrantissima* (Sweet Myrtle) have been recorded within five kilometres of the *Project Area* (see *Table 3.1*). An online search of DEWHA database (DEWHA, 2009) identified 20 threatened flora species that are predicted to occur in the locality (see *Table 3.1*).

The likelihood of these species occurring in the *Project Area* was assessed by comparing known habitat requirements with habitat present in the *Project Area* (see *Annex A Table A.1*).

4.1.2 *Vegetation Communities*

Under the Lismore City Council Vegetation Mapping vegetation in the *Project Area* and surrounding area is mapped as:

- Dry Rainforest;
- North Coast Wet Sclerophyll Forest;
- Coastal Valley Grassy Woodlands; and
- Cleared (see *Annex C*).

Ground truthing identified the following vegetation communities in and contiguous with the *Project Area*:

- Dry Rainforest;
- Wet Sclerophyll Forest;
- Regenerating Pink Bloodwood/Forest Oak Woodland; and
- Grassland.

The boundaries of these communities are shown in *Figure 3.1*.

Dry Rainforest

Rainforest occurs to the west of the proposed *Central Section* of the quarry and to the southwest of the *Southern Section* of the quarry (see *Figure 3.1*). Intermittent drainage channels bisected these areas and rocky outcrops and overhanging rock formations protruded from the slopes of the gullies. For the purpose of this report, this community has been divided into two distinct areas according to the dominant characteristic species (*Areas 1* and *2*, *Figure 3.1*).

Area 1 is dominated by an overstorey of *Araucaria cunninghamii* (Hoop Pine) to approximately 30 m in height (see *Photograph 4.1*). *Acmena smithii* (Lilly Pilly) trees dominated the midstorey (approximately 8 m) along with Hoop Pine specimens of varying ages. Ground cover vegetation was sparse and dense leaf litter covered the forest floor. Numerous *Asplenium australasicum* (Bird's Nest Fern) and *Platynerium bifurcatum* (Elkhorn) specimens were growing on tree trunks and rocky outcrops. This community is representative of *Araucaria cunninghamii* Suballiance 21 Dry Rainforest as described by Floyd (1990). The eastern most portion of this area is bisected by a historical farm access road. No Hoop Pine occur to the east of the road or immediately to west of the road.



Photograph 4.1 *Area 1 Dry Rainforest (Hoop Pines)*

Area 2 is dominated by an overstorey of *Lophostemon confertus* (Brush Box) (approximately 18 m high) with various rainforest species including Lilly Pilly, *Trochocarpa laurina* (Tree Heath), *Wilkiea huegeliana* (Veiny Wilkiea), *Rhodamnia rubescens* (Scrub Heath) with *Pittosporum* spp dominating the midstorey. Ground cover comprised patches of native grasses such as *Oplismenus imbecillis* (Basket Grass) and herbs. Dense leaf litter covered the forest floor. Bird's Nest Ferns and Elkhorns were scattered throughout the area. It is noted that a transition toward Wet Sclerophyll Forest occurs in *Area 2* between the south facing slope through to the northerly facing slope toward *Area 3* (see *Figure 3.1*). Similar transition also occurs toward the

northeast above the motocross track, noting that this area appears to have undergone clearing in the past as part of the motocross track (i.e. viewing area).

This Dry Rainforest may be representative of *Backhousia myrtifolia* – *Lophostemon confertus* – *Tristaniopsis* spp Suballiance 29 as described by Floyd (1990). Suballiance 29 rainforest canopy is usually dominated by myrtles with occasional *Lophostemon confertus* (Brush Box) and *Tristaniopsis* spp (Water Gum) with small trees in the sub-canopy including *Streblus* spp, *Pittosporum undulatum*, *Trochocarpa laurina* (Tree Heath) and *Notelaea longifolia* (Large Mock-Olive) (Floyd 1990). It is associated with poorer soils derived from sedimentary rocks sometimes enriched by basaltic or doleritic rocks, seasonally dry gullies or on very shallow and dry soils over rocks on hillsides (Floyd 1990).

Wet Sclerophyll Forest

Area 3 (see *Photograph 4.2*) to the west and south of the Brushbox dominated rainforest (*Area 2*) is mapped as Wet Sclerophyll Forest (see *Figure 3.1*). This community was dominated by emergent canopy species *Corymbia intermedia* (Pink Bloodwood) (up to 20 m in height) and Lilly Pilly (up to 15 m in height) in the upper stratum and midstorey. Native grasses and herbs dominated the ground layer and dense leaf litter covered the forest floor. Vegetation cover in this community was less dense in comparison with *Area 1* and *Area 2* with drier soils and fewer Elkhorns and Bird's Nest Ferns present.



Photograph 4.2 *Area 3 Wet Sclerophyll Forest*

As previously discussed, this area could also be described as an ecotone (transition zone) between Rainforest and the regenerating Pink Bloodwood Woodland.

Regenerating Pink Bloodwood / Forest Oak Woodland

Within the *Southern Section* of the *Project Area* there are scattered stands of regenerating woodland (refer *Photograph 4.3*) within the highly modified area of the motocross track (see *Figure 3.1*). These areas have recently been cleared of some regrowth and consist of a number of remnant *Allocasuarina torulosa* (Forest Oak) and Pink Bloodwood trees in the upper canopy layer with regenerating native and exotic species in the lower storey. Dominant regenerating native species included *Lomandra longifolia* (Spiny-headed Mat-rush), *Imperata cylindrica* (Blady Grass) and *Pteridium esculentum* (Bracken). These were intertwined with exotic species such as *Lantana camara* (Lantana), *Cinnamomum camphora* (Camphor Laurel) and *Acacia saligna* (Golden Wreath Wattle). Rocky outcrops and stockpiled cleared vegetation was scattered throughout.



Photograph 4.3 Disturbed Regenerating Pink Bloodwood/Forest Oak Woodland

Grassland

Grassland in the *Project Area* was dominated by a variety of pasture grasses (refer *Photograph 4.4*), including *Setaria spp.* (Pigeon Grass) and *Pennisetum clandestinum* (Kikuyu), and herbaceous weeds, including *Conyza bonariensis* (Flaxleaf Fleabane) and *Senecio madagascariensis* (Fireweed). Remnant native and exotic trees including Pink Bloodwood and Mango trees were scattered throughout. These areas are currently maintained via a mixture of mowing, cattle grazing and pasture improvement.



Photograph 4.4 View toward Southern Section showing Grassland

4.1.3 *Endangered Ecological Communities*

A number of EECs have been identified as potentially occurring within the *Lismore 1:100,000 Map Sheet* (DECCW, 2009a). These EECs are listed in *Table 4.1*.

Table 4.1 Database Search Results for Endangered Ecological Communities

Endangered Ecological Communities	Bioregions
Byron Bay Dwarf Graminoid Clay Heath Community	-
Coastal Saltmarsh	NSW North Coast, Sydney Basin and South East Corner
Freshwater Wetlands on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
Hunter Lowland Redgum Forest	Sydney Basin and NSW North Coast Bioregions
Littoral Rainforest	NSW North Coast, Sydney Basin and South East Corner
Lowland Rainforest	NSW North Coast and Sydney Basin
Lowland Rainforest on Floodplain	NSW North Coast
Montane Peatlands and Swamps	New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps
River-Flat Eucalypt Forest on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
Subtropical Coastal Floodplain Forest	NSW North Coast
Swamp Oak Floodplain Forest	NSW North Coast, Sydney Basin and South East Corner
Swamp Sclerophyll Forest on Coastal Floodplains	NSW North Coast, Sydney Basin and South East Corner
Themeda Grassland on Seacliffs and Coastal Headlands	NSW North Coast, Sydney Basin and South East Corner
White Box Yellow Box Blakely's Red Gum Woodland	-

Source: DECCW Atlas Lismore 1:100,000 Map Sheet 9540

Of these communities only the Lowland Rainforest EEC is considered likely to occur on the *Project Site*.

The rainforest communities identified on the *Project Site* are considered to be representative of Lowland Rainforest EEC based on consideration of affinity of the two areas to suballiances identified in the Scientific Committee determination. Scientific Committee describe Lowland Rainforest EEC as subtropical rainforest and some related forms of dry rainforest, excluding Littoral Rainforest and Lowland Rainforest on the floodplains. In a relatively undisturbed state Lowland Rainforest has a closed canopy characterised by a high diversity of trees including emergents, canopy and sub-canopy. Scattered eucalypt emergents may include *Eucalyptus grandis* or *E. saligna*. There is a range of plant forms including palms, vines and epiphytes. It is associated with a range of high nutrient substrates including basalt and fine-grained sedimentary rocks. In the north of its range Lowland Rainforest is found up to 600 metres above sea level.

Area 1 is a dry rainforest community dominated by *Araucaria cunninghamii* (Hoop Pine) in the upper and lower strata and occurs in a gully on steep slopes strewn with large boulders. This community is representative of *Araucaria cunninghamii* suballiance 21 dry rainforest as described by Floyd (1990) which is one of the principal suballiances defining the Lowland Rainforest EEC.

The *Area 2* rainforest community dominated by *Lophostemon confertus* (Brush Box) may be representative of *Backhousia myrtifolia* – *Lophostemon confertus* – *Tristaniopsis* spp suballiance 29 as described by Floyd (1990) based on species composition and occurrence (see *Section 4.1.2*).

The Rainforest community is largely external to the proposed quarry area excepting a small area to be disturbed within the *Central Section* (see *Figure 3.1*). As previously noted this small section is divided by a farm access road and no Hoop Pine occur within the *Project Area*. A buffer area will be managed between the retained rainforest community and the proposed quarry.

An assessment of this community has been undertaken in accordance with the requirements of the TSC Act.

The Regenerating Pink Bloodwood/Forest Oak Woodland was assessed as not being representative of the Subtropical Coastal Floodplain Forest EEC. While it does support some scattered examples of the species that typically occur within this EEC (i.e. Pink Bloodwood with Forest Oak in the sub-canopy layers and *Imperata cylindrica* in the ground layer) the community on-site is associated with upper slopes and ridgeline and is not associated with clay-loams and sandy loams on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains as described in the Scientific Committee determination. It is noted that this area has been highly modified by the motocross track operation which commenced in the 1960's with sections of the track, vehicle access tracks and remnant infrastructure dispersed throughout this remnant stand of vegetation.

4.2

FAUNA

All fauna species identified within or on land adjacent to the *Project Area* are listed in *Annex D*. A total of 15 bird, 10 mammal, and one amphibian species were recorded. Of these species three were exotic.

Most of those species recorded in the *Project Area* are common and widespread species across similar environs. However, three threatened species were recorded in habitats adjacent to the *Project Area* - *Pteropus poliocephalus* (Grey-headed Flying-fox), *Myotis macropus* (Large-footed Myotis) and *Phascolarctos cinereus* (Koala) (see *Figure 3.1*). There is also an unconfirmed record of a bat species detected from Anabat surveys (refer

Section 4.2.3). These species are discussed further within Sections 4.2.2, 4.2.3 and Chapter 5 of this report.

4.2.1 *Fauna Habitat*

Field investigations at the time of the assessment revealed that potentially suitable fauna habitat exists in the *Project Area* in the form of:

- fallen hollow logs;
- lantana thickets;
- intermittent ponds and drainage channels; and
- rocky outcrops and overhangs.

Vegetation in the *Project Area* was limited and highly disturbed as a result of past clearing, grazing and weed invasion. The vegetation in the proposed quarry area is predominantly regrowth and there is a high percentage cover of introduced species.

The Pink Bloodwoods are up to 20 m in height and provide few hollows that may provide shelter and/or roosting sites for hollow-dependent fauna.

Allocasuarina torulosa (Forest Oak) in the regenerating woodland could provide a foraging resource for a number of birds in particular cockatoos. However, no evidence of use of the trees for foraging (i.e. crushed cones) were evident during the filed assessment. The higher slopes are characterised by rocky outcrops that may provide habitat for a range of reptiles.

Lantana camara (Lantana) thickets in the *Project Area* have the potential to provide suboptimal habitat for common small bird species. Small insectivorous bird species such as *Malurus cyaneus* (Superb Fairy-wren) may use dense shrubby species such as Lantana for shelter and foraging.

Habitats in the *Project Area* are connected to or in close proximity to higher quality areas of vegetation to the west and south west of the *Project Area*. The areas of Dry Rainforest (*Area 2*) and Wet Sclerophyll Forest (*Area 3*) to the west and south west of the proposed quarry are bisected by an intermittent drainage channel flanked by rocky slopes and supports a variety of rainforest species including Lilly Pilly to varying heights. This area provides foraging habitat for a range of species and also has the potential to provide roosting and breeding habitat in the form of hollow logs and trees; rocky outcrops and overhangs, and dense foliage for these species. As discussed in Section 4.2.3 a recent inspection of all rocky overhangs found one potential bat habitat location.

Areas 1, 2 and 3 will be retained and enhanced through ongoing management including revegetation of cleared areas as part of the proposal (refer Section 6.3).

Rocky slopes and outcrops associated with the Dry Rainforest and Wet Sclerophyll Forest to the west and southwest of the *Project Area* also have the potential to provide suitable habitat for shelter and basking for a variety of reptile species including *Morelia spilota* (Diamond Python) which is known to occur in the locality (Baverstock, 2005a). Further assessment of potential reptile habitat within the *Project Area* is to be undertaken prior to the granting of consent.

4.2.2 *Koala Habitat*

The Lismore City Council (LCC) State of the Environment Report (2004) shows vegetation on and adjacent to the *Project Area* mapped as Primary Koala Habitat. However, subsequent ground truthing of the area has identified that this area had been incorrectly mapped as such (Baverstock, 2007 – refer *Annex B*).

Site investigations undertaken by ERM have identified vegetation within the *Project Area* as Dry Rainforest, Wet Sclerophyll Forest and scattered regenerating Pink Bloodwood/Forest Oak Woodland (see *Figure 3.1*). Trees identified with the vegetation are not listed as Koala feed trees in *Schedule 2* of SEPP 44 and accordingly vegetation in the *Project Area* is not identified as *potential* Koala habitat as defined by SEPP 44. Further no evidence of Koala occupation was noted during field inspections within the *Project Area* and contiguous rainforest and Wet Sclerophyll Forest habitat.

Within the locality, the majority of Koala records occur in the Tucki district to the north through to Tuckurimba. Tucki Tucki Nature Reserve (northern portion) was conserved in 1963, planted and is managed to provide habitat for the Koala.

Koalas were identified during site inspections to the north east of the *Project Area* along Hazelmount Lane. Vegetation in these areas consists of preferred Koala habitat such as *Eucalyptus tereticornis* (Forest Red Gum) and *Melaleuca quinquenervia* (Broad-leaved Paperbark). Baverstock (2008) reports, that, Koalas are frequently encountered along Hazelmount Lane, which was planted some 20 years ago and has been managed by the proponent.

It is unlikely that the Koalas observed along Hazelmount Lane would utilise habitats within the *Project Area* as a feeding resource given the absence of Koala feed trees. However, it is possible that Koalas may traverse lower lying land to the east of the *Project Area* within the *Project Site*, in order to move between feeding areas within and between Koala territories. During a recent site inspection undertaken by ERM a total of six Koala's were observed (from a moving vehicle) to be occupying trees along Hazelmount Lane external to the *Project Site*.

4.2.3

Threatened Fauna Species

A search of the DECCW Atlas of NSW Wildlife database (DECCW, 2009a) revealed that 31 threatened fauna species had previously been recorded within the locality (i.e. within a 10km radius of the *Project Area*) being 19 birds, 13 mammals, a frog and a beetle (see *Table 3.1*) of which 10 species have been recorded within five kilometres of the *Project Area* (see *Table 3.1*).

An online search of MNES identified that 13 threatened fauna species are predicted to occur in the locality being two amphibians, six birds, one reptile and four mammals (see *Table 3.1*).

The likelihood of these species utilising or inhabiting the *Project Area* was assessed by comparing known habitat requirements with habitat present on the site (see *Annex A, Table A.1*).

The habitat assessment showed that the following threatened fauna species had a moderate likelihood of utilising or inhabiting the *Project Area* and contiguous habitats:

- *Calyptorhynchus lathami* (Glossy Black Cockatoo);
- *Ptilinopus magnificus* (Wompoo Fruit-Dove);
- *Ptilinopus regina* (Rose-crowned Fruit-Dove);
- *Miniopterus australis* (Little Bentwing-bat);
- *Nyctophilus bifax* (Eastern Long-eared Bat);
- *Phascolarctos cinereus* (Koala); and
- *Pteropus poliocephalus* (Grey-headed Flying Fox).

Targeted site surveys by ERM identified that the Grey-headed Flying Fox utilise vegetation in areas adjacent to the *Project Area* (see *Figure 3.1*), while Koala would utilise vegetation within the wider *Project Site*. It is possible that Koala may on occasion traverse the *Project Area*, however given that no feed and/or core habitat tree species exist within the *Project Area* or the immediate surrounds this is likely to be a rare occurrence.

Potential *Nuras atlas* habitat is not considered to be present within the *Project Area*, but there may be potential for it to occur within the remnant rainforest area adjoining the *Project Area*. This species was not targeted during the field activities. *N. atlas* is discussed further in *Section 5.4*.

These species are listed as Vulnerable under the *TSC Act* and the Grey-headed Flying Fox is also listed as Vulnerable under the *EPBC Act*.

Analysis of ultrasonic bat detection (Anabat) data by Glenn Hoye of Fly By Night Bat Surveys, revealed a recording of a species of *Nyctophilus sp.* (Long-

eared Bat). There are two species of this genus known to occur within the locality: the *N. bifax* (Eastern Long-eared Bat) which is listed as Vulnerable under the *TSC Act*; and *N. gouldi* (Gould's Long-eared Bat) (not listed). Call characteristics of these species almost completely overlap making them indistinguishable using standard Anabat parameters (Pennay, Law & Reinhold, 2004). It is noted that *Nyctophilus* species do not roost in caves, rather in hollows and under bark. Anabat call detection also identified *Myotis macropus* syn *M. adversus* (Large-footed Myotis) as occurring in the *Project Area*.

The precautionary approach has been adopted for the purpose of this assessment and the Eastern Long-eared Bat has been included in the impact assessment (*Section 5*) to identify any potential impacts on that species associated with the proposal.

An inspection of all sandstone rock overhangs within the *Area 1* and *Area 2* was recently undertaken by ERM on 13 November 2009. The majority of the overhangs were observed to be either two small (i.e. low, shallow) and/or exposed to be considered potential bat habitat. One larger and deeper overhang located in *Area 2*, in the vicinity of where the original Anabat survey was conducted, was inspected and found to contain a significant amount of scat material. The scat material appears to possibly be that of an insect eating Microbat species, however this is being confirmed. It should be noted that the inspection occurred during daylight hours and no bats were observed utilising this potential habitat at the time. The scat material has been sent for analysis, however the results were not available at the time of completion of this report.

Cave roosting microchiropteran species known to occur in the region include *Miopterus australis*, *Miniopterus schreibersii oceansis* and *Myotis macropus*. All three of these species may utilise this habitat resource. In terms of abundance in the region, *M. australis* would normally be considered the most likely. However, as previously discussed Anabat call detection also identified *Myotis macropus* syn *M. adversus* (Large-footed Myotis – see *Photograph 4.5*) as occurring in the *Project Area*. It is proposed that further investigation to attempt to confirm the species of bat utilising the overhang site will be undertaken prior to consent using methods as described in the DECCW (2004) draft *Threatened Species Survey and Assessment* guidelines.



Photograph 4.5 Large-footed Myotis - Wildlife Images (Pavel German© Wildlife Images)

4.2.4 Migratory Birds

A total of 14 migratory terrestrial, wetland and/or marine bird species listed under the *EPBC Act* were identified on the DEWHA database search as potentially occurring within the locality (i.e. within a 10km radius of the *Project Area*) of the site. (see *Table 4.2*).

Table 4.2 *Migratory Species Predicted to occur in the Locality*

Scientific Name	Common Name	Status EPBC Act
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory Marine
<i>Ardea alba</i>	Great Egret, White Egret	Migratory Wetland, Migratory Marine
<i>Ardea ibis</i>	Cattle Egret	Migratory Wetland, Migratory Marine
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig Parrot, Double-eyed Fig-parrot	Migratory Terrestrial, Endangered
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Migratory Wetland
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	Migratory Terrestrial
<i>Hirundapus caudacutus</i>	White-throated Needletail	Migratory Terrestrial
<i>Merops ornatus</i>	Rainbow Bee-eater	Migratory Terrestrial
<i>Monarcha melanopsis</i>	Black-faced Monarch	Migratory Terrestrial
<i>Monarcha trivirgatus</i>	Spectacled Monarch	Migratory Terrestrial
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Migratory Terrestrial
<i>Rhipidura rufifrons</i>	Rufous Fantail	Migratory Terrestrial
<i>Rostratula benghalensis s. lat</i>	Painted Snipe	Migratory Wetland, Vulnerable
<i>Xanthomyza phrygia</i>	Regent Honeyeater	Migratory Terrestrial, Endangered

Source: DEWHA Online database search

Many of these migratory species utilise habitat in the vicinity of wetlands or rivers, but some species, in particular the migratory terrestrial birds, also have the potential to utilise woodland and rainforest habitats and may occur in open habitats or urban areas during migration. The *Project Site* has the potential to provide foraging habitat for some of the terrestrial migratory birds, especially as a 'stepping stone' during migration in particular the Rufous Fantail, Spectacled Monarch and Satin Flycatcher. However, habitats within the *Project Area* are unlikely to provide significant feeding or breeding resources for these species due to level of disturbance and the small area of remnant vegetation. Those migratory species that are also listed as threatened (Coxen's Fig Parrot, Painted Snipe and Regent Honeyeater) have all been considered to have low likelihood or are unlikely to occur in the *Project Area* (see *Annex A, Table A.1*).

The most significant ecological impact of a quarrying operation is vegetation clearing and land surface disturbance. The following section predicts the impacts of the proposed quarry operation on flora and fauna.

5.1 FLORA

5.1.1 Clearing

For the purpose of this assessment it is assumed that all remaining vegetation within the *Project Area*, being the operational quarry footprint, will be removed. The proposed quarrying operation will clear an area of 16 ha comprising approximately 14.4 ha of grazing grassland, 0.44 ha of wet sclerophyll forest, 0.95 ha of highly modified regenerating Pink Bloodwood/Forest Oak Woodland and 0.18 ha of regrowth buffering Dry Rainforest (see *Figure 3.1*). A number of other scattered trees will also be removed from across the *Project Area*. Vegetation clearance will occur over the life of the project (25 years). It is proposed that quarrying operations would occur concurrently in three separate three hectare cells. Operations are proposed to continue in the *Central Section*, and commence in the *Southern Section* starting from the western edge and moving east.

Upon completion of extraction in the *Central Section* this area will be used for processing of material and would therefore not be completely rehabilitated until completion of total extraction from the *Project Area*. In the *Southern Section*, upon completion of extraction operation within each three hectare cell, rehabilitation will be undertaken progressively.

Approximately 0.07ha of regrowth (refer *Photograph 5.1*) buffering the Hoop Pine that is dominated Dry Rainforest in *Area 1* will be cleared within the *Central Section* of the *Project Area* (see *Figure 3.1*). The area proposed for disturbance is divided by an existing farm road and regrowth dominated by *Acacia* sp. with introduced species such as *Cinnamomum camphora* (Camphor Laurel) and *Ligustrum* sp. (Privet) with *Lantana camara* (Lantana) (Baverstock 2005a). The area proposed to be cleared does not support any Hoop Pines. Quarry operations will not clear any established Hoop Pine and/or the core area of Dry Rainforest with 1.5 ha of this area of Dry Rainforest to be avoided and managed. In addition, 2.28 ha of Dry Rainforest (*Area 2*) will also be avoided and managed.



Photograph 5.1 *Regrowth on Edge of Dry Rainforest (Area 1)*

To the south east of the Dry Rainforest *Area 1* an area estimated to be less than 0.05 ha of regenerating Pink Bloodwood/Forest Oak Woodland (refer *Photograph 5.2*) will be cleared in the *Southern Section* of the quarry (see *Figure 3.1*). This transitional vegetation community was highly disturbed, contains a number of exotic species, and provided minimal suitable habitat or conservation value for threatened flora and fauna species.



Photograph 5.2 *Disturbed Regenerating Pink Bloodwood/Forest Oak Woodland (Area 1)*

An area estimated to be less than 0.4 ha of regenerating Pink Bloodwood/Forest Oak (refer *Photograph 5.3*) located uphill east of the Motocross Track would also be cleared in the *Southern Section* of the *Project Area*. This area has been significantly disturbed by past land uses.

An area of approximately 0.23 ha of regenerating Wet Sclerophyll Forest (refer *Photograph 5.3*) uphill of the Motocross track will be partially cleared within the *Southern Section* of the *Project Area*. The stand of Wet Sclerophyll Forest immediately to the west of the *Southern Section* will not be cleared and this area (approximately 2.8 ha) will be avoided and managed, including revegetation of cleared areas. While this area has connectivity with the *Area 2* Dry Rainforest, the conservation value of the Wet Sclerophyll Forest is reduced by being narrow (approximately 50 m wide) and is subjected to a high degree of edge effects in particular weed invasion. As discussed above the eastern portion only of this area is to be cleared.



Photograph 5.3 Regenerating Forest (Area 2)

Annex C contains recent survey information undertaken for the area of Wet Sclerophyll Forest uphill of the motocross track (shown as *Area 1* in the survey figure), and the regrowth buffering the Hoop Pine in *Area 1* (shown as divided *Area's 2* and *3* in the survey figure). It also contains a site figure and log of mature trees located within the *Project Area* that are earmarked for removal. In total, in the order of 134 mature native trees of various species are to be removed, including those connected to larger stands of vegetation and those scattered across the *Project Area*. This equates to less than 1.5 ha in total vegetation removal in terms of the more dense stands of vegetation.

The limits of all clearing to be undertaken within the *Project Area* will be clearly identified in the field by demarcation and all future quarrying activities will be excluded from native vegetation area that are proposed to be retained.

5.1.2 *Indirect Impacts*

The removal of contiguous vegetation will result in an increase in exposure to edge effects for retained vegetation adjoining the quarry footprint. Associated

with edge effects is an increase in light penetration, microclimate changes and weed invasion. It should be noted that given the past disturbances and currently high edge ratio for all of these remnants this impact is restricted to the interface between *Area 1* Dry Rainforest and regenerating Pink Bloodwood/Forest Oak in the north west of the *Southern Section*. Wet Sclerophyll Forest will be retained between the quarry footprint and Dry Rainforest *Area 2* limiting edge effect impacts on the rainforest. Boundaries will be defined and managed between the quarry and all retained vegetation. Revegetation areas are also proposed (as discussed in *Section 6.3*) that are directly associated with *Area's 1, 2, and 3* that improve the connectivity and reduce the potential for edge effects.

5.2 *IMPACTS TO FAUNA HABITAT*

5.2.1 *Loss of Habitat*

The vegetation clearing described in *Section 5.1.1*, will have minimal associated impacts on fauna with loss of foraging, shelter and breeding habitat for a range of native species.

Vegetation within the footprint is predominantly Grassland with minor regenerating Pink Bloodwood/Forest Oak Woodland. These vegetation communities are highly disturbed and provided minimal suitable habitat for local native species or conservation value for threatened flora and fauna species. The regenerating Pink Bloodwood/Forest Oak Woodland occurs on a slope supporting some areas of rocky outcrops that would be expected to provide habitat for reptiles.

A small area of Wet Sclerophyll Forest occurs along the south-west boundary of the *Project Area* adjacent to the motocross track. This area of vegetation has the potential to provide suitable foraging habitat for threatened fauna species. However, it is considered unlikely that the majority of species would utilise these areas within the *Project Area* as a roosting or breeding site given the limited availability of hollow-bearing trees, narrow width of the vegetation and the high degree of edge effects in particular weed invasion which has altered the floristic and habitat structure. The Rainforest and Wet Sclerophyll Forest to the west of the *Project Area* provides a larger remnant of suitable habitat with relatively less edge effects, and presence of rocky outcrops and overhangs. These factors increase the habitat value of these areas of remnant vegetation.

A small area of vegetation mapped as Dry Rainforest currently occurs within the proposed quarry footprint (the eastern edge of *Area 1*), which is connected to a larger area of Dry Rainforest. This area has previously been mapped as Coastal Valley Grassy Woodland (LCC 2008, see *Annex C*) and is described as regrowth vegetation with Lantana and Golden Wreath Wattle and Hoop Pine

dominating the overstorey (Baverstock, 2005a & 2005b – refer *Annex B*). The area to be cleared does not contain any established Hoop Pine.

These areas will be preserved and managed, including revegetation efforts to reduce edge effects, improve connectivity between the existing vegetation stands and provide biodiversity off-set for the vegetation to be removed.

Lantana thickets have the potential to provide suboptimal habitat for common small bird species. Small insectivorous bird species such as *Malurus cyaneus* (Superb Fairy-wren) may use dense shrubby species such as Lantana for shelter and foraging.

Rocky slopes and outcrops on the site have the potential to provide suitable habitat for shelter and basking for a variety of reptile species including *Morelia spilota* (Diamond Python) which is known to occur in the locality (Baverstock, 2005a – refer *Annex B*). No rocky overhangs occur within the *Project Area*, and those contained within *Area's 1* and *2* are to be retained.

5.2.2 *Habitat Connectivity*

Habitats in the *Project Area* are limited and highly disturbed as a result of historical clearing and weed invasion. These habitats are contiguous with Dry Rainforest and/or Wet Sclerophyll Forest to the west of the proposed quarry footprint. There is no connectivity with remnant and or regenerating vegetation to the north or east of the proposed quarry area (see *Figure 3.1*).

Remnant vegetation on low lying land to the east of the proposed quarry area is continuous with Coastal Swamp Forest and Coastal Floodplain Forest as mapped by Council (see *Annex C*) through to remnant habitat and plantings along Hazelmount Lane. Within the immediate area (less than two kilometre radius of the *Project Area*) continuity of habitats appear to be largely associated with the linkage in the floodplain corridor associated with the low lying land to the east of *Project Area*. The proposed quarry will not impact on habitat corridors in low lying land to the east of the quarry.

The Rainforest and Wet Sclerophyll Forest form part of a fragmented corridor along Wyrallah Road that may provide 'stepping stones' for highly mobile species such as birds and bats. Terrestrial fauna need to traverse open land between the fragmented habitats and are at these points vulnerable to predation and potential conflict with vehicles along Wyrallah Road and property access roads. The proposed quarry operation will reduce the eastern extent of the fragment however a large area of the remnant will be retained thereby retaining this 'stepping stone' in the fragmented habitat corridor along Wyrallah Road. In addition, revegetation to be undertaken as part of the proposal will significantly improve the connectivity between these vegetation stands (refer to *Biodiversity Off-sets* in *Section 6.2*).

An increase in traffic along the access road to the quarry will occur during daylight operating hours (7.00am and 5.30pm weekdays and 7.30am and

3.30pm Saturdays) with some minor potential for conflict with terrestrial fauna moving across the road in particular in early morning and evening. It is noted that no Koala feed trees are established in this area or are proposed to be planted as part of amenity screening along the road.

It is possible that Koalas may traverse lower lying land to the east of the *Project Area* and to the north of the *Project Area* within the *Project Site*, in order to move between feeding areas within and between Koala territories in these areas. However it is unlikely that Koala observed along Hazelmount Lane would utilise habitats within the *Project Area* as a feeding resource given the absence of Koala feed trees. The proposed quarry operation will not impact directly or indirectly on Koala habitat and/or movement between territories on low lying land in the east of the *Project Site* or across the northern end of the *Project Site*.

There is likely to be only limited potential for conflict between trucks and Koalas along the access road to the quarry. However, restriction on vehicular speed and planting of shrubs and/or tree species not favoured by Koalas is proposed to discourage Koalas using the visual screening planting in the area of the access road and to the south along Wyrallah Road. In addition, all site workers and haulage transporters will receive training with regard to on-site speed regulations, and steps to be undertaken should any injured wildlife be encountered. Further detail will be provided in the final Quarry Plan of Management prior to commencement of expansion works.

5.3 *IMPACTS TO WATER RESOURCES*

The site lies within the headwaters of 1st order ephemeral tributaries of the low lying flood plain and Tucki Tucki Creek. The catchment is characterised by undulating topography to the west draining toward flat country to the east. The *Project Area* generally drains to the northeast towards the Tucki Tucki Creek, located approximately 3 km from the eastern boundary of the *Project Area* (ERM 2009a). The operation of the proposed quarry is unlikely to result in increased sediment loads or acidity in the Tucki Tucki Creek as all water will be adequately treated in settling ponds before leaving the *Project Area*. Therefore, impacts from quarry operations to aquatic biota and abiotic environments in the locality are considered unlikely.

It is assumed that shallow perched groundwater generally follows the landform and flows in an east to north easterly direction towards the low lying flood plain (ERM 2009a). Given the location of the site within the upper reaches of the catchment, and the limited area to be disturbed for the quarry operations, it is unlikely that the quarry will cause significant changes to the environmental flows in the tributaries or Tucki Tucki Creek. In addition, the quarry is not expected to intercept the groundwater table and the quarry operators will ensure that the regional aquifer beneath the site in the southern section will not be intercepted (ERM 2009a). Therefore, the proposal is not

likely to result in significant impact to groundwater dependant ecosystems or other types of remnant native vegetation in the locality.

5.4 NOISE, VIBRATION AND LIGHTING ISSUES

The proposed quarry will only operate during the day (i.e. between 7am and 5.30pm). No blasting activities are proposed throughout the operation of the extended quarry. The primary source of noise will be from the operation of plant, equipment and haul trucks. The truck movements will be restricted to between 7.00am and 5.30pm weekdays and 7.30am and 3.00pm Saturdays. In addition, mitigation measure such as limiting the speed of haul trucks to 30km/h and prohibiting compression braking are recommended (ERM 2009b).

Potential noise and lighting impacts associated with the quarry operations are not considered to represent a significant level of disturbance to nocturnal native fauna.

Given that blasting activities are not proposed, it is considered unlikely that nocturnal fauna potentially roosting during the day in nearby vegetation (such as owls or bats) will be significantly disturbed. The proposed push and rip quarrying methods are not expected to result in significant vibration impacts to adjoining areas including the retained vegetation stands. The use of a rock hammer is not expected to be undertaken until at depth within the quarry, and given the absorptive nature of the softer sandstone (in comparison to hard rock such as basalt) vibration impacts are not expected to be significant. It is again noted that there is an existing operational quarry on the site, a regularly used and long-term operational motocross and the *Project Area* is in close proximity to Wyrallah Road.

The one location in *Area 2* where a potential bat roosting site was indentified is within close proximity to the motocross track, which has been in use since the 1960's and also to Wyrallah Road. If, as suspected, this bat is identified to be *Myotis macropus* syn *M. adversus*, this species would not be expected to be adversely effected as it is known to commonly roost in road culverts and other similar noisy and high vibration locations.

Recent communication from the DECCW (Letter: Geff Cramb, October 2009, DECCW Ref: DOC09/47647;FIL08/16580-06) has identified that the threatened invertebrate species *Nurus atlas* (see *Plate 10*) has the potential to occur in rainforest areas within the *Project Site*. *N.atlas* was historically widespread in heavily timbered high rainfall areas east of the Great Dividing Range on the north coast of NSW. *Nurus atlas* had not been seen for many years and was thought to be extinct up until 1973 when it was re-discovered by G. Monteith in Victoria Park, near Lismore. The only other known locations for *N. atlas* are near Lismore and Alstonville (DECCW 2009b).



Photograph 5.4 Atlas Rainforest Ground-beetle (Geoff Thompson © DECCW)

Given the small size and fragmented nature of the remnant rainforest vegetation stands in *Area's 1* and *2* adjoining the *Project Area*, it is considered unlikely that *N. atlas* would be present on-site due to the inherent difficulty for small isolated population to survive. The proponent will however undertake to further investigate the potential presence of *N. atlas* prior to gaining consent. It is noted that *Area's 1* and *2* are to be retained and managed and vibration impacts are not expected.

5.5 POTENTIAL EFFECTS OF THE PROPOSAL ON THREATENED SPECIES

Under Part 3A of the EP&A Act the impact of the proposal on threatened species, populations or ecological communities or their habitats is considered against the Guidelines for Threatened Species Assessment in particular Appendix 3 (DEC & DPI 2005).

This section considers the impact of the proposal on threatened species identified in *Table A.1* in Annex A as occurring or having a high likelihood of occurrence in habitats in the *Project Area* that may be impacted by the proposal:

- *Calyptorhynchus lathami* (Glossy Black Cockatoo);
- *Ptilinopus magnificus* (Wompoo Fruit Dove);
- *Ptilinopus regina* (Rose-crowned Fruit Dove);
- *Miniopterus australis* (Little Bentwing-bat);

- *Myotis macropus* syn *M. adversus* (Large-footed Myotis);
- *Nyctophilus bifax* (Eastern Long-eared Bat);
- *Phascolarctos cinereus* (Koala);
- *Pteropus poliocephalus* (Grey-headed Flying Fox);
- *Nurus atlas* (Atlas Rainforest Ground-beetle)
- *Desmodium acanthocladium* (Thorny Pea);
- *Gossia fragrantissima* (Sweet Myrtle);
- *Marsdenia longiloba* (Slender Marsdenia); and
- Lowland Rainforest EEC.

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

Impacts to the lifecycles of local populations of threatened species include disruptions to breeding cycles, roosting behaviour, foraging behaviour, as well as affects on migration or dispersal, pollination cycles and seed bank stores.

Glossy Black Cockatoo

The Glossy Black Cockatoo inhabits open forests and woodland of the coast and Great Dividing Range, feeding almost exclusively on stands of She-oak species, particularly Black She-oak (*Allocasuarina littoralis*) and Forest Oak (*Allocasuarina torulosa*). The species also requires large tree hollows in both living and dead trees for nesting (DECC 2005).

Forest Oak trees to 20 m high were identified in the *Project Area* during the field assessment works. However the Glossy Black Cockatoo was not recorded on-site during field investigations. A search of the *Project Area* for indirect evidence of habitation and foraging (e.g. chewed cones) was conducted. Searches were also undertaken to identify any hollows suitable to provide breeding and sheltering habitat for this species. Targeted field surveys did not reveal any evidence of this species inhabiting the *Project Area* and contiguous vegetation.

The lack of suitable available sheltering and breeding habitat may discourage this species from utilising the *Project Area*. Areas directly to the west and south west of the *Project Area*, contain trees with hollows potentially suitable for this species. These areas will not be impacted by the proposed development. Therefore, the proposal is unlikely to disrupt the life cycle of this species.

Rose-crowned Fruit-dove

The Rose-crowned Fruit-dove occurs along the coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south in Victoria. The Rose-crowned Fruit-dove is found mainly in sub-tropical and dry rainforest and occasionally in moist *Eucalypt* forest and swamp forest, where fruit is plentiful. Fruit-doves feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits.

The Rose-crowned Fruit-dove breeds between November and April, and nests on a platform of twigs located low in vines or other understorey vegetation (Pizzey & Knight 2003).

While the Rose-crowned Fruit-dove has been recorded within the locality (see *Table 3.1*) no individuals of the Rose-crowned Fruit-dove were recorded on site and there are few records (one) within five kilometres of the *Project Area*. The Rose-crowned Fruit-dove may forage in the 3.99 ha of Dry Rainforest habitat within and adjoining the *Project Area*. The proposed quarry will remove a small area (0.18 ha) of potential foraging habitat associated with the Camphor Laurels on the edge of the core area of Dry Rainforest to the west of the *Project Area*. Approximately 3.8 ha of Dry Rainforest adjoining the *Project Area* will be protected and managed to provide potential seasonal habitat for frugivores such that the loss of a small area of potential foraging habitat is unlikely to affect the lifecycle of this species.

Wompoo Fruit-dove

The Wompoo Fruit-dove occurs along the coast and ranges from the Hunter River in NSW to Cape York Peninsula. It is rare south of Coffs Harbour. The species occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests and is most often seen in mature forests, although it is also found in remnant and regenerating rainforest. The Wompoo Fruit-dove feeds on a diverse range of tree and vine fruits and is locally nomadic as it follows the ripening fruit.

The Wompoo Fruit-dove breeds between October and February (Pizzey and Knight 2003). Its' nest is a typical pigeon nest, a flimsy platform of sticks on a thin branch or a palm frond, often over water and usually three to 10 m above the ground.

While the Wompoo Fruit-dove has been recorded within the locality (see *Table 3.1*) no individuals of the Wompoo Fruit-dove were recorded on site and there are few records (three) within five kilometres of the *Project Area*. Wet Sclerophyll Forest and the area of regrowth Dry Rainforest in the *Project Area* may provide marginal foraging resource however given the disturbed nature of the habitat are unlikely to provide nesting habitat as described above. The proposed clearance of disturbed and/or are regenerating foraging habitat is unlikely to affect the lifecycle of the Wompoo Fruit-dove. Protection and management of more intact stands of Brush Box dominated rainforest in

Area 2, and Wet Sclerophyll Forest to the west of the quarry will ensure that potential seasonal foraging habitat continues to be provided within the locality.

Eastern Long-eared Bat

The Eastern Long-eared Bat is found along the east coast of Australia. In NSW, the species appears to be confined to the coastal plain and nearby coastal ranges, extending south to the Clarence River area, with a few records further south around Coffs Harbour. The Eastern Long-eared Bat is found in lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured.

The Eastern Long-eared Bat has been recorded within the locality (see *Table 3.1*) and limited habitat within the *Project Area* and that within the broader property (*Project Site*) is expected to provide hunting habitat. The Eastern Long-eared Bat roosts in tree hollows, the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark and may roost in habitat in the *Project Site*. Habitats within the *Project Area* have been disturbed and/or regrowth and this may reduce likelihood of this species roosting in the *Project Area*.

An unidentified Long-eared Bat (potentially the Eastern Long-eared Bat) was recorded during Anabat surveys in the area of vegetation directly to the south west of the proposed quarry. While the proposal would result in the removal of a small area of potential hunting and roosting habitat, habitat to the west and south west of the *Project Area* will be protected and managed to improve or maintain habitat as part of the proposal. Measures will be implemented during clearing operations to minimise any impact on any roosting individuals.

The proposal is considered to be unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction.

Little Bentwing-Bat

Little Bentwing-Bat is found in coastal north-eastern NSW and eastern Queensland. It inhabits moist *Eucalypt* forest, rainforest or dense coastal *Banksia* scrub. The Little Bentwing Bat forages for small insects at night beneath the canopy of densely vegetated habitats.

The Little Bentwing-Bat roosts in caves, tunnels and sometimes tree hollows during the day. It gathers in large maternity colonies in Summer and then disperses into smaller colonies after young become independent in March (Menkhorst and Knight 2004).

The Little Bentwing-Bat has been recorded within the locality (see *Table 3.1*) and habitat within the *Project Area* and broader property (*Project Site*) is

expected to provide hunting habitat. The small rocky overhang identified in the Project Site may provide roosting habitat however it is unlikely to provide critical maternity roost or winter hibernation roosts. The absence of preferred roosting habitat on the *Project Area* in the form of caves and tunnels suggests that the proposed development would not disrupt the roosting aspects of the life cycle of this species. The removal of a small area of potential foraging habitat is unlikely to impact on the life-cycle of the Little Bentwing-Bat.

Large-footed Myotis

Myotis macropus formerly *M. adversus* (Large-footed Myotis) generally roost in groups of 10 to 15 individuals close to water in caves, tunnels, under bridges, in hollow-bearing trees and in dense vegetation. They forage for insects and small fish over nearby pools, rivers and large streams. The DECCW online species profiles (DECC, 2005) identifies that in the Northern Rivers CMA the Large-footed Myotis is associated with a range of vegetation formations including dry sclerophyll forest (shrub/grass sub-formation), dry sclerophyll forest (shrubby sub-formation), forested wetlands, freshwater wetlands, grassy woodlands, heathlands, rainforest, saline wetlands, wet sclerophyll forest (shrubby sub-formation) and wet sclerophyll forest (grassy sub-formation).

Calls of the Large-footed Myotis have been recorded in the Dry Rainforest/Wet Sclerophyll Forest habitat to the southwest of the proposed quarry. Habitats within the *Project Area* are fragmented and disturbed. The *Project Area* does not provide hunting habitat, however a potential roosting site in the form of a rocky overhang was identified in *Area 2*. Individuals may also roost in hollow-bearing trees or dense vegetation associated with the Dry Rainforest in *Area 2* or Wet Sclerophyll Forest habitat to the south west of the proposed quarry, foraging along the nearby Tucki Tucki Creek or the Richmond River.

The proposal will not impact on foraging habitat in the locality. The proposal may remove potential roosting habitat in hollow-bearing trees within the Wet Sclerophyll Forest and/or Pink Bloodwood/Forest Oak woodland however potential roosting habitat will be protected and managed in the Dry Rainforest and Wet Sclerophyll Forest to the west and southwest of the proposed quarry. No rocky overhangs are to be removed by quarrying activities and the one identified potential roosting site is to be retained in *Area 2*. Measures will be implemented during clearing operations to minimise any impact on any roosting individuals. Accordingly, the proposal is considered to be unlikely to disrupt the life cycle of these species such that a viable local population would be placed at risk of extinction.

Koala

Phascolarctos cinereus (Koalas) inhabit eucalypt woodlands and forests and feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range

size varies with quality of habitat, ranging from less than two hectares to several hundred hectares in size.

Koala habitat assessment of the *Project Area* identified that the *Project Area* does not constitute *potential* or *core* Koala habitat as defined under SEPP 44 due to the absence of Koala feed trees (see Section 4.2.2). Koalas were identified in areas to the east and north east of the *Project Area* along Hazelmount Lane though no individuals or evidence of Koalas was recorded in the *Project Area* by ERM and Baverstock (see *Annex B*). Given the lack of suitable feed trees the proposed quarry footprint is unlikely to support a socially stable Koala population.

No Koala feed trees (as defined by SEPP 44) will be removed as a result of the proposal. No Koalas were observed within the *Project Area* during the field investigation. It is however noted that individuals may move across the broader land holding (*Project Site*) within and between territories to the north and east of the proposed quarry. Measures will be taken to ensure that all trees are inspected prior to felling and that any trees are felled inwards (towards the cleared areas) so as to prevent damage to nearby vegetation. Implementation of the measures as discussed in *Section 5.2.2* and *Section 6.2* will minimise the potential traffic impacts. It is noted that the proposal includes the planting of in excess of 1 ha of Koala feed and habitat trees along the Northern boundary of the *Project Site*.

Accordingly, the proposal is unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction. The inclusion of targeted planting of Koala feed and Habitat trees as proposed would be expected to enhance the life cycle of this species.

Grey-Headed Flying Fox

The Grey-headed Flying Fox has been recorded in the locality (see *Table 3.1*) and was recorded in vegetation directly to the southwest of the proposed quarry during field surveys (see *Figure 3.1*). This species prefers a wide range of habitat generally where there is a nectar source such as *Melaleuca*, *Banksia* and *Eucalyptus* or fruits of native figs and palms (Tidemann 1999). They roost in camps, which are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy. Foraging can occur up to 50 km from the camp site however camps are generally located 20 km from a regular food source (DECC 2005). Potential seasonal foraging habitat for this species exists on site, however is limited given the extent of clearing. Foraging habitat appears to be abundant in the locality.

The Grey-Headed Flying-Fox is sensitive to the loss of camp sites. No roosting camps for this species occur in the *Project Area* or in the contiguous vegetation. Given the absence of a roosting camp within the *Project Area* and *Project Site* and retention of areas of foraging habitat in the Wet Sclerophyll Forest the proposed removal of a small area of potential foraging habitat will not significantly disrupt the life cycle of the Grey-Headed Flying Fox.

Atlas Rainforest Ground-beetle

The Atlas Rainforest Ground-beetle has been recorded in the locality (i.e. 10km radius of the *Project Area*). This species was historically widespread in heavily timbered high rainfall areas east of the Great Dividing Range on the north coast of NSW. It had not been seen for many years and was thought to be extinct up until it was re-discovered in Victoria Park, near Lismore. It prefers low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Other habitat requirements may be relatively undisturbed old-growth forests on highly productive soils and consistently high moisture levels. It is flightless and preys on other ground invertebrates (DECCW, 2009b).

It is threatened by:

- disturbance to rainforest and wet eucalypt forest remnants including cattle grazing, agricultural activities, fire, removal of fallen timber and litter, and desiccation caused by widening of tracks and small scale clearing;
- risk of local extinction due to small isolated populations;
- clearing of rainforest and wet eucalypt forest remnants;
- invasion of habitat by introduced weeds;
- predation by feral and domestic cats.; and
- beetle collecting activities (DECCW 2009b).

While not specifically identified during field investigations it is considered to have a low likelihood of occurring in the Dry Rainforest habitat within the *Project Site* and contiguous vegetation based on the isolated habitat and low number of records in the locality (see *Table 3.1*).

The proposal will clear less than 0.06 ha of Dry Rainforest buffer zone that could arguably provide marginal habitat at best.

The proposal includes retention of potential habitat and management to improve or maintain approximately 3.8 ha habitat (*Area's 1, 2 and 3*) within the *Project Site*. The proponent will commit to undertaking further field assessment in *Area's 1* and *2* prior to gaining consent to investigate the presence or otherwise of this species to better inform management practices within these offset areas. It is noted that the proposed quarry methods are not expected to result in significant vibration or additional noise impact to adjoining areas, which are already subject to noise impacts from Wyrallah Road, the motocross track and the existing quarry operations.

Sweet Myrtle

Gossia fragrantissima syn *Austromyrtus fragrantissima* (Sweet Myrtle) is a shrub/small tree that occurs in north-east NSW, south to the Richmond River where it is mostly found on basalt-derived soils in dry subtropical and riverine rainforest. Sweet Myrtle coppices from roots left in the ground and can also occur as isolated plants in paddocks or as regrowth in areas originally covered by rainforest.

It is threatened by clearing of habitat, modification of and or loss of suitable habitat by weed invasion, risk of extinction due to low numbers, and grazing.

While not identified during the field investigations it is considered to have a moderate likelihood of occurring in the Dry Rainforest habitat in the *Project Area* and contiguous vegetation based on habitat and high number of records in the locality and within five kilometres of the area (see *Table 3.1*). The proposal will clear approximately 0.18 ha of regrowth and weed infested Dry Rainforest in the *Central Section* of the quarry (see *Figure 3.1*) that could provide marginal habitat.

The proposal includes protection and management of approximately 3.8 ha of potential habitat to improve or maintain habitat in the *Project Site* and locality. Given the lack of sightings during field investigations, implementation of preclearance inspections and mitigation measures it is considered that the loss of a small area of marginal habitat is unlikely to impact on the life cycle of Sweet Myrtle.

Thorny Pea

Desmodium acanthocladum (Thorny Pea) only occurs in north-east NSW, mainly in the Lismore area, but there are also records of the species from near Grafton, Coraki, Casino and the Mount Warning area.

The Thorny Pea is a sprawling low shrub that occurs on basalt-derived soils at low elevations, mainly along rivers (Harden 1991). It also occurs in dry rainforest and on the fringes of riverine subtropical rainforest. Much of the habitat for this species has been cleared for agriculture. It is also threatened by modification of and or loss of suitable habitat by weed invasion in particular Lantana and Asparagus, grazing and trampling by cattle.

While not identified during the field investigations it is considered to have a moderate likelihood of occurring in the Dry Rainforest habitat in the *Project Area* and contiguous vegetation based on habitat and high number of records in the locality and within five kilometres of the area (see *Table 3.1*). The proposal will clear approximately 0.18 ha of regrowth and weed infested Dry Rainforest in the *Central Section* of the quarry (see *Figure 3.1*) that would provide marginal habitat. The proposal includes protection and management of approximately 3.8 ha of potential habitat to improve or maintain habitat in the *Project Site* and locality. Given the lack of sightings during field investigations, implementation of preclearance inspections and mitigation measures it is considered that the loss of a small area of marginal habitat is unlikely to impact on the life cycle of the Thorny Pea.

Slender Marsdenia

Marsdenia longiloba (Slender Marsdenia) occurs in subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest and sometimes in areas with rocky outcrops. Slender Marsdenia may occur in the Dry Rainforest and/or Wet Sclerophyll Forest in the *Project Site*. Despite the existence of suitable habitat on the site, targeted field surveys which coincided with its known flowering period did not reveal the presence of this species in the *Project Site*. While it is predicted to occur in the locality there are no records of this species on the DECCW database (see *Table 3.1*) or on the online BioNet website for this species.

Given the highly disturbed nature of habitats within the *Project Area* and the presence of higher quality habitat adjacent to the *Project Area* in the south and south-west, the proposal is unlikely to disrupt the life cycle of this species such that a viable local population would be placed at risk of extinction.

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

The proposed quarrying operation will clear an area of 16 ha comprising approximately 14.4 ha of grazing grassland, 0.44 ha of Wet Sclerophyll Forest, 0.95 ha of Pink Bloodwood/Forest Oak Woodland and 0.18 ha of regrowth buffering Dry Rainforest (see *Figure 3.1*) over the life of the project (25 years).

The proposal will remove a small area of potential habitat for the three threatened flora species that are largely associated with rainforest and/or wet sclerophyll forest.

As discussed in *Section 5.2.1*, associated with this vegetation loss is the loss of fauna habitats including foraging resources and potential roosting habitat. However it should be noted that the majority of the area to be quarried has been disturbed by past clearing, fragmentation, grazing and weed invasion.

Habitats within the *Project Area* and contiguous with the *Project Area* have been identified as providing important habitat for a number of threatened species. The protection and management of the Dry Rainforest and Wet

Sclerophyll Forest contiguous with the proposed quarry area will aim to maintain and improve habitat values of the *Project Site*. Further the proposal will not fragment any habitat corridors within the *Project Site* (see *Section 5.2.2*)

Endangered Ecological Community

As discussed in *Section 4.1.3*, the rainforest communities identified in the *Project Area* are considered to be representative of Lowland Rainforest EEC based on consideration of affinity of the two areas to suballiances identified in the Scientific Committee determination.

The NSW Scientific Committee describes Lowland Rainforest EEC as subtropical rainforest and some related forms of dry rainforest, excluding Littoral Rainforest and Lowland Rainforest on the floodplains. In a relatively undisturbed state Lowland Rainforest has a closed canopy characterised by a high diversity of trees including emergents, canopy and sub-canopy. Scattered eucalypt emergents may include *Eucalyptus grandis* or *E. saligna*. There is a range of plant forms including palms, vines and epiphytes. It is associated with a range of high nutrient substrates including basalt and fine-grained sedimentary rocks. In the north of its range Lowland Rainforest is found up to 600 metres above sea level.

Past clearing of land around the remnants of Lowland Rainforest in the *Project Site* have resulted in fragmentation, weed invasion and reduced or altered floristic diversity, and an increased risk of stochastic events impacting on viability of the remnants.

The core area of the northern remnant of Dry Rainforest in the *Project Site* (*Area 1*) is dominated by *Araucaria cunninghamii* (Hoop Pine) in the upper and lower strata and occurs in a gully on steep slopes strewn with large boulders. This community is representative of *Araucaria cunninghamii* suballiance 21 dry rainforest as described by Floyd (1990) which is one of the principal suballiances defining the Lowland Rainforest EEC. This area of Dry Rainforest covers approximately 1.5 ha of largely introduced species on the outer edge of the rainforest will be cleared. None of the core area of this rainforest remnant will be cleared and management measures will be implemented to avoid and minimise indirect impacts on the core area of the rainforest remnant. This will include preclearance inspections and provision of bushfire prevention measures.

Area 2 rainforest community covers approximately 2.28 ha and is dominated by *Lophostemon confertus* (Brush Box) and may be representative of *Backhousia myrtifolia* – *Lophostemon confertus* – *Tristaniopsis* spp suballiance 29 as described by Floyd (1990) based on species composition and occurrence (see *Section 4.1.2*). This rainforest remnant is external to the proposed quarry area (*Project Area*) and will be protected from direct impacts and managed to maintain or improve habitat value of the rainforest for protected and threatened species. In addition a narrow band of Wet Sclerophyll Forest will be retained and managed between the Rainforest and the *Southern Section*. The proposal is therefore unlikely to affect the habitat of the EEC in the local area.

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

The Thorny Pea is at its northern limit in the Lismore area.

d) How is the proposal likely to affect current disturbance regimes?

Current disturbances affecting the *Project Area* are a result of land use and include fragmentation, grazing pressure, spread of introduced species and clearing. Remnant vegetation is associated with the steeper slopes and higher land within the *Project Site* and is largely fragmented by grazing grassland and subject to increased edge effects and associated weed invasion.

At present there are 33 key threatening processes listed on *Schedule 3* of the *TSC Act*. A number of these key threatening processes currently operate in the *Project Area* including:

- clearing of native vegetation;
- invasion and establishment of exotic vines and scramblers;
- invasion and establishment of the Cane Toad;
- invasion of native plant communities by exotic perennial grasses;
- invasion, establishment and spread of Lantana (*Lantana camara*);
- loss and/or degradation of sites used for hill-topping by butterflies;
- predation by feral cat; and
- predation by the European Red Fox.

The proposed quarry will result in operation of a number of additional key threatening processes in particular removal of bush rock, loss of hollow-bearing trees and removal of dead wood and dead trees, the majority of which are already gone. It should be noted that the areas to be cleared are largely regrowth and have a limited number of hollow-bearing trees, therefore the proposal is unlikely to reduce significantly the availability of this habitat resource. There are currently no significant logs on the existing cleared land.

The proposal will result in removal of 1.5 ha of remnant and regenerating native vegetation. While clearing of vegetation within the quarry footprint has the potential to increase the impact of this key threatened process, clearing has been limited to avoid impacting on the more intact stands of the EEC and adjoining habitat.

Protection and management of the Dry Rainforest and Wet Sclerophyll Forest adjoining the proposed quarry footprint will provide for implementation of measures to reduce current disturbance regimes including fencing to exclude cattle, retention of a buffer area to the quarry and weed management to

reduce impact of invasion and establishment of Lantana, exotic vines and scramblers.

The *Project Area* is located on the upper slopes and ridgeline above the Richmond River floodplain. This area may provide a habitat resource for butterfly species (especially of the families Hesperidae, Papilionidae and Lycaenidae) that appear to be obligatory hill-toppers congregating on hill or ridge tops for mating. The loss and/or degradation of sites used for hill-topping by butterflies is listed as a key threatening process under the TSC Act. The Scientific Committee determination identifies a number of sites in northern NSW as examples of butterfly hill-topping sites including Mt Warning, Razorback Lookout, Lions Lookout, Peates Mountain and Mt Ramornie (west of Grafton). The determination also identifies that small changes in the appearance of a site (topography) or its slopes and immediate environs can result in males not recognising it as a suitable site.

Current disturbance regimes in the *Project Area* may limit the value of the elevated land as a hill-topping site. The proposal will result in additional changes to vegetation and topography likely reducing further the habitat value of the area for hill-topping species. It is noted that the proposed changes should be considered in the context of the extensive surrounding ridgelines and hills, including those within the *Project Site*, which likely provide greater habitat value.

e) *How is the proposal likely to affect habitat connectivity?*

The impacts of the proposal on habitat connectivity are discussed in *Section 5.2.2*. It is noted that while the habitats in the *Project Area* are contiguous with Dry Rainforest and Wet Sclerophyll Forest within the *Project Site*, they are largely isolated from larger tracts of habitat external to the *Project Site*.

The Rainforest and Wet Sclerophyll Forest in the *Project Area* and contiguous with the *Project Area* form part of a fragmented corridor along Wyrallah Road that may provide 'stepping stones' for highly mobile species such as birds and bats. However this corridor has a reduced value for terrestrial and arboreal fauna that need to traverse open land between the fragmented habitats and are at these points vulnerable to predation and potential conflict with vehicles along Wyrallah Road and property access roads.

The proposed quarry operation will reduce the eastern extent of the fragment however a large area of the remnant will be retained thereby retaining this 'stepping stone' in the fragmented habitat corridor along Wyrallah Road. The proposed quarry operation is unlikely to impact on the value of this habitat corridor for highly mobile species such as birds and bats.

Habitats on low lying land in the east of the *Project Site* are part of a larger corridor associated with floodplain forest and wetland habitat in the locality. The proposal will not fragment or isolate this habitat corridor.

f) *How is the proposal likely to affect critical habitat?*

No areas of critical habitat as listed under the TSC Act have been recorded within the locality.

The *Project Area* and *Project Site* do not contain habitat critical for any of the threatened species that potential may occur at the site, therefore the proposal is unlikely to have an impact on critical habitat for those species.

5.6

COMMONWEALTH THREATENED AND MIGRATORY SPECIES

The Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* requires approval for actions that may have a significant impact on matters of national environmental significance or Commonwealth land. There are no World Heritage properties, National Heritage places, Ramsar wetlands, Commonwealth marine areas or nuclear actions on or near the *Project Area*. There are, however, Commonwealth listed threatened species and migratory species recorded or likely to occur on the *Project Site*.

5.6.1

Threatened Species

The Grey-Headed Flying Fox (*Pteropus poliocephalus*) was recorded within vegetation to the south west of the *Project Area*. This species is listed as Vulnerable under the *EPBC Act*. The nature and extent of a likely impact to this species from the proposed quarry expansion has been assessed below in accordance with criteria described by the DEH (2005).

An action has, will have, or is likely to have a significant impact on a threatened species if it does, will, or is likely to:

lead to a long-term decrease in the size of an important population of a species;

The Grey-headed Flying-fox forages over a wide range of habitats generally where there is a nectar source such as *Melaleuca*, *Banksia* and *Eucalyptus* spp. The species roosts in camps, which are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy. Foraging can occur up to 50 km from the camp site however camps are generally located 20 km from a regular food (DECC, 2005).

The *Project Area* provides potential foraging habitat in particular associated with the regenerating Pink Bloodwood/Forest Oak Woodland however it does not provide roosting habitat for the Grey-headed Flying Fox. Given the absence of roosting habitat, the extent of alternative foraging habitat in the immediate environs, and the mobile nature of the species, the proposal is unlikely to lead to the long-term decrease in the size of an 'important population' of Grey-headed Flying Fox.

reduce the area of occupancy of an important population;

The proposed quarry expansion may require the removal of a small area of potential foraging habitat for this species, however it is unlikely this will reduce the area of occupancy of an 'important population'.

An action has, will have, or is likely to have a significant impact on a threatened species if it does, will, or is likely to:

fragment an existing important population into two or more populations;

The removal of a small area of potential foraging habitat for this species is unlikely form a barrier for highly mobile species such as the Grey-headed Flying Fox.

adversely affect habitat critical to the survival of the species;

Potential foraging habitat in the *Project Area* is not regarded as critical to the survival of the species.

disrupt the breeding cycle of an important population;

The proposed quarry expansion is unlikely to disrupt the life cycle of the Grey-headed Flying Fox as no roosting areas have been identified in the *Project Area* or contiguous habitat.

modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

The degree of clearing that is proposed in potential foraging habitat areas is not significant in terms of the abundance of adjoining and nearby habitat areas. No habitats will become isolated for this highly mobile species.

result in invasive species that are harmful to a threatened species becoming established in the threatened species habitat;

Much of the site is highly modified as a result of past and present land use and exotic grassland covers most of the site. However there is potential for weed species to be transferred to areas to the south western portion of the quarry footprint that have minimal weed invasion and which potentially provide suitable foraging habitat for this species. With the ongoing implementation of management measures proposed (see *Section 6.2*) it is anticipated that the risk posed to the Grey-headed Flying Fox is minimal.

interfere substantially with the recovery of the species

The proposed development is unlikely to interfere with the recovery of this species.

As a local important population of the Grey-headed Flying-fox would not be significantly impacted by the proposed quarry expansion, no further assessment under the EPBC Act is warranted.

5.6.2

Migratory Species

Migratory species predicted to occur within the locality are identified in *Section 4.2.4*. Habitat for the marine and/or wetland migratory species is not present within the *Project Area* and therefore these species have not been included in this assessment.

The *Project Site* has the potential to provide foraging habitat for some of the terrestrial migratory birds, especially as a 'stepping stone' during migration in particular the Rufous Fantail, Spectacled Monarch and Satin Flycatcher. However, habitats within the *Project Area* are unlikely to provide significant feeding or breeding resources for these species due to level of disturbance and the small area of remnant vegetation.

The proposal will remove approximately 1.5 ha of foraging and/or sheltering habitat however the distribution of these habitats is not confined to the *Project Area*. As these species are wide-ranging with generalist habitat requirements, it is unlikely that the proposal will have a significant impact as the proposed modification will not:

- substantially modify, destroy or isolate an area of important habitat of the migratory species;
- result in harmful invasive species becoming established in the *Project Area*; or
- disrupt the life cycle of an ecologically significant proportion of a population of the species.

The proposal is not expected to have a significant effect upon the health and viability of any threatened or migratory species listed under the provisions of the EPBC Act.

Given the proposed modification will not impact on matters of national environmental significance, approval from the Commonwealth Minister for the Environment, Heritage and the Arts is not required.

6.1 AVOIDING IMPACTS

One of the main measures considered in the quarry expansion proposal to reduce ecological impacts was to avoid impacting on the core rainforest areas as described by Baverstock in 2005a, 2005b and 2007 (see *Annex B*). The footprint of the proposed quarry has been restricted to avoid direct clearance of core rainforest habitat thereby avoiding direct impacts on Lowland Rainforest EEC and the footprint has been designed to avoid clearance of the larger remnant of Wet Sclerophyll Forest to the south of Dry Rainforest (*Area 2* and *Area 3*).

The Dry Rainforest and Wet Sclerophyll Forest directly to the west and southwest of the quarry will be retained and protected from disturbances associated with the proposed quarry operation. Weed management works will be undertaken to remove any current infestations and/or minimise establishment and invasion of weed species. A Vegetation Management Plan will be prepared to identify appropriate management measures to be implemented to maintain and improve habitat values of the area including proposed biodiversity offset areas. These areas are within the property holding and the proponent commits to the avoidance, protection and ongoing management of same.

6.2 MITIGATION MEASURES

A number of measures are to be implemented to minimise direct and indirect impacts associated with the proposed quarry operation.

Measures to minimise direct impacts associated with the clearance of vegetation and habitats within the quarry footprint include:

- further assessment to confirm the species of Microbat identified in *Area 2* (suspected to be *M. macropus*) and to consider the potential for Nurus atlas to be inhabiting the Dry Rainforest areas adjoining the *Project Area*. These works will be undertaken in accordance with the methods described in the DECCW (2004) *Draft Threatened Biodiversity Survey and Assessment Guidelines*;
- pre-clearance inspection of each 'work cell' prior to the commencement of clearing works to identify potential fauna habitat (e.g. rocky outcrops, fallen hollow logs, and hollow-bearing trees) and identify appropriate measures. Measures to minimise impact on fauna during clearing operations would include modified clearance of hollow-bearing trees by clearing up to the tree, nudging the tree then leaving the tree to be cleared at a later period to allow any resident fauna to relocate;

- where potential fauna habitat identified a suitably qualified wildlife handler would be present during clearing operations to supervise clearance and rescue any individuals where required;
- pre-clearance inspection of trees to be felled for Koalas; and
- relocation of any fallen logs to adjoining areas and or rehabilitation areas.

Measures to minimise impact of traffic movement on fauna includes:

- limiting traffic movement to daylight hours;
- limiting the speed of haul trucks to 30km/h; and
- selection of shrub species and/or tree species that do not provide a foraging resource for Koalas in visual screening proposed along the haul road;
- training for all quarry staff and haulage contractors to promote awareness of local fauna, including Koala, and what steps to follow if injured wildlife are ever encountered; and
- providing a break in the screening planting near the junction of the haul road and Wyrallah Road to discourage directing terrestrial fauna on to the road.

It is proposed that the Dry Rainforest and Wet Sclerophyll Forest to the west of the proposed quarry area will be protected and managed, and enhanced via biodiversity offset plantings. In order to minimise indirect impacts on these areas of retained habitat boundaries will be defined and managed between the quarry footprint and retained vegetation. The location of the boundaries will be determined in the field prior to clearing operations in proximate areas. The boundary edges will be fenced and managed to remove weeds and minimise spread of weed species to retained vegetation and the integrity of the buffer zone will be inspected regularly. This will be undertaken in accordance with a Vegetation Management Plan prepared for the protected vegetation and buffer zones.

With respect to weed management it should be noted that Lantana is a declared Class 4 Noxious Weed within the *Far North Coast County Council* control area (2008) and a Class 5 Noxious Weed (Notifiable Weed) under the *NSW Noxious Weeds Act 1993 (NW Act)*. In accordance with the relevant legislation, measures will be taken to control the growth and spread of existing Lantana infestations in the *Project Site*. Camphor Laurel is also a declared Class 4 Noxious Weed within the *Far North Coast County Council* control area (2008) however it is also recognised as an important foraging resource for frugivores and the removal of Camphor Laurel must be offset by planting of fruiting rainforest trees.

The existing quarry has a Rehabilitation and Final Landscape Plan. The principals of this plan will be applied to the expanded quarry operation. Work cells will be progressively rehabilitated. A large part of the proposed quarry will be rehabilitated with pasture species to grazing land as currently characterises the *Project Area*. The benches will be shaped and rehabilitated with locally occurring native species and where possible tied into the adjoining conservation areas. The rehabilitation will be monitored monthly to assess establishment of vegetation and progress documented by the Quarry's Environmental Officer.

6.3 *BIODIVERSITY OFF-SETS STRATEGIES*

6.3.1 *Overview*

The proposed quarry expansion will clear less than 1.5 ha vegetation including Dry Rainforest buffer zones and Wet Sclerophyll Forest, and including minor scattered stands of vegetation. The areas to be cleared has been minimised by the design of the quarry footprint, however these remnant and regenerating vegetation stands will not be avoided by the proposal. The loss of this relatively small amount of vegetation over a 25 year period will be offset through the management and protection of existing areas, and revegetation areas of the same communities and habitat attributes within the *Project Site* to provide a net improvement in habitat values.

Identification of suitable offset areas was guided by consideration of DECCW offsetting principles that an offset must:

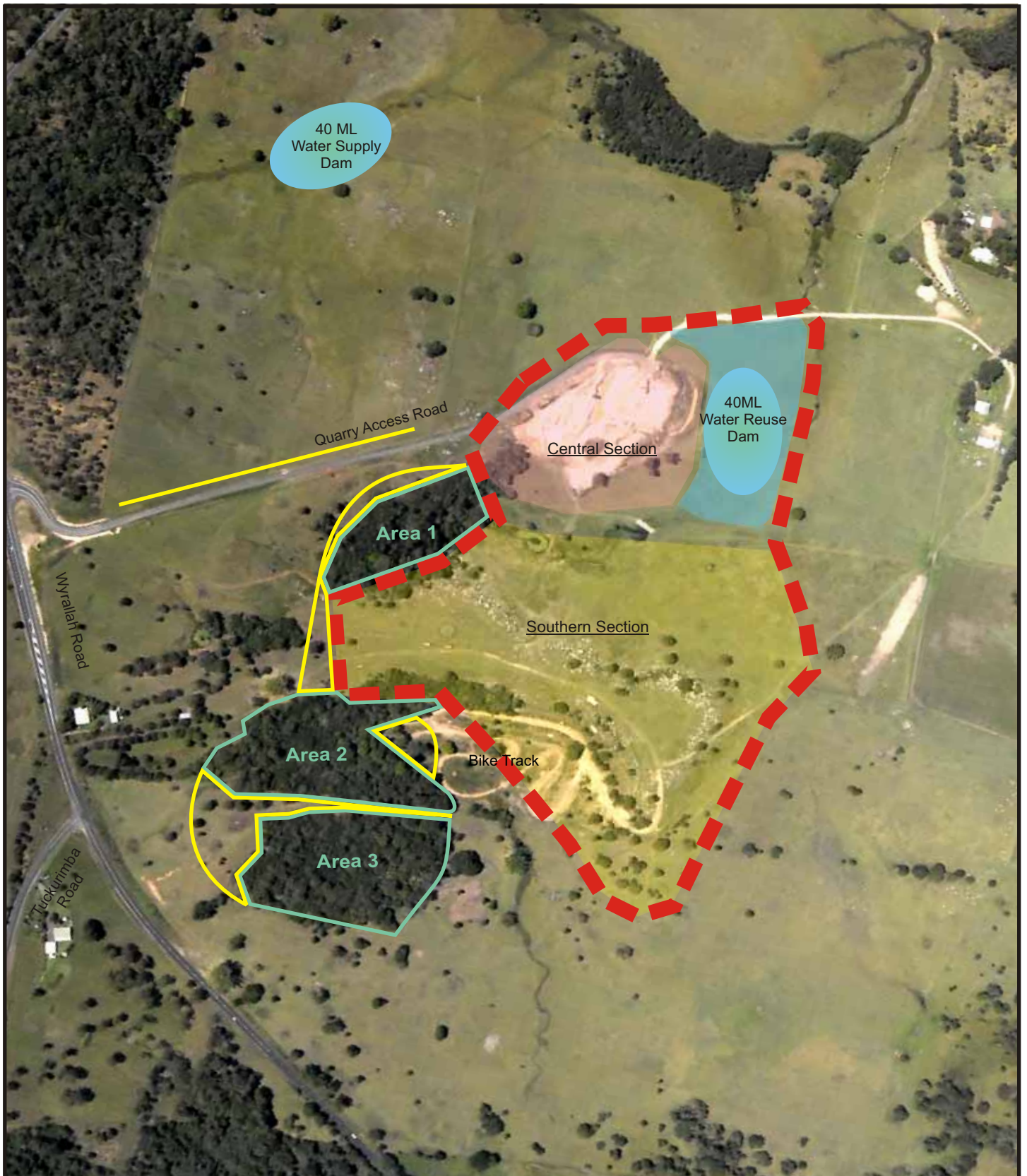
- consider the structure, function and compositional elements of biodiversity including threatened species;
- enhance biodiversity;
- consider the conservation status of ecological communities; and
- ensure the long-term viability and functionality of biodiversity.

The offset areas should preferably be located on-site or in the locality, contain the same or equivalent vegetation communities and be in equivalent or better condition to provide for an offset of 'like for like'. Further, preference was given in identifying suitable offset areas, to areas that provide offset strategies through implementation of measures such as habitat enhancement and securing land for conservation as opposed to reconstruction of communities. The latter option is not preferred as it involves high risk and uncertainties for biodiversity outcomes in the short-term and long-term. It is noted, however, that significant areas of the existing identified vegetation to which the proposed offsets are to enhance are also to be protected and managed as offsets.

To ensure long-term security and implementation of management measures, the offset area should be located on land owned by, or which can be purchased by the proponent. The proponent will commit to the protection and management of the offset areas through legal enforcement of the offset strategy.

6.3.2 *Proposed Biodiversity Offsets*

Areas proposed to be identified and managed as biodiversity offset zones for the loss of the remnant and regenerating habitat in the *Project Area* are shown on *Figure 6.1*.



Legend

- Extent of Quarry Extraction and Operations (Project Area)
- Protected Revegetation Zone
- Protection Areas
- Central Section
- Southern Section
- Water Management (Non-quarrying area)

Client:	Champions Quarry	
Project:	Champions Quarry Expansion	
Drawing No:	0098287pm_03_ecology_V4	
Date:	25/11/09	Drawing size: A4
Drawn by:	AM	Reviewed by: WW
Source:	-	
Scale:	Refer to Scale Bar	

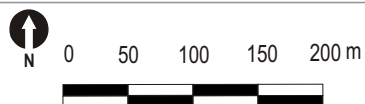


Figure 6.1

Biodiversity Offsets

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 Port Macquarie NSW 2444
 Telephone +61 2 6584 7155



To address DECCW offsetting principles and to ensure that the proposal meet the 'maintain and improve' test the offset area must include the following features:

- contain community of similar floristic and structural characteristics which has equivalent of greater conservation value to that identified in the *Project Area*;
- contain suitable habitat features and resources for the suite of threatened fauna potentially affected by the proposal;
- the offset ratio is well in excess of 5:1 which based on the conservative total clearing area is approximately 1.5 ha;
- the offset must be identified and secured within 12 months from the date of approval; and
- the offset area must be permanent and secured by a conservation agreement or reservation as agreed with DECCW.

Champions Quarry has identified three specific offset areas within their land holding (*Area's 1, 2 and 3*). This includes increasing the total size of *Area's 1, 2 and 3* by revegetating adjoining cleared land as shown on *Figure 6.1*. In addition, local *Casuarina* species are to be included in the corridor of vegetation planting along the northern side of the main haul road.

The offset areas include linking *Area's 1, 2 and 3*, along with revegetation at the boundaries of these areas to increase their size, and reduce the potential for edge effects. As shown on *Figure 6.1* this will reduce in excess of 40% edge from *Area's 1, 2 and 3*. The revegetation works will involve the use of locally endemic species that are specifically selected to be consistent with the vegetation communities in these areas.

The above proposed offsets do not take into account the significant amount of vegetation to be established for screening purposes at the site, and the significant amount of Koala Tree planting (in excess of 1 ha) to be undertaken along the northern boundary of the *Project Site* as has been outlined in the main EA report. Non-Koala screening vegetation will consist of appropriate native species. This will include a row of *Casuarina* to be planted along the main haul road to offset the removal of several *Casuarina* from the *Project Area*.

6.3.3 *Management of the Offset Area*

To enhance the habitat value of the offset areas for threatened species and to encourage a more diverse range of native species the following recommendations have been made:

- the offset areas will be fenced to exclude cattle and so remove grazing pressure;

- control of feral animals where practical;
- weed management program to reduce competition and encourage growth of native species in the understorey;
- fallen timber and branches within the disturbance area should be relocated to the offset areas to provide additional nesting and foraging habitat;
- species to be used in any revegetation should include locally occurring species; and
- monitoring and reporting on biodiversity and management actions undertaken including annual surveys conducted within the offset areas.

Implementation of the above species specific measures will also enhance habitat value for a number of other threatened species, in particular birds and Microbats, that are known from the locality and that may use rainforest habitat in the *Project Area* on a transient basis or as part of a larger home range.

The offset areas will be managed in perpetuity. A Vegetation Management Plan will be prepared for the offset areas. The management plan would include but not be limited to the following considerations:

- baseline assessment of the community and habitat values of the offset area;
- identification of environmental weeds to be targeted in the weed management plan;
- any fencing reconfiguration requirements;
- safety issues for revegetation and weed management works on the steeper slopes;
- fire management; and
- ongoing monitoring programs.

The identified biodiversity offset areas are all within the proponent's ownership. In addition, the proponent will commit to the protection and management of the offset area secured through legal enforcement of the offset strategy via a voluntary conservation agreement under the *National Parks and Wildlife Act 1974* or Section 88B-E covenant of the *Conveyancing Act 1919* to be negotiated by the proponent and the DoP and DECCW.

The biodiversity offset areas are proposed as a means of ensuring that the proposal maintains or improves biodiversity in the local area. The biodiversity offset areas will support similar vegetation community and habitat structure within the immediate area of the proposal and provides for long-term protection, management and conservation of an area in excess 10 ha of Rainforest and Wet Sclerophyll Forest. The proposed regeneration

offset areas will improve biodiversity values within the *Project Site* through enhancing habitat connectivity, and in the long-term will minimise edge effects on the existing remnant vegetation within the offset areas.

CONCLUSION

This ecology assessment report has considered the potential impacts of the proposed expansion of sandstone quarrying operations at Champions Quarry Tuckurimba on threatened species known, or considered likely to use the resources presented in the *Project Area*. The proposal has been assessed in accordance with Part 3A Guidelines for Threatened Species Assessments.

The *Project Area* is located on the Far North Coast of NSW. The *Project Area* has been considerably disturbed by land clearing and grazing and approximately 90% of the *Project Area* is cleared of remnant vegetation, now supporting grassland. The forested areas are characterised by regenerating or regrowth including Dry Rainforest, Wet Sclerophyll Forest and Pink Bloodwood/Forest Oak Woodland. The Dry Rainforest and Wet Sclerophyll Forest habitats are continuous with remnant vegetation to the west and south west of the *Project Area* and/or quarry footprint. Of these communities the Dry Rainforest is considered to be representative of the Lowland Rainforest Endangered Ecological Community of the Sydney Basin and North Coast Bioregions.

Given the disturbed nature of vegetation within the *Project Area* the ecological and conservation values of these areas are considered to be low. Notwithstanding this field investigations have identified three threatened species in habitats adjacent to the *Project Area* and tentatively identified an additional bat species. A number of other species were considered to have a moderate to high likelihood of occurrence based on habitat requirements and records in the locality. The impact of the proposal on the life cycle and habitat of the Glossy Black Cockatoo, Wompoo Fruit Dove, Rose Crowned Fruit Dove, Little Bentwing-bat, Eastern Long-eared Bat, Large-footed Myotis, Koala, Grey-headed Flying-fox, Sweet Myrtle, Thorny Pea, Slender Marsedenia and the Lowland Rainforest EEC has been considered.

The proposal is unlikely to have an adverse effect on the life cycle of the threatened species such that a viable local population is likely to be placed at risk of extinction. The proposal is also unlikely to have an adverse effect on the extent of the Lowland Rainforest EEC or substantially modify the composition of the EEC such that its local occurrence is likely to be placed at risk of extinction. Further the proposal is unlikely to fragment or isolate areas of habitat.

The report considered the impact of the proposal on matters of national environmental significance as defined under the Commonwealth *EPBC Act*. There are no World Heritage properties, National Heritage places, Ramsar wetlands, Commonwealth marine areas or nuclear actions on or near the *Project Area*. There are, however, Commonwealth listed threatened species (Grey-headed Flying-fox) and migratory species recorded or likely to occur in the *Project Area*.

The proposal is not expected to have a significant effect upon the health and viability of any threatened or migratory species listed under the provisions of the *EPBC Act*. Given the proposed modification will not impact on matters of national environmental significance, approval from the Commonwealth Minister for the Environment, Heritage and the Arts is not required.

A number of measures are proposed to minimise the direct and indirect impacts of the proposal on flora and fauna. This includes preclearance inspections, relocation of fallen logs to rehabilitation areas, management of remnant vegetation and progressive rehabilitation of the quarry cells to either grazing land or with native vegetation. The proposal avoids disturbance of larger remnant of Wet Sclerophyll Forest and core areas of Dry Rainforest to the west of the quarry area where the threatened bat species were identified.

Significant areas of the remnant vegetation stands on the *Project Site* are to be retained and managed under a Vegetation Management Plan. These offsets have been identified within the *Project Site* and would be expected to improve habitat connectivity and reduce edge effects. In addition, land on the northern boundary of the *Project Site* is proposed to be established with Koala feed and habitat trees which would be expected to significantly enhance habitat value of the *Project Site* and provide an alternative movement corridor away from the main haul road. The proponent is committed to the protection of these areas within the proponent's land holding and to undertake management to maintain and improve biodiversity values of these areas through weed management in accordance with a Vegetation Management Plan to be prepared in consultation with the DECCW. The Vegetation Management Plan will also go further to provide details of a fire management strategy for the *Project Site*, including and provision for implementation of an ecologically appropriate fire regime within native vegetation communities.

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Annex A

Threatened Species Search
Results and Consideration of
Occurrence

Table A.1 Threatened Species Habitat Assessment and Likelihood of Occurrence in the Project Area.

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Amaurornis olivaceus</i>	Bush-hen	-	Vulnerable	Occurs in a variety of coastal wetlands from mangroves, lagoons and swamps, to river margins and creeks running through rainforest. It has also been recorded away from water in dense low vegetation, including Blady Grass and Lantana.	Low to Moderate	No
<i>Anseranas semipalmata</i>	Magpie Goose	-	Vulnerable	Mainly found in shallow wetlands (less than 1m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; nests are formed in trees over deep water. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	Not expected.	No
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	-	Vulnerable	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur. Feeds almost exclusively on the seeds of several species of she-oak. Dependent on large hollow-bearing eucalypts for nest sites.	Moderate	Yes
<i>Coracina lineata</i>	Barred Cuckoo-shrike	-	Vulnerable	Rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses. They are usually seen in pairs or small flocks foraging among foliage of trees for insects and fruit.	Low to Moderate	No
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig Parrot, Double-eyed Fig-parrot	Endangered, Migratory	Critically Endangered	Usually recorded from drier rainforests and adjacent wetter eucalypt forest but rarely seen due to its small size and cryptic habits. 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. Inhabit live or dead eucalypts close to rainforest or trees within rainforest close to foraging habitat.	Low to Moderate	No
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	-	Endangered	Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water on a variety of prey including fish, frogs, eels, turtles, crabs and snakes. A large nest, up to 2m in diameter, is made in a live or dead tree, in or near a freshwater swamp.	Not expected	No
<i>Erythrotriorchis radiatus</i>	Red Goshawk	Vulnerable	Critically Endangered	In NSW, mainly found along or near watercourses, in swamp forest and woodlands on the coastal plain. It favours patches of dense forest interspersed with open woodland or cleared land and often frequents forest edges.	Low to Moderate	No
<i>Grus rubicunda</i>	Brolga	-	Vulnerable	Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged. They feed primarily on sedge roots and tubers. They will also take large insects, crustaceans, molluscs and frogs. The nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water.	Not expected	No

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Irediparra gallinacea</i>	Comb-crested Jacana	-	Vulnerable	Inhabits permanent wetlands with a good surface cover of floating vegetation, especially water-lilies. They feed primarily on insects and other invertebrates, as well as some seeds and other vegetation. Breeds in spring and summer in NSW, in a nest of floating vegetation.	Not expected	No
<i>Ixobrychus flavicollis</i>	Black Bittern	-	Vulnerable	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks.	Not expected	No
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Endangered	Occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany (<i>Eucalyptus robusta</i>), Spotted Gum (<i>Corymbia maculata</i>), Red Bloodwood (<i>C. gummifera</i>), Mugga Ironbark (<i>E. sideroxylon</i>), and White Box (<i>E. albens</i>). Commonly used lerp infested trees include Grey Box (<i>E. microcarpa</i>), Grey Box (<i>E. moluccana</i>) and Blackbutt (<i>E. pilularis</i>).	Low	No
<i>Menura alberti</i>	Albert's Lyrebird	-	Vulnerable	Mixed rainforest and wet open forest, frequently dominated by Brush Box. In winter birds commonly forage in moist forest on ridges between wetter forest.	Low to Moderate	No
<i>Monarcha leucotis</i>	White-eared Monarch	-	Vulnerable	In NSW this species occurs primarily in coastal rainforest, swamp forest and wet eucalypt forest. It appears to favour rainforest edges where trees are frequently covered with vines and through the canopy of more extensive patches of rainforest.	Low to Moderate	No
<i>Pandion haliaetus</i>	Osprey	-	Vulnerable	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Low	No
<i>Poephila cincta cincta</i>	Black-throated Finch (southern subspecies)	Endangered	Endangered	Eucalypt woodland and riverside vegetation, including paperbark and wattle shrubland. Areas close to water with a dense understorey of seeding grass and shrubs are favoured.	Low	No
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	-	Vulnerable	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Birds are generally unable to cross large open areas. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts.	Low	No
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	-	Vulnerable	Occurs in, or near rainforest, low elevation moist eucalypt forest and Brush Box forests. Feeds on a diverse range of tree and vine fruits and is locally nomadic - following ripening fruit; some of its feed trees rely on species such as the this to distribute their seeds. The nest is a typical pigeon nest - a flimsy platform of sticks on a thin branch or a palm frond, often over water, usually 3 - 10 m above the ground. Most often seen in mature forests, but also found in remnant and regenerating rainforest.	Moderate	Yes

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	-	Vulnerable	Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits.	Moderate	Yes
<i>Rostratula benghalensis australis</i>	Painted Snipe (Australian subspecies)	Vulnerable	Endangered	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.	Not expected	No
<i>Stictonetta naevosa</i>	Freckled Duck	-	Vulnerable	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates. Nests are usually located in dense vegetation at or near water level.	Not expected	No
<i>Turnix maculosa</i>	Red-backed Button-quail	-	Vulnerable	Red-backed Button-quail inhabit grasslands, woodlands and cropped lands of warm temperate areas that annually receive 400mm or more of summer rain. Observations of populations in other parts of its range suggest the species prefers sites near water, including grasslands and sedgelands near creeks, swamps and springs, and wetlands. Usually breed in dense grass near water, and nests are made in a shallow depression sparsely lined with grass and ground litter.	Low	No
<i>Turnix melanogaster</i>	Black-breasted Button-quail	Vulnerable	Critically Endangered	Prefers drier rainforests and viney scrubs, often in association with Hoop Pine and a deep, moist leaf litter layer. During drought the bird may move into adjacent wetter rainforests.	Low to Moderate	No
<i>Tyto capensis</i>	Grass Owl	-	Vulnerable	Grass Owls are found in areas of tall grass, including grass tussocks in swampy areas, grassy plains, swampy heath, and cane grass, or sedges on flood plains. They rest by day in a 'form' - a trampled platform in a large tussock or other heavy growth. They also nest in trodden-down grass.	Low	No
<i>Tyto tenebricosa</i>	Sooty Owl	-	Vulnerable	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (<i>Pseudocheirus peregrinus</i>) or Sugar Glider (<i>Petaurus breviceps</i>). Nests in very large tree-hollows.	Low to Moderate	No

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Xanthomyza phrygia</i>	Regent Honeyeater	Endangered, Migratory	Endangered	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Nectar and fruit from the mistletoes. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. A shrubby understorey is an important source of insects and nesting material. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria.	Low	No
Frogs						
<i>Crinia tinnula</i>	Wallum Froglet	-	Vulnerable	Found only in acid paperbark swamps and sedge swamps of the coastal 'wallum' country.	Low	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	Vulnerable	Endangered	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.). Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs. Preyed upon by various wading birds and snakes. The species is active by day and usually breeds in summer when conditions are warm and wet.	Low	No
<i>Litoria olongburensis</i>	Wallum Sedge Frog, Olongburra Frog	Vulnerable	Vulnerable	Paperbark swamps and sedge swamps of the coastal "wallum" country. Wallum is a Banksia dominated lowland heath ecosystem characterised by acidic waterbodies. Olongburra Frogs are usually found amongst sedges and rushes in coastal wetlands.	Low	No
<i>Mixophyes iteratus</i>	Southern Barred Frog, Giant Barred Frog	Endangered	Endangered	Forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They feed primarily on large insects and spiders. They breed around shallow, flowing rocky streams from late spring to summer. Females lay eggs onto moist creek banks or rocks above water level, from where tadpoles drop into the water when hatched.	Low to Moderate	No
Mammals						
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat	Vulnerable	Vulnerable	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Hirundo ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies. This species probably forages for small, flying insects below the forest canopy. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years.	Low	No

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Endangered	Vulnerable	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. Use 'latrine sites', often on flat rocks among boulder fields and rocky cliff-faces; these may be visited by a number of individuals; latrine sites can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. Females occupy home ranges up to about 750 ha and males up to 3500 ha; usually traverse their ranges along densely vegetated creeklines. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	Low to Moderate	No
<i>Miniopterus australis</i>	Little Bentwing-bat	-	Vulnerable	Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Eastern Bentwing-bat and, in winter, the two species may form mixed clusters.	Moderate	Yes
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat	-	Vulnerable	A range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses. Roost mainly in tree hollows but relatively large colonies have been found under house roofs in urban areas in Queensland.	Low to Moderate	No
<i>Myotis macropus</i> (syn <i>M.adversus</i>)	Large-footed Myotis	-	Vulnerable	Generally they roost in groups of 10 to 15 individuals in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Roost sites are close to water as they forage over streams and pools for insects and small fish.	Recorded	Yes
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	-	Vulnerable	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark.	Moderate	Yes
<i>Petaurus norfolcensis</i>	Squirrel Glider	-	Vulnerable	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Low	No
<i>Phascolarctos cinereus</i>	Koala	-	Vulnerable	Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than 2 ha to several hundred hectares in size. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Moderate	Yes

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Planigale maculata</i>	Common Planigale	-	Vulnerable	Common Planigales inhabit rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water. They are active at night and during the day shelter in saucer-shaped nests built in crevices, hollow logs, beneath bark or under rocks. They are fierce carnivorous hunters and agile climbers, preying on insects and small vertebrates, some nearly their own size. The female builds a nest lined with grass, eucalypt leaves or shredded bark.	Low to Moderate	No
<i>Potorous tridactylus</i>	Long-nosed Potoroo	Vulnerable	Vulnerable	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. Often digs small holes in the ground in a similar way to bandicoots. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil.	Low	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Vulnerable	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Site fidelity to camps is high with some camps being used for over a century. Travel up to 50 km to forage. Feed on the nectar and pollen of native trees, in particular eucalypts, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops and can inflict severe crop damage.	Recorded	Yes
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	-	Vulnerable	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Low to Moderate	No
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	-	Vulnerable	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.	Low to Moderate	No
<i>Thylogale stigmatica</i>	Red-legged Pademelon	-	Vulnerable	Inhabits forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub. Wet gullies with dense, shrubby ground cover provide shelter from predators. In NSW, rarely found outside forested habitat. They disperse from dense shelter areas to feed from late afternoon to early morning, favouring native grasses and herbs on the edge of the forest. Also known to feed on fruits, young seedling leaves and stems, fungi and ferns.	Low to Moderate	No

Reptiles

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	Vulnerable	Vulnerable	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.	Low to Moderate	No
Insects						
<i>Nurus atlas</i>	Atlas Rainforest Ground-beetle	-	Endangered	Historically widespread in heavily timbered, high rainfall areas east of the Great Dividing Range on the north coast of NSW. Rediscovered at Victoria Park near Lismore and presently only known from a few locations in the Lismore-Alstonville area. Low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Other habitat requirements may be relatively undisturbed old-growth forests on highly productive soils and consistently high moisture levels. It is flightless and preys on other ground invertebrates.	Low to Moderate	No
Plants						
<i>Acronychia littoralis</i>	Scented Acronychia	Endangered	Endangered	Scented Acronychia grows in littoral rainforest on sand.	Low	No
<i>Arthraxon hispidus</i>	Hairy Jointgrass		Vulnerable	Occurs in south-east Queensland, and on the northern tablelands and north coast of NSW, but is never common. A creeping perennial grass it prefers moist and shady conditions, in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps, as well as woodland.	Low to Moderate	No
<i>Baloghia marmorata</i>	Jointed Baloghia	Vulnerable	Vulnerable	In NSW, known only from the Lismore district. Found in subtropical rainforest on soils derived from basalt.	Low to Moderate	No
<i>Clematis fawcettii</i>	Northern Clematis	Vulnerable	Vulnerable	Within NSW, found in the north-east of the State, north from Lismore. Occurs in drier rainforest, usually near streams	Low	No
<i>Corchorus cunninghamii</i>	Native Jute	Endangered	Endangered	In NSW, populations occur at Bungabbee and Toonumbar. Occurs in ecotones between wet eucalypt forest and dry to dry-subtropical rainforest on sheltered slopes and gullies, and grassy, open forest on exposed slopes and ridges	Low to Moderate	No
<i>Cryptocarya foetida</i>	Stinking Cryptocarya	Vulnerable	Vulnerable	Found in littoral rainforest, usually on sandy soils, but mature trees are also known on basalt soils.	Low	No
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	Vulnerable	Vulnerable	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>). Little is known about the ecology of the species; being leafless it is expected to have limited photosynthetic capability and probably depends upon a fungal associate to meet its nutritional requirements from either living or dead organic material.	Low	No
<i>Desmodium acanthocladum</i>	Thorny Pea	Vulnerable	Vulnerable	Dry rainforest and fringes of riverine subtropical rainforest on basalt-derived soils at low elevations.	Moderate	Yes
<i>Diploglottis campbellii</i>	Small-leaved Tamarind	Endangered	Endangered	Recorded from the coastal lowlands between Richmond River on the Far North Coast of NSW and Mudgeeraba Creek on the Gold Coast hinterland, Queensland. Confined to the warm subtropical rainforests of the NSW-Queensland border lowlands and adjacent low ranges. The forest types in which the species occurs vary from lowland subtropical rainforest to drier subtropical rainforest with a Brush Box open overstorey. Occurs on basalt-derived soils and also on poorer soils such as those derived from quartz monzonite.	Low to Moderate	No

Scientific Name	Common Name	Conservation Status		Habitat Requirements	Likelihood of Occurrence	Assessment of Significance
		EPBC Act	TSC/FM Act			
<i>Endiandra hayesii</i>	Rusty Rose Walnut, Velvet Laurel	Vulnerable	Vulnerable	A restricted distribution from Burleigh Heads in Queensland to the Richmond River in north-east NSW. Found in sheltered moist gullies in lowland subtropical and warm temperate rainforest on alluvium or basaltic soils .	Low to Moderate	No
<i>Floydia praealta</i>	Ball Nut	Vulnerable	Vulnerable	Small scattered populations distributed from Gympie in Queensland to the Clarence River in north-east NSW. Found in riverine and subtropical rainforest, usually on soils derived from basalt.	Low to Moderate	No
<i>Geijera paniculata</i>	Axe-Breaker	-	Endangered	Very rare in north-east NSW, where it is known from the Tweed, Lismore and Wardell areas. Found in dry subtropical rainforest and vine scrub, often along rivers.	Low	No
<i>Gossia fragrantissima</i>	Sweet Myrtle	Endangered	Endangered	Occurs in north-east NSW, south to the Richmond River where it is mostly found on basalt-derived soils in dry subtropical and riverine rainforest. Coppices from roots left in the ground and can also occur as isolated plants in paddocks or as regrowth in areas originally covered by rainforest.	Moderate to High	Yes
<i>Hicksbeachia pinnatifolia</i>	Monkey Nut	Vulnerable	Vulnerable	Within NSW, occurs in coastal areas of north-east NSW, north from the Nambucca Valley. Found in subtropical rainforest, moist eucalypt forest and Brush Box forest.	Low to Moderate	No
<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	Vulnerable	Vulnerable	Within NSW, this species is chiefly confined to the Richmond and Tweed Rivers in north-east NSW where it is found in subtropical rainforest, usually near the coast.	Low	No
<i>Marsdenia longiloba</i>	Clear Milkvine, Slender Marsdenia	Vulnerable	Endangered	Subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest and, sometimes, in areas with rock outcrops.	Moderate	Yes
<i>Myrsine richmondensis</i> (<i>Rapanea</i> sp. Richmond River)	Ripple-leaf Muttonwood	Endangered	Endangered	Known only from a few populations at Coraki, Boatharbour near Lismore and the Cherry Tree area west of Casino. Found in subtropical and dry rainforest and swamp forest on creek flats and slopes on basalt derived soil.	Low to Moderate	No
<i>Ochrosia moorei</i>	Southern Ochrosia	Endangered	Endangered	Southern Ochrosia is found in riverine and lowland subtropical rainforest.	Low	No
<i>Owenia cepiodora</i>	Onion Cedar	Vulnerable	Endangered	Subtropical and dry rainforest on or near soils derived from basalt.	Low to Moderate	No
<i>Randia moorei</i>	Spiny Gardenia	Endangered	Endangered	Subtropical, riverine, littoral and dry rainforest. In NSW, Hoop Pine and Brush Box are common canopy species.	Low to Moderate	No
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	Vulnerable	Vulnerable	Within NSW, has a restricted range in the north-east of the state, north from the Richmond River. Usually found in riverine and subtropical rainforest on rich alluvial or basaltic soils.	Low to Moderate	No
<i>Tinospora tinosporoides</i>	Arrow-head Vine	Vulnerable	Vulnerable	Occurs north from the Richmond River in north-east NSW, where it is locally common in some parts of its range. Found in wetter subtropical rainforest, including littoral rainforest, on fertile, basalt-derived soils	Low	No

REFERENCE:

All species and habitat information from NSW Scientific Committee Threatened Species Profiles. Department of Environment and Climate Change. <http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx>

Annex B

Reports by Professor Peter Baverstock

COPY

**HABITAT ASSESSMENT
OF LOT 4, DP588125
WYRALLAH ROAD, TUCKI**

PREPARED FOR: REAVILL FARMS

By

PROFESSOR PETER BAVERSTOCK, BSc(Hons), PhD, DSc

July 2005

1. INTRODUCTION

The subject site, Lot 4, is situated on the east side of Wyrallah Road, Tucki.

The area is approximately 38.7ha, with no existing dwelling. The entire site is zoned 1(a), 1(r). Approximately 5ha of the property has been identified from aerial photography as possibly Rainforest (Attachment 1).

The present report provides the results of ground truthing the area, and recommendations for future sustainable management of the area.

2. QUALIFICATIONS AND EXPERIENCE OF PERSON PREPARING REPORT

Qualifications – Professor Peter Baverstock has a PhD and a DSc in wildlife biology.

Wildlife Experience

- (i) 22 years conducting research into Australian wildlife;
- (ii) Over 150 publications in refereed scientific journals;
- (iii) Lecturer in Wildlife Biology for 4 years;
- (iv) Currently supervising 12 PhD and Masters students in Wildlife Biology.

Experience specifically in relation to Koalas –

- (i) Supervised Honours student on radio tracking of Koalas
- (ii) Worked closely with Steve Phillips currently of Australian Koala Foundation, for last 5 years
- (iii) Prepared Koala Management Plans for Lismore Council and for private landholders in Ashby region
- (iv) Constantly liaising with Friends of Koala.

3. METHODS

I inspected the site on 1st July, 2005.

The area was searched thoroughly and special note was taken of habitat features that might be significant to Schedule 1 or Schedule 2 species that might occur in the area. These included:-

- (i) Presence of Koala food trees and, where present, occurrence of koala faecal pellets around the base of such trees, and/or Koala scratch marks on smooth-barked gums.

- (ii) Presence of large old hollow trees that might provide nesting sites for Schedule 2 birds such as Glossy Black Cockatoos, *Calyptorhynchus lathami*, and Red-tailed Black Cockatoos, *C. magnificus*, or day roosts for Schedule 2 Microchiropteran Bats.
- (iii) Presence of Allocasuarina that might provide food for Glossy Black Cockatoos.
- (iv) Presence of thick undergrowth that might provide habitat for Schedule 1 or Schedule 2 ground mammals such as the Long-nosed Potoroo, *Potorous tridactylus* or Rufous Bettong, *Aepyprymnus rufescens*.
- (v) Presence of hollows that might provide habitat for Schedule 1 or Schedule 2 mammals such as Phascogales, *Phascogale tapoatafa*, or Squirrel Gliders, *Petaurus norfolkensis*.

4. HABITAT DESCRIPTION

The subject area consists of two distinct vegetation and landform types.

These are shown as areas A and B in the attached aerial photograph (Appendix 2).

Area A

This is an area of approximately 2.5ha surrounding Area B. It consists generally of gently undulating brown kraznozem soil.

The vegetation of Area A consists entirely of regrowth, probably 5-7 years old.

The vegetation has a Foliage Protective Cover (FPC) of 50%. The overstorey is dominated by Black Wattle, *Acacia*, and the midstorey by *Lantana*. There is no understorey.

Scattered throughout Area A are Camphor Laurel, *Camphor*, Lilly Pilly, *Syzigium sp.*, and Privett, with some scattered young Pink Bloodwood, *Eucalyptus intermedia*. There are some noxious weed Coxspur.

There are no hollow trees, either dead or alive, in Area A.

Area A is not Rainforest!

Area B

Area B is a steep gully, dissected by an intermittent creek. The creek is flanked by large granite boulders.

The vegetation of Area B is dominated by an overstorey of Hoop Pine, *Araucaria cunninghamii*, and a midstorey and understorey of Hoop Pine of various ages. Hoop Pine is a relatively slow growing species and the larger specimens I estimate to be at least 40 years old.

The rocks are sprinkled with birds nest ferns, and staghorns occur on some Hoop Pines.

There are no hollow trees, dead or alive, in Area B.

Area B could be classified as Rainforest.

Area B has encroaching Lantana and Camphor at its periphery.

5. THREATENED FAUNA

There are no hollows that might provide nesting sites for Schedule 2 species of birds such as Red-tailed Black Cockatoos, *Calyptorhynchus magnificus*, and Glossy Black Cockatoos, *C. lathami*, both of which are known to occur in the region, or diurnal roosting sites for nocturnal Schedule 2 mammals such as Sugar Gliders, *Petaurus australis*, Squirrel Gliders, *Petaurus norfolkensis*, or Schedule 2 Microchiroptera Bats, such as *Saccolaimus flaviventris*, *Mormopterus norfolkensis*, *Scoteanax rueppellii*, and *Nyctophilus bifax*, all of which occur in the region.

The Tucki area is well known to have a significant population of Koalas, *Phascolarctos cinereus*. In the Tucki area, their food trees are Forest Red Gum, *Eucalyptus tereticornis*, Tallowood, *Eucalyptus microcorys*, and Swamp Mahogany, *Eucalyptus ovata*. None of these species occur on the subject land.

The rocky slopes flanking the creek would be ideal habitat for the Carpet Python, *Morelia spilota*, a Schedule 2 species.

6. MANAGEMENT IMPLICATIONS

It is worth noting that the boundaries of the areas identified as Possible Rainforest and Critical Habitat in Appendix 1 were not entirely supported by ground truthing. Much of this area is in fact regrowth – my Area A, although some of it incorporates my Area B, Rainforest. However, some of my Area B, Rainforest, was not included in the areas identified in Appendix 1.

Area B is Rainforest, and therefore has Conservation Value. It is also the habitat of the Schedule 2 Carpet Python, *Morelia spilota*.

Area B is dominated by Hoop Pine specimens of various ages up to at least 40 years of age. Hoop Pine will not cope with fire, and will not regenerate after fire. The periphery of Area B has incursions of Lantana and Camphor.

Area A consists primarily of Wattle, Lantana and Camphor, all of which are fire prone.

The greatest risks to Area B are therefore –

- 1) Fire
- 2) Continued incursion by exotic weeds.

It is therefore recommended that:

1. Area A be cleared as soon as possible and sown with pasture to prevent subsequent regrowth.
2. To the greatest extent practicable, Lantana and Camphor encroaching on Area B be removed with minimal disturbance to other flora. Otherwise Area B to be left undisturbed.

MR Bowen ~~met~~
1/7/05



Appendix 1

Received 28-2-05
JC

all communication to
GENERAL MANAGER

our ref:

NS:S899

your ref:

contact:

Nick Stephens

February 25, 2005

Reavill Farm Pty Ltd
Hazlemount Lane
Tuckurimba NSW 2480

Dear landholder,

STUDY OF REMNANT VEGETATION IN THE WILSONS RIVER FLOODPLAIN

Lismore City Council is currently undertaking a study of high conservation value vegetation within the Wilsons River floodplain zone. The study involves checking the accuracy of vegetation maps, assessing the condition of the vegetation and assisting landholders who are interested in managing their vegetation remnants by providing management advice, information and financial incentives.

Our vegetation maps indicate that rainforest vegetation exists on your land and we are keen to arrange with you a visit of the site to identify the species present, assess its condition and discuss with you assistance and incentives being offered to help manage these areas. The pink area on the attached map shows the general location of the vegetation mapped as rainforest.

Council will be contacting you in the near future regarding this study. If you wish to speak to me prior to then please do not hesitate to contact me on the numbers below.

Yours Sincerely

Nick Stephens
PROJECT COORDINATOR
for Lismore City Council
Ph: 6625 0565 (bh - Mon & Tues)
0439 795 512 (other times)



LISMORE CITY COUNCIL

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Digital Cadastral Database (C) Land Information Centre



Lismore City Geographic Information Report requested by: nicks

Owners Name: REAVILL FARM PTY LTD
Business Name:
Address: 1586 WYRALLAH ROAD TUCKI TUCKI 2480
Postal Address: REAVILL FARM PTY LTD HAZLEMOUNT LANE TUCKURIMBA NSW 2480
Description: DP 588125 lot 4 **Zone:** 1a 1r **Area:** 38.71 ha
Property No: 16275 **Status:** **Road Widening:** N

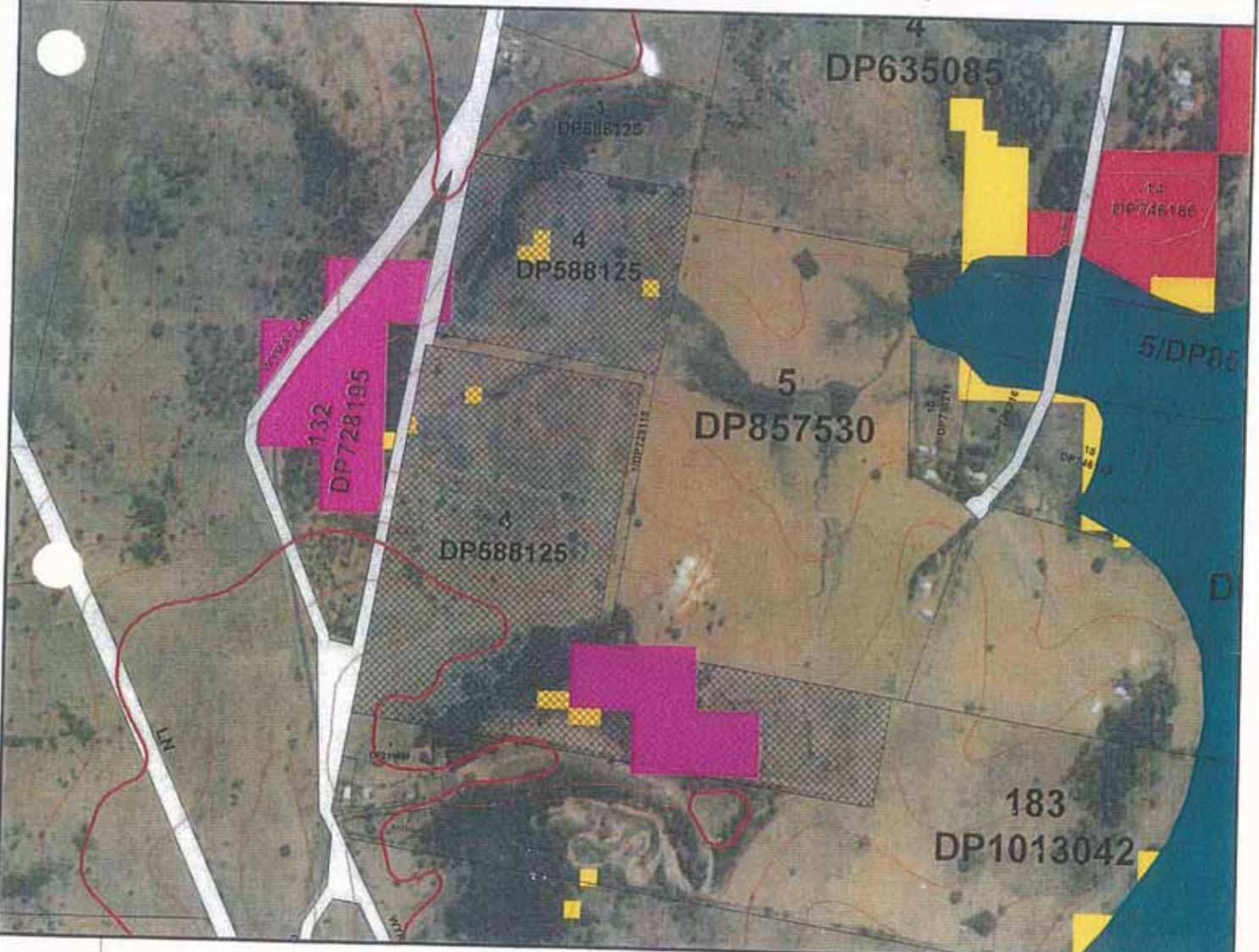
VG No: 1761285 **Pensioner:** N **Assessment No:** 15658 **Category:** farmland
Annual: \$1,085.31 **Prop(s):** 2 **Arrears:** \$0.0 **Balance:** \$0.00

Connection: N **Service No:** **Commenced:** **Pipe Diameter:**
Pensioner: N **Balance:** \$0.00 **Meter Number:** **Trade Waste:** Nil
Sewer: N

APPLICATIONS

TPC-040959 CT-041091 PA-DN040075

MAP DONE BY RICHMOND REGIONAL COUNCIL



LISMORE CITY COUNCIL

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Not To
Scale



*YELLOW - CAT 2.
VK-CAT 1A - RAIN FOREST,*

CATEGORY 1A (Very High Conservation Value)



**MAPPED
WETLAND**



**MAPPED
RAINFOREST**



**MAPPED
CANDIDATE
OLD GROWTH**



**MAPPED
MANGROVES**



CATEGORY 1B
(Very High Conservation Value)



CATEGORY 2
(High Conservation Value)

COPY

**HABITAT ASSESSMENT
OF PROPOSED QUARRY EXPANSION
LOT 5, DP857530 AND LOT 4 DP588125
TUCKI TUCKI**

PREPARED FOR: REAVILL FARM PTY LTD

By

PROFESSOR PETER BAVERSTOCK, BSc(Hons), PhD, DSc

October 2005

1. INTRODUCTION

The subject site encompasses Lot 5, DP857530 Tucki Tucki, situated approximately 0.5km east of the Wyrallah Road and Lot 4, DP588125 Tucki Tucki adjacent to Wyrallah Road (Figure 1).

It is proposed that the existing quarry will be expanded over the next few years in a south-westerly direction to encompass a total area of 2ha, all contained within Lot 5, and an access road built along the existing track from the quarry west to Wyrallah Road.

The proposed site is zoned 1(a) – General Rural. Therefore in relation to the above, the Development Application will need to address the following:

1. The Threatened Species Conservation Act 1995 (TSC Act).
2. The Environmental Planning and Assessment Act 1979, in relation to Fauna, Section 90 (1)(C2) and Section 4a, as amended by the TSC Act.
3. State Environmental Planning Policy No. 44 – Koala Habitat Protection (as amended January 1, 1996).
4. State Environmental Planning Policy No. 46 – Protection and Management of Native Vegetation.

2. QUALIFICATIONS & EXPERIENCE OF PERSON PREPARING REPORT

Section 49 of the amended EPA Act requires an 8-point test of significance conducted by a qualified fauna expert.

SEPP44 requires that decisions in relation to Koala Community must be provided by persons suitably qualified in biological science, fauna survey and management.

Qualifications – Professor Peter Baverstock has a PhD and a DSc in wildlife biology.

Wildlife Experience

- (i) 27 years conducting research into Australian wildlife;
- (ii) Over 150 publications in refereed scientific journals;
- (iii) Lecturer in Wildlife Biology for 4 years;
- (iv) Currently supervising 12 PhD and Masters students in Wildlife Biology.

Experience specifically in relation to Koalas –

- (i) Supervised Honours student on radio tracking of Koalas
- (ii) Supervised Steve Phillips, renowned Koala expert, for his PhD
- (iii) Prepared Koala Management Plans for Lismore Council and for private landholders in Ashby region
- (iv) Constantly liaising with Friends of Koala.
- (v) Lived at Hazelmount Lane, Tucki for 4 years.

3. METHODS

I inspected the site on 1st October, 2005.

The area was searched thoroughly and special note was taken of habitat features that might be significant to Schedule 1 or Schedule 2 species that might occur in the area. These included:-

- (i) Presence of Koala food trees and, where present, occurrence of koala faecal pellets around the base of such trees, and/or Koala scratch marks on smooth-barked gums.
- (ii) Presence of large old hollow trees that might provide nesting sites for Schedule 2 birds such as Glossy Black Cockatoos, *Calyptorhynchus lathami*, and Red-tailed Black Cockatoos, *C. magnificus*, or day roosts for Schedule 2 Microchiropteran Bats.
- (iii) Presence of *Allocasuarina* that might provide food for Glossy Black Cockatoos.
- (iv) Presence of thick undergrowth that might provide habitat for Schedule 1 or Schedule 2 ground mammals such as the Long-nosed Potoroo, *Potorous tridactylus* or Rufous Bettong, *Aepyprymnus rufescens*.
- (v) Presence of hollows that might provide habitat for Schedule 1 or Schedule 2 mammals such as Phascogales, *Phascogale tapoatafa*, or Squirrel Gliders, *Petaurus norfolkensis*.
- (vi) Presence or possibility of occurrence of ROTAP (Rare and Threatened Australian Plants) species.

4. RESOURCES AVAILABLE

I had available:

- (i) An aerial photograph of the proposed quarry site and the proposed road access site and the surrounding area (Figure 2).
- (ii) A "Koala Habitat" map provided by Lismore City Council (Figure 3).
- (iii) A "Vegetation Map" provided by Lismore City Council (Figure 4).

5. HABITAT DESCRIPTION

The subject area consists of four distinct vegetation and landform types.

These are shown as areas A, B, C and D in Figure 2.

Area A

This is an area of approximately 2.5ha surrounding Area B. It consists generally of gently undulating brown kraznozem soil.

The vegetation of Area A consists entirely of regrowth, probably 5-7 years old.

The vegetation has a Foliage Protective Cover (FPC) of 50%. The overstorey is dominated by Black Wattle, *Acacia*, and the midstorey by *Lantana*. There is no understorey.

Scattered throughout Area A are Camphor Laurel, *Camphor*, Lilly Pilly, *Syzigium sp.*, and Privett, with some scattered young Pink Bloodwood, *Eucalyptus intermedia*. There are some noxious weed Coxspur.

There are no hollow trees, either dead or alive, in Area A.

Area A is not Rainforest!

Area B

Area B is a steep gully, dissected by an intermittent creek. The creek is flanked by large granite boulders.

The vegetation of Area B is dominated by an overstorey of Hoop Pine, *Araucaria cunninghamii*, and a midstorey and understorey of Hoop Pine of various ages. Hoop Pine is a relatively slow growing species and the larger specimens I estimate to be at least 40 years old.

The rocks are sprinkled with birds nest ferns, and staghorns occur on some Hoop Pines.

There are no hollow trees, dead or alive, in Area B.

Area B could be classified as Rainforest.

Area B has encroaching *Lantana* and *Camphor* at its periphery.

Area C

Area C consists of four medium sized trees of the genus *Eucalyptus*. Three of these trees are Pink Bloodwood, *Eucalyptus intermedia*. The fourth specimen is a species of uncertain status, but it is definitely not a koala food tree (see 6 below).

None of the trees are hollow.

Area D

The remaining area consists entirely of grassland used as cattle grazing land. It is pasture-improved with *Setaria*.

It is probable that area D has been used for cattle grazing for many (probably around 100) years. Indeed the remnants of an old dairy occur on Lot 10 DP736216, which was part of Lot 5 DP857530 until 1986, when it was excised.

6. IMPLICATIONS FOR KOALAS

The Tucki Tucki area is well-known as a significant area for Koalas.

Moreover, land immediately adjacent to the subject site has been identified as a “Primary” Koala Habitat on the map provided by Lismore City Council (Figure 3).

Therefore the implications of the proposed activity on koalas in relation to SEPP44 will be dealt with first.

The area identified as “Primary Koala Habitat” on Figure 3 was almost certainly identified as such from aerial photographs, and has never been ground-truthed. Indeed, in the Tucki area, the only known food trees for the koala are the Forest Red Gum, *E. tereticornis*, the Tallowood, *E. microcorys*, and the Swamp Mahogany, *E. ovata*.

Not one single specimen of any of these species occurs within the subject site.

Indeed, the caption to Figure 3 states:

“While all reasonable care has been taken the Council does not guarantee the accuracy of the information contained on this map, ...”

There is no doubt that if the site had been ground-truthed before the preparation of the map, the area would not have ranked as Koala Habitat at all, let alone “Primary Koala Habitat”.

There are therefore no issues to address in terms of SEPP44.

7. CONSERVATION VALUE OF SUBJECT SITE

The boundaries of the areas identified as “Possible Rainforest” and “Critical Habitat” in Figure 4 were not entirely supported by my ground truthing. Much of this area is in fact regrowth – my Area A, although some of it incorporates my Area B, Rainforest. However, some of my Area B, Rainforest, was not included in the areas identified as Rainforest in Figure 4.

Area B is Rainforest, and therefore has Conservation Value. It is also the habitat of the Schedule 2 Carpet Python, *Morelia spilota*.

Area B is dominated by Hoop Pine specimens of various ages up to at least 40 years of age. Hoop Pine will not cope with fire, and will not regenerate after fire. The periphery of Area B has incursions of Lantana and Camphor.

Therefore the area identified as Area B has conservation value.

The proposed quarry itself is at least 300 metres from Area B, and the proposed access road to the quarry is at least 300 meters from Area B.

Therefore Area B will not be impacted by the proposed quarrying activities.

8. RARE OR THREATENED FAUNA AND FLORA

No Endangered Species (as defined in Schedule 1, Part 1 of the Threatened Species Conservation Act) are likely to occur within the area impacted by the proposed activity. For most of these species the subject site is well out of the geographic range of the species, while for the remainder the habitat is not suitable.

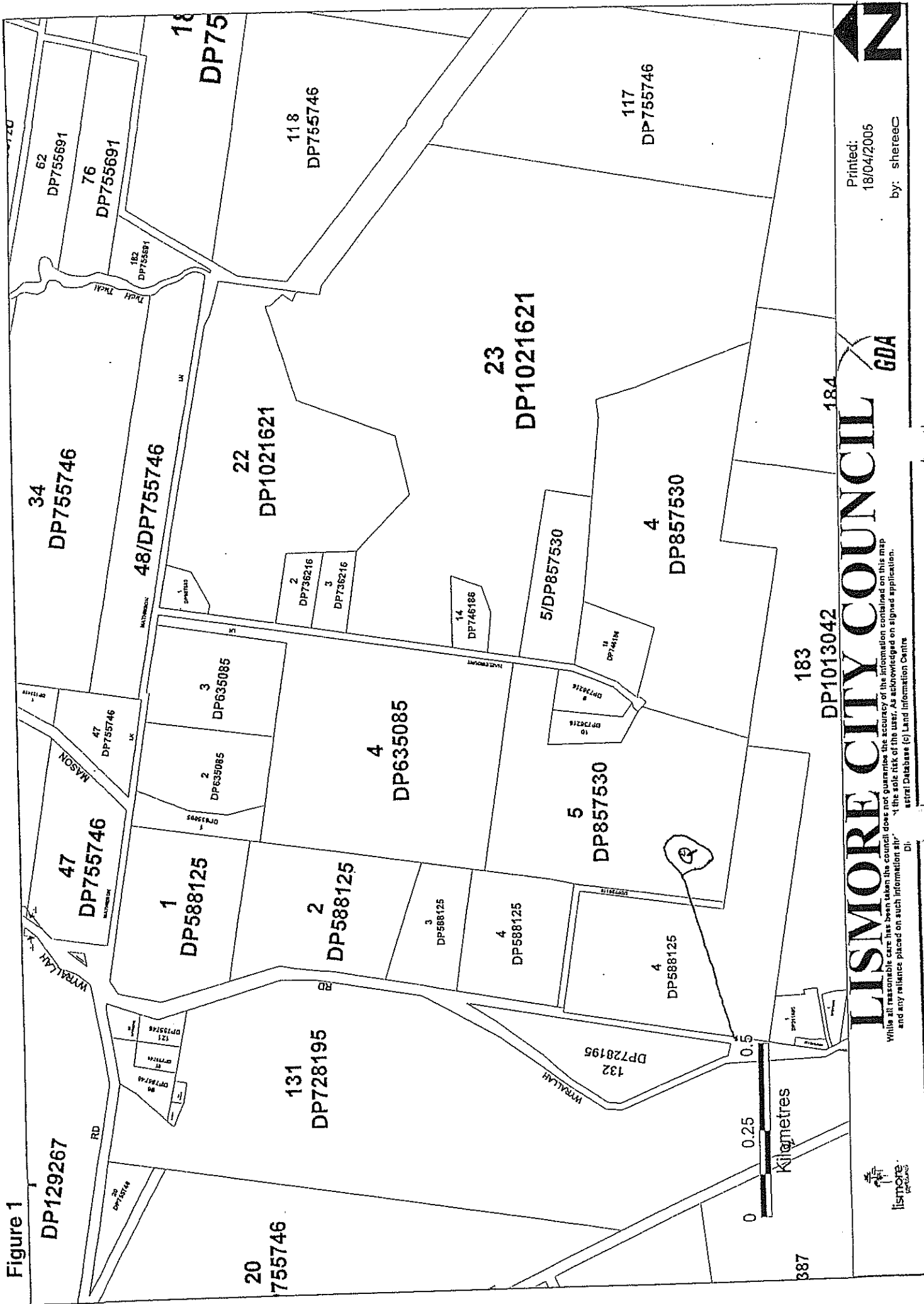
Of the Vulnerable Species listed in Schedule 2, there are a number which occur in the general area. These include the Glossy Black Cockatoo, *Calyptorhynchus lathami* and the Red-Tailed Black Cockatoo, *C. magnificus*, which use large hollows as nest sites, and the Brush-tailed Phascogale, *Phascogale tapoatafa*, the Squirrel Glider, *Petaurus norfolkensis*, and various species of Microchiroptera Bats listed in Schedule 2 that might use hollows as day roosts.

However, no hollow trees occur on the impacted site.

The area to be impacted by the quarrying activities consists entirely of land that has been grazed for around 100 years.

Therefore no Rare or Threatened Australian Plants are likely to occur on the impacted area.

Figure 1



Printed: 18/04/2005
by: shereec



LISMORE CITY COUNCIL

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0 0.25 0.5
Kilometres

Figure 2

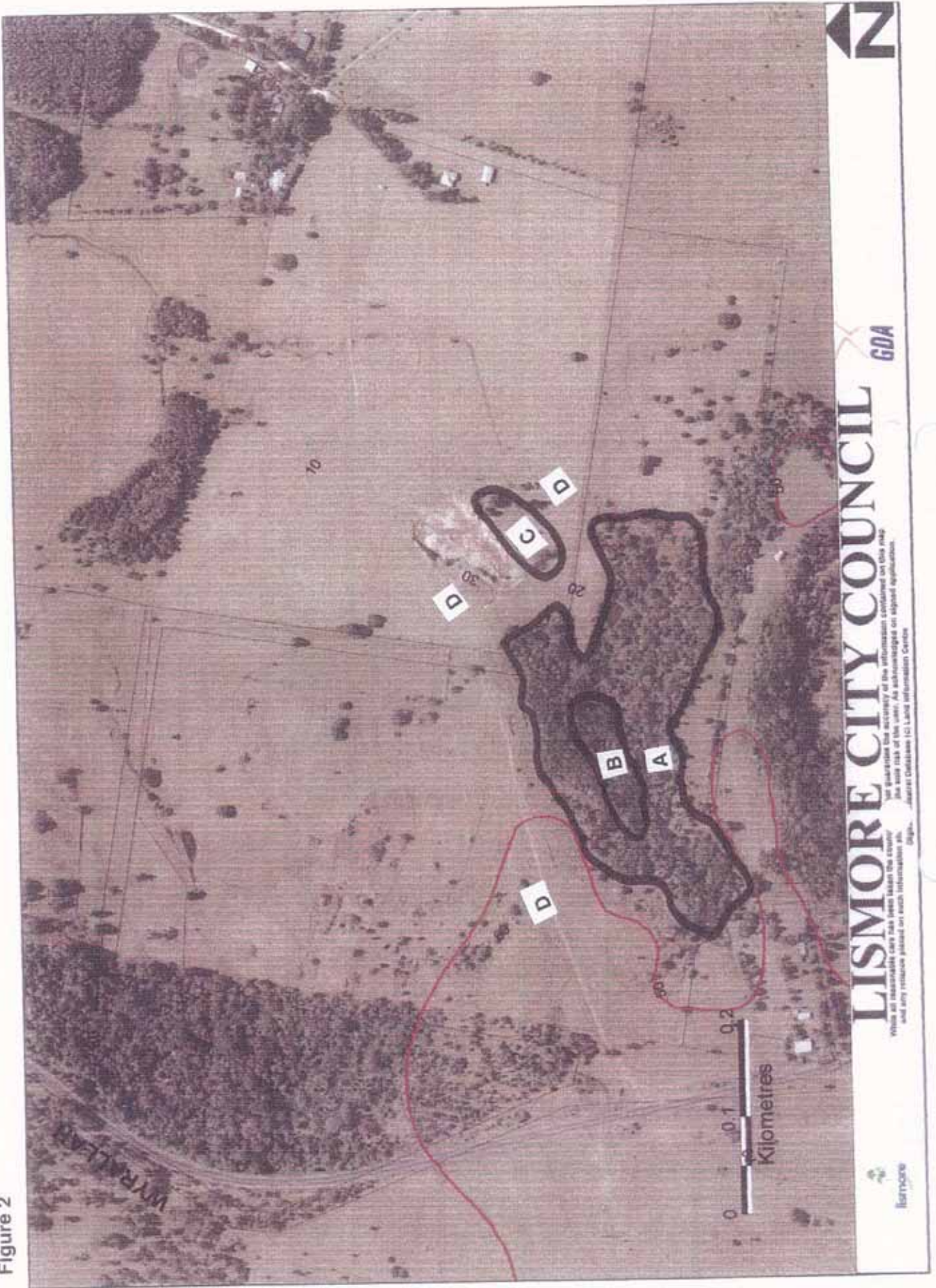
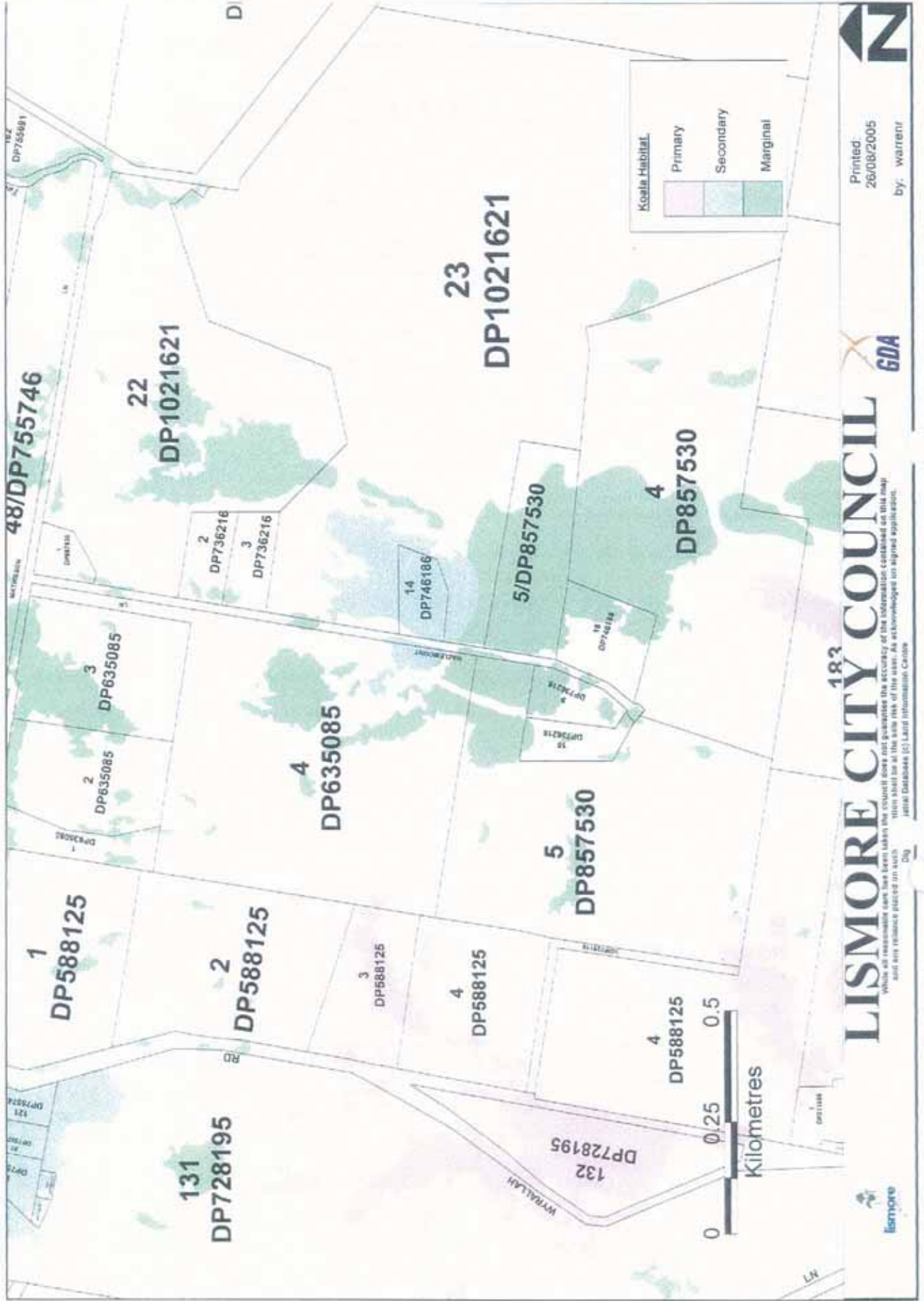


Figure 3



Lismore City Geographic Information Report. requested by: nicks

Owners Name: REAVILL FARM PTY LTD
Business Name:
Address: 1586 WYRALLAH ROAD TUCKI TUCKI 2480
Postal Address: REAVILL FARM PTY LTD HAZLEMOUNT LANE TUCKURIMBA NSW 2480
Description: DP 588125 lot 4 **Zone:** 1a 1r **Area:** 38.71 ha
Property No: 16275 **Status:** **Road Widening:** N

RATING INFORMATION

VG No: 1761285 **Pensioner:** N **Assessment No:** 15658 **Category:** farmland
Annual: \$1,085.31 **Prop(s):** 2 **Arrears:** \$0.0 **Balance:** \$0.00

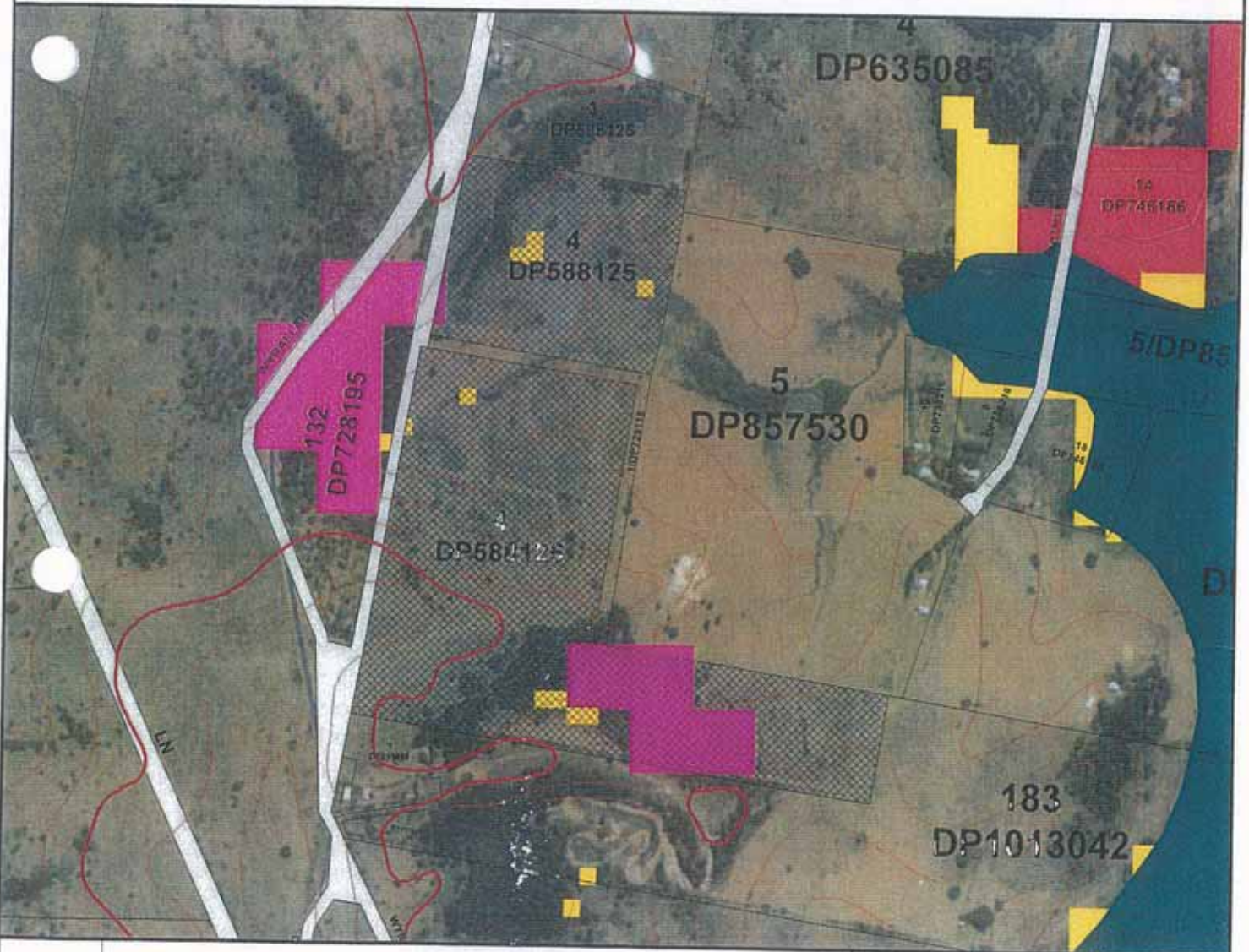
WATER INFORMATION

Connection: N **Service No:** **Commenced:** **Pipe Diameter:**
Pensioner: N **Balance:** \$0.00 **Meter Number:** **Trade Waste:** Nil
Sewer: N

APPLICATIONS

TPC-040959 CT-041091 PA-DN040075

MAP DONE BY RICHMOND REGIONAL COMM.



LISMORE CITY COUNCIL

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Not To

Scale



YELLOW - CAT 2.

VR-CAT 1A - RAIN FOREST,

CATEGORY 1A (Very High Conservation Value)



**MAPPED
WETLAND**



**MAPPED
RAINFOREST**



**MAPPED
CANDIDATE
OLD GROWTH**



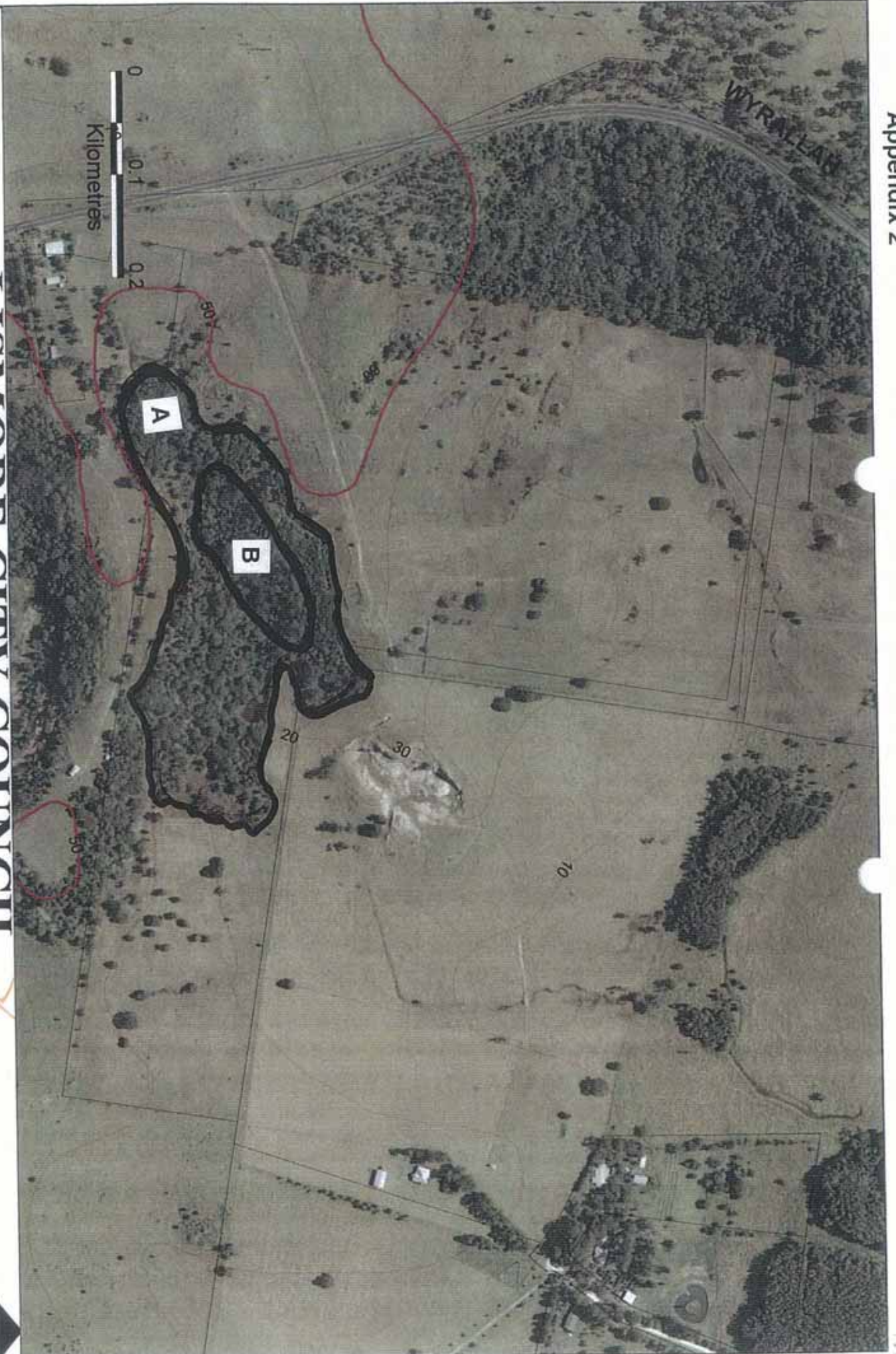
**MAPPED
MANGROVES**



CATEGORY 1B
(Very High Conservation Value)



CATEGORY 2
(High Conservation Value)



LISMORE CITY COUNCIL

While all reasonable care has been taken the council does not guarantee the accuracy of the information contained on this map and any reliance placed on such information shall be at the sole risk of the user. An acknowledgment on signed application.

Source: Queensland Geographical Names 1991 and Information Centre



COPY

**HABITAT ASSESSMENT
OF LOT 183 DP1013042, LOT 1 DP127550, and
LOT 101 DP755746
1692 WYRALLAH ROAD, TUCKURIMBA NSW
2480**

PREPARED FOR TUCKI HILLS PTY LTD

By

PROFESSOR PETER BAVERSTOCK, BSc(Hons), PhD, DSc

July 2007

1. INTRODUCTION

The subject site, Lot 183 DP1013042, Lot 1 DP127550, and Lot 101 DP755746, is situated on the east side of Wyrallah Road, Tucki.

The area is approximately 105 ha, with no existing dwelling. The entire site is zoned 1(a), 1(r).

The present report provides the results of ground truthing the area in June 2007, and recommendations for future sustainable vegetation management of the area.

The recommendations provided herein have taken due account of:

1. *The Threatened Species Conservation Act 1995 (TSC Act).*
2. *The Environmental Planning and Assessment Act 1979, in relation to Fauna, Section 90 (1)(C2) and Section 4a, as amended by the TSC Act.*
3. *State Environmental Planning Policy No. 44 – Koala Habitat Protection (as amended January 1, 1996).*
4. *Native Vegetation Act 2003.*



Professor Peter Baverstock

7th July 2007

2. QUALIFICATIONS AND EXPERIENCE OF PERSON PREPARING REPORT

Qualifications – Professor Peter Baverstock has a PhD and a DSc in wildlife biology.

Wildlife Experience

- (i) 22 years conducting research into Australian wildlife;
- (ii) Over 150 publications in refereed scientific journals;
- (iii) Lecturer in Wildlife Biology for 4 years;
- (iv) Currently supervising 12 PhD and Masters students in Wildlife Biology.

Experience specifically in relation to Koalas –

- (i) Supervised Honours student on radio tracking of Koalas
- (ii) Worked closely with Steve Phillips currently of Australian Koala Foundation, for last 5 years
- (iii) Prepared Koala Management Plans for Lismore Council and for private landholders in Ashby region
- (iv) Constantly liaising with Friends of Koala.

3. METHODS

I inspected the site on 17th June 2007.

An Aerial Photograph taken of the property in **INSERT DATE OF MODERN PHOTO HERE** is provided as Figure 1.

The area was searched thoroughly and special note was taken of habitat features that might be significant to Schedule 1 or Schedule 2 species of fauna that might occur in the area. These included:-

- (i) Presence of Koala food trees and, where present, occurrence of koala faecal pellets around the base of such trees, and/or Koala scratch marks on smooth-barked gums.
- (ii) Presence of large old hollow trees that might provide nesting sites for Schedule 2 birds such as Glossy Black Cockatoos, *Calyptorhynchus lathami*, and Red-tailed Black Cockatoos, *C. magnificus*, or day roosts for Schedule 2 Microchiropteran Bats.
- (iii) Presence of *Allocasuarina* that might provide food for Glossy Black Cockatoos.
- (iv) Presence of thick undergrowth that might provide habitat for Schedule 1 or Schedule 2 ground mammals such as the Long-nosed Potoroo, *Potorous tridactylus* or Rufous Bettong, *Aepyprymnus rufescens*.
- (v) Presence of hollows that might provide habitat for Schedule 1 or Schedule 2 mammals such as Phascogales, *Phascogale tapoatafa*, or Squirrel Gliders, *Petaurus norfolkensis*.

4. HABITAT DESCRIPTION

The property has for many years and up till the present been used for cattle grazing. Additionally, what appears to be an old disused quarry at the western end of the property was used by a dirt bike club from the 1960's to the 1990's.

An aerial photograph of the property obtained in 1985 clearly shows the dirt bike track area used at that time (**Area I**). The photograph also clearly shows the distribution of vegetation on the property at that time. This photograph has proved invaluable in assessing the extent of what is defined as "Remnant Vegetation" in the *Native Vegetation Act 2003*.

The subject area consists of nine distinct vegetation and landform types.

These are shown as areas A to I in the attached aerial photograph (Figure 2).

The Tucki/Tuckurimba area is known to have good populations of the Koala, *Phascolarctos cinereus*, and therefore special note was taken of the presence or otherwise of Koala feed trees, which in this area are almost exclusively Forest Red Gum, *E. tereticornis*, the Tallowood, *E. microcorys*, and the Swamp Mahogany, *E. ovata*.

Not one single specimen of any of these species occurs within the subject site.

Therefore there are no considerations under *State Environmental Planning Policy No. 44 – Koala Habitat Protection*

Following is a Habitat Assessment of each of the Vegetation Areas A to I.

Area A

This is an area of approximately one ha. It is a rocky wet gully, with large boulders and steep slopes. The overstorey consists of mature rainforest trees with Foliage Protective Cover (FPC) of 100%. There is minimal midstorey, and the understorey is sparse and dominated by bird nest ferns. It is largely undisturbed.

Based on the Aerial Photograph Figure 1, in combination with the ground truthing on June 17th 2007, much of the vegetation predates 1st January 1990. Therefore under the *Native Vegetation Act 2003*, the older native vegetation should not be cleared. However, the fringes of area A are being encroached by Camphor Laurel, Black Wattle (*Acacia saligna*), and the noxious weed .

The area is too small to be of major conservation significance, but the area may provide a refuge for fauna such as the Red-necked Wallaby, *Macropus rufogriseus*, the Long-nosed Bandicoot, *Isodon macroura*, and the Carpet Python, *Morelia spilota*, all of which are known to occur in the area.

Management Recommendations

Under the *Native Vegetation Act 2003*, the “Remnant Vegetation” as defined in *The Act*, should not be cleared. However, the declared noxious weed must be removed. Additionally, the encroaching Camphor Laurel, although not a noxious weed in this area, should also be removed. There will need to be ongoing active management of the area for encroachment by invasive weeds into the future.

Consideration could be given to fencing the area to prevent access by grazing cattle. However, it is apparent that although the surrounding area has been used to graze cattle for probably at least the last 100 years, the disturbance to Area A has been minimal. Moreover, fencing the area may reduce easy access by heavy machinery in the future for management of invasive weeds.

Areas B and C

The overstorey consists primarily of Camphor Laurel, with some scattered Bloodwoods, *E. intermedia*. Some of the Bloodwoods have a Diameter at Breast Height of 45cm plus, and possibly therefore predate January 1st 1990.

The midstorey is dominated by Black Wattle, *A. saligna*, and Lantana, with a few scattered Casuarina, *Allocasuarina* and Silky Oak, *Grevillia robusta*. The understorey consists of Blady Grass and Bracken Fern. There are many plants.

The AP obtained in 1985 shows area B and C to be well-vegetated at the time, although judging by the AP, most of the overstorey was at the time Camphor Laurel.

Significantly, none of the trees have hollows of any kind.

Management Recommendations

The area has no conservation value. There are no hollow trees, and the area is dominated by invasive weeds, which should be cleared for weed control. The few *Allocasuarina* are too few to be of any food value to Glossy Black Cockatoos. The few large Bloodwoods with DBH exceeding 45cm, and which possibly predate January 1st 1990, should be preserved.

Areas D and E

Area D of approximately two ha and area E of approximately six ha both consist primarily of Black Wattle, *A saligna*, and Lantana. There are some scattered Camphor Laurels. The fringing areas include Tobacco Bush, *Nicotiana*.

The AP obtained in 1985 shows only a few scattered trees in these areas, probably Camphor Laurel. Thus the vegetation currently in Areas D and E totally postdate January 1st 1990.

Management Recommendations

The Areas D and E have absolutely no conservation significance. There is no reason why they should not be cleared.

Area F

Area F is dominated by the Swamp Paperbark, *Melaleuca quinquenervia*. However, it is heavily infested throughout with Camphor Laurel. The fringing areas are being invaded by Lantana, and Tobacco Bush, *Nicotiana*. There are a few fringing Silky Oak, *G. robusta*.

Judging by the size and shape of the *M. quinquenervia*, the forest is an old established forest. Indeed, the AP 1 shows this area to be well vegetated in 1985. Many of the older specimens have developed hollows.

Management Recommendations

The dominant plant in the Area F is *M. quinquenervia* which almost certainly predates January 1st 1990. Therefore under *Native Vegetation Act* 2003, it is "Remnant Vegetation" as defined in *The Act*, and should not be cleared.

Moreover, the older trees are developing hollows. The Area F therefore has potentially high conservation value for hollow-nesting birds, and diurnal roosting sites for microchiropteran bats and marsupials.

However, the entire area is threatened by invasive Camphor Laurel weeds and Black Wattle. If left unmanaged, almost certainly these invasive plants will take over the entire area, with the total loss of its long-term Conservation Value.

Thus the Camphor Laurel especially needs to be eradicated. However, the Camphors are not just on the fringe of the Melaleuca Forest, but are currently spread throughout it. Thus their eradication, while critical for the long-term conservation value of the area, will not be an easy or inexpensive process.

It is therefore recommended that the owners seek financial support from a relevant government funding agency to provide financial support for the eradication programme.

Area G

The vegetation in this area is dominated by scattered Swamp Paperbark, *M. quinquenervia*, with some invading Camphor Laurel. The *M. quinquenervia* appear to be relatively old mature trees, with some hollows. Inspection of AP 1, from 1985, suggests that the actual trees present today were present at that time.

Recommendations

The *M. quinquenervia* almost certainly predates January 1st 1990, and therefore must be preserved. Indeed, because some have hollows, they have some conservation value.

However, as with Area F, the area already has invasive Camphor Laurel, which should be removed, and incursion into the future managed appropriately.

Area H

Area H consists almost entirely of open grazing land. The area is partly pasture-improved, with setaria and kikuya on the hill country and paspalum, couch and clovers on the lowlying areas.

Area 1

Area 1 appears to be an old disused quarry. From the 1960's to the 1990's it was used as a motor bike track.

The AP1 shows that in 1985, it had virtually no vegetation, so the minimal vegetation there now (AP2) is "Regrowth" under the definition in the *Act*.

Management Recommendations

The area has no conservation value.

Management Recommendations

The Land needs lantana and bracken fern removing, then soil renovation and a fertilizing program.

There are no flora and fauna management issues in Area H.

Figure 1
OBTAINED 1985





FIGURE 2 - 2007.

**REPORT ON PROPOSED KOALA TREE PLANTING BY
CHAMPIONS QUARRY PTY LTD**

Professor Peter Baverstock

January 2008

EXECUTIVE SUMMARY

As part of their development activities, Champions Quarry Pty Ltd propose to plant 2 rows approximately 850 metres long, with approximately 280 koala food trees on their property at Tucki, as shown in AP1 attached.

The proposed planting will ultimately increase the local Tucki koala population by around 30-50%, and will significantly enhance the health and long-term sustainability of the Tucki population of koalas.

1. QUALIFICATIONS AND EXPERIENCE OF PERSON PREPARING REPORT

Qualifications – Professor Peter Baverstock has a PhD and a DSc in wildlife biology.

Wildlife Experience

- (i) 40 years conducting research into Australian wildlife;
- (ii) Over 150 publications in refereed scientific journals;
- (iii) Lecturer in Wildlife Biology for 4 years;
- (iv) Supervised over 20 PhD and Masters students in Wildlife Biology.

Experience specifically in relation to Koalas –

- (i) Supervised Honours student on radio tracking of Koalas
- (ii) Supervised PhD of Dr Steve Phillips, renowned koala expert.
- (iii) Prepared Koala Management Plans for Lismore Council and for private landholders in Ashby region
- (iv) Constantly liaising with Friends of Koala.

INTRODUCTION

As part of their development activities, Champions Quarry Pty Ltd propose to plant approximately 280 koala food trees on their property at Tucki in two rows as shown in AP 1.

This report assesses the likely impact of the tree planting on the local koala population.

HISTORY OF THE KOALA IN THE TUCKI AREA.

The Tucki area has long been known to harbor a population of koalas *Phascolarctos cinereus*. It was recognized early in the 1940s that removal of trees in the area was having a detrimental effect on the koala population, and a group of locals established the Tucki Koala Sanctuary, a 2 ha plot of land. At the time little was known of the food requirements of the koala, and most of the trees planted in the sanctuary were not koala food trees.

In the 1980s, the Alstonville Office of the NSW National Parks and Wildlife Service organized annual "counts" of koalas in the Tucki area. The "count" was held on a single day each year, and relied on volunteers to take part in the count. The count was as "systematic" as possible in the sense that the procedure was repeated each year, but the number of volunteers varied from year to year, and the experience of the volunteers in spotting koalas varied. Moreover, the search was not "random", but focused on areas known from past experience to be the most likely areas where koalas might be spotted. Thus the "count" can only be taken as a rough guide to numbers. The area searched centered on the Tucki Koala Sanctuary, and usually for around 1-2 km in various directions. Thus the area searched was VERY approximately 3,000 ha. The numbers of koalas typically spotted on one of these "counts" was around 15.

I moved to the Tucki area, specifically Hazlemount Lane, in 1988. Being a wildlife biologist, I took more than a casual interest in the koalas of the area.

In general, the koala population in the area was such that one could not guarantee to actually find a koala in the area. The one exception was a clump of about 20 Forest Red Gums, *Eucalyptus tereticornis*, on the river flats off Mathieson Lane (label A in AP 2). Here, up to five koalas might be found browsing on some days.

Moreover, virtually every one of the koalas in the area that were spotted were suffering from Chlamydia infection.

In 1990, Mr Champion and I undertook to plant as many koala food trees as practicable along Hazlemount Lane and adjacent properties.

The procedure we adopted was:

1. Three weeks before planting, the entire area to be planted (AP 2) was sprayed with glyphosate.
2. The area to be planted was then ripped to a depth of approximately 500 mm with a single-tyne ripper.
3. The trees for planting were seedlings in tubes, provided by Friends of the Koala, grown from locally selected seed. Approximately 2/3 of the trees were Forest Red Gums, *E. tereticornis*, and the remainder were Tallowoods, *E. microcorys*. Some Swamp Mahogany, *E. robusta*, were planted in the swampier areas.
4. The planting itself was conducted with the assistance of some residents, along with volunteer members of Friends of the Koala.
5. The seedlings were immediately surrounded with newspaper and bagasse mulch and watered .
6. Over the subsequent 12 months, the trees were constantly pruned, and kept weed-free with glyphosate.

The vast majority (approximately 400 Koala food trees), survived, grew and can be seen by the white dotted line, in AP 3 taken in 2007.

OUTCOMES

The results of this planting in terms of Koalas has been remarkable. On any day at least five koalas can be found in the trees on Hazlemount Lane, and often many more. Mark Richardson from Byron Bay Wildlife Tours includes several weekly visits to Hazlemount Lane as part of his routine tour to show tourists, mostly international, Koalas in the wild. According to Mark Richardson , he has seen up to 19 koalas in these trees in Hazlemount Lane, on the one day (Mark Richardson *personal communication* Dec 23rd 2007).

Even more significant, I have not observed a single incident of chlamydia in any of the koalas in Hazlemount Lane, in recent times.

Finally, most of the female koalas seen in Hazlemount Lane are carrying young, so the population is breeding well.

Given that it is proposed to plant approximately 280 additional Koala Food Trees as part of the Champions Quarry development, (shown in Red on AP 1), and given that these trees will link into the Hazlemount Lane trees, the net effect of such a tree planting could be to increase the local koala population by as much as 30-50%. Moreover, the planting

will contribute to the health of the local population by ensuring an ongoing food supply, ensuring its long-term sustainability.

RECOMMENDATIONS

It is recommended that, except for tree spacing, the procedure adopted for the Hazlemount Lane planting be adopted for the new planting, viz:

1. Seedlings be sourced from locally collected seed provided by Friends of the Koala.
2. The mix of species be Forest Red Gums and Tallowood.
3. The lines be sprayed with glyphosate and ripped with a single-tyne ripper before planting.
4. The trees be mulched and watered.
5. The trees be pruned and kept weed free for the first 12 months.
6. The area to be planted will be 2 rows, approximately 850 metres long, in three sections as shown on AP1. Trees be planted, 6 meters apart, with 6 meters between the rows. The trees planted in Hazlemount Lane were 3 meters apart, which we have found is too close for long term survival of all trees.

Emeritus Professor Peter Baverstock

January 2008

Annex C

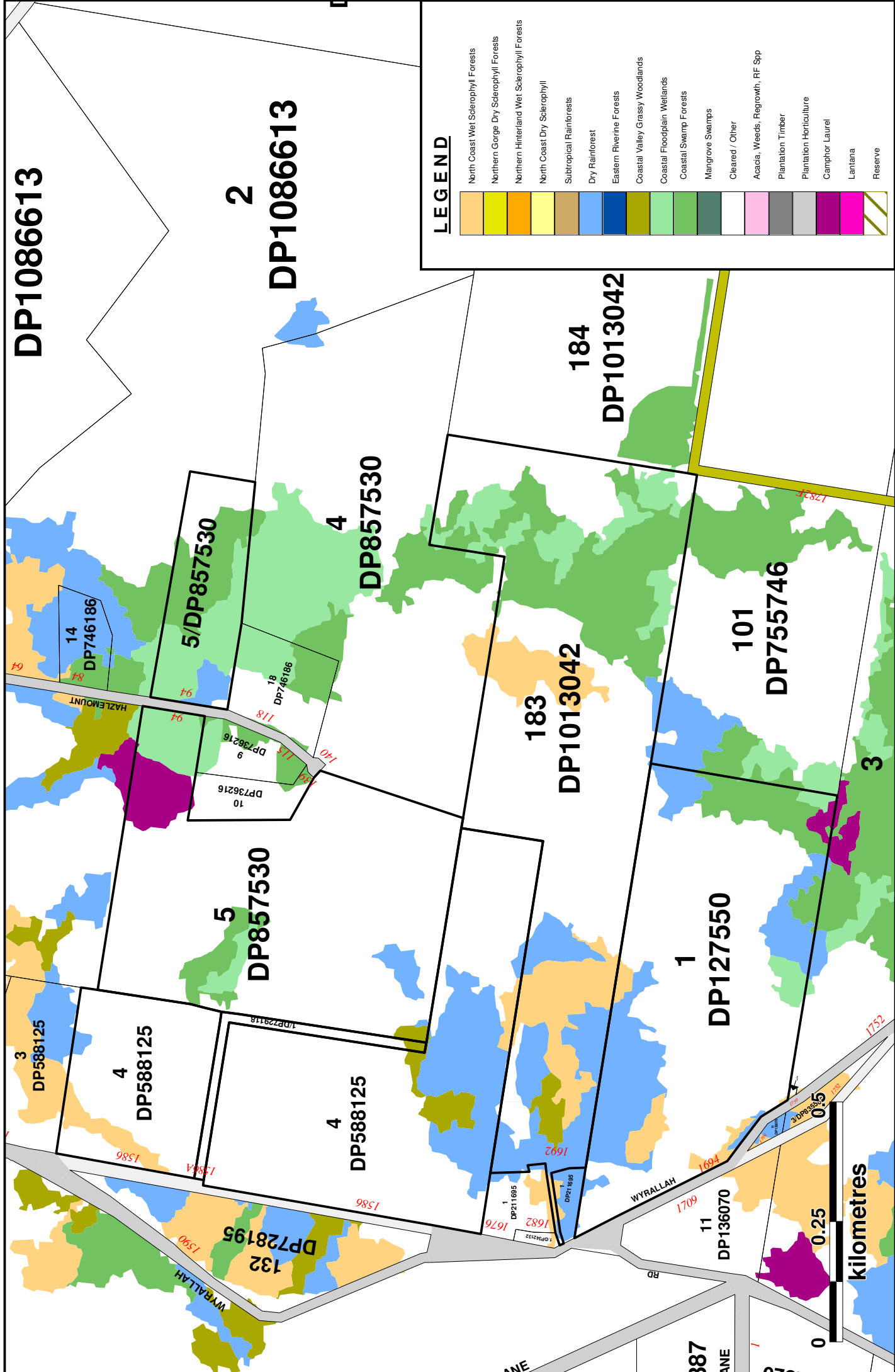
Lismore City Council Vegetation Mapping

DP1086613

2
DP1086613

LEGEND

	North Coast Wet Sclerophyll Forests
	Northern Gorge Dry Sclerophyll Forests
	Northern Hinterland Wet Sclerophyll Forests
	North Coast Dry Sclerophyll
	Subtropical Rainforests
	Dry Rainforest
	Eastern Riverine Forests
	Coastal Valley Grassy Woodlands
	Coastal Floodplain Wetlands
	Coastal Swamp Forests
	Mangrove Swamps
	Cleared / Other
	Acacia, Weeds, Regrowth, RF Spp
	Plantation Timber
	Plantation Horticulture
	Campor Laurel
	Lantana
	Reserve



Printed: 09/04/2008

Scale: 1:7,000

MAP TITLE: Vegetation Information



LISMORE CITY COUNCIL



Annex D

Species Lists

Table A1 Flora Species Identified on Site

Family	Scientific Name	Common Name
Acanthaceae	<i>Pseuderanthemum variabile</i>	Pastel Flower
Adiantaceae	<i>Cheilanthes sieberi</i>	Mulga Fern
Araucariaceae	<i>Araucaria cunninghamii</i>	Hoop Pine
Asparagaceae	<i>Asparagus plumosus*</i>	Climbing Asparagus Fern
Aspleniaceae	<i>Asplenium australasicum</i>	Bird's Nest Fern
Asteliaceae	<i>Cordyline stricta</i>	Narrow-leaved Palm Lily
Asteraceae	<i>Ageratina riparia*</i>	Mistflower
	<i>Bidens pilosa*</i>	Cobbler's Pegs
	<i>Conyza bonariensis*</i>	Flaxleaf Fleabane
	<i>Onopordum acanthium*</i>	Scotch Thistle
	<i>Senecio madagascariensis*</i>	Fireweed
Bignoniaceae	<i>Pandorea pandorana</i>	Wong Wonga Vine
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern
Campanulaceae	<i>Wahlenbergia gracilis</i>	Australian Bluebell
Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest Oak
Commelinaceae	<i>Aneilema acuminatum</i>	Pointed Aneilema
	<i>Commelina cyanea</i>	Native Wandering Jew
Cyperaceae	<i>Gahnia aspera</i>	Rough Saw-sedge
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Ericaceae	<i>Trochocarpa laurina</i>	Tree Heath
Fabaceae (Faboideae)	<i>Desmodium rhytidophyllum</i>	
	<i>Glycine microphylla</i>	Small-leaf Glycine
Fabaceae (Mimosoideae)	<i>Acacia obtusifolia</i>	Blunt-leaf Wattle
	<i>Acacia saligna*</i>	Golden Wreath Wattle
Gleicheniaceae	<i>Sticherus lobatus</i>	Spreading Shield Fern
Lamiaceae	<i>Plectranthus parviflorus</i>	Cockspur Flower
Lauraceae	<i>Cinnamomum camphora*</i>	Camphor Laurel
Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot
Lomandraceae	<i>Lomandra filiformis</i>	Wattle Mat-rush
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry
	<i>Geitonoplesium cymosum</i>	Scrambling Lily
Malvaceae	<i>Hibiscus heterophyllus</i>	Native Rosella
Menispermaceae	<i>Sarcopetalum harveyanum</i>	Pearl Vine
Monimiaceae	<i>Wilkiea huegeliana</i>	Veiny Wilkiea
Myrtaceae	<i>Acmena smithii</i>	Lilly Pilly
	<i>Corymbia intermedia</i>	Pink Bloodwood
	<i>Lophostemon confertus</i>	Brush Box
	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark
	<i>Rhodamnia rubescens</i>	Scrub Turpentine
Oxalidaceae	<i>Oxalis spp.*</i>	Oxalis
Passifloraceae	<i>Passiflora subpeltata*</i>	White Passionflower
Pittosporaceae	<i>Pittosporum multiflorum</i>	Orange Thorn
	<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum
	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Poaceae	<i>Chloris gayana*</i>	Rhodes Grass
	<i>Cynodon dactylon*</i>	Couch
	<i>Entolasia marginata</i>	Bordered Panic
	<i>Entolasia stricta</i>	Wiry Panic
	<i>Eragrostis brownii</i>	Brown's Love Grass
	<i>Imperata cylindrica</i>	Blady Grass
	<i>Microlaena stipoides</i>	Weeping Grass

Family	Scientific Name	Common Name
Poaceae	<i>Oplismenus imbecillis</i>	Basket Grass
	<i>Paspalum dilatatum</i> *	Paspalum
	<i>Pennisetum clandestinum</i> *	Kikuyu
	<i>Setaria spp.</i> *	Pigeon Grass
	<i>Themeda australis</i>	Kangaroo Grass
Polypodiaceae	<i>Platynerium bifurcatum</i>	Elkhorn
	<i>Pyrrhosia rupestris</i>	Rock Felt-fern
Proteaceae	<i>Banksia paludosa</i>	Swamp Banksia
Rubiaceae	<i>Pomax umbellata</i>	Pomax
Rutaceae	<i>Zieria fraseri</i>	
Smilacaceae	<i>Smilax australis</i>	Lawyer Vine
Solanaceae	<i>Solanum mauritianum</i> *	Wild Tobacco Bush
Verbenaceae	<i>Lantana camara</i> *	Lantana
	<i>Verbena bonariensis</i> *	Purpletop
	<i>Cayratia clematidea</i>	Slender Grape
Vitaceae	<i>Cissus hypoglauca</i>	Giant Water Vine

* Denotes Introduced Species

Table A2 Fauna Species Identified on Site

Class	Family	Scientific Name	Common Name
Amphibia	Bufonidae	<i>Bufo marinus</i> *	Cane Toad
Aves	Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
	Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck
	Ardeidae	<i>Egretta novaehollandiae</i>	White-faced Heron
	Artamidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird
		<i>Gymnorhina tibicen</i>	Australian Magpie
		<i>Strepera graculina</i>	Pied Currawong
	Centropodidae	<i>Centropus phasianinus</i>	Pheasant Coucal
	Charadriidae	<i>Vanellus miles</i>	Masked Lapwing
	Corvidae	<i>Corvus orru</i>	Torresian Crow
	Dicruridae	<i>Grallina cyanoleuca</i>	Magpie-lark
		<i>Rhipidura leucophrys</i>	Willie Wagtail
	Eupetidae	<i>Psophodes olivaceus</i>	Eastern Whipbird
	Meliphagidae	<i>Manorina melanocephala</i>	Noisy Miner
	Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater
	Psittacidae	<i>Platycercus adscitus eximius</i>	Eastern Rosella
Mammalia	Bovidae	<i>Bos taurus</i> *	Cow
	Canidae	<i>Canis lupus</i> *	Dog
	Macropodidae	<i>Macropus rufogriseus</i>	Red-necked Wallaby
		<i>Wallabia bicolor</i>	Swamp Wallaby
	Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala
	Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox
	Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
		<i>Myotis macropus</i>	Fishing Bat
		<i>Nyctophilus spp.</i>	Unidentified Long-eared Bat
		<i>Scotorepens orion</i>	Eastern Broad-nosed Bat

* Denotes Introduced Species

Annex E

Vegetation Survey And Mature Tree Log

M.M

AREA 3
(284.8m²)



AREA 2
(350.1m²)



AREA 1
(2333m²)

TOTAL AREA = 2967.9m²

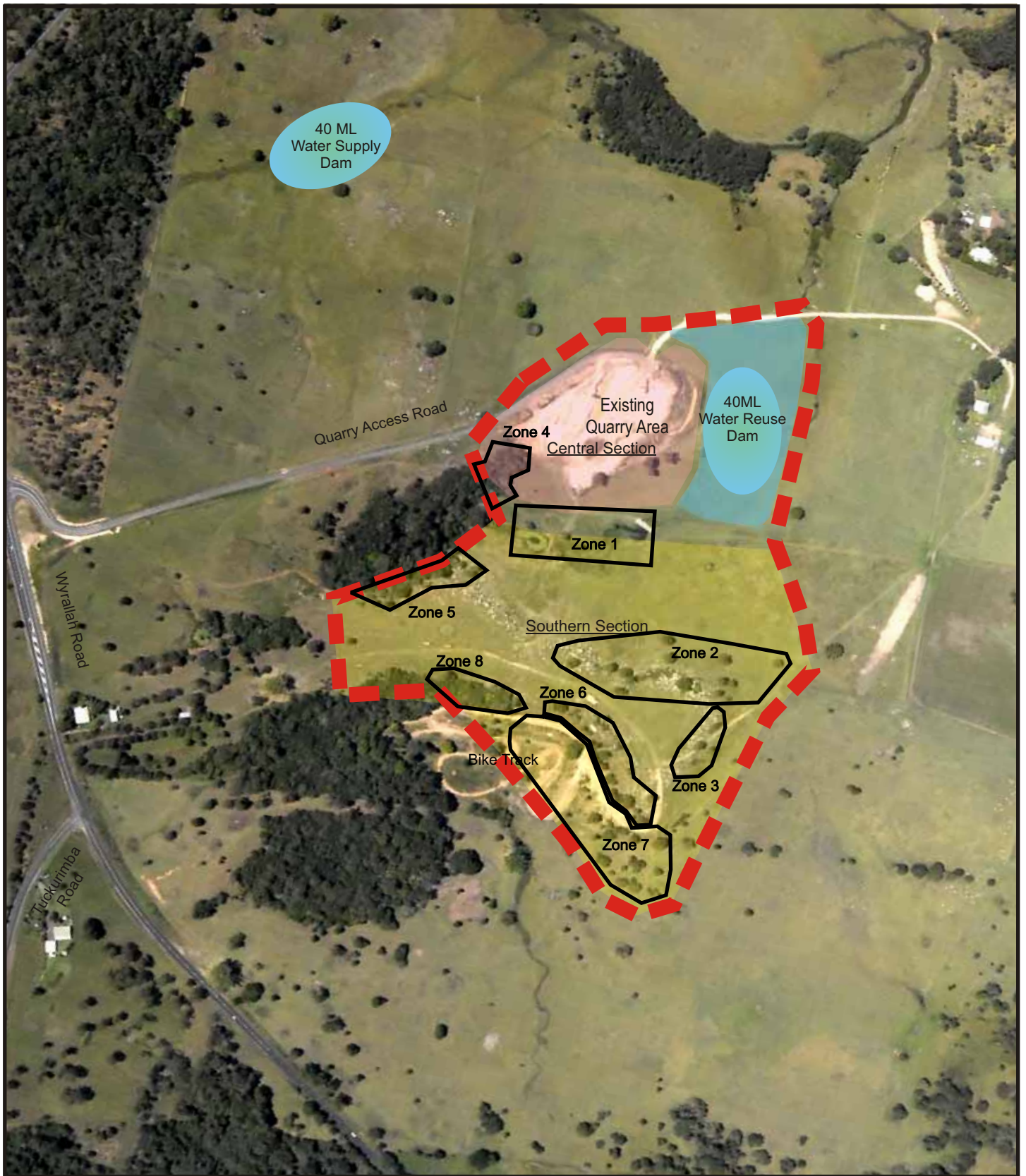


LandPartners Limited
Unit 5, 243 River Street
Maclean . NSW . 2463
Phone: (02) 6645 3074

**J CHAMPION
PLAN SHOWING AREA
COVERED WITH TREES
'CHAMPION QUARRY'
- TUCKI -**

SCALE:
LGA:
LOCALITY:
SURVEYED:
DRAWN:
APPROVED:
DATE:
COGO:
Dwg. No.

1 : 2000 at A4
LISMORE
TUCKI
B.M
C.D
16-11-2009
LM070268.ccx
LM070268-CV1



Legend

- Extent of Quarry Extraction and Operations (Project Area)
- Approximate Zone to be cleared
- Central Section
- Southern Section
- Water Management (Non-quarrying area)

Client:	Champions Quarry	
Project:	Champions Quarry Expansion	
Drawing No:	0098287pm_03_ecology_V3	
Date:	24/11/09	Drawing size: A4
Drawn by:	AM	Reviewed by: WW
Source:	-	
Scale:	Refer to Scale Bar	

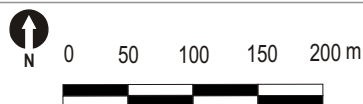


Figure C1

Tree Removal Zones

Environmental Resources Management Australia Pty Ltd
 PO Box 5711 3/146 Gordon Street
 Port Macquarie NSW 2444
 Telephone +61 2 6584 7155



Number of Mature Native Trees - Approximately 19 Years and Over

Area	Qty	Open Paddocks
1	3	Bloodwoods outside fence may be left
	1	Bloodwood inside fence to be removed
Total	4	

Area	Qty	Open Paddocks
2	5	Figs - 1 Fig near powerlines
	13	Bloodwoods
Total	18	

Area	Qty	Open Paddocks
3	5	Bloodwoods - 1 struck by lightening may die
Total	5	

Area	Qty	Outer Edge of Pine Forrest - mostly regrowth - no pines in this area. Contains old farm road approximately 40m x 20m approximately 0.08 HA
4	1	She Oak
	1	Fig
	3	Other
	26	Red Ash
Total	31	<i>Mature trees plus understory of young natives</i>

Area	Qty	Open Paddocks
5	2	Sally Wattle
	1	Silky Oak
Total	3	

Area	Qty	Open Paddock with Scattered Trees Above Bike Track
6	1	Fig
	2	Other
	6	Red Ash
	10	Bloodwoods
	13	She Oak
Total	32	

Area	Qty	Open Paddock Containing Bike Track
7	1	Gum - Non Koala
	6	Bloodwood
	1	Other
	1	Box
	4	Sally Wattle
	2	Red Ash
	1	She Oak
Total	16	

Area	Qty	Narrow Point of Wet Scleraphyl Forrest Approximately 100m x 10-30m Deep Approximate Area 0.2 HA
8	7	Sally Wattle
	2	Fig
	4	Red Ash
	5	Bloodwood
	6	Lilly Pilly
	1	Other
Total	25	<i>Mature trees plus understory of young native</i>

* Areas 1 - 8 inclusive 134 mature trees