Appendix 8

Ecological Assessment
prepared by
Eco Logical Australia Pty Ltd

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Ecological Assessment

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Acronyms and Abbreviations

ABBREVIATION	DESCRIPTION
AHD	Australian Height Datum
ALA	Atlas of Living Australia
CEEC	Critically Endangered Ecological Community
CMA	Catchment Management Authority
DoE	Commonwealth Department of the Environment
EARs	Environmental Assessment Requirements
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
MNES	Matters of National Environmental Significance
NV Act	NSW *Native Vegetation Act 2003*
OEH	NSW Office of Environment and Heritage
PMST	Protected Matters Search Tool
RWC	R.W. Corkery & Co Pty Ltd
RVC	Regional Vegetation Community
SAT	Spot Assessment Technique
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
Tpa	tonnes per annum
TSC Act	NSW *Threatened Species Conservation Act 1995*

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EXECUTIVE SUMMARY

Eco Logical Australia completed an ecological assessment of the proposed on-going operation and extension of Dowe's Quarry (the Project Site), 8 km northwest of Tenterfield NSW (the Proposal). This was undertaken in accordance with the Environmental Assessment Requirements (EARs) (No. 831), involving both desktop assessment and field verification of ecological values to determine potential ecological impact and undertake statutory assessments.

The Project Site is approximately 13.5 ha, with an existing disturbance area of 3.9 ha. The Proposal will cover 3.1 ha, of which only 2.1 ha will involve the proposed clearing of vegetation. An area of 6.5 ha of remnant vegetation will remain within the Project Site.

The key findings of the ecological assessment were:

- Remnant vegetation within the Project Site was consistent with the forest ecosystem classification of Dry Open New England Blackbutt which is not a listed Threatened Ecological Community and no threatened flora was observed.

- The vegetation community was in good condition and 17 hollow-bearing trees were recorded within or immediately adjacent to the Project Site. These trees have hollows ranging from small to large and are considered to provide potential breeding habitat for hollow dependent fauna including several threatened species.

- Three threatened fauna species were observed, or were evident, on the Project Site:

    - Koala (*Phascolarctos cinereus*), listed as vulnerable under both the TSC Act and EPBC Act.

    - Scarlet Robin (*Petroica boodang*) listed vulnerable under the TSC Act.

    - Flame Robin (*P. phoenicea*) listed vulnerable under the TSC Act.

- Vegetation in the Project Site was identified as known Koala habitat due to the presence of two secondary food species: *Eucalyptus dalrympleana* (Mountain Blue Gum) and *Eucalyptus biturbinata* (Grey Gum), of which four trees contained evidence of Koala activity (scats and / or scratches).

- 15 threatened and migratory species have the potential, or are likely, to occur within the Project Site due to the presence of suitable habitat values as well as proximity to several large protected areas (Girraween National Park, Bald Rock National Park and Basket Swamp National Park).

The key ecological impacts of this Proposal are largely associated with the clearing of 2.1 ha of Dry Open New England Blackbutt (Ecosystem 41) forest including the loss of eight hollow-bearing trees. This will result in a minor loss of habitat for the threatened species known or expected to occur on the Project Site.

Other potential indirect impacts that may occur during the ongoing quarry operation of the proposed extended extraction area include mortalities or injuries to native fauna, spread of weeds and pests, increased vibration, dust and noise, edge effects on adjacent vegetation and soil erosion and sedimentation.

According to the Draft referral guidelines for Koalas (DoE 2013b), the Project site is determined to be 'critical habitat'. However field observations indicated that this is not the case due to the low density of Koala activity across the site and the absence of primary food trees. The proposed activity was assessed against the guidelines as it may adversely affect Koala habitat due to the following:

- The impact area (the proposed extended extraction area) has a Koala habitat score ≥ 5 using the Koala habitat assessment tool (DoE 2013b)
- The area contains known food trees, Grey Box, Mountain Gum and Broad-leaved Stringybark
- The proposed on-going operation of the quarry will clear ≥ 2 ha of habitat containing known Koala food trees
- Less than ≤ 20 ha will be cleared.

However due to the small area proposed to be cleared (2.1 ha), a lower habitat score of 5 and very low density of Koalas (≤ 0.01 per ha), a referral is not recommended based on the guidelines and impacts to Koalas are not considered to be significant.

15 threatened and migratory species are considered to potentially, or likely occur, within the Project Site. Several threatened species may potentially be impacted by the proposed extension and on-going operation of the quarry with the removal of eight high-quality hollow-bearing trees. An Assessment of Significance was undertaken for these species which identified that the Proposal is unlikely to result in a significant impact for any species for the following reasons:

- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable breeding and foraging habitat immediately adjacent to the Project Site and within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- The proposed activity is likely to remove eight hollow-bearing trees, however, 6.5 ha of habitat will remain within the Project Site including five hollow-bearing trees.
- Most species are highly mobile and the proposed activity will, therefore, not isolate or fragment any currently connecting areas of habitat in terms of use by these species.

A number of management measures are recommended to mitigate potential ecological impacts. Key mitigation measures are:

- Sequential vegetation clearing.
- Use of a spotter-catcher pre-clearing and during vegetation clearing.
- Marking and sensitive clearing of hollow-bearing trees.
- Fauna management protocols for clearing and ongoing operations.
- Topsoil management for future rehabilitation.
- Salvaging and re-using cleared vegetation.

- Weed control measures for declared species and environmental weeds.
- Rehabilitation.

The proposed quarry extension is unlikely to have a significant ecological impact due to the small area of native vegetation and habitat being cleared, the lack of connectivity with higher quality habitats as well as the relatively minor impact at a landscape scale and proximity to protected areas such as Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).

1. INTRODUCTION

1.1 BACKGROUND

An ecological assessment is required for an Environmental Impact Statement (EIS) for the proposed on-going operation and extension of Dowe's Quarry, via Tenterfield NSW (the Proposal). The EIS is being prepared by R.W. Corkery & Co Pty Ltd (RWC) on behalf of Darryl McCarthy Constructions Pty Ltd (DM Constructions).

Eco Logical Australia Pty Ltd (ELA) has been engaged by RWC to undertake the ecological assessment. This ecological assessment has been designed to meet the Environmental Assessment Requirements (EARs) (No. 831) issued by the Secretary of the NSW Department of Planning and Environment and pursuant to the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and other State and local government policies.

1.2 PROJECT SITE DESCRIPTION

Dowe's Quarry (the Project Site) is located 8 km northeast of Tenterfield, off Mount Lindesay Road, in the Border Rivers-Gwydir Catchment Management Authority (CMA) (**Figure 1**). The quarry is situated along a ridgeline and operates to extract quartzose material. The Project Site is in the vicinity of several protected areas such as Girraween National Park, Bald Rock National Park and Basket Swamp National Park which are located to the north and north east. The nearest waterway to the quarry is Washpool Creek, approximately 1 km north of the Project Site.

The Project Site area is approximately 13.5 ha which includes the existing operation consisting of:

- the extraction area including constructed dams with associated collection drains;
- an internal road (**Figure 2**).

These existing disturbances are approximately 3.9 ha in size.

1.3 PROJECT OVERVIEW

The activities for which DM Constructions is seeking development consent (collectively referred to as "The Proposal" are:

- the ongoing extraction of quartzose rock within the existing extraction area and a 1.4 ha extension of the extraction area, producing no more than 100 000 tpa;
- the proposed extended extraction area will go a depth of approximately 890 m AHD, approximately 25 m lower than the floor of the existing extraction area;
- transportation of extracted rock via the State and local road network, i.e. the New England Highway for delivery principally to the Sunnyside Crushing and Screening Plant, 10 km northwest of Tenterfield;
- backloading of clay fines and crusher fines from the Sunnyside Plant to Dowe's Quarry;

- progressive emplacement of overburden and returned clay fines within and adjacent to the extraction area;
- storage of surplus crusher fines from the Sunnyside Plant awaiting sale and despatch; and
- transportation of clay fines and crusher fines to customers in the New England region.

Proposed activities that would disturb existing vegetation would involve:

- the proposed clearing of an additional 1.4 ha of vegetation to the west-south-west of the existing extraction area and along the ridgeline (proposed extended extraction area);
- additional internal roads (0.1 ha); and
- the storage of clay fines, including potential clearing of an additional 0.6 ha of vegetation, in the clay fines area (1.6 ha) to the northeast of the existing extraction area (**Figure 2**).

The Proposal will cover 13.5 ha, of which only 2.1 ha will involve the proposed clearing of vegetation. The area of remnant vegetation remaining within the Project Site is currently 9.6 ha and is contiguous with a larger patch of remnant vegetation (>50 ha).

1.4 PLANNING AND LEGISLATION

Table 1 provides a description of the legislative context for the project. The ecological assessment addresses the objectives and requirements of the legislation as it relates to biodiversity.

Table 1 Legislative Context for Dowe's Quarry

NAME	DESCRIPTION	RELEVANCE TO PROJECT
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance (MNES).	MNES have been identified on or near the site. This will be addressed in Part 2 of the ecological assessment to identify is if the development will have a significant impact on MNES.
State		
Environmental Planning and Assessment Act 1979 (EP&A Act)	The proposed development requires consent under Part 4 of the EP&A Act.	Assessments of significance for impacts to threatened ecological communities, species, or endangered populations, have been prepared in accordance with s5A of the Act in Part 2.
Threatened Species Conservation Act 1995 (TSC Act)	The TSC Act lists threatened species, endangered populations or endangered ecological communities. An assessment of impacts on any threatened species, endangered populations or endangered ecological communities with the potential to occur is required under the EP&A Act.	Threatened species have been recorded, or have the potential, to occur. Assessment of impacts will be addressed in Part 2 of the ecological assessment.
Native Vegetation Act 2003 (NV Act)	Does not apply to designated developments under Clause 25F on the NV Act	Not Applicable.
Planning Instruments		
SEPP (M*ining Petroleum, and Extractive Industries*) 2007	Permissible with consent under Clause 7.	Not Applicable.
SEPP 44 Koala Habitat	SEPP 44 applies to the local government area in which the development is proposed.	An assessment of Koala habitat has been made in accordance with Part 2 of the SEPP.
Tenterfield Local Environment Plan 2013	The site is zoned RU1 under the Tenterfield LEP 2013 and requires development consent.	Extractive industry is permissible land use under Tenterfield LEP 2013.

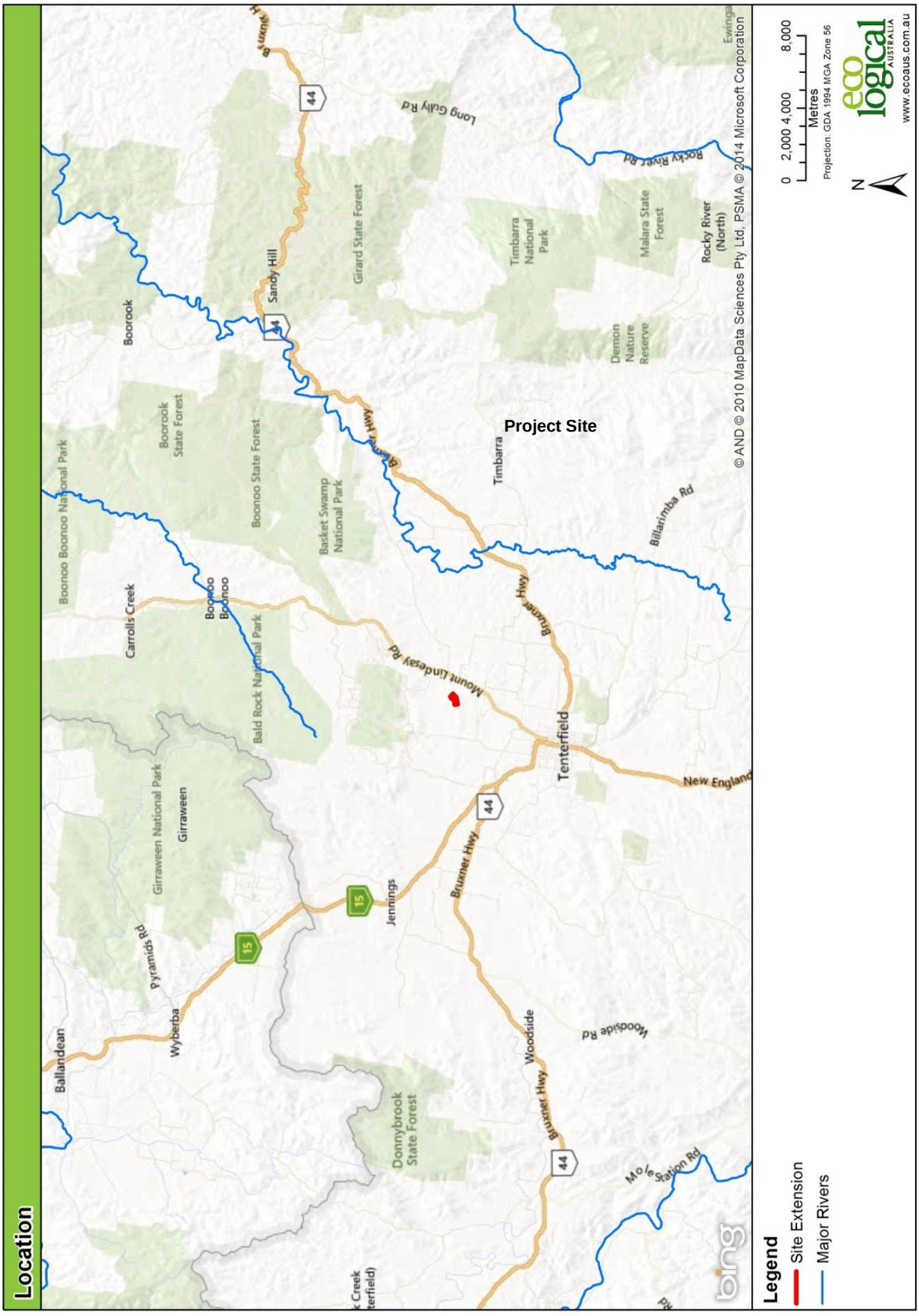

Figure 1 Location of Dowe's Quarry

Figure 2 Proposed Quarry extension

2. ECOLOGICAL ASSESSMENT METHOD

The ecological assessment of the proposed development was developed to meet the EARs (EAR No 831) issued by the NSW Department of Planning and Environment.

2.1 DESKTOP ASSESSMENT

The desktop assessment involved database searches to identify threatened flora and fauna species and/or endangered ecological communities that have been recorded in the region surrounding the Project Site. The databases searched were:

- NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife.
- Commonwealth Department of the Environment (DoE) online Protected Matters Search Tool (PMST).
- OEH Vegetation mapping and Forest Ecosystem Classifications for the Upper and Lower North East.
- Atlas of Living Australia (ALA).
- Australian Virtual Herbarium.

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database searches as occurring within 10 km of the Project Site. This assessment was based on database or other records, presence or absence of suitable habitat, features of the Project Site, results of the field survey and professional judgement. Five terms for the likelihood of occurrence of species are used in this report. These are:

- "yes" = the species was or has been observed on the Project Site;
- "likely" = a medium to high probability that a species uses the Project Site;
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur;
- "unlikely" = a very low to low probability that a species uses the Project Site; and
- "no" = habitat on site and in the vicinity is unsuitable for the species.

The results of these searches and the likelihood of occurrence assessment are at **Appendix A**.

2.2 FIELD SURVEY

A field survey was conducted over two days to validate the vegetation community(s) present, collect site-specific flora and fauna information and identify fauna habitats on site. The survey was undertaken over approximately 12 hours on 26 and 27 March 2014 by senior ecologist, Brad Dreis. Weather consisted of mild temperatures (maximum of 18° C) with rain showers and moderate winds. Rain recorded in Tenterfield on these days, respectively, was 7 mm and 15 mm (BoM 2014).

The survey method comprised:

- Four Biometric plots consistent with the Biobanking Assessment Methodology (**Figure 3**).
- Random meander.
- Targeted searches for threatened flora species.
- 20 minute bird surveys.

- Targeted searches for *Phascolarctos cinereus* (Koala) across the Project Site and Koala Spot Assessment Technique (SAT) survey of 30 Eucalypt trees in the proposed extended extraction area for scratches (Phillips and Callaghan 2011).
- Incidental observations of other fauna.
- Identification of significant habitat features, such as hollow-bearing trees and rocky outcrops.

Photos and GPS location of the Biometric plots, the centre of the SAT survey, significant species and features were recorded (**Figure 3**). Some plant samples were collected for further identification.

Figure 3 Location of field survey sites

2.3 ECOLOGICAL VALUES AND IMPACT ASSESSMENT

Findings from the desktop assessment and field survey were used to identify ecological values of the Project Site and potential impacts associated with the quarry extension. This includes:

- Identification of any areas of conservation significance within the proposed extended extraction area.
- Verification of the likelihood of any threatened species or communities occurring within or near the proposed extended extraction area.
- Assessment of the conservation status of any recorded species and communities, including any 'red flag' species or communities.
- Identification of 'red flag' species and/or communities.
- Statutory impact assessments, including the Assessment of Significance.
- Provision of management and mitigation measures for the proposed activity.

2.4 ADVICE AND LIMITATIONS

Recommendations are provided regarding avoiding high conservation value areas or means of protecting such features. Based on the proposed area of impact and the biometric data collected, the potential quantum of offset required using the Biobanking Assessment Methodology is included.

The field survey was limited to a survey over two days in autumn. Targeted fauna surveys were limited to Koala searches and bird surveys. No nocturnal surveys or trapping were undertaken.

3. ECOLOGICAL ASSESSMENT RESULTS

3.1 DATA REVIEW

The Atlas of NSW Wildlife returned 31 species listed under the TSC Act and the PMST returned 38 species and two ecological communities listed under the EPBC Act (**Appendix A**). Existing vegetation within the Project Site is mapped as Regional Vegetation Community 48, Biometric Vegetation Type: New England Blackbutt - Stringybark heathy open forests on granite, eastern New England Tablelands and NSW North Coast. This community is not analogous with any threatened ecological communities.

In total, 14 threatened bird and mammal species identified in the database searches occur or have the potential to occur within the Project Site. Four of the migratory birds identified in the database searches can potentially fly over the Project Site due to the proximity to potential habitat in the region.

3.2 FIELD SURVEY

3.2.1 Flora

Only one vegetation community was identified as occurring across the proposed extended extraction area (**Figure 4**), which differed from the mapped vegetation type. This vegetation community was consistent with the forest ecosystem classification of Dry Open New England Blackbutt (Ecosystem 41) as the dominant and common species identified were *Eucalyptus biturbinata* (Grey Gum), *E. campanulata* (New England Blackbutt), *E. caliginosa* (Broad-leaved Stringybark), *E. dalrympleana* (Mountain Gum) and *E. moluccana* (Grey Box) (**Appendix B**). This community does not correlate with any of the threatened ecological communities listed under State or federal legislation.

Generally, the vegetation community was in good condition and contains numerous very large habitat trees (up to 30 m), high native plant species richness and over-storey regeneration. Seventeen hollow-bearing trees were recorded within or immediately adjacent to the Project Site (**Figure 4**). These trees contained combinations of small to large sized hollows (Error! Reference source not found.). Nine of these trees are within the proposed extended extraction area and clay fines area (**Figure 5**). No threatened flora species were observed during the field survey.

BioBanking plot results are provided in **Appendix C**.

Table 2 Habitat trees recorded on the Project Site, and immediate area

TREE SPECIES	SMALL HOLLOWS	MEDIUM HOLLOWS	LARGE HOLLOWS	NOTE
Clay Fines Area				
Eucalyptus moluccana (Grey Box)	✓	✓		
Grey Box	✓	✓		
Eucalyptus biturbinata (Grey Gum)	✓	✓	✓	
Grey Gum		✓		
Proposed Extended Extraction Area				
Eucalyptus dalrympleana (Mountain Gum)		✓		
Mountain Gum	✓			
Mountain Gum	✓	✓		
Grey Gum		✓		
Grey Gum				>30 m in height
Remaining native vegetation				
Grey Gum		✓	✓	
Grey Gum		✓	✓	Just outside Project Site
Grey Gum		✓	✓	
Grey Gum			✓	Just outside Project Site
Grey Gum		✓	✓	
E. deanei (Mountain Blue Gum)		✓		Just outside Project Site
Mountain Blue Gum		✓	✓	Just outside Project Site
Mountain Gum		✓	✓	
Eucalyptus campanulata (New England Blackbutt)		✓		

Other minor disturbances within the Project Site include:

- minor weed invasion in the intact vegetation (there is some moderate weed invasion in the existing quarry- related footprint) consisting mostly of *Ligustrum lucidum* (Broad-leaved Privet) – a declared Class 4 noxious weed in the Tenterfield LGA;
- historical selective logging;
- low impact grazing; and
- fragmentation from clearing for surrounding pastures.

3.2.2 Fauna

Three threatened fauna species were observed or were evident on the Project site by other means (**Figure 5**). There was evidence of Koala (*Phascolarctos cinereus*) using the Project Site. Koala is listed as vulnerable under both the TSC Act and EPBC Act. Activity appears to be infrequent and low intensity with four trees (out of 30 surveyed) observed to have scats or scratches in the Koala SAT area (**Figure 4**). The scratches appeared to be aged (**Appendix D**). The SAT results equated to 13% activity and based on the activity categories provided in the SAT method for western areas, this is considered Low Use. Koala activity was observed on *Eucalyptus dalrympleana* (Mountain Blue Gum) and *Eucalyptus biturbinata* (Grey Gum). Although these species are not listed as primary browse trees under Schedule 2 of SEPP44 Koala Habitat Protection, both these species are listed under the Koala Recovery Plan (DECC 2008b) as secondary food trees in the Northern Tablelands (DECC 2007). In terms of statutory assessment requirements for Koala, such assessments are undertaken in Section 6 of this report.

The Scarlet Robin (*Petroica boodang*) and Flame Robin (*P. phoenicea*), both listed vulnerable under the TSC Act, were recorded within the Project Site (**Appendix B**). Scarlet Robin was commonly recorded throughout the Project Site and at each bird survey location, while the Flame Robin was only recorded once at the top of the ridge along the western boundary (Error! Reference source not found.). No other threatened species were observed.

The majority of fauna recorded were bird species. There are 17 hollow-bearing trees within, the Project Site or immediately adjacent to the Project Site, consisting of small to large hollows (**Figure 4**). The majority of trees have medium to large sized hollows and are likely to be used by hollow dependent birds and mammals and potentially provide habitat for threatened micro-bats or owls. The majority of trees with the largest hollows are located outside the proposed extended extraction area and clay fines area.

Other fauna habitat features that occur on the Project Site include fallen timber. These provide habitat for a variety of fauna species, in particular ground-dwelling mammals.

European Red Fox (*Vulpes vulpes*) was observed in the Project Site and there was also evidence of rabbits or hares occurring (**Appendix B**). The Rabbit (*Oryctolagus cuniculus*) is a Declared Pest under the *Rural Lands Protection Act 1998.*

Figure 4 Vegetation community and habitat features identified in field survey

Figure 5 **Threatened species recorded on during the field survey. Note that the point for Koala only identifies the centre of the search area**

4. ECOLOGICAL VALUES

4.1 AREAS OF ECOLOGICAL IMPORTANCE

Several hollow-bearing and large habitat trees were observed within the Project Site, including four trees within or immediately adjacent to the proposed extended extraction area (**Figure 4**). In particular, four very large habitat trees within the Project Site contain large hollows that are sufficient size for forest owls. Although there was no evidence of activity during the survey, two of these trees are unlikely to be avoided with the proposed on-going operation of the quarry and would require the adoption of specific mitigation measures during vegetation clearing.

Furthermore, three secondary Koala food tree species were identified throughout the Project Site; Broad-leaved Stringybark, Mountain Gum and Grey Gum (DECC 2007; 2008b). As Koala activity was observed on Grey Gum, and scats were also observed at other locations, these areas should be classified as known Koala habitat. However, the relative age and low intensity of these scratches indicate that Koala usage of the Project Site is infrequent.

4.2 THREATENED BIODIVERSITY CONSIDERED TO OCCUR ON THE PROJECT SITE

In addition to the three threatened species recorded within the Project Site, 11 threatened bird and mammal species have the potential, or are likely, to occur within the Project Site due to high quality habitat trees and good condition of the vegetation community observed during the field survey as well as the Project Sites proximity to several protected areas (**Table 2**).

Table 3 Threatened biodiversity considered as potential/likely to occur and require statutory assessment

Threatened Species Recorded or Considered Potential or Likely to Occur	Common Name	EPBC Act	TSC Act
LIKELY TO OCCUR			
Glossopsitta pusilla	Little Lorikeet	-	V
POTENTIAL TO OCCUR			
Calyptorhynchus lathami	Glossy Black-Cockatoo	-	V
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	-	V
Chthonicola sagittata	Speckled Warbler	-	V
Daphoenositta chrysoptera	Varied Sittella	-	V
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	-	V
Ninox strenua	Powerful Owl	-	V
Stagonopleura guttata	Diamond Firetail	-	V
Tyto novaehollandiae	Masked Owl	-	V
Tyto tenebricosa	Sooty Owl	-	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	V
Dasyurus maculatus maculatus	Spotted-tailed Quoll	E	V
Petaurus australis	Yellow-bellied Glider	-	V
Petaurus norfolcensis	Squirrel Glider	-	V

V = Vulnerable, E = Endangered

None of the species identified in **Table 2** were observed during the field survey but the majority occur in the region (**Figure 6**).

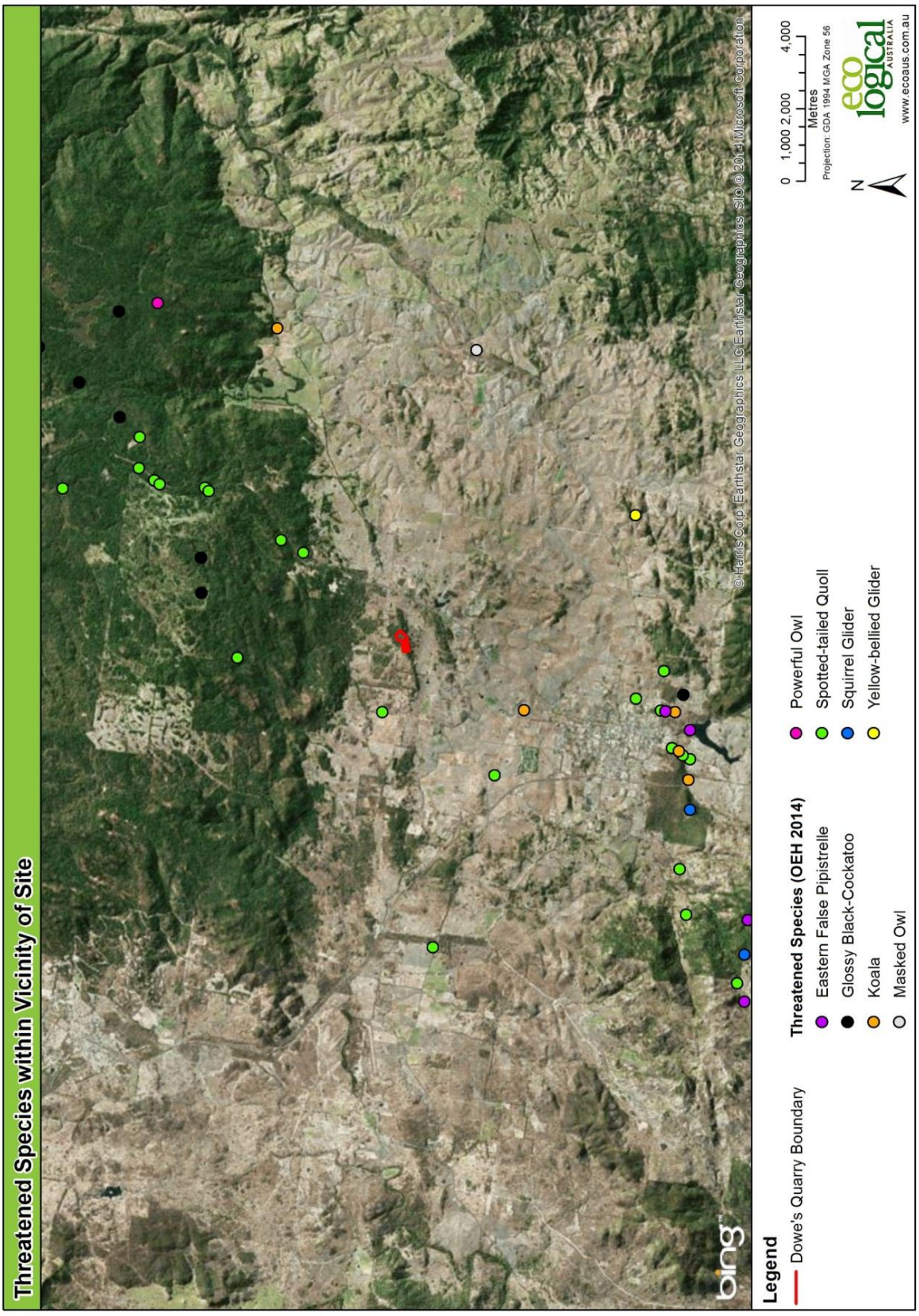

Figure 6 **Location of threatened species recorded in the vicinity of the Project Site**

5. POTENTIAL ECOLOGICAL IMPACTS

5.1 DIRECT IMPACTS

The proposed activity will clear a total of 2.1 ha of Dry Open New England Blackbutt (Ecosystem 41) forest dominated by Grey Gum and New England Blackbutt in the proposed extended extraction area (1.4 ha) and proposed clay fines area (0.6 ha).

The vegetation community within the proposed extended extraction area was in relatively good condition and contains four hollow-bearing trees with small to medium sized hollows and one large habitat tree (over 30 m in height) with no hollows (**Table 2**). All hollow bearing trees provide breeding habitat for the majority of hollow dependent fauna that potentially utilise the Project Site. The large habitat tree is considered to provide breeding habitat for nest building birds. All trees cannot to be avoided with the proposed extended extraction area.

The vegetation community within the proposed clay fines area consists of similar vegetation and habitat to the proposed extended extraction area. The area contains an additional four hollow-bearing trees with small to large sized hollows. There was only one tree with large hollows but this is unlikely to be avoided with the operation of the proposed clay fines area. Another four hollow-bearing trees occur in proximity to the clay fines area but are expected to be avoided during vegetation clearing.

Vegetation on the Project Site is identified as known Koala habitat with evidence of Koala activity on four secondary food trees, within the proposed extended extraction area (DECC 2007; 2008b). Given the age of scratch marks and lack of primary food trees, it appears that the Koala habitat is of low quality and Koalas inhabit the Project Site infrequently.

Construction of an access track immediately north of the proposed extended extraction area will require approximately 0.1 ha of vegetation clearing. This track will have up to three entry points to access the proposed extended extraction area but will not result in the removal of any hollow-bearing or large habitat trees. However, this area is also considered known Koala habitat considering its proximity to records of Koala activity on the Project Site.

Native fauna may be injured or killed during vegetation clearing.

5.2 INDIRECT IMPACTS

It is expected that the proposed activity will include indirect impacts such as vibration, dust and noise from:

- Drilling - drilling of blast holes would typically be undertaken on a 3 m x 3 m pattern using 89 mm drill holes with up to 5 m deep. The drilling would typically occur on approximately 1 day per month.
- Blasting - typically fragments approximately 5,000 to 10,000 tonnes per blast.
- Fragmented rock and soil removal - loaded into highway trucks for transportation off site.
- Continued use of extraction equipment – one hydraulic drill rig, two excavators (one permanently on site) and one haul truck will be required.
- Stockpiling and emplacement of material in the clay fines area.

Other potential indirect impacts that may occur during the quarry operation of the extended extraction area are:

- Mortalities or injuries to native fauna from vehicle strikes due to traffic.
- Introduction and spread of weeds and pests.
- Litter and pollution from quarry materials.
- Edge effects on adjacent vegetation from littering and inappropriate waste management.
- Soil erosion and sedimentation of adjacent drainage lines.
- Initiation of fire in adjacent vegetation from quarry activities and workers (e.g. cigarettes).

5.3 THREATENED FLORA

No impacts to threatened flora will result from the quarry extension as none were recorded on the Project Site.

5.4 THREATENED FAUNA

The proposed activities will result in the loss of marginal Koala habitat. Although the Koala habitat consists of three types of secondary Koala food trees, activity was only observed on four Grey Gums. Given that the evidence suggests that Koala activity is low on the Project Site, the proposed activity is considered unlikely to have a significant impact on the local Koala population.

The proposed activity will also result in the loss of known foraging habitat of the Scarlet and Flame Robins (2.1 ha). However, the Project Site will retain 6.5 ha of remnant foraging habitat that could be utilised by the species.

The proposed activities could also result in the loss of potential breeding habitat of threatened species that are hollow-dependent; including large forest owls, gliders, woodland birds and the Eastern False Pipistrelle (**Appendix A**). It is noted that while there was no evidence of these species recorded, surveys were not undertaken for these species. Also, the majority of habitat trees with large hollows that occur on the Project Site will not be impacted by the proposed activity (Error! Reference source not found.).

The statutory assessment of the three threatened species recorded within the Project Site, and the 11 threatened bird and mammal species that have the potential, or are likely, to occur within the Project Site, is undertaken in Section 6.

6. STATUTORY ASSESSMENT

6.1 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

All listed threatened species and migratory species protected under international agreements that have the potential to, or are known to, occur in the Project Site (**Appendix A**) will require assessment against the Significant Impact Criteria to determine whether the impact is significant (DoE 2013a). Under the EPBC Act, an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance (MNES) (DoE 2013a).

6.1.1 Koala

The Koala is likely to be impacted by the removal of known habitat within the proposed extended extraction area. The Significant Impact Guidelines 1.1 for MNES states that 'actions are likely to have a significant impact on a vulnerable species if they adversely affect the habitat critical to the survival of the species' (DoE 2013a). For the Koala, habitat loss is recognised as the primary adverse effect on habitat critical to their survival (DoE 2013b).

For the assessment, the 800 mm per annum rainfall isohyet is used to separate the coastal and inland geographic contexts of the Koala. For this proposed activity, it was determined that the geographical context of Tenterfield was coastal as the area received > 800 mm per year (BoM 2014).

The Project Site was considered in the context of the 'Draft EPBC Act referral guidelines for the vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)' (DoE 2013b). Within DoE (2013b), a tool is provided to assess the sensitivity, value and quality of Koala habitat at a site. The tool nominates five attributes of Koala habitat and three characteristics within each attribute. The characteristic that best describes the site is selected for each attribute, which then correlates to a score (0, 1, or 2). The score for each attribute is summed giving a habitat score (maximum overall score is 10); habitat scores greater or equal to 5 are deemed habitat critical to the survival of the Koala, while habitat scores less than or equal to 4 or deemed habitat not critical to the survival of the Koala.

The assessment of Koala habitat at the Project Site identified the habitat critical to the survival of this species (habitat score of 5) under the guidelines (**Table 4**). However field observations indicated that this is not the case due to the low density of Koala activity across the site and the absence of primary food trees.

Table 4 Assessment of known Koala habitat identified on site using the Koala habitat assessment tool (DoE 2013b)

ATTRIBUTE	COASTAL DESCRIPTION	JUSTIFICATION	SCORE
Koala occurrence	Evidence of one or more Koalas within the last 2 years	Evidence observed across four trees and scats recorded.	+2 (high)
Vegetation composition	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species in the canopy	Dry woodland in good condition with two secondary food species for the Northern Tablelands (*E. moluccana* and *E. dalrympleana*) and one supplementary species (*E. caliginosa*) (DECC 2008).	+2 (high)
Habitat connectivity	Area part of contiguous landscape ≥500 ha	No, less than 10 ha	0 (low)
Key existing threats	Little or no evidence of koala mortality from vehicle strike or dog attack	Unknown, however the Project Site is located adjacent to a highway and an internal road occurs within the quarry. The feral fox was recorded on site and listed as a key threatening process under TSC Act.	+1 (medium)
Recovery Value	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context	The quality and extent of habitat refuge on site is considered low quality.	0 (low)
			Habitat score 5

According to the Draft referral guidelines for Koalas (DoE 2013b), the proposed activity *may* adversely affect habitat critical to the survival of the Koala and a referral may be required as:

- The impact area (the proposed extended extraction area) has a Koala habitat score ≥5.
- The area contains known food trees: Grey Box, Mountain Gum and Broad-leaved Stringybark.
- The proposed on-going operation of the quarry will clear ≥ 2 ha of habitat containing known Koala food trees.
- Less than ≤ 20 ha will be cleared.

However the guidelines also identify characteristics in which the proposed activity and site will reduce adverse effects to Koala habitat, therefore, not requiring referral (refer to Figure 2 of DoE 2013b). This was undertaken and the following was determined:

- A smaller area of Koala habitat is being cleared.
- The habitat score (5) just meets the threshold for habitat critical to the survival of the species (maximum score is 10).
- The density of Koalas is low i.e. ≤ 0.01 per ha.
- The clearing is occurring on the edge of patch and causing minimal fragmentation.
- The method of clearing retains Koala food trees on the Project Site.
- Koala food trees will be included in site rehabilitation.

Given the small area proposed to be cleared (≤ 3 ha), a lower habitat score of 5 and very low density of Koalas, a referral is not recommended based on the guidelines. Further, the field survey determined that the habitat is of low quality and Koalas inhabit the Project Site infrequently (**Section 0.4)**.

6.1.2 Spotted-tailed Quoll

The Spotted-tailed Quoll (*Dasyurus maculatus maculatus*) is listed as endangered under the EPBC Act and considered to potentially occur on the Project Site given the proximity of the Project Site to several protected areas, such as Girraween National Park, where the species is known to occur.

The Significant Impact Guidelines 1.1 for MNES state that an action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

The Significant Impact Guidelines for the Spotted-tailed Quoll (south-eastern mainland population) only assists in determining if a proposed 1080 baiting program will significantly impact the species (DEWHA 2009). Therefore, an assessment against the stated impacts above was undertaken to determine if the proposed activity would have a significant impact on this species:

- The Project Site is already fragmented due to existing quarry-related activity and timber harvesting and unlikely to lead to a long-term decrease in the size of a population.
- No suitable habitat features i.e. denning habitat was observed on the Project Site and the proposed activity is unlikely to reduce the area of occupancy of the species.
- The proposed activity is unlikely to fragment an existing population into two or more populations, as there was no evidence of the species occurring on the Project Site and there are several protected areas, which provide more suitable habitat, within the region.
- This species prefers mature wet forest habitat and forests that have been less disturbed by timber harvesting (DoE 2014a), therefore the proposed activity will not adversely affect habitat critical to the survival of this species.
- No significant denning habitat or wet forest habitat was observed within the Project Site. Therefore the proposed activity will not disrupt the breeding cycle of a population nor will it modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that this species is likely to decline.

- As no preferred habitat was observed within the Project Site and any Spotted-tailed Quoll occurring in the area is only likely to be a transient individual, the proposed activity will not result in the European Red Fox (*Vulpes vulpes*) affecting critical habitat, introducing disease that may cause this species to decline, or interfering with the recovery of this species.

The outcome of this assessment indicates that this proposed action is unlikely to have a significant impact on the Spotted-tailed Quoll.

6.1.3 Migratory birds

Four migratory species are considered to potentially occur within the Project Site: *Apus pacificus* (Fork-tailed Swift); *Hirundapus caudacutus* (White-throated Needletail); *Merops ornatus* (Rainbow Bee-eater) and *Monarcha melanopsis* (Black-faced Monarch). Detailed consideration of the potential for significant impact under the EPBC Act for each migratory species considered to potentially occur is provided in **Table 5**.

Each of the migratory species assessed has a broad natural distribution and is found in a large variety of areas throughout Australia. Any impacts on these species as a result of the Proposal are, therefore, expected to be minor (if any), highly localised and restricted to individual animals. In addition, the project area does not represent important habitat or support an ecologically significant proportion of any population of the purely migratory species listed below, indicating that the threshold for significant impact will not be met.

It is considered that there is an adequate amount of field data from both the Project Site and region. A field survey was undertaken within the Project Site as part of this ecological assessment and a number of surveys have been undertaken within the New England region given the abundance of available habitat within the surrounding protected areas.

Table 5 provides an analysis of the potential presence of important habitat or an ecologically significant proportion of the population for each species. Key information used to determine the potential importance of the Project Site includes:

- General information for each species in relation to distribution, habitat requirements, population and potential threats.
- Site specific information for Project Site including the results of surveys and habitat use.

Table 5 Significant impact assessment of migratory species

Species	Presence in Australia	Presence within the Project Area	Important Habitat or an Ecologically Significant Proportion of a Population	Is the Project Site Likely to Contain Important Habitat or an Ecologically Significant Proportion of a Population?
Fork-tailed Swift *Apus pacificus*	Non-breeding visitor Broad distribution across Australia Almost exclusively aerial No known threats in Australia (DoE 2014a)	Not observed within the Project Site during ecological survey.	Abundance of this species has not been quantified within Australia, however, there are records of up to 90,000 individuals occurring in a single flock on rare occasions. As the species is not known to utilise key areas specifically for foraging, and does not breed in Australia, no important habitat or an ecologically significant portion of the population can be identified.	Unlikely
White-throated Needletail *Hirundapus caudacutus*	Non-breeding visitor Broad distribution across the east coast of Australia Almost exclusively aerial No known threats in Australia (DoE 2014a)	Not observed within the Project Site during ecological survey.	Abundance of this species has not been quantified within Australia. As the species is not known to utilise key areas specifically for foraging, and does not breed in Australia, no important habitat or an ecologically significant portion of the population can be identified. The species may show an affinity for forested sites.	Unlikely

Species	Presence in Australia	Presence within the Project Area	Important Habitat or an Ecologically Significant Proportion of a Population	Is the Project Site Likely to Contain Important Habitat or an Ecologically Significant Proportion of a Population?
Rainbow Bee-Eater *Merops ornatus*	Widely distributed throughout Australia and eastern Indonesia Occurs across most of mainland Australia; although extent of occurrence and areas of occupancy are not well understood The total Australian population size has not been estimated although it is thought to be reasonably large based on reporting rates (over 30,000 recorded sightings since 1998) Usually occurs in cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water Feeds on insects and less commonly earthworms, spiders and tadpoles Primary threat in north eastern Australia is the cane toad which feeds on eggs and nestlings and displaces nesting birds (DoE 2014a)	Not observed within the Project Site during ecological survey.	Abundance of this species has not been quantified within Australia. As the species is not known to utilise key areas specifically for forage or breeding, no important habitat or an ecologically significant portion of the population can be identified. The species is known to nest in loose colonies, and the species is known to show some degree of site fidelity returning to the same sites to breed. Important habitat for the species may include areas which are known to contain breeding sites for a large number of individuals (>300), or sites to which the species shows strong site fidelity. The Project Site lacks sandy soils that the species prefers for nesting.	Unlikely
Monarcha melanopsis (Black-faced Monarch)	Widely distributed throughout eastern Australia but movements are poorly known In New South Wales, it occurs around the eastern slopes and tablelands of the Great Divide Mainly occurs in rainforest ecosystems and selectively logged and 20—30 years old regrowth rainforest. No known threats in Australia (DoE 2014a)	Not observed within the Project Site during ecological survey.	Abundance of this species has not been quantified within Australia. As the species is not known to utilise key areas specifically for forage or breeding, no important habitat or an ecologically significant portion of the population can be identified. It usually breeds in rainforest habitat and nests near the top of trees with large leaves. Feeds mostly in rainforest but also in open eucalypt forest.	Unlikely

6.2 STATE MATTERS

6.2.1 NSW EP&A Act, TSC Act and relevant SEPPs

An assessment in accordance with s5A of the EP&A Act Assessment of Significance (7 Part Test) has been undertaken for species listed as threatened under the TSC Act in **Table 3** (**Appendix E**). The following section summarises the outcomes of these assessments.

6.2.1.1 Woodland birds

Eight threatened woodland birds species are either known to occur on the Project Site or considered as potentially occurring (**Appendix A**). It is considered unlikely that significant impacts will occur to these woodland birds due to the following:

- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable breeding and foraging habitat immediately adjacent to the Project Site and within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- The proposed activity is likely to remove eight hollow-bearing trees, however, 6.5 ha of foraging and breeding habitat will remain within the Project Site including five hollow-bearing trees.
- These species are highly mobile and the proposed activity will, therefore, not isolate or fragment any currently connecting areas of habitat in terms of use by these species.

6.2.1.2 Large Forest Owls

Three threatened forest owls species are identified as potentially occurring on the Project Site (**Appendix A**). It is considered unlikely that significant impacts will occur to these owls due to:

- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable breeding and foraging habitat within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- The proposed activity is likely to remove eight hollow-bearing trees; however, only one of these trees contains large hollows that would be suitable for these species. Five hollow-bearing trees, including four that contain large hollows, will be retained on the Project Site.
- These species are highly mobile with large home ranges and the proposed activity will, therefore, not isolate or fragment any currently connecting areas of habitat in terms of use by these species.

6.2.1.3 Glossy Black-Cockatoo

The Glossy Black-Cockatoo is identified as potentially occurring due to the presence of food trees and hollow-bearing trees that provide potential breeding habitat. However, it is considered unlikely that the project will have a significant impact on this species due to:

- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable breeding and foraging habitat immediately adjacent to the Project Site and within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- The proposed activity is likely to remove eight hollow-bearing trees; however, only one of these trees contains large hollows that would be suitable for this species. Five hollow-bearing trees, including four that contain large hollows, will be retained on the Project Site.
- No food trees occur within the proposed disturbance footprint and are therefore expected to be retained.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

6.2.1.4 Koala

Koalas are known to utilise the Project Site with evidence (scat and scratches) identified on several trees. However, it is considered unlikely that the Proposal will have a significant impact on Koalas due to the following:

- The Proposal will result in the removal of 2.1 ha of known Koala habitat, however, 6.5 ha of known Koala habitat will remain within the Project Site.
- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable habitat immediately adjacent to the Project Site and within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- Evidence suggests that Koalas only inhabit the Project Site infrequently and at low densities (≤ 0.01 per ha).
- No primary food trees for the Northern Tablelands occur on the Project Site. Only two secondary food species (*E. moluccana* and *E. dalrympleana*) and one supplementary species (*E. caliginosa*) occur.
- The proposed clearing would occur on the edge of patch and causing minimal fragmentation

Under SEPP 44 Koala Habitat Protection the Project Site does not contain greater than 15% primary browse trees and, therefore, does not qualify as potential Koala habitat or, in turn, core Koala habitat.

6.2.1.5 Spotted-tailed Quoll

Spotted-tailed Quoll is considered as potentially occurring on the Project Site due to the proximity of several protected areas, such as Girraween National Park, where the species is known to occur. The Proposal is unlikely to significantly impact upon the Spotted-tailed Quoll given that the proposed activity:

- would only remove a small area of potential foraging and breeding habitat within the Project Site, given the extent of suitable breeding and foraging habitat within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha);
- no suitable breeding habitat occurs on site; and
- would not isolate an area of known habitat from currently interconnecting areas of potential habitat for this species.

6.2.1.6 Gliders

Squirrel Glider and Yellow-bellied Glider are identified as potentially occurring on the Project Site (**Appendix A**). It is considered unlikely that significant impacts will occur to either due to the following:

- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable habitat within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- The proposed activity is likely to remove eight hollow-bearing trees. However, 6.5 ha of foraging and breeding habitat will remain within the Project Site including five hollow-bearing trees.
- The Proposal would not isolate or fragment any currently connecting areas of habitat as vegetation removal will occur sequentially and also in the middle of the Project Site. Also, there is no evidence of either species currently utilising the habitat.

6.2.1.7 Eastern False Pipistrelle

The Eastern False Pipistrelle is identified as potentially occurring due to the presence of hollow-bearing trees that provide potential breeding habitat. However, it is considered unlikely that the Proposal will have a significant impact on this species due to:

- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable breeding and foraging habitat within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- The proposed activity is likely to remove eight hollow-bearing trees. However, 6.5 ha of foraging and breeding habitat will remain within the Project Site including five hollow-bearing trees.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

7. RECOMMENDED MANAGEMENT AND MITIGATION MEASURES

7.1 AVOIDANCE

Clearing of vegetation is unavoidable for the quarry extension to occur. However, the proposed activities have been modified to avoid clearing several habitat trees, wherever possible.

7.2 MINIMISATION

7.2.1 Vegetation clearing

Opportunities to minimise impacts associated with vegetation clearing are minimal. Due to the proposed activity, and the necessary earthworks required, the retention of existing native trees is not possible within the proposed extended extraction area. Wherever possible, the extent and nature of clearing should be minimised and/or undertaken in a sensitive manner.

However, the number of hollow-bearing trees containing large hollows requiring clearing has been minimised to reduce potential impacts on species that are dependent on these features (such as forest owls, Glossy Black-Cockatoos, etc.).

7.2.2 Quarry operation

All practical steps would be taken to minimise the impacts to vegetation from the placement of clay fines and progressively reviewed throughout the life of the quarry. In particular, opportunities to minimise impacts on hollow-bearing trees in the area should be considered.

Furthermore, a range of harm minimisation measures should be implemented to prevent further disturbance and to minimise adverse impacts on retained native vegetation, habitats and resident fauna. These measures should be designed to address potential impacts associated with the operational phase of the proposed activity and the long-term protection of biodiversity.

7.3 MITIGATION

A series of measures should be implemented to mitigate potential impacts through an Environmental Management Plan (EMP) that would be prepared to guide the execution and completion of the proposed activities. The key ecological considerations generally fall under the following categories:

- Vegetation clearing.
- Fauna management.
- Topsoil management.
- Salvaging and re-using cleared vegetation.
- Managing waste vegetation.
- Rehabilitation.

7.3.1 Vegetation clearing

Vegetation clearing should be undertaken in a sequential manner and under the guidance of a spotter-catcher. Sequential clearing should occur over multiple stages as quarrying progresses from east to west. In particular, clearing would provide any Koala occupying the Project Site enough time to move without human intervention and into nearby native vegetation.

For each clearing stage the following should occur:

1. An initial site assessment is undertaken by a spotter-catcher
2. If no Koalas are observed on site, a section of the vegetation will be cleared
3. If Koalas are observed within the area to be cleared, only the surrounding vegetation should be cleared (this must not include any tree with a crown overlapping a tree where a Koala is present)
4. Clearing of the remaining area where Koalas are present will not recommence until the Koala has moved without human intervention.

A pre-clearance survey should be undertaken to identify and mark habitat features to be cleared, such as hollow bearing trees. When hollow bearing trees are found they will be marked all the way around the trunk at a height of approximately 1.5 m using fluorescent spray marking paint. This is to ensure that the hollow bearing tree markings are clearly visible from all directions. Notes should be made regarding the number and size of the hollows within each tree.

Any hollow-bearing trees or trees with fauna known to be in residence are to be noted and treated with the utmost circumspect to protect the fauna and allow them to vacate the tree.

Hollow-bearing trees should be cleared after all other surrounding vegetation has been removed. It is recommended to remove all other vegetation several days in advance of hollow tree removal in order to make the hollow bearing trees less suitable due to the lack of cover and foraging habitat nearby. Animals will frequently abandon hollows when clearing is conducted in this way.

Hollow bearing trees should be felled using the following protocol in association with the presence of a spotter-catcher:

- Plant equipment, such as an excavator or front-end loader, is to be used. The plant is to be of sufficient size, weight and power to achieve this with a large margin of safety.
- Each individual hollow bearing tree is to be gently 'tapped' twice with the machine;
- The operator is to wait for approximately one minute to see if any fauna appear;
- A second series of slightly harder 'taps' is to be delivered to the hollow bearing tree;
- Wait for another minute, watching for the appearance of fauna.
- If fauna appears from within the tree, every effort should be made to safely encourage and assist the animal/s to vacate and relocate into the wider study area;
- If no fauna appears, the tree is to be pushed over as slowly or gently as possible (known as 'soft felled').
- After the felled tree has settled, the spotter-catcher is to inspect the hollows and any other part of the tree for the presence of fauna.

- If any fauna are found within the tree they are to be allowed to relocate into nearby bushland, if they are uninjured. However, if they are injured the spotter-catcher is to transport the animal to a local vet or to an organisation, such as WIRES, for treatment.

Dead timber or trees not containing hollows may be salvaged and re-distributed within the Project Site or surrounding bushland. Dead wood provides food and nesting habitat for a number of insects and reptiles which in turn provide food for other fauna.

Hollow trees when felled may be cut into manageable pieces and reused. Hollow logs can be relocated and placed on the ground to retain or enhance the natural bushland habitat values. Smaller hollow branches can be re-used by fastening them in retained trees for use as replacement nests or dens by birds or arboreal fauna.

Most of the cleared vegetation can be mulched and re-used throughout the Project Site to assist with soil management and future rehabilitation. When used in this way, mulch helps to ameliorate the effects of drying and assists with the retention of moisture in the soil. Mulch also assists in the stabilisation of soil and helps minimise soil erosion and sedimentation.

Noxious or weed species are to be excluded from the mulching process. Mulch containing weed fragments or propagules will spread the incidence of weeds within any area where the mulch is spread.

7.3.2 Quarry Operations

7.3.2.1 Fauna management

Fauna that have been displaced by the removal of vegetation or the felling of hollow-bearing trees are to be allowed to find its way into the wider study area. If the animal requires assistance to do so then assistance to achieve removal of the animal should be provided. This assistance is to be as non-invasive as possible and is to be carried out in the gentlest or least traumatic possible way.

Injured fauna is to be assessed regarding survivability. If the animal is unlikely to survive it is to be captured and taken to a local vet or to an organisation such as WIRES for treatment.

7.3.2.2 Topsoil management

Topsoil should be stored in a manner to allow for future use in site rehabilitation by maintaining a viable seed bank and to limit soil impermeability. Some general strategies are:

- Use the topsoil as soon as possible.
- Aerate the topsoil at regular intervals during storage (by moving it or otherwise with a machine).
- Store topsoil in shallow or small piles or windrows (to allow oxygen and moisture to penetrate).

Topsoil should be removed from the newly cleared areas using appropriate machinery such as excavators. The topsoil should then be stockpiled for later use in rehabilitation or directly transferred to an area to be revegetated. It is recommended that topsoil is stockpiled separately and, where possible, close to the initial area of removal. Topsoil stockpiling is best undertaken in small piles or windrows to facilitate the permeability required to provide adequate moisture and oxygen for the seedbank.

Topsoil stockpiling should include provisions for erosion and sediment controls, at least until the stockpile is used or it re-vegetates naturally. Sediment controls should be installed in accordance with best practice. Erosion and sediment control measures should be implemented to minimise adverse effects as a result of increased likelihood of erosion and sediment transportation.

The minimisation of soil erosion will be achieved through soil stabilisation measures. These measures may include strategies or methods such as sediment fencing.

7.3.2.3 Weed management

Preventative measures for weeds are generally limited to control of weed occurrences within the Project Site, prevention of the spread of weeds throughout the Project Site and prevention of the transportation of weeds into the Project Site from external sources. On this basis, control of weeds within the Project Site is the most effective strategy.

To control the spread of weeds to and from the Project Site, it is recommended that all vehicles are inspected on a regular basis and any plant material removed from the undercarriage. Furthermore, all earthmoving equipment transported to the Project Site should be clean of foreign soil and vegetative matter prior to arrival.

Weed removal should include any species likely to significantly invade bushland, prevent natural regeneration, or impede native seedling growth. Priority should be given to declared weed species, such as Broad-leaved Privet, as a legal requirement of a Control Class 4 noxious weed declared for the Tenterfield Shire Council.

Weeding techniques should be appropriate to the weed type, growth form, ecology and to the existing site conditions. Wherever possible, weed removal should be carried out prior to annual seed set. The strategy for weed removal is based on the Bradley (2002) Method and is summarised as follows:

- Work from good (low weed level) areas into the bad (high weed level) areas.
- Make minimal disturbance to the soil or adjacent native plants.
- Do not over-clear, it results in potential soil erosion and provides space for more weeds to colonise.

Herbicides should not be applied prior to rain occurring. This reduces the effectiveness of the herbicide and poses the risk of the herbicide being transported by runoff into local creek lines and waterways. An advantage of herbicide use is the low time taken to spray weeds as compared to physically removing them, particularly for large infestations of weeds.

The use of herbicides should be considered when:

- There are small areas of dense weeds with few or no native plants to protect.
- There are large areas of weeds.
- The weeds are growing too rapidly for physical removal.

Herbicide application via stem injection, frilling, scraping or foliar spray must not be applied to plants bearing ripe or semi-ripe fruit. It is important to plan herbicide control of target species according to a weeding calendar that recognises the weed's life form and seasonality (i.e. flowering, fruiting and seed set).

The spraying of weeds must only be undertaken by experienced persons with Chemcert or equivalent qualifications. The success of each treatment must be evaluated by the operator after a set period of time and re-applied (if necessary) according to the labelled effectiveness for each herbicide. Care must be taken when applying herbicides near drainage lines to avoid excess use environmental contamination and loss of sensitive flora and fauna.

The herbicide of choice for bush regeneration work is glyphosate. A bioactive form of Glyphosate shall be used in wet areas (e.g. drainage lines, dams).

Unless otherwise agreed, herbicide application shall be limited to the following techniques:

- Cut-stump and poison (cut and dab).
- Stem injection.
- Stem-scrape or frilling and poison.
- Basal bark painting.
- Selective spot-spraying.

7.3.3 Koalas

The following additional measures to minimise risks to Koalas during proposed activities should be adopted:

- Quarry activities, including vegetation clearing and blasting, will only occur between the hours of 6am and 6pm.
- Vehicle speeds on site will remain at 30 km/h on the quarry access road and 10 km/h within the quarry.

7.3.4 Offsets

As the statutory assessments indicated that none of the threatened species with the potential to occur on the Project Site will be significantly impacted by the Proposal, offsets were only considered for threatened species known to occur within the Project Site: Koala, Flame Robin and Scarlet Robin (**Section 5.4**).

Potential offset requirements for state matters were considered using the Biobanking assessment process and only the Koala and Scarlet Robin are credit listed species. Both species have a higher Tg value, indicating that these species can cope with change (**Table 6**).

Table 6 Offset requirements for species likely to be impacted by proposed activity

COMMON NAME	SCIENTIFIC NAME	Tg value
Koala	*Phascolarctos cinereus*	0.83
Scarlet Robin	*Petroica boodang*	0.6

Furthermore the proposed quarry extension is considered unlikely to result in any significant residual impacts to these three species due to the small area of native vegetation and habitat being cleared as well as the relatively minor impact at a landscape scale. Therefore offsets are not considered to be required for any protected matters that are known to occur on the Project Site.

8. CONCLUSION

Darryl McCarthy Constructions Pty Ltd (DM Constructions) is seeking approval for the continued operation, and extension, of Dowe's Quarry, near Tenterfield NSW (the Proposal). Eco Logical Australia (ELA) has undertaken an ecological assessment for an Environmental Impact Statement (EIS) for the proposed activity.

The ecological assessment has been prepared to address the Environmental Assessment Requirements (EARs No 831) issued by the Secretary of the NSW Department of Planning and Environment and pursuant to the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and other State and local government policies. The assessment involved reviewing available databases and a Project Site survey to verify mapped vegetation, describe biodiversity values and search for threatened species, including targeted searches for Koala and bird census. This was used to assess potential impacts on areas of ecological importance from the proposed extension and on-going operation of the quarry.

The Project Site contains one native vegetation community which corresponds to Dry Open New England Blackbutt (**Figure 4**). Although no threatened flora species were observed within the Project Site, the vegetation was in good condition and contains very large habitat trees (up to 30 m), high native plant species richness and over-storey regeneration. 17 hollow-bearing trees were identified across the Project Site, with four hollow bearing trees occurring within the proposed extended extraction area and another four within the proposed clay fines area. These trees have hollows ranging from small to large and are considered to provide potential breeding habitat for hollow dependent fauna including several threatened species. The Project Site also contained rocky outcrops, however, these areas are not considered to be suitable for fauna requiring denning features due to the lack of large boulders and crevices.

Three threatened fauna species were evident or recorded within the Project Site; Koala, Scarlet Robin and Flame Robin. There was evidence of Koala activity on four trees within the proposed extended extraction area. Several trees within the proposed extended extraction area are also secondary food source trees: Mountain Gum and Grey Box. Areas where there was evidence of Koala activity, and/or where Mountain Gum and Grey Box trees occur, are considered Koala habitat. The Scarlet Robin was more common across the Project Site, yet the Flame Robin was only recorded once at the top of the ridge along the western boundary.

The proposed extended extraction area was assessed in the context of SEPP 44. As the proposed extended extraction area did not contain any primary Koala feed trees, it cannot be considered core Koala habitat, despite evidence that they have previously occurred on the Project Site.

The key ecological impacts are largely associated with the clearing of 2.1 ha of Dry Open New England Blackbutt (Ecosystem 41) forest including the loss of eight hollow-bearing trees. These impacts will result in a minor loss of habitat for several threatened species known to occur on the Project Site i.e. the Koala, Scarlet Robin and Flame Robin.

Other potential indirect impacts that may occur during the ongoing quarry operation of the proposed extended extraction area are:

- Mortalities or injuries to native fauna from vehicle and equipment strikes.
- Introduction and spread of weeds and pests.

- Increased vibration, dust and noise effects quarry activities (e.g. blasting and vegetation clearing) on the adjacent vegetation community and habitat.
- Litter and pollution from quarry materials.
- Edge effects on adjacent vegetation from littering and inappropriate waste management.
- Soil erosion and sedimentation of adjacent drainage lines.
- Initiation of fire in adjacent vegetation from quarry activities and workers.

According to the Draft referral guidelines for Koalas (DoE 2013b), the Project site is determined to be 'critical habitat'. However field observations indicated that this is not the case due to the low density of Koala activity across the site and the absence of primary food trees. The proposed activity was assessed against the guidelines as it may adversely affect Koala habitat due to the following:

- The impact area (the proposed extended extraction area) has a Koala habitat score ≥ 5 using the Koala habitat assessment tool (DoE 2013b).
- The area contains known food trees, Grey Box, Mountain Gum and Broad-leaved Stringybark.
- The proposed on-going operation of the quarry will clear ≥ 2 ha of habitat containing known Koala food trees.
- Less than ≤ 20 ha will be cleared.

However due to the small area proposed to be cleared (2.1 ha), a lower habitat score of 5 and very low density of Koalas (≤ 0.01 per ha), a referral is not recommended based on the guidelines.

15 threatened and migratory species are considered to potentially, or likely occur, within the Project Site. Several threatened species may potentially be impacted by the proposed extension and on-going operation of the quarry with the removal of eight high-quality hollow-bearing trees. An Assessment of Significance was undertaken for these species which identified that the Proposal is unlikely to result in a significant impact for any species for the following reasons:

- The proposed activity would constitute a moderate disturbance in the context of habitat available within the Project Site but is a minor disturbance given the extent of suitable breeding and foraging habitat immediately adjacent to the Project Site and within the surrounding landscape i.e. Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).
- The proposed activity is likely to remove eight hollow-bearing trees, however, 6.5 ha of habitat will remain within the Project Site including five hollow-bearing trees.
- Most species are highly mobile and the proposed activity will, therefore, not isolate or fragment any currently connecting areas of habitat in terms of use by these species.

A number of management measures are recommended to mitigate potential ecological impacts. Key mitigation measures are:

- Sequential vegetation clearing.
- Use of a spotter-catcher pre-clearing and during vegetation clearing.

- Marking and sensitive clearing of hollow-bearing trees.
- Fauna management protocols for clearing and ongoing operations.
- Topsoil management for future rehabilitation.
- Salvaging and re-using cleared vegetation.
- Weed control measures for declared species and environmental weeds.
- Rehabilitation.

The proposed quarry extension is unlikely to have a significant ecological impact due to the small area of native vegetation and habitat being cleared, the lack of connectivity with higher quality habitats as well as the relatively minor impact at a landscape scale and proximity to protected areas such as Girraween, Bald Rock and Basket Swamp National Parks (>10,000 ha).

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APPENDIX A. LIKELIHOOD TABLES

FAUNA

Listing: V = Vulnerable, E = Endangered, CE = Critically Endangered

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
AVES						
Anseranas semipalmata	Magpie Goose	V	Mi	Now confined to northern Australia and patchily distributed through eastern Queensland. Small numbers have returned to north-east New South Wales, and re-introduced successfully to Victoria, where populations expanding in south-west and on the Gippsland Plain, and South Australia (Marchant & Higgins 1990).	Unlikely	One specimen has been recorded approximately 2km south of the Quarry (OEH 2014b). No natural wetland habitat.
Anthochaera phrygia	Regent Honeyeater	CE	E	Regent Honeyeaters mostly occur in dry box-ironbark eucalypt woodland and dry sclerophyll forest associations, wherein they prefer the most fertile sites available, e.g. along creek flats, or in broad river valleys and foothills.	Unlikely	Nearest sighting is Bald Rock National Park, north of the quarry (ALA 2014).
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Associated with a variety of forest types containing *Allocasuarina* species, usually reflecting the poor nutrient status of underlying soils (OEH 2014). Intact drier forest types with less rugged landscapes are preferred (OEH 2014). Nests in large trees with large hollows (OEH 2014).	Potential	Has been recorded both 10km north (Basket Swamp National Park) and 10km southeast of the quarry (ALA 2014). *Allocasuarina torlosa* occurs on site.
Circus assimilis	Spotted Harrier	V	-	The Spotted Harrier is found in mainland Australia and Indonesia. It is widespread but sparsely distributed and found in open wooded country in tropical and temperate Australia, particularly in arid and semi-arid areas (BIB 2014).	Unlikely	Recorded in Leechs gully, 3km northwest of the quarry (OEH 2014b). Brief flyover only but not foraging.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	The Brown Treecreeper occupies eucalypt woodlands, particularly open woodland lacking a dense understorey. It is sedentary and nests in tree hollows within permanent territories (NSW Scientific Committee 2001a) and has been observed 10km northwest of Tenterfield (Wildlife Atlas).	Potential	Recorded 8km northwest of the quarry (OEH 2014b). Suitable habitat occurs on site.

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Chthonicola sagittata	Speckled Warbler	V	-	Occupies a wide range of eucalypt dominated communities with a grassy understorey, often on rocky ridges or in gullies (OEH 2014). Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy (OEH 2014).	Potential	Recorded 8km northwest of the quarry and within Tenterfield (OEH 2014b). Suitable habitat occurs on site.
Daphoenositta chrysoptera	Varied Sittella	V	-	This species prefer rough-barked trees like stringybarks and ironbarks or mature trees with hollows or dead branches in eucalypt woodlands and forests (BIB 2014).	Potential	Recorded 8km northwest of the quarry, within Tenterfield township and at Mt Mackenzie (OEH 2014b). Suitable habitat occurs on site.
Dasyornis brachypterus	Eastern Bristlebird	E	E	In northern NSW occurs in open forest with tussocky grass understorey burnt five to 10 years previously.	No	No suitable habitat on site and nearest sighting is Boorook National Park, 20km northwest of the quarry (ALA 2014).
Erythrotriorchis radiatus	Red Goshawk	CE	V	In NSW, this species is thought to favour mixed subtropical rainforest, Melaleuca Swamp Forest, and open eucalypt forest along rivers, often in rugged terrain (Marchant & Higgins 1993; Debus 1991 & 1993; OEH 2014).	Unlikely	Nearest observation is Washpool National Park, 50km southeast of the quarry (ALA 2014).
Geophaps scripta scripta	Squatter Pigeon (southern)	E	V	Occurs at sites that consist of eucalypt woodlands that are intersected with patches of acacia and stands of cypress pine *Callitris columellaris* and that have a ground cover of grasses and herbs (OEH 2014).	Unlikely	Tenterfield area classified only as potential distribution.
Glossopsitta pusilla	Little Lorikeet	V	-	Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range and mostly occur in dry, open eucalypt forests and woodlands. Uses hollow-bearing smooth barked Eucalyptus species for breeding.	Likely	Recorded at both Tenterfield Park in Tenterfield and 9km northwest of the quarry (OEH 2014b). Suitable habitat occurs on site.
Hieraaetus morphnoides	Little Eagle	V	-	The Little Eagle is widespread in mainland Australia and occupies open eucalypt forest, woodland or open woodland. Nests in tall trees with stick and twig nests.	Unlikely	Recorded in Tenterfield on a small dam and 9km northwest of the quarry (OEH 2014b). Brief flyover only but not foraging.

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Lathamus discolor	Swift Parrot	E	E	Feeds mostly on nectar, mainly from eucalypts, but also eats psyllid insects and lerps, seeds and fruit. Migrates to mainland in autumn, where it forages on profuse flowering Eucalypts.	Unlikely	Nearest recording is Bald Rock National Park (ALA 2014). No favoured feed trees or lerp infested *Eucalyptus moluccana* were observed on site
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Breeding and foraging habitat within the Border-Rivers region has been described as woodland, mallee or open forest with occasional to frequent patches of trees or shrubs with open areas of native grasses and fallen or standing dead timber. (OEH 2014). Hooded Robin home ranges are relatively large, averaging 18ha for birds from the New England Tableland (NSW Scientific Committee 2001b).	Potential	Suitable habitat occurs on site. Recorded 9km northwest of the quarry (OEH 2014b).
Ninox strenua	Powerful Owl	V	-	Powerful Owls are associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes (Debus & Chafer 1994; DEC 2006). Large trees with hollows at least 0.5m deep are required for shelter and breeding (DEC 2006).	Potential	Suitable habitat (large trees with hollows) observed on site. Also, recorded 8km northeast of quarry, within Basket Swamp National Park (OEH 2014b)
Petroica boodang	Scarlet Robin	V	-	Lives in open forests and woodlands in Australia.	Known	Observed during the field survey
Petroica phoenicea	Flame Robin	V	-	Prefers forests and woodlands up to about 1800 m above sea level.	Known	Observed during field survey
Poephila cincta cincta	Black-throated Finch (southern)	E	E	All recent records from NSW have been in riparian habitat dominated by River Sheoak (*Casuarina cunninghamiana*) and Rough-barked Apple (*Angophora floribunda*) (OEH 2014).	Unlikely	Suitable habitat not observed on site.
Rostratula australis	Australian Painted Snipe	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber (OEH 2014).	Unlikely	Suitable habitat not observed on site and nearest recording was north of Stanthorpe (ALA 2014).

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Stagonopleura guttata	Diamond Firetail	V	-	Typically found in grassy eucalypt woodlands, but also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities (OEH 2014). It is often found in riparian areas and sometimes in lightly wooded farmland (OEH 2014).	Potential	Recorded 8km northwest of the quarry (OEH 2014b).
Tyto novaehollandiae	Masked Owl	V	-	Associated with forest with sparse, open, understorey, typically dry sclerophyll forest and woodland (OEH 2014) yet roosts and breeds in moist eucalypt forested gullies using large tree hollows (OEH 2014). Utilises forest margins to prey on small to medium sized mammals.	Potential	Suitable habitat observed on site. Recorded 9km east of the quarry (OEH 2014b)
Tyto tenebricosa	Sooty Owl	V	-	Sooty Owls are associated with tall wet old growth forest on fertile soil with a dense understorey and emergent tall Eucalyptus species (Debus 1994; DEC 2006). The Sooty Owl is typically associated with an abundant and diverse supply of prey items and a selection of large tree hollows (Debus 1994, Garnett 1993).	Potential	Suitable habitat observed on site. Recorded 12km northeast of the quarry, in Basket Swamp National Park (OEH 2014b)
FISH						
Maccullochella peelii	Murray Cod	-	V	Widespread throughout the Murray-Darling system originally being found in virtually all waterways of that system	No	Found in aquatic environments of the Murray Darling Basin
MAMMALS (BATS)						
Chalinolobus dwyeri	Large-eared Pied Bat	-	V	The Large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests (Churchill 1998; OEH 2014). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 1998; OEH 2014).	No	No suitable habitat was observed on site. Has not been recorded within 50km of the quarry (ALA 2014).
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Prefers moist habitats with trees taller than 20m (OEH 2014). Roosts in tree hollows but has also been found roosting in buildings or under loose bark (OEH 2014).	Potential	Suitable habitat was observed on site.

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland (Churchill 1998). In the Border-Rivers regions it breeds in Karst (limestone) caves yet there are no known maternity colonies (OEH 2014).	Unlikely	No suitable breeding habitat on site.
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	Occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands.	Unlikely	Nearest observation is 20km west of Tenterfield (ALA 2014)
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998; Eby 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998).	Unlikely	Nearest camp is Stanthorpe (DoE 2014b).
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range (Churchill 1998), tending to be more frequently located in more productive forests (Hoye & Richards 2008).	No	No suitable habitat was observed on site.
MAMMALS						
Dasyurus maculatus maculatus	Spotted-tailed Quoll (Southeastern mainland population)	V	E	More frequently recorded near the ecotones of closed and open forest and in NSW within 200km of the coast. Preferred habitat is mature wet forest, especially in areas with rainfall 600 mm/year (OEH 2014).	Potential	Suitable habitat is known within the area (throughout Tenterfield region) yet no suitable breeding habitat observed on site
Petaurus australis	Yellow-bellied Glider	V	-	Forest type preferences vary with latitude and elevation occurs in dry escarpment forests in the north. Breeding habitat in Border Rivers-Gwydir region is large trees with hollows >10cm in diameter (OEH 2014). Extracts sap by biting into the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar.	Potential	Observed 10km southeast of the quarry. Hollow bearing eucalypts on site.

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Petaurus norfolcensis	Squirrel Glider	V	-	Associated with dry hardwood forest and woodlands (Menkhorst & Knight 2010). Habitats typically include gum barked and high nectar producing species, including winter flower species (Menkhorst & Knight 2010). Breeding habitat in the Border Rivers region has been identified as tree hollows >5 cm diameter in eucalypt forests and woodlands (OEH 2014)	Potential	Observed 12km southwest of the quarry, at Mt Mackenzie. Hollow bearing eucalypts on site.
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices (OEH 2014).	Unlikely	Recordings approximately 20km southeast of the quarry (ALA 2014). Lack of suitable habitat on site.
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	The Brush-tailed Phascogale prefers dry sclerophyll open forest with a sparse open understorey (OEH 2014).	Unlikely	Recorded 6km south of the quarry. Lack of suitable habitat on site.
Phascolarctos cinereus	Koala	V	V	Associated with both wet and dry Eucalypt forest and woodland that contains a canopy cover of approximately 10 to 70% (Reed et al. 1990), with acceptable Eucalypt food trees. Some preferred Eucalyptus species are: *Eucalyptus tereticornis*, *E. punctata*, *E. cypellocarpa*, *E. viminalis.*	Known	Scratches and scats observed on site.
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE mainland population)	-	V	Associated with dry coastal heath and dry and wet sclerophyll forests (Strahan 1998) with dense cover for shelter and adjacent more open areas for foraging (Menkhorst & Knight 2010).	No	This species prefers wetter habitats.
Pseudomys novaehollandiae	New Holland Mouse	-	V	Most records are coastal yet populations have been recently recorded up to 400km inland. Habitat includes heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils (Kemper & Wilson 2008)	Unlikely	Nearest record in Malara State Forest, 20km southeast of quarry (ALA 2014)
Pseudomys oralis	Hastings River Mouse	E	E	Prefers open forest or woodland with a grassy sedge rush or heath understorey that is about 10-75cm above the ground. This habitat occurs beside creeks (permanent and ephemeral) and soakages, but is also found on ridges and grassy Plains (OEH 2014).	Unlikely	Recorded at Basket Swamp National Park, 10km northeast of the quarry, yet no suitable habitat (swampy) on site.

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
REPTILES						
Delma torquata	Collared Delma	-	V	This species occurs on rocky hillsides on basalt and lateritic soils supporting open eucalypt and Acacia woodland with a sparse understorey of shrubs and tussocks or semi-evergreen vine thicket.	No	Suitable habitat not observed on site.
Furina dunmalli	Dunmall's Snake	-	V	The distribution of Dunmall's Snake is mainly within Queensland yet extends as far south as Ashford in New South Wales (NSW). This species is found on a broad range of habitats, such as Bulloak open forest and woodland associations on sandstone derived soils and forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow (DoE 2014a)	No	At the southern extent of species distribution and suitable habitat not observed on site.
Uvidicolus sphyrurus	Border Thick-tailed Gecko	V	V	Found only on the tablelands and slopes of northern NSW and southern Queensland, reaching south to Tamworth and west to Moree (OEH 2014). Most common in the granite country of the New England Tablelands (OEH 2014). Rocky hills with dry open eucalypt forest or woodland (OEH 2014). Favours forest and woodland areas with boulders, rock slabs, fallen timber and deep leaf litter (OEH 2014).	Unlikely	Suitable habitat occurs on site. Recorded 10km from quarry, at Mt Mackenzie Nature Reserve (OEH 2014b)
Wollumbinia belli	Bell's Turtle	V	V	Found only in the upper reaches of the Namoi, Gwydir and MacDonald Rivers on the North West Slopes of NSW. Shallow to deep pools in upper reaches or small tributaries of major rivers in granite country.	No	No natural waterbodies occur on site.
MIGRATORY MARINE BIRDS						
Apus pacificus	Fork-tailed Swift	-	Mi	Sometimes travels with Needletails. Varied habitat with a possible tendency to more arid areas but also over coasts and urban areas (Simpson & Day 2004).	Potential	May flyover as occurs with Needletails (see below).
MIGRATORY TERRESTRIAL BIRDS						
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	Mi	Forages over large open fresh or saline waterbodies, coastal seas and open terrestrial areas (Marchant & Higgins 1993; Simpson & Day 2004). Usually extends inland along major waterways.	Unlikely	Quarry not located near major waterway.

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Hirundapus caudacutus	White-throated Needletail	-	Mi	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas (Marchant & Higgins 1993; Simpson & Day 2004).	Potential	Suitable habitat occurs on site, potential for species to flyover.
Merops ornatus	Rainbow Bee-eater	-	Mi	Resident in coastal and subcoastal northern Australia. Occurs in open country, chiefly at suitable breeding places in areas of sandy or loamy soil: sand-ridges, riverbanks, road-cuttings, sand-pits, occasionally coastal cliffs (ibid).	Potential	Potential for species to flyover.
Monarcha melanopsis	Black-faced Monarch	-	Mi	Occurs in rainforest ecosystems, feeding in tangled understorey (Blakers et al. 1984; DoE 2014a).	Potential	Potential for species to flyover.
Myiagra cyanoleuca	Satin Flycatcher	-	Mi	Inhabits heavily vegetated gullies in eucalypt-dominated forests and taller woodlands (DoE 2014a).	Unlikely	No suitable habitat on site.
Rhipidura rufifrons	Rufous Fantail	-	Mi	The Rufous Fantail is a summer breeding migrant to southeastern Australia and is found in rainforest, dense wet eucalypt and monsoon forests, paperbark and mangrove swamps and riverside vegetation (OEH 2014).	Unlikely	No suitable habitat on site.
Symposiachrus trivirgatus	Spectacled Monarch	-	Mi	Occurs in wet forests and mangroves (Simpson & Day 2004).	Unlikely	No suitable habitat on site.
MIGRATORY WETLANDS BIRDS						
Ardea alba	Great Egret	-	Mi	The Great Egret is common and widespread in Australia (McKilligan 2005). It forages in a wide range of wet and dry habitats including permanent and ephemeral freshwaters, wet pasture and estuarine mangroves and mudflats (McKilligan 2005).	No	No suitable habitat on site.
Ardea ibis	Cattle Egret	-	Mi	Cattle Egrets forage on pasture, marsh, grassy road verges, rain puddles and croplands, but not usually in the open water of streams or lakes and they avoid marine environments (McKilligan 2005).	No	No suitable habitat on site.
Gallinago hardwickii	Latham's Snipe	-	Mi	Occupies a variety of vegetation around wetlands (Marchant & Higgins 1999) including wetland grasses and open wooded swamps (Simpson & Day 2004).	No	Dams on site considered unsuitable habitat
Rostratula australis	Australian Painted Snipe	E	E, Mi	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber (OEH 2014).	No	Dams on site considered unsuitable habitat

FLORA

Listing: V = Vulnerable, E = Endangered, CE = Critically Endangered

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Acacia macnuttiana	MacNutt's Wattle	V	V	*Acacia macnuttiana* is known from four areas on the Northern Tablelands and North Western Slopes – Boonoo Boonoo Falls, the north-western additions to Washpool National Park, Torrington State Conservation Area, and Pindari Dam. Grows in dry sclerophyll woodland and heath on granite and acid volcanics.	Unlikely	Within known distribution but not observed during survey.
Boronia granitica	Granite Boronia	V	V	Occurs from just north-west of Armidale north to the Queensland border. Plants occur in heath and woodland in rocky areas on granite (Vegetation Types 7a, 6, 3a, 3b) (DoE 2014a).	Unlikely	No vegetation associations on site in which species is found.
Cadellia pentastylis	Ooline	V	V	In NSW, occurs along the western edge of the North West Slopes to west of Tenterfield. Plants grow in a variety of habitats such as dry rainforest and shrubby woodland communities.	Unlikely	Outside known distribution
Caladenia atroclavia	Black-clubbed Spider-orchid	-	E	Open forest on heavy loams derived from granite, peak flowering period is October (DoE 2013b)	Unlikely	Habitat associations not on site and outside key distribution range of Queensland.
Callistemon pungens		-	V	Occurs in south-east Queensland and the northern tablelands of northeast NSW. In NSW, it is found along rocky watercourses usually with sandy granite (or occasionally basalt) creek beds, and generally among naturalised species (TSSC 2008).	Unlikely	No suitable habitat (creek beds) on site.
Callitris oblonga	Pygmy Cypress-pine	V	V	Plants occurring in northern NSW are referrable to *Callitris oblonga* subsp. *parva*. Grows in sand along watercourses but also occurs in open woodland in granite country and in drier sites on exposed ridges.	Unlikely	Not observed along the ridgeline during survey and site is outside the known distribution range (OEH 2014).
Eucalyptus caleyi subsp. ovendenii	Ovenden's Ironbark	V	V	Known from west of Guyra north to the Queensland border on the western edge of the Tablelands. Grows in shallow soils over granite and acid volcanics.	Unlikely	Not observed during survey and site is outside the known distribution range (OEH 2014).
Eucalyptus magnificata	Northern Blue Box	E	-	Known from just a few scattered localities from east of Uralla north to near Glencoe. Most commonly grows in shallow soils close to the edge of gorges.	Unlikely	Observed approximately 13km southwest of the quarry yet no suitable habitat on site

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	*Eucalyptus nicholii* naturally occurs in the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield. Grows in dry grassy woodland, on shallow and infertile soils of slopes and ridges, mainly on granite (OEH 2014).	Unlikely	Not observed during the survey.
Eucalyptus scoparia	Wallangarra White Gum	E	V	Known in NSW only from the Tenterfield district where it is very uncommon. Grows on rocky hillsides in shrubby woodland close to granite outcrops.	Unlikely	Not observed during the survey.
Euphrasia orthocheila subsp. *peraspera*	Tenterfield Eyebright	E	-	Currently only known from two swamps in the Tenterfield area where it is recorded from 'moist open situations' such as swamps (OEH 2014).	Unlikely	Not observed on site and dams considered unsuitable habitat.
Haloragis exalata subsp. velutina	Tall Velvet Sea-berry	V	V	Known from a number of populations on the eastern edge of the Northern Tablelands and the adjacent coastal valleys. Plants occur in a range of habitats but are often in disturbed areas where they appear to be favoured (e.g. roadsides, landslips, eroded creek lines, etc.).	Unlikely	Not observed during survey and nearest sighting is 50km east of the quarry, on the Clarence River (AVH 2014)
Homoranthus lunatus	Crescent-leaved Homoranthus	V	V	Known from three locations in the northern half of the NSW Northern Tablelands – Boonoo National Park, Basket Swamp National Park and private property near Torrington. Plants grow in heath and shrubby woodland on land around the edge of large granite outcrops.	Unlikely	Not observed during survey and site is outside the known distribution range (OEH 2014).
Lepidium peregrinum	Wandering Pepper-cress	-	E	*Lepidium peregrinum* was recently rediscovered in north-eastern NSW (near Tenterfield) at a site in an open riparian forest on the banks of the Tenterfield Creek at Clifton with sandy alluvium soil (OEH 2014). *Lepidium peregrinum* was most abundant in the tussock grassland fringe of the riparian open forest, comprising Poa species, *Lomandra longifolia* and *Paspalum dilatatum* (OEH 2014).	Unlikely	Not observed during survey and riparian vegetation does not occur on site.
Marsdenia longiloba	Slender Marsdenia	E	V	It occurs in subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest and, sometimes, in areas with rock outcrops (OEH 2014). Preferred habitat seems to be moist open forest with a fern-grass understorey and occasional small rainforest trees, often on hillslopes adjacent to gully rainforest (Ecos Environmental Pty Ltd 2005).	Unlikely	Not observed during survey and no suitable habitat occurs on site.

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Phebalium glandulosum subsp. *eglandulosum*	Rusty Desert Phebalium	E	V	Known from the Torrington district and on Rock Of Gibraltar to the west of Tenterfield. Plants occur in heath and shrubby woodland in skeletal rocky soils close to granite and acid volcanic outcrops.	Unlikely	Not observed during survey and site is outside the known distribution range (OEH profile page).
Prostanthera staurophylla	Torrington mint-bush	E	V	In the strict sense *Prostanthera staurophylla* is known only from Mount Mackenzie Nature Reserve to the west of Tenterfield (Hunter & Conn 2006). It grows in heath and shrubby woodland on and around the edges of granite outcrops.	Unlikely	Not observed during survey and nearest sighting is west of Tenterfield (Wildlife Atlas).
Streblus pendulinus	Siah's Backbone	-	E	On the Australian mainland, Siah's Backbone is found in warmer rainforests, chiefly along watercourses (DoE 2014a)	Unlikely	Not observed during survey and habitat does not occur on site.
Thesium australe	Austral Toadflax	V	V	Widespread throughout the eastern third of NSW but most common on the North Western Slopes, Northern Tablelands and North Coast. Occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (*Themeda australis*) (OEH 2014). Observed on Dismal and Basket swamps, approximately 20km northeast of Tenterfield.	Unlikely	Not observed during survey and swamp habitats not occurring on site.
Tylophora woollsii	Cryptic Forest Twiner	E	E	Widespread but uncommon on the Northern Tablelands and North Coast of NSW. Known localities include the Ebor, Gibraltar Range, Nymboida and Tenterfield districts. Plants grow in moist eucalypt forest and on the margins of rainforest.	Unlikely	Not observed during survey and habitat does not occur on site.

TEC's

Listing: V = Vulnerable, E = Endangered, CE = Critically Endangered

SCIENTIFIC NAME	TSC ACT	EPBC ACT	DESCRIPTION	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
New England Peppermint (*Eucalyptus nova-anglica)* Grassy Woodlands	CE	CE	Predicted to occur in the Tenterfield area and primarily occurs in valley flats subject to cold air drainage. It is a type of temperate grassy eucalypt woodland to open forest in which the tree canopy is dominated or co-dominated by *Eucalyptus nova-anglica* (New England Peppermint) and the ground layer is mostly grassy. *Eucalyptus nova-anglica* is a tree species.	Unlikely	Community was not identified on site.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	E	CE	Predicted to occur in the Tenterfield area.	Unlikely	Community was not identified on site.

APPENDIX B. SPECIES OBSERVED DURING FIELD SURVEY

FAUNA

SPECIES	COMMON NAME	CONSERVATION STATUS
AVES		
Acanthiza lineata	Striated Thornbill	-
Acanthiza pusilla	Brown Thornbill	-
Acanthiza reguloides	Buff-rumped Thornbill	-
Artamus cyanopterus	Dusky Woodswallow	-
Cormobates leucophaea	White-throated Treecreeper	
Corvus coronoides	Australian Raven	-
Corvus orru	Torresian Crow	-
Cracticus tibicen	Australian Magpie	-
Dacelo novaeguineae	Laughing Kookaburra	-
Dicaeum hirundinaceum	Mistletoebird	-
Eastern Yellow Robin	Eastern Yellow Robin	-
Falcunculus frontatus	Crested Shrike-tit	-
Lichenostomus fuscus	Fuscous Honeyeater	-
Lichmera indistincta	Brown Honeyeater	-
Malurus cyaneus	Superb Fairy-wren	-
Malurus lamberti	Variegated Fairy-wren	-
Manorina melanocephala	Noisy Miner	-
Melithreptus albogularis	White-throated Honeyeater	-
Microeca fascinans	Jacky Winter	-
Myiagra inquieta	Restless Flycatcher	-
Neochmia temporalis	Red-browed Finch	-
Pardalotus punctatus	Spotted Pardalote	-
Petroica boodang	Scarlet Robin	Vulnerable (TSC Act)
Petroica phoenicea	Flame Robin	Vulnerable (TSC Act)
Platycercus elegans	Crimson Rosella	-
Rhipidura albiscapa	Grey Fantail	-
Rhipidura leucophrys	Willie Wagtail	-
Sericornis frontalis	White-browed Scrubwren	-
MAMMALS		
Macropus rufogriseus	Red-necked Wallaby	-
Macropus robustus	Wallaroo	-
Phascolarctos cinereus	Koala	Vulnerable (TSC and EPBC Act)
EXOTICS		
Leporidae spp.	Hare/Rabbit	Declared Pest under the *Rural Lands Protection Act 1998*
Vulpes vulpes	European Red Fox	-

FLORA

Origin: E = exotic; N = native, NT = naturalised, non-native

FAMILY	SPECIES	COMMON NAME	ORIGIN
Apocynaceae	*Parsonsia* spp.	-	N
Asteraceae	*Bidens pilosa*	Cobblers Pegs	E
Asteraceae	*Carthamus lanatus*	Saffron thistle	E
Asteraceae	*Cassinia quinquefaria*	-	N
Asteraceae	*Conyza* sp.	-	E
Asteraceae	*Olearia elliptica*	Sticky Daisy-bush	N
Asteraceae	*Senecio pinnatifolius* var. *pinnatifolius*	-	N
Asteraceae	*Vittadinia* sp.	-	N
Caryophyllaceae	*Scleranthus biflorus*	Knawel	N
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	N
Celastraceae	*Denhamia silvestris*	-	N
Celastraceae	*Maytenus silvestris*	Narrow-leaved Orangebark	N
Chenopodiaceae	*Einadia* sp.	-	N
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew	E
Cyperaceae	*Cyperus gracilis*	Slender Flatsedge	N
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	N
Cyperaceae	*Gahnia aspera*	Rough Saw-sedge	N
Fabaceae	*Acacia graniticia*	-	N
Fabaceae	*Acacia implexa*	Hickory Wattle	N
Fabaceae	*Acacia irrorata*	Green Wattle	N
Fabaceae	*Acacia ulicifolia*	Prickly Moses	N
Fabaceae	*Glycine microphylla*	Small-leaf glycine	N
Fabaceae	*Glycine* sp.	-	N
Fabaceae	*Hardenbergia violacea*	Purple Coral Pea	N
Lamiaceae	*Plectranthus suaveolens*	-	N
Lamiaceae	*Prostanthera* sp.	-	N
Lobeliaceae	*Pratia purpurascens*	Whiteroot	N
Lomandraceae	*Lomandra confertifolia*	Mat-rush	N
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	N
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	N
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	N
Malvaceae	*Brachychiton populneus*	Kurrajong	N
Myrtaceae	*Angophora subvelutina*	Broad-leaved Apple	N
Myrtaceae	*Eucalyptus biturbinata*	Grey Gum	N
Myrtaceae	*Eucalyptus caliginosa*	Broad-leaved Stringybark	N
Myrtaceae	*Eucalyptus cameronii*	Diehard Stringybark	N
Myrtaceae	*Eucalyptus campanulata*	New England Blackbutt	N
Myrtaceae	*Eucalyptus dalrympleana*	Mountain Gum	N
Myrtaceae	*Eucalyptus deanei*	Mountain Blue Gum	N
Myrtaceae	*Eucalyptus moluccana*	Grey Box	N

FAMILY	SPECIES	COMMON NAME	ORIGIN
Oleaceae	*Ligustrum lucidum*	Broad-leaved Privet	E Class 4 Noxious weed in Tenterfield LGA
Oxalidaceae	*Oxalis* sp.	-	N
Phormiaceae	*Dianella caerulea*	Blue Flax-lily	N
Phytolaccaceae	*Phytolacca octandra*	Inkweed	E
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	N
Poaceae	*Enneapogon* sp.	-	N
Poaceae	*Entolasia stricta*	Wiry Panic	N
Poaceae	*Eragrostis* spp.	-	N
Poaceae	*Poa sieberiana*	-	N
Poaceae	*Themeda australis*	Kangaroo Grass	N
Pteridaceae	*Cheilanthes sieberi*	-	N
Ranunculaceae	*Clematis* sp.	-	N
Rosaceae	*Crataegus monogyna*	Common Hawthorn	NT
Rosaceae	*Rubus molucannus*	Molucca Bramble	N
Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart	N
Solanaceae	*Solanum ferocissimum*	Spiny Potato Bush	N
Solanaceae	*Solanum sp.*	-	N
Violaceae	*Viola hederacea*	Ivy-leaved Violet	N

APPENDIX C. BIOBANKING PLOTS

VARIABLE	PLOT 1	PLOT 2	PLOT 3	PLOT 4
50m Transect				
Native over-storey cover (%)	16	35.5	30	39
Native mid-storey (%)	6.4	1.5	2	1.5
Native ground cover (grasses) (%)	10.4	6	33.5	8.6
Native ground cover (shrubs) (%)	0.6	0	0.5	0.2
Native ground cover (other) (%)	9.3	2.9	11.9	5.5
Exotic plant cover	0.2	0	0	0
Larger sampling area				
Native plant species richness	24	22	31	23
Number of trees with hollows	5	3	0	1
Over-storey regeneration	100	67	75	67
Total length of fallen logs (m)	109.5	55	40.5	61

APPENDIX D. SITE PHOTO

APPENDIX E. ASSESSMENTS OF SIGNIFICANCE

Glossopsitta pusilla (Little Lorikeet)

Glossopsitta pusilla (Little Lorikeet) is listed as Vulnerable under the TSC Act.

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. It usually nests in smooth barked Eucalypts with small hollows (3 cm) which are high above the ground (>2 m) (OEH 2014b). It feeds mostly on nectar and pollen and forage primarily on Eucalypts in open woodland but also utilise other trees such as Angophora and Melaleuca (OEH 2014b).

Little Lorikeets were not recorded during the field survey but have been recorded within 10 km of the Project Site, which contains potential breeding and foraging habitat.

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

Threats to Little Lorikeets include the extensive clearing of woodlands for agriculture, the loss of hollow-bearing trees, and competition with the introduced *Apis mellifera* (Honeybee). The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt, which is not a listed TEC) which is considered potential breeding and foraging habitat.

The proposed activity will result in permanent loss of eight hollow-bearing trees, considered potential breeding and foraging habitat. This clearance represents 24% of the native vegetation on the Project Site (8.6 ha) and five hollow-bearing trees with small sized hollows.

Given the high mobility of the Little Lorikeet, it is unlikely that it has a high dependence on the resources on the Project Site, therefore, the proposed activity is unlikely to place a viable local population of this species at risk of extinction.

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

The Little Lorikeet is not endangered population.

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

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

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

The Little Lorikeet is not an endangered ecological community.

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

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

The Proposal will remove 2.1 ha of potential habitat within 8.6 ha of potential habitat on the Project Site. The amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will remove 2.1 ha of potential habitat. Given the highly mobile nature of the species and that this species will forage within open areas if necessary, it is unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The Proposal will result in disturbance to the native vegetation which represents potential foraging and breeding habitat. The habitat to be removed cannot be considered important to the long-term survival of this species.

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

The Little Lorikeet is listed as vulnerable. Critical habitat cannot be declared for a vulnerable species.

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

No recovery plan or threat abatement plan has been prepared for the Little Lorikeet

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

Two key threatening processes are relevant to this Proposal with respect to the Little Lorikeet:

- Clearing of native vegetation.
- Loss of hollow-bearing trees.

The Proposal involves the removal of 2.1 ha of native vegetation with 6.5 ha remaining in the Project Site. In addition, eight hollow-bearing trees are to be removed with five of these trees considered potential breeding habitat (<3 cm hollow).

Conclusions

The Proposal is unlikely to constitute a significant impact on Little Lorikeet given that:

- The proposed activity will remove eight hollow-bearing trees but foraging habitat is still available within the Project Site (6.5 ha).
- The species is wide ranging and unlikely to have a high dependence on the resources on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Little Lorikeet.

Climacteris picumnus victoriae (Brown Treecreeper (eastern subspecies))

Climacteris picumnus victoriae (Brown Treecreeper) is listed as Vulnerable under the TSC Act.

The Brown Treecreeper occurs in inland plains and slopes of the Great Dividing Range of eastern Australia. This species is found in Eucalypt woodlands (including Box-Gum Woodland) and uses hollows >6 cm in live trees or in dead standing or fallen timber. Fallen timber is also an important habitat component for this species (OEH 2014b).

The Brown Treecreeper (eastern subspecies) was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains potential breeding and foraging habitat.

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

The Brown Treecreeper has the potential to use native vegetation (Dry Open New England Blackbutt, which is not a listed TEC) in the Project Site.

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which is considered potential breeding and foraging habitat. This clearance represents 24% of the native vegetation on site (8.6 ha) and seven hollow-bearing trees with medium sized hollows.

Given the low quality of foraging habitat in the Project Site and the high mobility of the Brown Treecreeper, the proposed activity is unlikely to place a viable local population of this species at risk of extinction.

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

The Brown Treecreeper is not an endangered population.

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

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

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

The Brown Treecreeper is not an endangered ecological community.

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

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

The proposed disturbance of potential habitat is minimal when considering that large areas of potential breeding and foraging habitat are present in the surrounding areas which are protected and accessible to this highly mobile species. Therefore, the amount of potential breeding habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. Given the highly mobile nature of the species and that this species will forage within open areas if necessary, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The Proposal will result in disturbance to the native vegetation which represents potential foraging and breeding habitat. The habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

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

The Brown Treecreeper is listed as vulnerable. Critical habitat cannot be declared for a vulnerable species.

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

No recovery plan or threat abatement plan has been prepared for the Brown Treecreeper.

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

Three key threatening processes are relevant to this Proposal with respect to the Brown Treecreeper (eastern subspecies):

- Vegetation clearing.
- Fragmentation of habitat that isolates populations.
- Habitat degradation such as the removal of dead timber and loss of Hollow-bearing trees.

The proposed activity involves the removal of 2.1 ha of native vegetation with 6.5 ha remaining on site. In addition, eight hollow-bearing trees are to be removed. However, there is an ample amount of native vegetation with suitable habitat features in the local area given the proximity of the Project Site to several protected areas. The Proposal is unlikely to exacerbate these key threatening processes.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Brown Treecreeper given that:

- The proposed activity will remove eight hollow-bearing trees but foraging habitat is still available within the Project Site (6.5 ha).
- The species is wide ranging and unlikely to have a high dependence on the vegetation on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Brown Treecreeper.

Petroica boodang (Scarlet Robin)

Petroica boodang (Scarlet Robin) is listed as Vulnerable under the TSC Act.

It is distributed widely across the coastal and Great Divide regions of eastern Australia from southern Queensland to Victoria as well as Tasmania. This species feeds mostly on insects and forage primarily in forests and woodlands.

Four Scarlet Robins were recorded across the Project Site during the field survey, including one observation within the proposed development area.

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

Threats to Scarlet Robins include habitat loss and modification (including loss of structural complexity), predation by feral cats, rats and *Strepera graculina* (Pied Currawong) and loss of habitat connectivity. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which represents known foraging and movement habitat and potential breeding habitat.

This clearance represents 24% of the native vegetation on site (8.6 ha), including eight of the 18 habitat trees within the Project Site and immediate area. The remaining native vegetation within the Project Site (6.5 ha) will still provide suitable foraging and breeding habitat.

Given the availability of foraging habitat throughout the Project Site and the high mobility of the Scarlet Robin, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Scarlet Robin is not an endangered population.

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

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

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

The Scarlet Robin is not an endangered ecological community

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

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

The proposed disturbance of known foraging habitat is minimal considering there are large areas of potential foraging habitat present on surrounding areas that are protected and accessible to this species. Therefore, the amount of known foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. Given the amount of suitable foraging habitat surrounding the Project Site, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The Proposal will result in disturbance to the native vegetation which represents known foraging habitat. The habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

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

No critical habitat has been declared for the Scarlet Robin

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

No recovery plan or threat abatement plan has been prepared for the Scarlet Robin.

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

Three key threatening processes are relevant to this Proposal with respect to the Scarlet Robin:

- Clearing of native vegetation.
- Reduction of size of remnant patches.
- Ecological consequences of high frequency fires.

The Proposal involves the removal of 2.1 ha of native vegetation represents 27% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. This proposed development is not expected to increase the frequency of fires. Therefore, the proposed activity is unlikely to be considered a significant impact as none of these key threatening processes will be exacerbated.

Conclusions

The Proposal is unlikely to constitute a significant impact on Scarlet Robin given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha of the entire surrounding patch. This is sufficient habitat to support a viable local population.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Scarlet Robin.

Petroica phoenicea (Flame Robin)

Petroica phoenicea (Flame Robin) is listed as Vulnerable under the TSC Act.

It is distributed widely across eastern Australia, from near the Queensland border to south east South Australia and also in Tasmania. In NSW, there is likely to be two separate populations with one in the Northern tablelands. It breeds in upland tall moist eucalypt forests and woodlands that have native grasses as understorey. Breeding habitat is also located on ridges and slopes. In winter, birds migrate to drier more open habitats in the lowlands. The Flame Robin mostly feeds on small invertebrates and they prefer a sparse mid-storey vegetation layer to allow them to forage for prey (OEH 2014b).

One Flame Robin was recorded within the proposed extended extraction area during the field survey.

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

Threats to Flame Robins include clearing and degradation of breeding habitat, degradation of wintering habitat, nest predation and dense regeneration. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which represents known foraging and movement habitat and potential breeding habitat.

This clearance represents 24% of the native vegetation on site (8.6 ha), including eight of the 18 habitat trees within the Project Site and immediate area. The remaining native vegetation within the Project Site (6.5 ha) will still provide suitable foraging and breeding habitat.

Given the availability of foraging habitat throughout the Project Site and the high mobility of the Flame Robin, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Flame Robin is not an endangered population.

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

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

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

The Flame Robin is not an endangered ecological community.

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

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

The proposed disturbance of known foraging habitat is minimal when considering that large areas of potential foraging habitat are present on surrounding protected areas and accessible to this species.

Therefore, the amount of known foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The proposed action will result in permanent removal of 2.1 ha of native vegetation around the existing quarry. Given the amount of suitable habitat both within the perimeter of the Project Site and surrounding protected areas, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The Proposal will result in disturbance to native vegetation which is known foraging habitat. However, the habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

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

No critical habitat has been declared for the Flame Robin.

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

No recovery plan or threat abatement plan has been prepared for the Flame Robin.

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

One key threatening process is relevant to this Proposal with respect to the Flame Robin:

- Clearing and degradation of breeding habitat.

The Proposal involves the removal of 2.1 ha of native vegetation represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. Sufficient breeding habitat to support a viable local population will be retained on the Project Site and the Proposal is unlikely to exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Flame Robin given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha in the entire surrounding patch. This is sufficient habitat to support a viable local population.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Flame Robin.

Chthonicola sagittata (Speckled Warbler)

Chthonicola sagittata (Speckled Warbler) is listed as vulnerable under the TSC Act.

The Speckled Warbler has a patchy distribution across Eastern Australia but is more frequently reported from the hills and tablelands of the Great Dividing Range (OEH 2014). This species lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. However, it requires large, and relatively undisturbed vegetation remnants, to persist in an area.

The Speckled Warbler was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains potential foraging habitat.

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

Impacts likely to have an adverse effect on the lifecycle of the Speckled Warbler include impacts which resulted in the loss or degradation of significant areas of forest and woodland habitat.

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which is considered potential breeding and foraging habitat. This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the amount of foraging habitat that will remain on the Project Site which is sufficient to support a viable local population, as well as the species mobility, this Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Speckled Warbler is not an endangered population.

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

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

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

The Speckled Warbler is not an endangered ecological community.

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

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

The proposed disturbance of potential habitat is minimal when large areas of potential foraging habitat are present on surrounding lands which are protected and accessible to this highly mobile species. Therefore, the amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. The proposed disturbance of potential habitat is minimal when large areas of potential foraging habitat are present on surrounding lands which are protected and accessible to this highly mobile species

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

The habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

f) Whether the action proposed is likely to have an adverse effect on critical habitat.

No critical habitat has been declared for the Speckled Warbler.

g) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

No recovery plan or threat abatement plan of relevance to the Speckled Warbler has been prepared.

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

One key threatening process is relevant to this Proposal with respect to the Speckled Warbler:

- Clearing of native vegetation

The Proposal involves the removal of 2.1 ha of native vegetation with 6.5 ha remaining on site. As there is an ample amount of native vegetation in good condition remaining on the Project Site, the Proposal is unlikely to significantly exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Speckled Warbler given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha in the entire surrounding patch. This is sufficient habitat to support a viable local population.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Speckled Warbler.

Daphoenositta chrysoptera (Varied Sittella)

Daphoenositta chrysoptera (Varied Sittella) is listed as Vulnerable under the TSC Act.

The Varied Sittella has a widespread range across mainland Australia, excluding some areas of the arid interior (Nullabor, Pilbara and Simpson Desert). The species inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy (NSW Scientific Committee 2009).

The Varied Sittella was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains potential foraging habitat.

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

Impacts likely to have an adverse effect on the lifecycle of the Varied Sittella would include impacts which resulted in the loss or degradation of significant areas of forest and woodland habitat.

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which is considered potential breeding and foraging habitat. This clearance represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the amount of foraging habitat that will remain on the Project Site which is sufficient to support a viable local population, as well as the species mobility, this Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Varied Sittella is not an endangered population.

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

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

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

The Varied Sittella is not an endangered ecological community.

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

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

The proposed disturbance of potential habitat is minimal when large areas of potential foraging habitat are present on surrounding lands which are protected and accessible to this highly mobile species.

Therefore, the amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. Given the mobile nature of the species, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

e) Whether the action proposed is likely to have an adverse effect on critical habitat.

No critical habitat has been declared for the Varied Sittella.

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

No recovery plan or threat abatement plan of relevance to the Varied Sittella has been prepared.

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

One key threatening process is relevant to this Proposal with respect to the Varied Sittella:

- Clearing of native vegetation.

The Proposal involves the removal of 2.1 ha of native vegetation represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. Therefore, the proposed activity is unlikely to significantly exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on Varied Sittella given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha in the entire surrounding patch. This is sufficient habitat to support a viable local population.
- The species is wide ranging and unlikely to have a high dependence on the vegetation on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Varied Sittella.

Melanodryas cucullata cucullata (Hooded Robin (south-eastern form))

Melanodryas cucullata ssp. cucullata (Hooded Robin) is listed as Vulnerable under the TSC Act.

The species is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. It prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. The Hooded Robin requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses (OEH 2014). The Hooded Robin is threatened by clearance and fragmentation of habitat including removal of dead timber. The species also appears unable to survive in remnants smaller than 100 to 200 ha (Egan et al. 1997; N. Schrader, unpub.).

The Hooded Robin was not recorded in the Project Site during the field survey but has been recorded within 10 km of Project Site, which contains potential foraging habitat.

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

Threats to Hooded Robins include clearing and fragmentation of habitat. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which is considered potential breeding and foraging habitat. This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the amount of foraging habitat that will remain on the Project Site which is sufficient to support a viable local population, as well as the species mobility, this Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Hooded Robin is not an endangered population.

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

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

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

The Hooded Robin is not an endangered ecological community

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

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

The proposed disturbance of potential foraging habitat is minimal when considering that large areas of potential foraging habitat are present on surrounding protected areas and accessible to this species.

Therefore, the amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The proposed action will result in permanent removal of 2.1 ha of native vegetation. The proposed disturbance of potential habitat is minimal when large areas of potential foraging habitat are present on surrounding lands which are protected and accessible to this highly mobile species.

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

The Proposal will result in disturbance to native vegetation which is potential foraging habitat. However, the habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

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

No critical habitat has been declared for the Hooded Robin.

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

No recovery plan or threat abatement plan has been prepared for the Hooded Robin.

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

One key threatening process is relevant to this Proposal with respect to the Hooded Robin:

- Clearing of woodlands, resulting in loss and fragmentation of habitat.

The Proposal involves the removal of 2.1 ha of native vegetation represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. In summary, the Proposal is unlikely to exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Hooded Robin given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha in the entire surrounding patch. This is sufficient habitat to support a viable local population.
  The species is wide range and unlikely to have a high dependence on the vegetation on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Hooded Robin.

Stagonopleura guttata (Diamond Firetail)

Stagonopleura guttata (Diamond Firetail) is listed as Vulnerable under the TSC Act.

The Diamond Firetail is endemic to south-eastern Australia and widely distributed in NSW. It usually occurs in grassy eucalypt woodlands, including Box-Gum Woodlands and usually found near riparian areas (OEH 2014b). This species feeds exclusively on the ground, including ripe and partly ripe plants and insects. It usually nests in shrubby understory.

The Diamond Firetail was not recorded in the Project Site during the field survey but has been recorded within 10 km of the Project Site, which contains potential foraging habitat.

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

Threats to Diamond Firetails include: clearing and fragmentation of habitat, invasion of weeds resulting in loss of food plants, destruction of shrub layer, predation from native predators i.e. *Strepera graculina* (Pied Currawong), and risk of local extinction due to small, isolated populations

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which is considered potential breeding and foraging habitat. This clearing represents 27% of the native vegetation on the Project Site (8.6 ha).

Given the amount of foraging habitat that will remain on the Project Site which is sufficient to support a viable local population, as well as the high mobility of the Diamond Firetail, this Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Diamond Firetail is not an endangered population.

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

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

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

The Diamond Firetail is not an endangered ecological community.

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

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

The proposed disturbance of known foraging habitat is minimal when considering that large areas of potential foraging habitat are present on surrounding protected areas and accessible to this species. Therefore, the amount of known foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The proposed action will result in permanent removal of 2.1 ha of native vegetation. The proposed disturbance of potential habitat is minimal when large areas of potential foraging habitat are present on surrounding lands which are protected and accessible to this highly mobile species.

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

The Proposal will result in disturbance to native vegetation which is potential foraging habitat. However, the habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

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

No critical habitat has been declared for the Diamond Firetail.

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

No recovery plan or threat abatement plan has been prepared for the Diamond Firetail.

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

One key threatening process is relevant to this Proposal with respect to the Diamond Firetail:

- Clearing of woodlands, resulting in loss and fragmentation of habitat.

The Proposal involves the removal of 2.1 ha of native vegetation represents 24% of the native vegetation on the Project Site (8.6 ha). However, 8.6 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. Therefore, the proposed activity is unlikely to significantly exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Diamond Firetail given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha in the entire surrounding patch. This is sufficient habitat to support a viable local population.
- The species is wide range and unlikely to have a high dependence on the vegetation on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Diamond Firetail.

Ninox strenua (Powerful Owl)

Ninox strenula (Powerful Owl) is listed as Vulnerable under the TSC Act.

The Powerful Owl inhabits woodland and open sclerophyll forest, tall open wet forest and rainforest that are usually conservation reserves or state forests (DEC 2006). Although this species requires large areas of forest or woodland habitat in which to breed and forage is also known to hunt over fragmented landscapes (OEH 2014b). It roosts by day in dense vegetation and nests in large tree hollows, typically trees of 80 – 240cm DBH. Prey items include small to medium sized mammals and birds, many of which are themselves dependent on tree hollows for shelter and reproduction (OEH 2014b).

There was no evidence of the Powerful Owl occurring in the Project Site during the field survey but the species has been recorded within 10 km of Project Site which contains large hollow-bearing trees.

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

Powerful Owls require large tracts of habitat and large hollow bearing trees to nest. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) that contains eight hollow-bearing trees and one large habitat tree. This represents potential breeding and foraging habitat. Only one of the six trees with large hollows will be removed.

This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the availability of suitable breeding (i.e. large hollows) and foraging habitat that will remain on the Project Site and the high mobility of the Powerful Owl, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Powerful Owl is not an endangered population.

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

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

The Powerful Owl is not an endangered ecological community

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

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

The proposed disturbance of potential habitat is minimal when considering the nature and length of time of the disturbance and that large areas of potential foraging habitat are present on surrounding lands and accessible to this highly mobile species. Therefore, the amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. Given the highly mobile nature of the species and that this species will forage within open areas if necessary, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The habitat of the Powerful Owl that is to be removed does not pose a risk to the long term survival of the species given minimal potential nesting habitat will be impacted and the availability of large areas of potential foraging habitat available in the locality.

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

No critical habitat has been declared for the Powerful Owl.

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

The proposed action does not oppose the overall objective of the recovery plan for Large Forest Owls, which includes the Powerful Owl (DEC 2006) by not having an adverse impact of the species due to the retention of large hollow bearing trees in the Project Site.

This plan identified 8 specific objectives to recover Large Forest Owls in NSW.

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

One key threatening process is relevant to this Proposal with respect to the Powerful Owl:

- Clearing of native vegetation.

The Proposal involves the removal of 2.1 ha of native vegetation which represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. Therefore, the proposed activity is unlikely to significantly exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on Powerful Owl given that:

- The proposed activity will remove eight hollow-bearing trees including one tree containing a large hollow, however five large hollow-bearing trees will still available within the Project Site.
- The species is wide range and unlikely to have a high dependence on the resources on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Powerful Owl.

Tyto novaehollandiae (Masked Owl)

Tyto novaehollandiae (Masked Owl) is listed as Vulnerable under the TSC Act.

Distributed from the coast, where it is most abundant, to the western plains between Northern Australia and Victoria. This species lives in dry eucalypt forests and woodlands from sea level to 1100 m and is largely a forest owl, but often hunts along the edges of forests, including roadsides. Pairs have a large home-range of 500 to 1000 hectares. This species roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting (OEH 2014).

There was no evidence of the Masked Owl occurring in the Project Site during the field survey but the species has been recorded within 10 km of Project Site which contains large hollow-bearing trees.

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

Masked Owls require large tracts of habitat and large hollow bearing trees to nest. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) that contains eight hollow-bearing trees and one large habitat tree. This represents potential breeding and foraging habitat. Only one of the six trees with large hollows will be removed.

This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the availability of suitable breeding (i.e. large hollows) and foraging habitat that will remain on the Project Site and the high mobility of the Masked Owl, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Masked Owl is not an endangered population.

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

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

The Masked Owl is not an endangered ecological community

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

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

The proposed disturbance of potential habitat is minimal when considering the nature and length of time of the disturbance and that large areas of potential foraging habitat are present on surrounding lands and accessible to this highly mobile species. Therefore, the amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. Given the highly mobile nature of the species and that this species will forage within open areas if necessary, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The habitat of the Masked Owl that is to be removed does not pose a risk to the long term survival of the species given no potential nesting habitat will be impacted and given the availability of large areas of potential foraging habitat available in the locality.

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

No critical habitat has been declared for the Masked Owl

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

The proposed action does not oppose the overall objective of the recovery plan for Large Forest Owls, which includes the Masked Owl (DEC 2006) by not having an adverse impact of the species due to the retention of large hollow bearing trees in the Project Site.

This plan identified 8 specific objectives to recover Large Forest Owls in NSW.

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

One key threatening process is relevant to this Proposal with respect to the Powerful Owl:

- Clearing of native vegetation.

The Proposal involves the removal of 2.1 ha of native vegetation represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. Therefore, the proposed activity is unlikely to significantly exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on Masked Owl given that:

- The proposed activity will remove eight hollow-bearing trees including one tree containing a large hollow, however five large hollow-bearing trees will still available within the Project Site.
- The species is wide range and unlikely to have a high dependence on the resources on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Masked Owl.

Tyto tenebricosa (Sooty Owl)

Tyto tenebricosa (Sooty Owl) is listed as vulnerable under the TSC Act.

This species is strongly associated with sheltered gullies, especially where there is a tall, dense understorey (DEC 2006). Sooty Owls roost during the day in sheltered, dense vegetation (such as sub-canopy rainforest trees), in tree hollows or caves, cliff ledges and rock overhangs (DEC 2006). Nest sites are usually hollows in live and old, eucalypt or rainforest species within 100 m of streams, but can be in caves (DEC 2006). Hollows are in trees of at least 120 cm diameter at breast height, and are greater than 40 cm wide and 100 cm deep. Owls are faithful to traditional nesting hollows. Sooty Owl home ranges are estimated to be from 200-800 ha according to habitat productivity (DEC 2006).

There was no evidence of the Sooty Owl occurring in the Project Site during the field survey but large hollow-trees occur on site.

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

Sooty Owls require large hollow bearing trees near streams to nest. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) that contains eight hollow-bearing trees and one large habitat tree. This represents potential breeding and foraging habitat. Only one of the six trees with large hollows will be removed.

This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the availability of suitable breeding (i.e. large hollows) and foraging habitat that will remain on the Project Site and the high mobility of the Sooty Owl, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Sooty Owl is not an endangered population.

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

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

The Sooty Owl is not an endangered ecological community

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

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

The proposed disturbance of potential habitat is minimal when considering the nature and length of time of the disturbance and that large areas of potential foraging habitat are present on surrounding lands

and accessible to this highly mobile species. Therefore, the amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. Given the highly mobile nature of the species and that this species will forage within open areas if necessary, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The habitat of the Sooty Owl that is to be removed does not pose a risk to the long term survival of the species given no potential nesting habitat will be impacted and given the availability of large areas of potential foraging habitat available in the locality.

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

No critical habitat has been declared for the Sooty Owl.

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

The proposed action does not oppose the overall objective of the recovery plan for Large Forest Owls, which includes the Sooty Owl (DEC 2006) by not having an adverse impact of the species due to the retention of large hollow bearing trees in the Project Site.

This plan identified 8 specific objectives to recover Large Forest Owls in NSW.

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

One key threatening process is relevant to this Proposal with respect to the Sooty Owl:

- Clearing of native vegetation.

The Proposal involves the removal of 2.1 ha of native vegetation which represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat will remain in the Project Site and approximately 50 ha of the entire patch that the Project Site occurs within. Therefore, the proposed activity is unlikely to significantly exacerbate this key threatening process.

Conclusions

The Proposal is unlikely to constitute a significant impact on Sooty Owl given that:

- The proposed activity will remove eight hollow-bearing trees including one tree containing a large hollow, however five large hollow-bearing trees will still available within the Project Site.
- The species is wide range and unlikely to have a high dependence on the resources on site.

- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Sooty Owl.

Calyptorhynchus lathami (Glossy Black-Cockatoo)

Calyptorhynchus lathami (Glossy Black-Cockatoo) is listed as a vulnerable species under the TSC Act.

It inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly *Allocasuarina littoralis* (Black She-oak), *A. torulosa* (Forest She-oak) or Drooping *A. verticillata* (She-oak), occur. It feeds almost exclusively on the seeds of several species of *Casuarina* and *Allocasuarina* species (She-Oak), shredding the cones with its bill. The species is dependent on large hollow-bearing eucalypts for nest sites. One or two eggs are laid between March and August.

The Glossy Black-Cockatoo is threatened by a number of processes including habitat clearing and fragmentation, loss of mature hollow bearing trees, and inappropriate fire regimes which reduce its range and remove nesting and feeding resources.

The Glossy Black-Cockatoo was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains suitable habitat.

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

Factors likely to have an adverse effect on the life cycle of the Glossy Black-Cockatoo would include a substantial loss and/or fragmentation of foraging habitat and loss of suitable nesting and roosting habitat. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) that contains eight hollow-bearing trees and one large habitat tree. This represents potential breeding and foraging habitat. Only one of the six trees with large hollows will be removed.

This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the availability of suitable breeding (i.e. large hollows) and foraging habitat that will remain on the Project Site and the high mobility of the Glossy Black-Cockatoo, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

Not applicable. The Glossy Black-Cockatoo is not an endangered population.

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

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

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

Not applicable. The Glossy Black-Cockatoo is not an endangered ecological community.

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

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

The proposed disturbance of potential habitat is minimal when large areas of potential foraging habitat are present on surrounding lands which are protected and accessible to this highly mobile species. Therefore, the amount of potential foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The Proposal will result in permanent removal of 2.1 ha of native vegetation. Given the mobile nature of the species, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

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

No critical habitat has been declared for the Glossy Black-Cockatoo.

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

No Recovery Plan or Threat Abatement Plans have been prepared for the Glossy Black-Cockatoo. The Proposal does not conflict any on the nine Priority Actions identified for this species.

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

Two key threatening process is relevant to this Proposal with respect to the Glossy Black-Cockatoo:

- Clearing of native vegetation.
- Loss of hollow-bearing trees.

The Proposal involves the removal of 2.1 ha of native vegetation represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.5 ha of known habitat and five large hollows will remain in the Project Site. Therefore, the proposed activity is unlikely to significantly exacerbate these key threatening processes.

Conclusions

The Proposal is unlikely to constitute a significant impact on Glossy Black-Cockatoo given that:

- The proposed activity will remove eight hollow-bearing trees including one tree containing a large hollow, however five large hollow-bearing trees will still available within the Project Site.
- The species is wide range and unlikely to have a high dependence on the vegetation on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Glossy Black-Cockatoo.

Petaurus australis (Yellow-bellied Glider)

Petaurus australis (Yellow-bellied Glider) is listed as a Vulnerable species under the TSC Act.

This species is widespread in southeastern Australia but with a patchy distribution (NPWS 2003). It occurs in a diversity of habitats and in northeastern NSW prefers either mixed sclerophyll forests of the coastal plains, sub-coastal mid- to high-elevation forests and moist and dry escarpment forests or dry sclerophyll forests with a grassy or xeric understorey. The Yellow-bellied Glider requires a variety of food types given its diet varies with location and season. It is typically associated with food that provides plant and insect exudates and characteristically leaves an incision on trees. Identified tree species utilised as sap trees in northeast NSW include: New England Blackbutt, Mountain Gum, Mountain Blue Gum and Grey Box (NPWS 2003). It also uses large trees with hollows (> 10 cm) to breed.

The Yellow-bellied Glider was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains suitable habitat.

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

Threats to Yellow-bellied Glider include Loss and fragmentation of habitat, loss of hollow-bearing trees and loss of feed trees. The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) and eight hollow-bearing trees. This represents potential breeding and foraging habitat with four sap trees occurring on the Project Site. This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the availability of breeding and foraging habitat throughout the Project Site and no sign of activity (v-shaped incisions) on trees, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Yellow-bellied Glider is not an endangered population.

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

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

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

The Yellow-bellied Glider is not an endangered ecological community.

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

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

The proposed disturbance of potential foraging habitat is minimal when considering that large areas of potential foraging habitat are present on surrounding protected areas and accessible to this species.

Therefore, the amount of potential habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The proposed action will result in permanent removal of 2.1 ha of native vegetation. Given the amount of potential habitat surrounding the Project Site, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The Proposal will result in disturbance to native vegetation which is potential foraging habitat. However, the habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

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

No critical habitat has been declared for the Yellow-bellied Glider.

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

This Proposal is consistent with the five objectives stated in the recovery plan for the Yellow-bellied Glider (NPWS 2003).

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

Three key threatening processes are relevant to this Proposal with respect to the Yellow-bellied Glider:

- Loss and fragmentation of habitat.
- Loss of hollow-bearing trees.
- Loss of feed trees.

The Proposal involves the removal of 2.1 ha of native vegetation with 6.5 ha remaining on site. This 6.5 ha of known habitat in the Project Site includes five large hollow-bearing trees and a large number of feed trees. In summary, the Proposal is unlikely to exacerbate these key threatening processes.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Yellow-bellied Glider given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha in the entire surrounding patch.
- The proposed activity will remove eight hollow-bearing trees but it is suggested to retain two habitat trees with small hollows in the proposed clay fines and foraging habitat is still available within the Project Site.
- The species is wide ranging and unlikely to have a high dependence on the resources on site.

- The Proposal would not isolate or fragment any currently connecting areas of habitat as vegetation removal will occur sequentially and also in the middle of the Project Site. Also, there is no evidence of the species currently utilising the habitat.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Yellow-bellied Glider.

Petaurus norfolcensis (Squirrel Glider)

Petaurus norfolcensis (Squirrel Glider) is a vulnerable species listed under the TSC Act.

It is sparsely distributed along the east coast and immediate inland districts from western Victoria to north Queensland, where it occurs in dry sclerophyll forest and woodland (DECC 2005). Suitable habitat for this species requires abundant hollow-bearing trees and a mix of eucalypts including some smooth barked and winter flowering species and flowering shrubs (NPWS 1999, OEH 2014b).

Squirrel Gliders are nocturnal and dependent upon hollows for shelter (>5 cm diameter). They feed on nectar, pollen, flowers, acacia gum and insects, but may also eat sap from feeding scars from other species of Glider (NPWS 1999).

The Squirrel Glider was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains suitable habitat.

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

Factors likely to have an adverse effect on the life cycle of the Squirrel Glider would include a substantial loss and/or fragmentation of foraging habitat, loss of hollows and increased presence of foxes and cats.

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) and eight hollow-bearing trees and one mature habitat tree. This represents potential breeding and foraging habitat with a mixture of mature eucalypts with hollows occurring on the Project Site. This clearing represents 24% of the native vegetation on the Project Site (8.6ha).

Given the availability of breeding and foraging habitat throughout the Project Site, the Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

Squirrel Gliders are not an endangered population.

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

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

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

The Squirrel Glider is not an endangered ecological community.

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

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

The proposed disturbance of potential foraging habitat is minimal when considering that large areas of more favourable habitat are present on surrounding protected areas as this species requires an

abundance of tree hollows and prefers a flowering mid-storey layer. Therefore, the amount of potential habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The proposed action will result in permanent removal of 2.1 ha of native vegetation. Given the amount more favourable habitat surrounding the Project Site, it is considered unlikely that the Proposal would result in fragmentation of habitat for this species.

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

The Proposal will result in disturbance to native vegetation which is potential foraging habitat. However, the habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

e) Whether the action proposed is likely to have an adverse effect on critical habitat.

No critical habitat has been declared for the Squirrel Glider.

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

No recovery plan or threat abatement plan has been prepared for the Squirrel Glider.

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

Two key threatening processes are relevant to this Proposal with respect to the Squirrel Glider:

- Loss, fragmentation and degradation of habitat.
- Loss of hollow-bearing trees.

The Proposal involves the removal of 2.1 ha of native vegetation with 6.5 ha remaining on site. This 6.5 ha of known habitat in the Project Site includes five large hollow-bearing trees and a large number of feed trees.. In summary, the Proposal is unlikely to exacerbate these key threatening processes.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Squirrel Glider given that:

- 6.5 ha of habitat will remain on the Project Site and approximately 50 ha in the entire surrounding patch.
- The proposed activity will remove eight hollow-bearing trees but it is suggested to retain two habitat trees with small hollows in the proposed clay fines and foraging habitat is still available within the Project Site.
- The species is wide range and unlikely to have a high dependence on the vegetation on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat as vegetation removal will occur sequentially and also in the middle of the Project Site.

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Squirrel Glider.

Phascolarctos cinereus (Koala)

Phascolarctos cinereus (Koala) is listed Vulnerable under both the TSC and EPBC Acts.

Koalas are solitary and territorial (particularly males), yet live in established sedentary polygynous breeding aggregates arranged in a matrix of overlapping home ranges whose size varies according to sex (males tend to be larger so that they overlap the ranges of several females) and carrying capacity of the habitat (usually measured in terms of density of primary browse species) (Phillips and Callaghan 1995).

Nationally, Koalas have been observed feeding or resting in about 120 eucalypt species (66 in NSW) and 30 non-eucalypt (seven in NSW) species. Usage may also be determined by site-dependent edaphic factors e.g. soil type (Sharp and Phillips 1999), which affects the nutrient quality of forage. Forest consisting of primary browse species associations located on deep, fertile soils on floodplains, in gullies and along watercourses are generally considered preferred Koala habitat. This may possibly be a reflection of the nutritional value of the foliage.

Adult Koalas appear to generally avoid each other except during mating season (generally warmer months from spring but as early as July-August) when the males actively seek females with most births occurring late November-March (Martin and Lee 1984). Social cohesion is maintained in a Koala population by interactions through scent marking, vocalisations and antagonistic behaviour patterns (Phillips 1997).

An established Koala home range is usually occupied for several years or throughout its life (Phillips 1997, Sharp and Phillip 1999). Size of a Koala home range may vary from a hectare to hundreds of hectares (e.g. Jurskis and Potter 1997 report home ranges of 38 ha to 520 ha with an average size of 169 ha, near Eden); varying with habitat quality (e.g. if primary browse species dominate the tree component, home range size is expected to be small and carrying capacity high), sex (males have larger territories and may make forays into other areas), age of the animals (e.g. sub-adults versus adults), and location (Jurskis and Potter 1997, Phillips 1997, Sharp and Phillip 1999).

Research on Koala home ranges in similar habitats in the region has found that breeding female Koalas had home ranges in the order of 10 – 60 ha, and male Koalas in the order of 50 – 150 ha.

Koala activity was observed on Mountain Blue Gum and Grey Box.

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

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which has been determined to be known Koala habitat. Clearing will include the loss of two secondary food trees and one supplementary species. This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

The proposed works are unlikely to have an adverse effect on the life cycle of the Koala such that a viable local population is likely to be placed at the risk of extinction.

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

The Koala is not an endangered population.

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

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

The Koala is not an endangered ecological community.

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

This is not an endangered ecological community.

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

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

The Proposal will result in the removal of 2.1 ha of known Koala habitat.

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

The proposed activity is unlikely to fragment or isolate known Koala habitat from other habitat on the Project Site and surrounding area as the proposed works will result in the removal of vegetation adjacent to the current quarry and will allow for Koalas to move freely. Although Koalas have been recorded within the Project Site, activity appeared to be infrequent and restricted to the western section of the proposed extended extraction area. Therefore, the Proposal is unlikely to result in the fragmentation or isolation of areas of potential Koala habitat.

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

The Proposal will result in the removal of 2.1 ha of known Koala habitat. However, the proposed activity is unlikely to impact on habitat for the Koala required for the long term survival of the species or local population given the nature of their activity on the Project Site, the lack of primary food species and the relatively small area of clearing.

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

There are currently no areas of 'critical habitat' for Koala identified under the TSC Act. However, this habitat was identified as 'critical habitat' under the EPBC Act.

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

The Approved Recovery plan for the Koala (DECC 2008) provides a framework for localised recovery efforts throughout NSW through a number of recovery actions. The actions include:

- Conserving Koalas in their existing habitat, rehabilitate and restore Koala habitat and populations.
- Develop a better understanding of the conservation biology of Koalas.

- Ensure that the community has access to factual information about the distribution, conservation and management of Koalas at a national, state and local level.
- Manage captive, sick or injured Koalas and orphaned wild Koalas to ensure consistent and high standards of care.
- Manage overbrowsing to prevent both Koala starvation and ecosystem damage in discrete patches of habitat.
- Coordinate, promote the implementation, and monitor the effectiveness of the NSW Koala Recovery Plan across New South Wales.

The majority of these actions are not relevant to the Proposal and their implementation is the responsibility of OEH.

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

Three key threatening processes are relevant to the Proposal:

- Key threatening process: 'clearing of native vegetation': The proposed quarry extension will result in the removal of 2.1 ha of habitat. 6.5 ha of known Koala habitat will remain within the Project area. The loss of vegetation from the proposed activity is unlikely to significantly impact on the local population given the nature of their activity on the Project Site, the relatively small area of clearing and the proximity to large areas of habitat that are protected.
- Key threatening process: 'Predation by the *Vulpes vulpe*s (European red fox) and the 'Predation by the *Felis catus* (Feral cat). Foxes are known to inhabit the Project Site and it is likely that feral cats occur in the area. Introduced predators (i.e. foxes and cats) have exhibited learned behaviour by using trails for hunting and movement and vegetation removal could advantage these predators (Finegan 1997); however, the Proposal is not considered to contribute to this effect.

Conclusion

The Proposal will result in the removal of 2.1 ha of known Koala habitat, however, 6.5 ha of known Koala habitat will remain within the Project area. Clearing will include the loss of two secondary food trees and one supplementary species, however no primary food trees occur on the Project Site.

On the basis of the above considerations, it is not likely that the Proposal would result in a significant impact on this species. Consequently, a Species Impact Statement is not required for the Proposal with respect to this species.

Dasyurus maculatus maculatus (Spotted-tailed Quoll)

Dasyurus maculatus maculatus (Spotted-tailed Quoll) is listed vulnerable under the TSC Act and endangered under the EPBC Act.

It is a medium-sized marsupial carnivore with dark brown fur and white spots which are present on the body and tail. It occupies a range of environments within a disjunct distribution along the east coast of Australia, extending from south-eastern Queensland through NSW and Victoria to Tasmania.

This species is found in a variety of habitats, including sclerophyll forest and woodlands, coastal heathlands and rainforests (Dickman & Read 1992; Edgar & Belcher 1995). Occasional sightings are made in open country, grazing lands, rocky outcrops and other treeless areas. This species feeds on a wide variety of birds, reptiles, mammals and invertebrates and uses several 'latrines' within its territory for defecation (NPWS 2002b). It is essentially terrestrial, but is also an agile climber (NPWS 2002b).

Nesting occurs in rock shelters, hollow logs, caves or tree hollows and they use numerous dens within the home range. Estimates of home ranges vary from 800 ha to 20 km^2 and individuals may move several kms in a night. It is a highly mobile species and there are numerous records of overnight movements of several kms (Edgar & Belcher 1995).

The Spotted-tailed Quoll is threatened by a number of processes including fragmentation and degradation of habitat through clearing of native vegetation, logging and frequent fire (Edgar & Belcher 1995; Dickman & Read 1992). The loss of large hollow logs and other potential den sites (Scotts 1992) is a major problem, as well as competition for food and predation by foxes and cats (Edgar & Belcher 1995; Dickman & Read 1992).

The Spotted-tailed Quoll was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains suitable habitat.

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

The proposed development would result in the removal of foraging habitat and eight hollow-bearing trees, which this species could potentially utilise for den sites.

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which is considered potential foraging habitat. This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the amount of foraging habitat that will remain on the Project Site, the lack of available breeding habitat and the species mobility, this Proposal is unlikely to place a viable local population of this species at risk of extinction.

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

The Spotted-tailed Quoll is not an endangered population.

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

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

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

The Spotted-tailed Quoll is not an endangered ecological community.

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

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

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

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

The Proposal would result in the removal of approximately 2.1 ha of potential foraging and breeding habitat. The potential habitat to be removed comes from areas close to the current quarry and would not isolate any currently interconnecting areas of habitat.

The loss of habitat associated with Proposal, approximately 2.1 ha, is only minimal when compared to the surrounding native vegetation which is widespread and adequately reserved within the Tenterfield LGA.

This species is not expected to be reliant upon habitat in the Project Site for its long-term survival.

e) Whether the action proposed is likely to have an adverse effect on critical habitat.

No critical habitat has been declared for the Spotted-tailed Quoll.

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

No recovery plan or threat abatement plan has been prepared for the Spotted-tailed Quoll.

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

Two key threatening processes are relevant to the Spotted-tailed Quoll:

- Clearing of native vegetation.
- Removal of dead wood which would result in a small loss of potential foraging and breeding habitat.

The Proposal involves the removal of 2.1 ha of native vegetation with 6.5 ha remaining on site. There is an ample amount of native vegetation in good condition in the local area. In summary, the Proposal is unlikely to exacerbate these key threatening processes.

The Proposal involves the removal of 2.1 ha of native vegetation represents 24% of the native vegetation on the Project Site (8.6 ha). However, 6.1 ha of foraging habitat will remain in the Project

Site. Therefore, the proposed activity is unlikely to be considered a significant impact as none of these key threatening processes will be exacerbated

Conclusions

The Proposal is unlikely to significantly impact upon the Spotted-tailed Quoll given that the proposed activity:

- 6.5 ha of habitat will remain on the Project Site.
- The species is wide ranging and unlikely to have a high dependence on the vegetation on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species and would not isolate an area of known habitat from currently interconnecting areas of potential habitat for this species.

On the basis of the above considerations, it is not likely that the proposed development would result in a significant effect on the survival of the Spotted-tailed Quoll.

Falsistrellus tasmaniensis (Eastern False Pipistrelle)

Falsistrellus tasmaniensis (Eastern False Pipistrelle) is listed as a Vulnerable species under Schedule 2 of the TSC Act.

The Eastern False Pipistrelle is found on the South-east coast and ranged of Australia, from Southern Queensland to Victoria and Tasmania. It generally roosts in Eucalypts hollows but has also been found under loose bark on trees or in buildings showing preference for moist habitats and trees taller than 20m. The Eastern False Pipistrelle forages above or just below the tree canopy for beetles, moths, weevils and other flying insects (DECCW 2010).

Eastern False Pipistrelle was not recorded during the field survey but has been recorded within 10 km of the Project Site, which contains suitable habitat.

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

Factors likely to have an adverse effect on the life cycle of a viable population of this species would include: disturbance to winter roosting and breeding sites; loss of trees for foraging and hollow-bearing trees for roosting; application of pesticides adjacent to foraging areas.

The proposed activity would involve the clearing of approximately 2.1 ha of native vegetation (Dry Open New England Blackbutt) which is considered potential breeding and foraging habitat. This clearing represents 24% of the native vegetation on the Project Site (8.6 ha).

Given the amount of suitable breeding and foraging habitat that will remain on the Project Site, as well as the high mobility of the Eastern False Pipistrelle, this Proposal is unlikely to place a viable local population of this species at risk of extinction

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

This is not an endangered population.

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

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

This is not an endangered ecological community.

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

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

The proposed disturbance of known foraging habitat is minimal when considering that large areas of potential foraging habitat are present on surrounding protected areas and accessible to this species. Therefore, the amount of known foraging habitat disturbed due to the Proposal is not likely to represent a significant loss to the species.

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

The proposed action will result in permanent removal of 2.1 ha of native vegetation. The proposed disturbance of potential habitat is minimal when large areas of potential foraging habitat are present on surrounding lands which are protected and accessible to this highly mobile species.

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

The Proposal will result in disturbance to native vegetation which is potential foraging and breeding habitat. However, the habitat to be removed cannot be considered important to the long-term survival of this species as native vegetation is widespread and adequately reserved within the Tenterfield LGA.

e) Whether the action proposed is likely to have an adverse effect on critical habitat.

No critical habitat has been declared for the Eastern False Pipistrelle.

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

No recovery plan or threat abatement plan has been prepared for the Eastern False Pipistrelle, although 16 Priority Actions have been identified to help recover this species. The current Proposal is not in conflict with any of the priority actions.

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

Two key Threatening Processes are relevant to this Proposal with respect to the Eastern False Pipistrelle:

- Clearing of native vegetation.
- Loss of hollow-bearing trees.

The Proposal involves the clearing of a small area of native vegetation (2.1 ha) from the Project Site. However, 6.5 ha of known habitat will remain in the Project Site including five hollow-bearing trees. The Proposal is therefore unlikely to exacerbate these key threatening processes.

Conclusions

The Proposal is unlikely to constitute a significant impact on the Eastern False Pipistrelle given that:

- 6.5 ha of habitat will remain on the Project Site.
- Five hollow-bearing trees will be retained within the Project Site.
- The species is wide ranging and unlikely to have a high dependence on the resources on site.
- The Proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by this highly mobile species

On the basis of the above considerations, it is unlikely that the Proposal will constitute a significant impact on the Eastern False Pipistrelle.