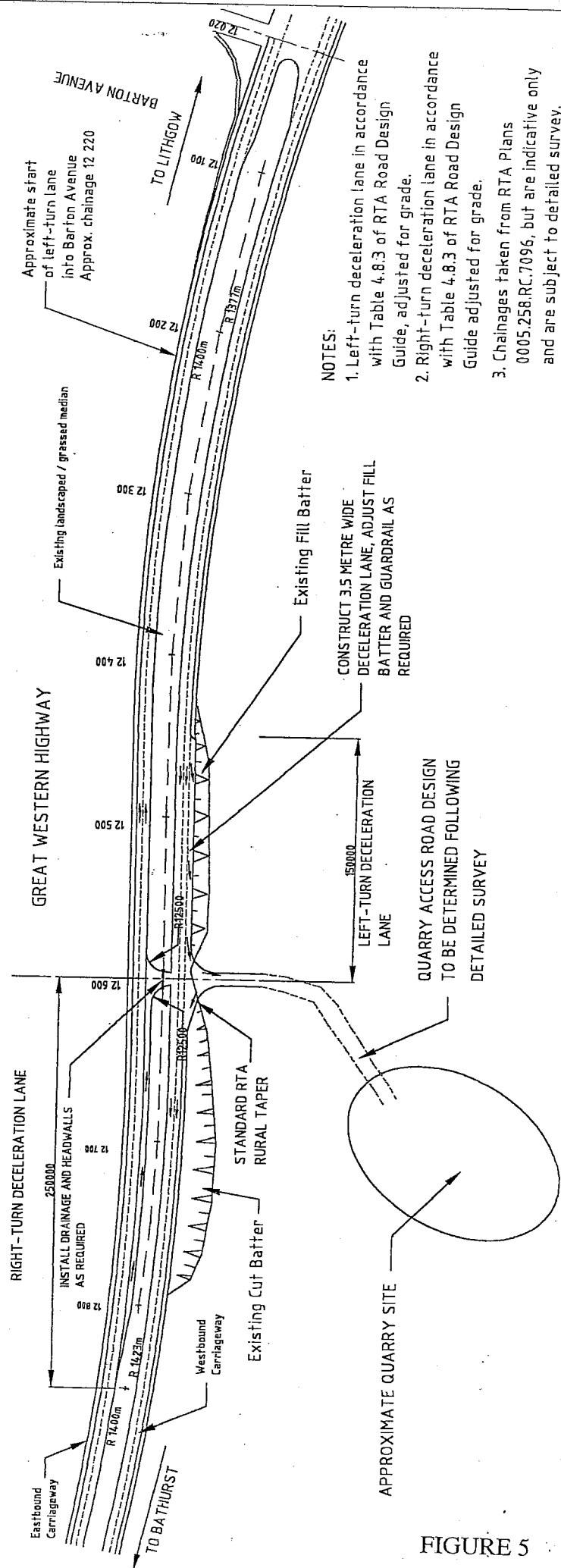




APPROXIMATE CENTRELINE
OF QUARRY ACCESS ROAD

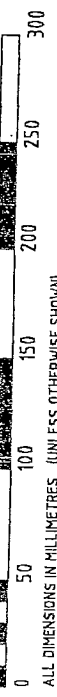


NOTES:

1. Left-turn deceleration lane in accordance with Table 4.8.3 of RTA Road Design Guide, adjusted for grade.
2. Right-turn deceleration lane in accordance with Table 4.8.3 of RTA Road Design Guide adjusted for grade.
3. Chainages taken from RTA Plans 0005.258RC.7096, but are indicative only and are subject to detailed survey.
4. Design subject to detailed survey.
5. Truck warning signs and appropriate fog warning devices to be installed in accordance with RTA requirements.

FIGURE 5

SCALE 1:2500 (A3 SIZE)



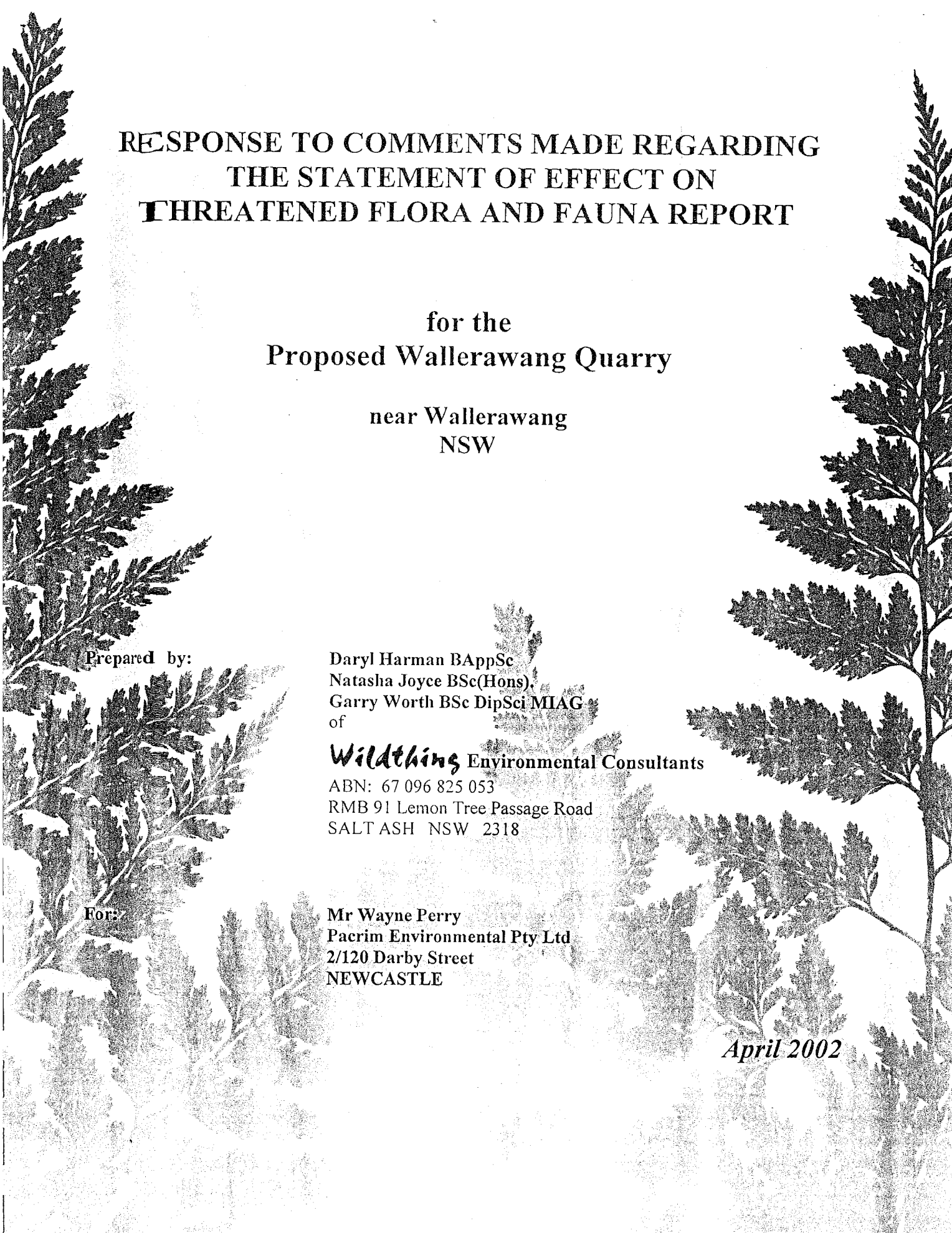
ALL DIMENSIONS IN MILLIMETRES (UNLESS OTHERWISE SHOWN)
CHAINAGES SHOWN IN METRES

Drawn By:
B.J. Bradley

B J BRADLEY & ASSOCIATES
P O Box 2030 Gateshead Business Centre, GATESHEAD, NSW 2290 PHONE / FAX 02 49485312
PROPOSED ACCESS TO PROPOSED WALLERAWANG
QUARRY ONTO GREAT WESTERN HIGHWAY
CONCEPTUAL LAYOUT OF NEW T-JUNCTION

Drawing No. 020601A

Date: 28 June 2002
Sheet No. 1 of 1



RESPONSE TO COMMENTS MADE REGARDING THE STATEMENT OF EFFECT ON THREATENED FLORA AND FAUNA REPORT

for the
Proposed Wallerawang Quarry
near Wallerawang
NSW

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NEWCASTLE

April 2002

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- 6.7 RUFOUS BETTONG
- 6.8 GREY-HEADED FLYING-FOX

7.0 CONCLUSION

8.0 BIBLIOGRAPHY

1.0 INTRODUCTION

This report has been written in response to comments made by representatives of Planning New South Wales, State Forests and National Parks and Wildlife Service on the Statement of Effect of Threatened Flora and Fauna for the proposed Wallerawang Quarry carried out by Wildthing Environmental Consultants in December 1999. The proposed site is within EL 4473 and is located south-east of Wallerawang NSW as shown in Figure 1. A field visit for the response to the comments took place on the 27th and 28th of March 2002.

2.0 COMMENTS RECEIVED

The comments pertaining to ecological matters received from Planning NSW, State Forests and the NSW National Parks and Wildlife Service are displayed below.

2.1 PLANNING NSW.

Flora and Fauna Issues and Requisite Actions

Methods

1. It is noted that weather conditions experienced during the fauna surveys were not provided. This information is necessary to determine the likelihood of many threatened species being detected.

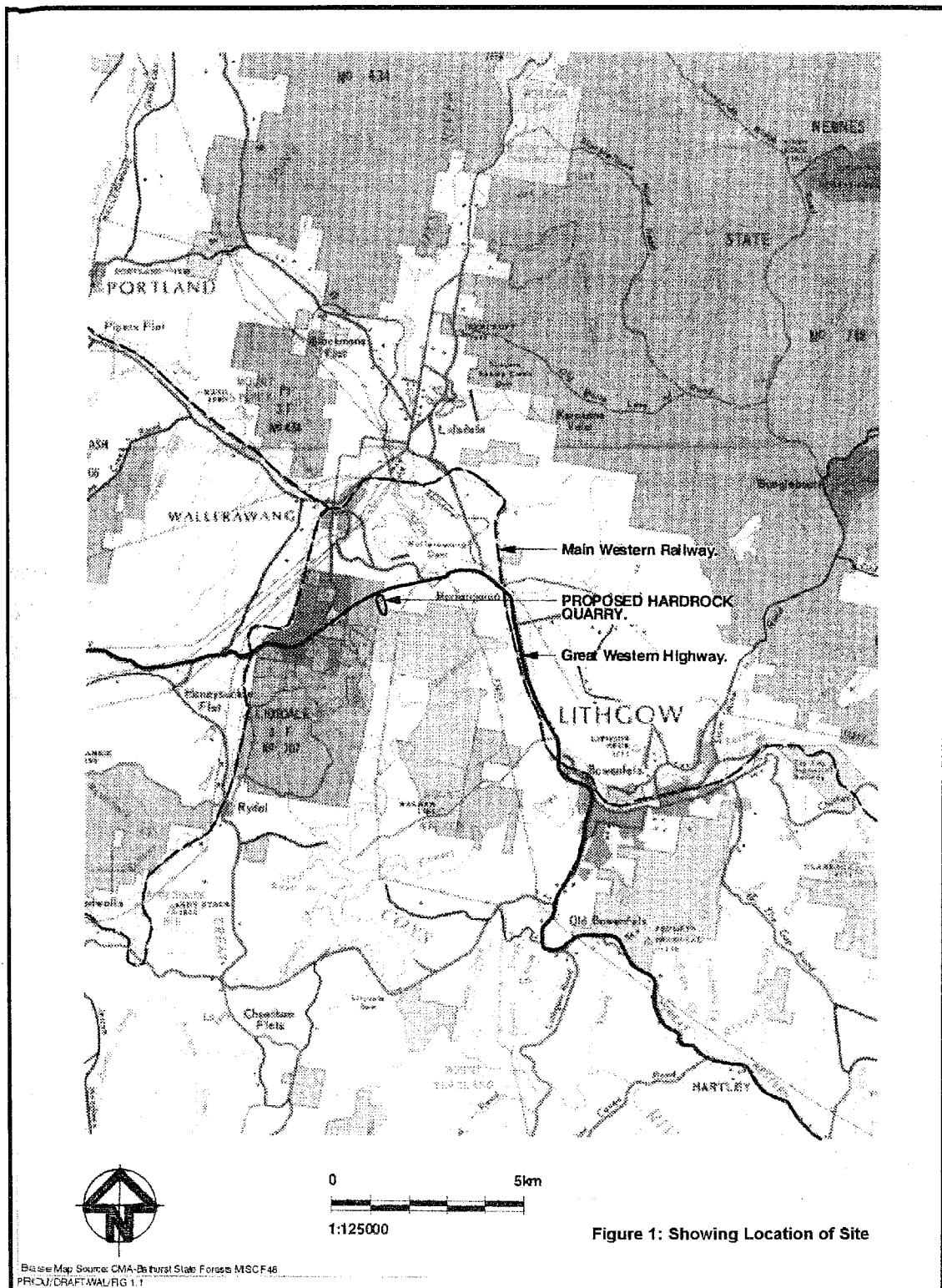
Action: It is necessary to provide the general weather conditions experienced during the fauna surveys, including approximate temperatures wind speed and rainfall.

2. The timing of the fauna surveys are not considered appropriate for detecting the threatened Bathurst Copper Butterfly which is a potential inhabitant of the site given the presence of suitable habitat and records of this species on adjacent land (1500metres away from the site – see State Forest submission). Initially, the Department seeks further information regarding the potential habitat for the Bathurst Copper Butterfly and the manoeuvrability of the operational areas and the key environmental constraints that may arise as a result avoiding habitat for this threatened species.

Action: Map potential habitat for the Bathurst Copper Butterfly and provide information on the manoeuvrability of the operational areas, and key environmental constraints that may arise as a result avoiding habitat for this threatened species.

Species Considered

3. Clarification is required of information about the amount of habitat to be removed for each threatened species that is known or considered likely to occur in the study area.



These details are particularly required to support the conclusions reached in questions a) and c) of the 5A Assessment for each species.

Action: Quantify the amount of habitat proposed to be removed for each threatened species known or considered likely to occur. This includes the approximate number of hollow bearing trees and the amount of vegetation (in hectares) to be removed.

4. Appendix D (Expected Fauna Species List) includes the threatened Grey-headed Flying-fox although this species was not recorded during the current surveys. On the basis of the title of Appendix D it is assumed that this species is a potential inhabitant of the site and therefore the impacts of the proposal on this species and its habitat needs to be assessed.

Action: Provide a 5A Assessment of significance for the Grey-headed Flying-fox. This assessment needs to include whether roost sites are present in the study area. If this information was not obtained during the survey for the EIS, further surveys will be required to justify the conclusions in the s.5A and these surveys will need to be done prior to determination of this proposal.

5. The Department requires further information for your response to question d) of the s.5A Assessment for each threatened species. As little information is given on the presence of Wildlife Corridors, it is difficult to determine the impacts of the proposal on these interconnecting areas of habitat.

Action: Provide further information to address question d) of the s.5A Assessment for each threatened species.

2.2 STATE FORESTS OF NSW

State Forest of NSW considers the following points require further clarification in the EIS (Development Application 334-11-2001-1 – Proposed Wallerawang Quarry):

Flora and Fauna

With reference to the Species Impact Statement and the comments made about flora and fauna in the EIS please note the following:

- * Additional threatened species recorded within 10km that have not been considered in the EIS include:
  - Booroolong Frog
  - Rufous Bettong

- Masked Owl
- White-eared Monarch
- Bush Stone-Curlew
- Red Goshawk
- *Eucalyptus pulverulenta*

The EIS does not consider the conservation status of the woodland community towards achieving catchment management, native vegetation or other regional conservation goals.

2.3 NEW SOUTH WALES NATIONAL PARKS AND WILDLIFE SERVICE

We note that the *Statement of Effect on Threatened Flora and Fauna* finds that there will be no significant effect on flora and fauna.

Yellow-bellied Sheathtail Bat

The SEE states that one threatened species, the Yellowed-bellied Sheathtail Bat *Saccolaimus flaviventris*, was identified on the site. Habitat tree potential for this species on site was also identified. As a mitigation strategy the report recommends recovery of any individuals during clearing of trees containing hollows (p.28). The NPWS does not support this recommendation as relocation usually leads to the death of the individuals relocated, hence does not constitute an effective mitigation strategy. Where the recipient site is located external to the subject land, the proponent would need to apply for a license to carry out such an activity under the National Parks and Wildlife Act.

Purple Copper Butterfly (Bathurst Copper Butterfly)

The NPWS would like to point out that the survey carried out for the Statement of Effect on Threatened Flora and Fauna would not have detected this species as the survey was conducted in December when the species was not flying.

A site visit by the NPWS on 31 January 2002 identified several patches of potential Butterfly habitat on the margins of the development site (at the entrance to the processing site and along the haul road between the quarry and the processing site). An intensive survey during appropriate conditions during the flying season may detect the species.

The NPWS recommends that :

- * A survey for the species is carried out post-determination by a person experienced in the identification of this species and at the appropriate time of the year (mid to late September) to determine if this species is present within the development site.

- * If the species is present, management recommendations are provided by a suitably qualified expert and incorporated into both construction and operational EMP's.
- * Any confirmed Butterfly habitat is avoided on the margins of the subject site through redesign of operational areas.

Proposed Mt Walker Nature Reserve

The NPWS would like to advise that the proposed Mt Walker Nature Reserve is located to the east of the proposed development. The final boundaries of the Nature Reserve have yet to be determined and are subject to consultation between the NPWS, affected landholders and the NSW Department of Mineral Resources.

The NPWS would like to raise the following issues in relation to potential impacts on the adjoining proposed Mt Walker Nature Reserve.

Hydrology and Water Quality

The NPWS understands that the proposed development will modify the natural catchment of the proposed quarry and that water runoff will be diverted via diversion channels directly into the Cox's River (EIS p.35).

Changes to the hydrological behaviour and water quality of the Cox's River have the potential to impact on the proposed Mt Walker Nature Reserve and threatened species such as the endangered Booroolong Frog *Litoria booroolongensis* and the vulnerable *Eucalyptus pulverulenta*, which may occur within the vicinity of the proposed development.

The NPWS seeks to ensure that potential impacts on hydrology and water quality in the Cox's River have been adequately assessed and that best practice measures are adopted to minimise potential impacts over the life of the mining activity

3.0 SITE DESCRIPTION

3.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The proponent intends to develop a hardrock quarry with a life expectancy of 20 years. The quarry would be developed over three stages, resulting in a total disturbed area of approximately 11 ha. The proposal will necessitate the removal of native vegetation across the ridgetop, and within a smaller area to the west where crushing and stockpiling will occur. Extraction will involve drilling and blasting and a crusher will be located either in-pit or at the surface facilities site. Quartzite material and rock aggregate will both be quarried. A sealed access road and a new intersection with the Great Western Highway will also be constructed.

4.0 HABITAT ASSESSMENT

4.1 HABITAT DESCRIPTION AND DISTRIBUTION

In the 1999 Statement of Effect on Threatened Flora and Fauna Report (Wildthing Environmental Consultants 1999) one habitat type was identified on the site being, Sub-Alpine Woodland habitat which was dominated by Eucalypt tree species that included *Eucalyptus viminalis* (Ribbon Gum), *E. pauciflora* (Snow Gum), *E. stellulata* (Black Sally) and *E. dalrympleana* (Mountain Gum) with scattered *Pinus radiata* (Radiata Pine).

The understorey was quite open throughout the site and was composed of intermediate aged Eucalypt trees. The shrub layer was also generally sparse but concentrated in a few areas. Shrub species included *Persoonia linearis* (Narrow-leaved Geebung) and *Exocarpus cupressiformis* (Cherry Ballart).

The herb layer of the site was well developed and was composed of a mixture of grasses and small herbs. Species noted included *Poa sieberiana* (Snow Grass), *Aristida vagrans* (Three awned Grass), *Themeda triandra* (Kangaroo Grass) and *Brachyloma daphnoides* (Daphnae Heath).

Areas of similar habitat are contiguous with the site to the west and east with a large area to the south-east which includes the proposed Mt Walker Nature Reserve. Similar habitat also occurs to the north-west however, this area is separated by the Great Western Highway.

4.2 THE AMOUNT OF HABITAT THAT IS PROPOSED TO BE REMOVED

This was calculated by dividing the proposed development areas into separate parts such as the quarry itself, the surface facilities and the access road. Areas were then calculated for each portion then added together to give the overall area of habitat to be removed, as displayed below

Area of Quarry = 7.9ha

Area of Plant and Storage = 1.58ha

Area of haul road and the gap between it and the facilities = 0.6ha

Area of access road = 0.42ha

Overall area of habitat to be removed = 10.5ha

The threatened species identified in our original report (Wildthing Environmental Consultants, 1999) and in this response document with potential habitat occurring on the site are listed below:

<i>Eucalyptus pulverulenta</i>	Silver-leaved Mountain Gum
<i>Lophoictinia isura</i>	Squared-tailed Kite
<i>Lathamus discolor</i>	Swift Parrot
<i>Neophema pulchella</i>	Turquoise Parrot
<i>Xanthomyza phrygia</i>	Regent Honeyeater.
<i>Dasyurus maculatus</i>	Tiger Quoll
<i>Petrogale penicillata</i>	Brush-tailed Rock-Wallaby
<i>Aepyprymnus rufescens</i>	Rufous Bettong
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox
<i>Tyto novaehollandiae</i>	Mask Owl
<i>Erythrorhynchus radiatus</i>	Red Goshawk
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo

As mentioned above in Section 4.1, one habitat type has been identified on the site being sub-Alpine Woodland. It is therefore considered that the development of the proposed quarry will result in the removal of 10.5ha of potential habitat for the above listed species. However, the proposed development will not result in the removal of the only area of this available habitat in the locality, as there are areas of similar habitat contiguous with the site to the east, south and west.

One other threatened species has potential habitat scattered around the margins of the proposed development area, being *Paralucia spinifera* (Bathurst Copper Butterfly). However, as the habitat is on the margins of the development area there is a potential for the retention and maintenance of this habitat. The habitat for this species is discussed in detail in Section 4.4.1.

4.3 THE NUMBER OF TREE HOLLOWES TO BE REMOVED FROM THE SITE

The determination of the number of tree hollows to be removed from the site involved dividing the proposed development area as shown in Figure 2 i.e. Quarry Area A, access road etc. These areas were then carefully traversed and the tree hollows present were counted and caetgorised based on the size of the hollow opening. The results of this survey are displayed in Table 1.

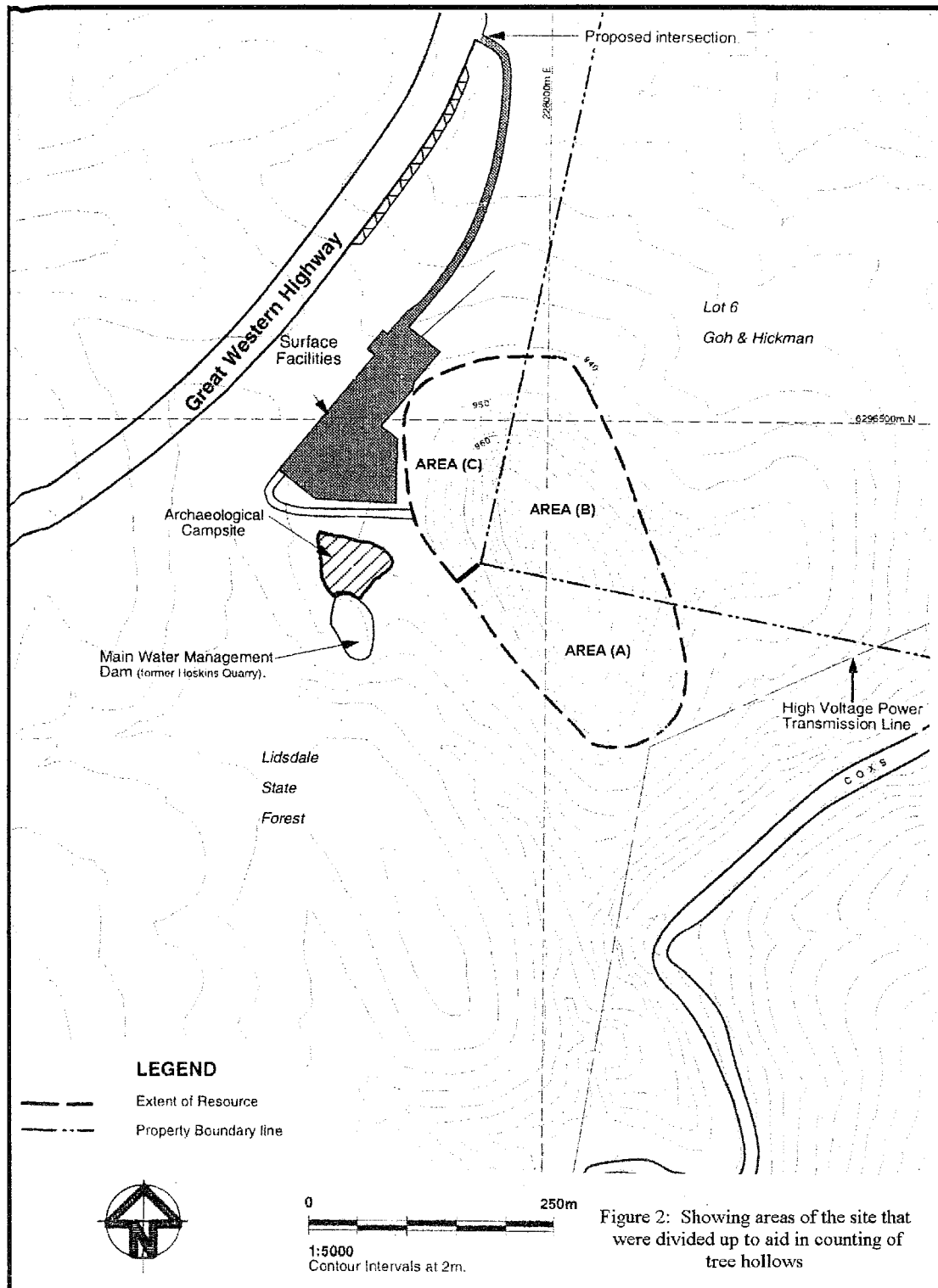


Table 1: The number and size of hollows to be removed to accommodate the proposed quarry.

AREA OF THE SITE	LARGE HOLLOWES (>30cm)	MEDIUM HOLLOWES (10-30cm)	SMALL HOLLOWES (<10cm)
Quarry Area A	1	5	16
Quarry Area B	1	5	23
Quarry Area C	0	4	15
Plant, Storage and Haul Road	0	1	6
Access Road	0	0	5
TOTAL	2	15	65

Hollow dependent threatened fauna will lose a number of hollows in the removal of 10.5ha as can be seen by Table 1. Two large hollows were found on site and would offer limited potential roosting and nesting habitat due to their low height and poor condition. Threatened species that utilise large hollows that were addressed in this report and in the original Statement of Effect include *Tyto novaehollandiae* (Masked Owl), *Ninox strenua* (Powerful Owl), *Calyptrorhynchus lathami* (Glossy Black Cockatoo) and *Petaurus australis* (Yellow-bellied Glider).

Saccolaimus flaviventris (Yellow-bellied Sheath-tail Bat) and *Falsistrellus tasmaniensis* (Eastern Falsistrelle) could potentially roost in any of the hollows on site so the proposal has the potential to remove approximately 82 potential roosting hollows for these two species.

4.4 HABITAT FOR SIGNIFICANT SPECIES

4.4.1 PARALUCIA SPINIFERA

Paralucia spinifera (Bathurst Copper Butterfly) is known to be distributed from the village of Yetholme, on the Great Dividing Range, to the area of the Central Tablelands of NSW between Oberon, Hartly and Bathurst (NSW NPWS, 2001). The distribution of *P. spinifera* is specifically limited by elevation. All the sites where it has been found occur above 900 metres elevation. The host plant for this Butterfly, *Bursaria spinosa* subsp. *lasiophylla* (Blackthorn) is a variant of the common species and also only occurs at a high altitude. *Paralucia spinifera* also has a mutualistic relationship with a species of small black ant, *Anonychomyrma itinerans*, which protects the caterpillar from predation and host the pupae within their nests.

The site has potential Butterfly habitat because of the presence of *B. spinosa* subsp. *lasiophylla* and the site is over 900metres altitude. The nearest record of *Paralucia spinifera*

(Bathurst Copper Butterfly) has been recorded 1500 metres from the site on adjacent land as NSW State Forests mentioned in their comments.

The Butterfly flying season is early August until early November with the peak happening in September. At the time of this site survey March 2002 as with the last survey in December 1999 the Butterfly flying season was over. Habitat for *P. spinifera* being the host plant was mapped in and around the site and can be seen in Figure 3. No habitat was found inside the quarry site but potential habitat was found around the margins of the site especially the western side as was also found by a visit by National Parks and Wildlife Service on the 31st of January 2002.

Invasion by weeds such as *Rubus fruticosus* (Blackberry) is a threat to Butterfly habitat. *Pinus radiata* (Radiata Pine) trees also have the potential to shade out habitat. Dust films on *B. spinosa* subsp. *lasiophylla* are believed to effect the edibility or at least palatability of the Blackthorn to the Bathurst Copper Butterfly (NSW NPWS, 2001).

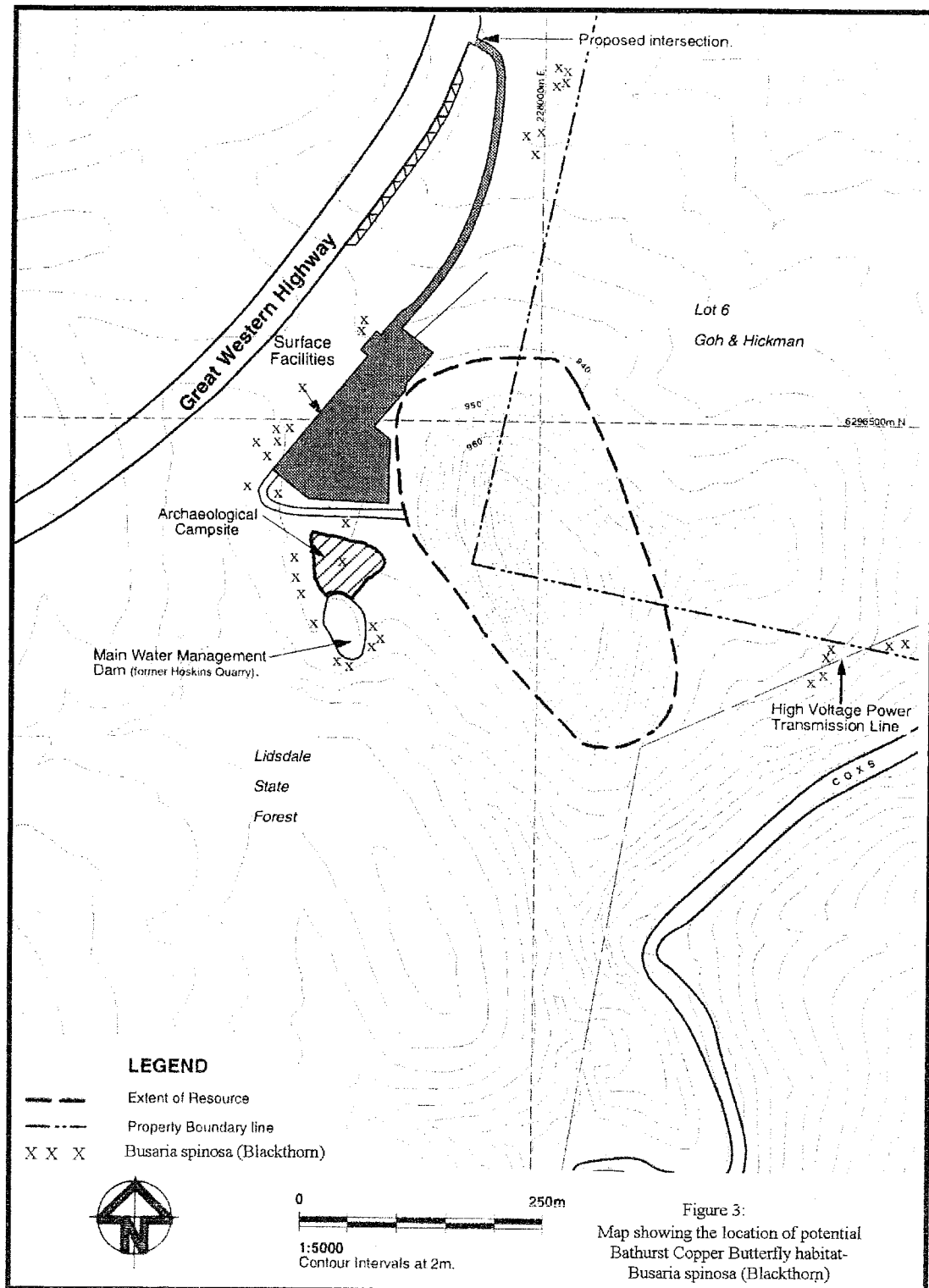
Accordingly it is recommended that measures be implemented at the proposed quarry to prevent degradation of the potential habitat available for the Bathurst Copper Butterfly on the periphery of the site including the implementation of a weed control program and dust control measures.

4.4.2 EUCALYPTUS PULVERULENTA SILVER-LEAVED MOUNTAIN GUM

Eucalyptus pulverulenta (Silver-leaved Mountain Gum) is endemic in south-eastern NSW but its occurrence is very restricted in disjunct localities, namely the upper Cox River area southwest of the Blue Mountains, east to Bredbo in the southern highlands, and south to Gurubang and Merriangah. It is found scattered in small stands mostly in the understorey of grassy woodland on relatively poor soil. Potential habitat occurs across all of the site for this species.

4.4.3 LITORIA BOOROOLONGENSIS BOOROOLONG FROG

Litoria booroolongensis is a highland species ranging from the Queensland Border down the Great Dividing nearly to the Victorian Border. It is almost always associated with western flowing rocky streams of the slopes and tablelands of the Great Dividing Range. Historical records indicate that they were once widespread along western flowing streams of the Northern Tablelands, but surveys conducted over the past 15 years have failed to locate these frogs in all but one locality (Barker et al., 1995). Previously known populations within the Blue Mountains are no longer able to be located. In the south of its range, it is suspected that tadpoles of the



Booroolong Frog are vulnerable to the predation by both the Brown Trout and Rainbow Trout. No potential habitat for this species occurs on the quarry site itself but the nearby Cox's River contains potential habitat.

4.4.4 MONARCHA LEUCOSTIS WHITE-EARED MONARCH

The White-eared Monarch is a very distinctive bird which has been likened to a miniature Magpie-lark. It is found along the east coast of Australia south to Crowdy Bay National Park and extends inland to the mountains of the Great Divide. It is thought that this species may undertake an autumn-winter migration from the highlands to the coastal inlands. The preferred habitat of the White-eared Monarch is the upper canopy of rainforest margins/regrowth areas and dense shrubs on streams and mangroves. Potential habitat for this species does not occur on site due to the openness of the vegetation assemblage present.

4.4.5 ERYTHROTRIORCHIS RADIATUS RED GOSHAWK

The Red Goshawk is thought to occupy Open Forest and Woodland, especially those located near wetlands, rivers and rainforest fringes. Its habits are not well known but it is considered to be a solitary, sedentary bird. It tends to be limited to coastal and sub-coastal north and north-east Australia, ranging from the Kimberleys in W.A. to the NSW/QLD border in the south. Potential foraging and nesting habitat occurs on site.

4.4.6 BURHINUS GRALLARIUS BUSH STONE-CURLEW

The Bush Stone-curlew is widespread in north and north-east Australia. Within N.S.W. this species has been recorded mainly in pastoral areas of the western slopes and plains. It is rare east of the Great Divide. However, isolated populations have been recorded from Western Sydney, Gosford, Port Macquarie and Northern Rivers (around Grafton and Brunswick Heads). The Bush Stone-curlew inhabits dry open forest and woodland with an open grassy understorey that has not been overgrazed. It prefers woodland with many fallen branches near which it roosts during the day. Potential foraging and nesting habitat occurs throughout the site.

4.4.7 TYTO NOVAEHOLLANDIAE MASKED OWL

Masked Owls in NSW are distributed throughout the length of the Great Dividing Range and extend from the coast to the western slopes. Within this range they inhabit a range of wooded habitats that contain both mature trees for roosting and nesting and more open areas for hunting. They are most commonly encountered within Open Forest with a sparse understorey as well as along the ecotones of these areas to more or less densely vegetated habitats. There is much evidence to suggest, however, that the species is not entirely restricted to forested habitats and will readily hunt along the ecotone between wooded habitats and a range of open habitats such

as pastoral land (Marchant, 1999). Masked Owls usually roost in large hollows inside large, old living trees, most often Eucalypts. Potential hunting habitat occur on site although suitable nesting habitat appears to be absent.

4.4.8 AEPYPRYMNUS RUFESCENS RUFIOUS BETTONG

The Rufous Bettong occupies a variety of habitats ranging from coastal Eucalypt forests to tall wet sclerophyll forests along the east coast of Australia. West of the Great Dividing Range it occupies low, dry, open woodland. It tends to favour those areas where there is a sparse or grassy understorey. Potential habitat for this species occurs throughout the site.

4.4.9 PTEROPUS POLIOCEPHALUS GREY-HEADED FLYING-FOX

The Grey-headed Flying-fox is distributed predominantly along the sub-tropical east coast, from Rockhampton (Qld) through NSW to SE Victoria. Grey-headed Flying-foxes are known to occupy a variety of habitats, including wet and dry sclerophyll forests, rainforest, mangroves and paperbark swamps and *Banksia* woodlands, where they forage on a range of fruits and blossoms. The predominant food source is Eucalypt blossom and fruits from trees such as *Ficus* spp. (Figs). As with most species of Flying-fox, *P. poliocephalus* roost communally where they form large colonies called 'camps'. Camps are mostly in rainforest patches, mangroves, paperbark forests and modified vegetation in urban areas. Potential foraging habitat occurs on site in the form of seasonal flowering Eucalypts. Roosting habitat is absent due to the openness of the vegetation.

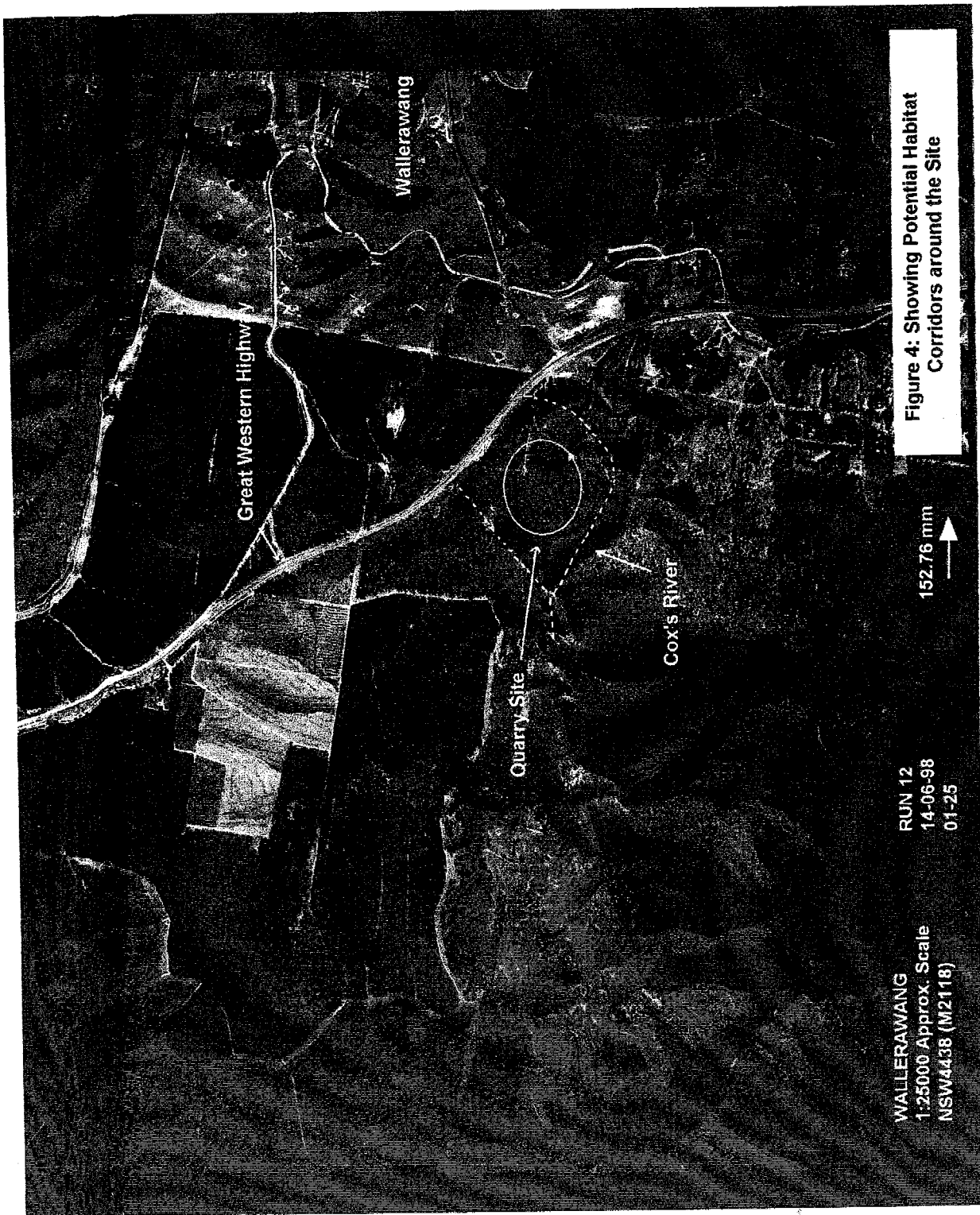
4.5 OTHER HABITAT CONSIDERATIONS

4.5.1 HABITAT CORRIDORS

While the proposed development will involve the removal of approximately 10.5ha of Sub-Alpine Woodland habitat, as noted in section 4.1 of this report this habitat type is contiguous off site to the east, south and west as shown in Figure 4. It is therefore believed that the removal of the habitat on site will not result in the severing of the current corridor available. However a small amount of "funneling" may occur to the north-west, through it is noted that the corridor to the north-west has already been divided by the Great Western Highway

4.5.2 THE PROPOSED MT WALKER NATURE RESERVE

The proposed Mt Walker Nature Reserve is to be located to the east of the proposed development. The final boundaries of the Nature Reserve are yet to be determined and are subject to consultation between the National Parks and Wildlife Service, effected landowners and the NSW Department of Mineral Resources.



The quarry site may act as a springboard for the introduction of weeds that may enter the site on machinery for example. It is therefore recommended that continued weed control measures be put in place around the quarry site in order to minimise weed introductions.

5.0 WEATHER RECORDS

Weather for the two days, during the last site visit, Wednesday 27th and 28th March are shown in Table 2 and weather details for the first visit in December 1999 are shown in Table 3.

Table 2: Showing weather conditions on the last site visit

Date	Temperature (°C)	Wind	Rainfall
27/03/02	25	Calm	dry
28/03/02	20	SE 9	Storm and heavy rain early in the morning, some drizzle throughout the day

Table 3: Showing the weather record for the Flora and Fauna Survey conducted by Wildthing Environmental Consultants during the period from 06/12/99 - 09/12/99, (Source - Climate and Consultancy Section in the NSW Office of the Bureau of Meteorology).

Date	Maximum Temperature (°C)	Minimum Temperature (°C)	Wind Speed (km/h) Direction at 3pm	Rainfall(mm) in.24hrs to 9am
06/12/99	26.5	11.5	9 SE	0
07/12/99	27.5	12.8	4 NW	0
08/12/99	30.7	12.2	9 WNW	0
09/12/99	24.6	16.5	18 W	2

6.0 ASSESSMENTS UNDER SECTION 5A OF THE EPA ACT (1979)

Consideration of this development under the guidelines of section 5A of the Environmental Planning and Assessment Act (1979) as amended by the Environmental Planning and Assessment Amendment Act (1997) has been made for each of the threatened species requested to be assessed by Planning NSW and State Forest. The heads of consideration of this section are given in italics followed by the answers applicable to this site. Each species is dealt with separately. It must be noted that these species were not addressed in the original report as they were either not scheduled as threatened species in December 1999 or were not recorded on the NPWS Database 8931.

6.2 **LITORIA BOOROOLONGENSIS**   **BOOROOLONG FROG**

Litoria booroolongensis is a highland species ranging from the Queensland Border down the Great Dividing nearly to the Victorian Border. It is almost always associated with western flowing rocky streams of the slopes and tablelands of the Great Dividing Range. It is often found in daylight on rocks on the waters edge. The call of this frog is a soft purring "qrk - qrk - qrk" lasting two or three seconds.

Litoria booroolongensis is a seasonal breeder and males begin calling about August. A large number of small pigmented eggs are deposited among the rocks. Historical records indicate that they were once widespread along western flowing streams of the Northern Tablelands, but surveys conducted over the past 15 years have failed to locate these frogs in all but one locality. Previously known populations within the Blue Mountains are no longer able to be located. In the south of its range, it is suspected that tadpoles of the Booroolong Frog are vulnerable to the predation by both the Brown Trout and Rainbow Trout.

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

No sign of *L. booroolongensis* was found on site during either the 1999 survey or the 2002 inspection. The quarry site itself did not contain suitable potential habitat for this frog, although the nearby Cox's River does have potential habitat. The quarry is not likely to have an adverse impact on the Cox's River due to water run off control measures from the Quarry site that are to be put implemented. This being the case the proposed development is not likely to have any affect on the species life cycle or place any local population at risk of extinction.

- b) *in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.*

No population of this species on site has been identified under Schedule 1, Part 2 of the TSC Act 1995.

- c) *in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.*

No significant area of known habitat is to be removed or modified as a result of the proposal.

- d) *whether an area of known habitat is likely to be isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

No areas of known habitat are likely to be isolated as a result of the proposal.

- e) *whether critical habitat will be affected.*

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act 1995.

- f) *whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

The proposed Mt Walker Nature Reserve is the closest area to the site where this frog would be protected. Existing reserves potentially conserving populations of this species and habitat include Gardens of Stone National Park, Blue Mountains National Park and Winburndale Nature Reserve.

- g) *whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Under Schedule 3 of the TSC Act (1995) the process referred to as, 'Clearing of Native Vegetation' has been listed as a Key Threatening Process. As there is no suitable habitat for this species on site the proposed development is not of a class that directly threatens this species in this instance.

- h) *whether any threatened species, population or ecological community is at the limit of its known distribution.*

Neither this species nor any population occurring in the local area is at the limit of its known standard distribution.

6.3 MONARCHA LEUCOSTIS WHITE-EARED MONARCH

The White-eared Monarch is a very distinctive bird which has been likened to a miniature Magpie-lark. It is found along the east coast of Australia south to Crowdy Bay National Park and extends inland to the mountains of the Great Divide. It is thought that this species may undertake an autumn-winter migration from the highlands to the coastal inlands.

The preferred habitat of the White-eared Monarch is the upper canopy of rainforest margins/regrowth areas and dense shrubs on streams and mangroves. They are active during the heat of the day, flushing insects from bark crevices or plucking them from leaves in the outer canopy. The call of this species is a distinct 'betaloo betaloo' and flycatcher-like chatters. They breed in August-January and nests are a deep cup of moss, roots, bark strips, spider webs and cocoons. The nests are lined with palm-fibre and are found in the upright fork of a tree 10-20m+ high.

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

No sign of this species was noted during either the 1999 survey or the 2002 inspection however, this result is not completely unexpected as the southern limit of this species is documented as being near the Crowdy Bay National Park on the north coast. Suitable habitat does not occur on site due to the openness of the vegetation. This being the case the proposed development is unlikely have any effect on this species' lifecycle or place any viable local population at risk of extinction.

- b) *in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.*

No population of this species in the area has been identified under Schedule 1, Part 2 of the TSC Act 1995.

- c) *in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.*

No significant area of known habitat is to be removed or modified as a result of the proposal.

- d) *whether an area of known habitat is likely to be isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

No areas of known habitat are likely to be isolated as a result of the proposal, particularly given the high mobility of the species.

- e) *whether critical habitat will be affected.*

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act 1995.

- f) *whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

Areas of suitable habitat for this species are represented in the Dorrigo, Woko, New England, Nymboida, Gibraltar Range, Mount Warning, Nightcap, Washpool, Border Ranges, Richmond Range and Toonumbar National Parks and Banyabba, Mount Neville, Limpinwood, Wallabadah and Camerons Gorge Nature Reserves. However, it must be noted that all of these Reserves lie within the northern coast region of NSW.

- g) *whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Under Schedule 3 of the TSC Act (1995) the process referred to as, 'Clearing of Native Vegetation' has been listed as a Key Threatening Process. While the proposed quarry will involve the removal of approximately 10.5ha of native vegetation, the absence of suitable habitat for the White-eared Monarch and the scarcity of records for this species south of the NSW/QLD border it is considered that the proposed development is not threatening in this instance.

- h) *whether any threatened species, population or ecological community is at the limit of its known distribution.*

Any individual or population of this species occurring in the local area would be south of the current standard distribution for this species.

6.4 *ERYTHROTRIORCHIS RADIATUS* RED GOSHAWK

The Red Goshawk is thought to occupy Open Forest and Woodland, especially those located near wetlands, rivers and rainforest fringes. Its habits are not well known but is considered to be a solitary, sedentary bird. The Red Goshawk nests in tree forks of Eucalypts and Melaleucas or those nests of other large birds such as Magpies or Crows. The nests are generally built of sticks which are lined with soft twigs and leaves. Breeding occurs during late winter/early spring and produces around two young. One of the features of the Red Goshawk is the massive, powerful yellow legs and talons. This species primarily feeds on small animals and nestlings of other birds, however it is known to have consumed animals as large as the Pacific Black Duck. It tends to be limited to coastal and sub-coastal north and north-east Australia, ranging from the Kimberleys in W.A to the NSW/QLD border in the south.

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

No sign of this species or indications of its presence were noted during fieldwork. The study area provides suitable hunting habitat, and potential nesting habitat. This being the case coupled with the fact that similar areas of habitat are common locally and contiguous to the site, the proposed development is not likely to disrupt the species lifecycle nor place any local populations at risk of extinction, especially as the known southern geographical limit of this species is the New South Wales – Queensland border.

- b) *in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.*

No population of this species in the area has been identified under Schedule 1, Part 2 of the TSC Act 1995.

- c) *in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.*

No significant area of known habitat is to be removed or modified as a result of the proposal.

- d) *whether an area of known habitat is likely to be isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

No areas of known habitat are likely to be isolated as result of the proposal, particularly given the high mobility of the species.

- e) *whether critical habitat will be affected.*

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act 1995.

- f) *whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

The adequacy of representation of the habitat of this species in the region is difficult to ascertain, although it appears that any of a number of reserves containing forested areas such as Wollemi, Blue Mountains, Winburndale Nature Reserve and the proposed nearby Mt Walker Nature Reserve could provide some protected habitat for this species. Accordingly, it could be tentatively stated that the habitat of this species is represented in conservation reserves in the region, although the majority of potential habitat remains 'unprotected'.

- g) *whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Under Schedule 3 of the TSC Act (1995) the process referred to as, 'Clearing of Native Vegetation' has been listed as a Key Threatening Process. While the proposed quarry will involve the removal of approximately 10.5ha of native vegetation, the availability of suitable habitat surrounding the site and the scarcity of records for this species south of the NSW/QLD border it is considered that the proposed development is not threatening in this instance.

- h) *whether any threatened species, population or ecological community is at the limit of its known distribution.*

Any individuals of this species occurring in the area would be below the southern limits of the species current distribution, being the New South Wales / Queensland Border.

6.5 BURHINUS GRALLARIUS

BUSH STONE-CURLEW

The Bush Stone-curlew is widespread in north and north-east Australia. Within N.S.W. this species has been recorded mainly in pastoral areas of the western slopes and plains. It is rare east of the Great Divide, However, isolated populations have been recorded from Western Sydney, Gosford, Port Macquarie and Northern Rivers (around Grafton and Brunswick Heads). The Bush Stone-curlew inhabits dry open forest and woodland with an open grassy understorey that has not been overgrazed. It prefers woodland with many fallen branches near which it roosts during the day. It is active at night and is detected by its characteristic eerie call. Pairs breed in the period from July to January. The food of the Bush Stone-curlew is primarily insects, spiders and other invertebrates. Occasionally small vertebrates are taken and fruits as they become available.

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

This bird was not recorded during the short period of time of the survey, although potential habitat existed in the form of an open grassy understorey where it could potentially forage for food and roost among fallen branches. Similar habitat is contiguous with the site to the east, south and west. As such the proposal is not likely to disrupt the species lifecycle or place any local population at risk of extinction.

- b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No population of this species in the area has been identified under Schedule 1, Part 2 of the TSC Act 1995.

- c) in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

The proposed development would involve the removal of approximately 10.5ha of potential habitat for this species. However, due to the absence of this species from the site and the availability of suitable habitat contiguous within the site including within the proposed Mt.

Walker Nature Reserve it is believed that no significant area of known habitat is to be removed or modified as a result of the proposal.

- d) *whether an area of known habitat is likely to be isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

No areas of known habitat are likely to be isolated as result of the proposal, given the relatively high mobility of the species.

- e) *whether critical habitat will be affected.*

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act 1995.

- f) *whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

The adequacy of representation of the habitat of this species in the region is difficult to ascertain, although it appears that any of a number of reserves containing forested areas such as Wollemi, Blue Mountains, Winburndale Nature Reserve and the nearby proposed Mt Walker Nature Reserve could provide some protected habitat for this species. As such, it could be tentatively stated that the habitat of this species is represented in conservation reserves in region, although the majority of potential habitat remains 'unprotected'.

- g) *whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Under Schedule 3 of the TSC Act (1995) the process referred to as, 'Clearing of Native Vegetation' has been listed as a Key Threatening Process. While the proposed quarry will involve the removal of approximately 10.5ha of native vegetation, with the availability of suitable habitat surrounding the site, it is considered that the proposed development is not threatening in this instance.

- h) *whether any threatened species, population or ecological community is at the limit of its known distribution.*

Neither this species nor any population occurring in the area is at the limit of its known standard distribution.

6.6 TYTO NOVAEHOLLANDIAE MASKED OWL

Masked Owls in NSW are distributed throughout the length of the Great Dividing Range and extend from the coast to the western slopes. Within this range they inhabit a range of wooded habitats that contain both mature trees for roosting and nesting and more open areas for hunting. They are most commonly encountered within Open Forest with a sparse understorey as well as along the ecotones of these areas to more or less densely vegetated habitats. There is much evidence to suggest, however, that the species is not entirely restricted to forested habitats and will readily hunt along the ecotone between wooded habitats and a range of open habitats such as pastoral land (Marchant [ed], 1999 and references cited therein). Their diet comprises mainly ground-dwelling prey, including several species of native and introduced rodents, *Antechinus* spp. and Bandicoots. On occasions, other prey such as Possums, Gliders and other birds are taken. Strictly nocturnal, Masked Owls will perch for long periods, up to several hours, in an exposed area, waiting to ambush a passing prey animal.

Masked Owls are recognised as being the least common of the three large forest Owls in NSW (Kavanagh and Murray, 1996). Evidence suggests that the species may be secure eastwards of the Great Divide in forests that are not intensively logged, although it may be threatened in cleared and overgrazed areas westwards of the range (Debus and Rose, 1994). The paucity of records of Masked Owls in NSW appears unusual due to the species dietary flexibility and its ability to utilise disturbed habitats (Kavanagh, 1996). This may be due to the apparent reluctance to vocalise during non-breeding periods, making the species difficult to detect for most of the year.

Masked Owls usually roost in large hollows inside large, old living trees, most often Eucalypts. Within dry forests they often choose hollow trees in gullies or drainage lines. These hollows are 1 to 5 metres deep, 40 to 50 cm wide. The trees containing these hollows are likely to be quite old (>150 years). They are also known to roost among the dense foliage of other trees such as *Pandanus*, *Livistona*, *Melaleuca* and *Acacia* species. There are also records of Masked Owls roosting in introduced pine trees and in shrubs in gardens and suburban areas (Marchant [ed], 1999 and references cited therein). The species also nests in large hollows, although there appears to be a preference for hollow tree trunks and vertical spouts of large trees. The breeding season, like that for other *Tyto* owls, is variable but there is a tendency for breeding to occur in autumn-winter. Two or three young are produced, although some pairs do not every year. Pairs appear to mate for life and occupy exclusive territories in order of 1000ha in size. A radio-tracked bird near Newcastle was found to utilise a home-range of between 1017-1178ha (Kavanagh and Murray, 1996) and another documented pair of Masked Owls in the North Lake Macquarie area may possibly be utilising a home range of up to 1700 hectares (Young, 1998).

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

No sign of this species was noted during fieldwork despite the use of call playback broadcasts which were used in the first survey and targeted searches for secondary indications consistent with forest owls. Potential hunting habitat exists given the presence of Common Ringtail Possums. However, potential nesting habitat appears absent, given the requirement for large hollows in tall trees. This being the case coupled with the fact that similar areas of habitat are contiguous with the site, the proposed development is not likely to disrupt the species lifecycle or place any local populations at risk of extinction.

- b) *in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.*

No population of this species in the area has been identified under Schedule 1, Part 2 of the TSC Act 1995.

- c) *in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.*

No significant area of known habitat is to be removed or modified as a result of the proposal.

- d) *whether an area of known habitat is likely to be isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

No areas of known habitat are likely to be isolated as a result of the proposal, particularly given the high mobility of the species.

- e) *whether critical habitat will be affected.*

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act 1995.

- f) *whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

Records of this species in the region are known from conservation reserve areas which include the Blue Mountains National Park (NPWS Database, 2000). The adequacy of representation of the habitat of this species in the region is difficult to determine, but it appears that a range of reserves containing forested areas could provide some protected habitat for this species such as the nearby proposed Mt Walker Nature Reserve. Accordingly, it could be tentatively stated that the habitat of this species is represented in conservation reserves in this region, although the majority of potential habitat remains 'unprotected'.

- g) *whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Under Schedule 3 of the TSC Act (1995) the process referred to as, 'Clearing of Native Vegetation' has been listed as a Key Threatening Process. While the proposed quarry will involve the removal of approximately 10.5ha of native vegetation, with the availability of suitable hunting habitat surrounding the site, it is considered that the proposed development is not threatening in this instance.

- h) *whether any threatened species, population or ecological community is at the limit of its known distribution.*

Neither this species nor any population occurring in the area is at the limit of its known standard distribution.

6.7 **AEPYPRYMNUS RUFESCENS** **RUFOUS BETTONG**

The Rufous Bettong occupies a variety of habitats ranging from coastal Eucalypt forests to tall wet sclerophyll forests along the east coast of Australia. West of the Great Dividing Range it occupies low, dry, open woodland. It tends to favour those areas where there is a sparse or grassy understorey. The Rufous Bettong constructs a nest of fibrous vegetation which is occupied during the day. It emerges just after dusk and forages on grasses and herbs as well as tubers and roots. Females are able to reach sexual maturity at 11 months and have four teats with a forward opening pouch. A single young leaves the pouch at approximately 16 weeks and follows its mother until 23 weeks.

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

No sign of this species was noted during fieldwork. Although the site provides potential suitable habitat for this species i.e. grassy understorey. This being the case coupled with the fact that similar areas of habitat are contiguous to the site, the proposal is not likely to disrupt the species life cycle or place any viable local population at risk of extinction.

- b) *in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.*

No population of this species on site has been identified under Schedule 1, Part 2 of the TSC Act 1995.

- c) *in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.*

The proposed development would involve the removal of approximately 10.5ha of potential habitat for this species. However, due to the absence of this species from the site and the availability of suitable habitat contiguous within the site including within the proposed Mt. Walker Nature Reserve it is believed that no significant area of known habitat is to be removed or modified as a result of the proposal.

- d) *whether an area of known habitat is likely to be isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

No areas of known habitat are likely to be isolated as a result of the proposal.

- e) *whether critical habitat will be affected.*

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act 1995.

- f) *whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

The adequacy of representation of the habitat of this species in the region is difficult to ascertain, although it appears that any of a number of reserves containing forested areas could provide some protected habitat for this species. Such reserves include The Blue Mountains and Wollemi National Parks and the nearby proposed Mt Walker Nature Reserve. As such, it could be tentatively stated that the habitat of this species is represented in conservation reserves in this region, although the majority of potential habitat remains 'unprotected'.

- g) *whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Under Schedule 3 of the TSC Act (1995) the process referred to as, 'Clearing of Native Vegetation' has been listed as a Key Threatening Process. While the proposed quarry will involve the removal of approximately 10.5ha of native vegetation, with the availability of suitable habitat surrounding the site, it is considered that the proposed development is not threatening in this instance.

- h) *whether any threatened species, population or ecological community is at the limit of its known distribution.*

Neither this species nor any population occurring in the area is at the limit of its known standard distribution.

6.8 PTEROPUS POLIOCEPHALUS

GREY-HEADED FLYING-FOX

The Grey-headed Flying-fox is distributed predominantly along the sub-tropical east coast, from Rockhampton (Qld) through NSW to SE Victoria. It is a fairly large species, weighing up to a kilogram and having a forearm length of up to 180mm. It is the only Australian Flying-fox to possess a mantle of rusty brown fur that full encircles the neck. The fur on the back is dark grey and as the common name suggests, the head is covered with light grey fur. The grey belly fur is often flecked with white and ginger. The fur extends down the legs to the toes., which contrasts with other *Pteropus* species, which are furred only to the knees.

Grey-headed Flying-foxes are known to occupy a variety of habitats, including wet and dry sclerophyll forests, rainforest, mangroves and paperbark swamps and *Banksia* woodlands. Here they forage on a range of fruits and blossoms. Their diet is so varied that they have been recorded eating the fruit or blossom of more than 80 species of plant. The predominant food source is Eucalypt blossom and fruits from trees such as *Ficus* spp. (Figs). It is likely to act as an important pollinator for many of the trees on which they utilise blossoms. They also inhabit cultivated areas where they feed on introduced trees including commercial food crops, and can become a 'pest' animal in these areas. Ironically, this has led to this species being the most intensively researched bat in Australia.

As with most species of Flying-fox, *P. poliocephalus* roost communally where they form large communal colonies called 'camps'. Camps are mostly in rainforest patches, mangroves, paperbark forests and modified vegetation in urban areas. These camps may contain thousands of individuals, and up to 200 000 individuals have been recorded at one camp. They may move up to 70km from the camp each night to forage. Young are raised in maternity camps after birthing in September to October. The young are able to fly at 3 months of age and puberty is reached at 18 months, although males do not achieve effective fertility until 30 months. Vocal communication is highly sophisticated, with over 20 different situation-specific calls being recorded.

The key threats to Grey-headed Flying-fox include the clearing or modification of native vegetation, in particular roost-camp habitat as well as winter food resources in NE NSW. This species is also threatened by persecution in the form of shooting of animals and the destruction of roost camps. This oppression may be a result of Grey-headed Flying-foxes being a perceived pest in agricultural areas or as presenting a noise problem in more urbanised areas. Recently, it has been identified as being a potential carrier of viral pathogens, such as Lyssa-virus. Another threat is from competition and hybridisation with *P. alecto* (Black Flying-fox).

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

No sighting or evidence of *P. poliocephalus* was encountered on site although potential foraging habitat is noted in the form of flowering Eucalypts. Potential roosting habitat is considered to be absent on site due to the openness of the vegetation. This being the case and the fact that similar habitat is contiguous with the site, the proposed development is not likely to disrupt the species lifecycle nor place any local population at risk of extinction

- b) *in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.*

No population of this species on site has been identified under Schedule 1, Part 2 of the TSC Act 1995.

- c) *in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.*

The proposed development would involve the removal of approximately 10.5ha of potential foraging habitat for this species. However, due to the absence of this species from the site and the availability of suitable habitat contiguous within the site including within the proposed Mt. Walker Nature Reserve it is believed that no significant area of known habitat is to be removed or modified as a result of the proposal.

- d) *whether an area of known habitat is likely to be isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

No areas of known habitat are likely to be isolated as a result of the proposal, particularly given the high mobility of the species.

e) *whether critical habitat will be affected.*

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act 1995.

f) *whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

Records of this species in the region exist from the Blue Mountains National Park (NPWS Database, 2000). The adequacy of representation of the habitat of this species in the region is difficult to ascertain, although it appears that any of a number of reserves containing forested areas could provide some protected habitat for this species such as the proposed Mt Walker Nature Reserve. However, it is believed that less than 15% of suitable forest for this species occurs in conservation reserves in NSW and only 5% of known roost sites occur in the reserve system in the state (Hall and Richards, 2000).

g) *whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Under Schedule 3 of the TSC Act (1995) the process referred to as, 'Clearing of Native Vegetation' has been listed as a Key Threatening Process. While the proposed quarry will involve the removal of approximately 10.5ha of native vegetation, with the availability of similar habitat surrounding the site, it is considered that the proposed development is not threatening in this instance.

h) *whether any threatened species, population or ecological community is at the limit of its known distribution.*

Neither this species nor any population occurring in the local area is at the limit of its known standard distribution.

7.0 CONCLUSION

Comments made by representatives from Planning NSW, State Forest and the NSW National Parks and Wildlife Service on the Statement of Effect on Threatened Flora and Fauna for the proposed Wallerawang Quarry conducted by Wildthing Environmental Consultants (2000), have led to this response. The information sort by the responses included the amount of habitat to be removed, the amount of hollows to be removed and the assessment of eight additional threatened species under Section 5A of the EPA Act (1979). The potential effect of the development on habitat corridors, the proposed Mt Walker Nature Reserve and the Cox's River were also addressed.

From the original study (Wildthing Environmental Consultants, 1999), the site was found to contain one vegetation assemblage, being Sub-Alpine Eucalypt Woodland. The amount of habitat to be removed was calculated to be approximately 10.5ha and the number of tree hollows to be removed totalled approximately 82 with the large majority of the hollows having small openings. The hollow-bearing tree were found to be distributed evenly around the proposed development site.

No threatened species were recorded on site during the latest site inspection. However, it is recognised that potential habitat does exist on site for most of the eight threatened species addressed. The exception being *Monarcha leucostis* (White-eared Monarch) as suitable potential habitat was considered to be absent due to the open nature of the site.

The proposed Quarry site is unlikely to effect the movement of terrestrial native fauna which will still be able to move from one area to another through the corridors of vegetation that will still be present around the site. The area to the north-west of the site where there is an area of bushland has been cut by the Great Western Highway. A small amount of funnelling may occur in the north-western corner due to the closeness of the Highway. To the south-east the site borders quite a large area of bushland which includes the proposed Mt Walker Nature Reserve.

The proposed Mt Walker Nature Reserve is to be located to the east of the proposed development. The final boundaries of the Nature Reserve are yet to be determined and are subject to consultation between the National Parks and Wildlife Service, effected landowners and the NSW Department of Mineral Resources. The quarry site has the potential to act as a springboard for the introduction of weeds in the Mt Walker Nature Reserve. Weeds may enter the site on machinery for example. It has therefore been recommended that weed

control measures be put in place around the quarry site in order to minimise weed introductions.

The proposed quarry is unlikely to impact on the Cox's river and the flora and fauna that depend on it due to run-off generated from disturbed areas of the site being captured and diverted through large trapezoidal channel structures to the Water Management Dam, as discussed in the EIS report for this development proposal.

Habitat for *Paralucia spinifera* (Bathurst Copper Butterfly) was mapped in and around the proposed quarry site. The habitat being the *Busaria spinosa* subsp *lasiophylla* (Blackthorn) shrub in which the larvae feeds on. The nearest record of *P. spinifera* has been recorded 1500 from the site. At the time of the last survey March 2002 and the survey before December 1999, the Butterflies flying season was over so only potential habitat could be mapped in the form of *B. spinosa* subsp. *lasiophylla* shrubs. No habitat was found inside the quarry site but potential habitat was found around the margins of the site, as was also found by a visit by National Parks and Wildlife Service on the 31st of January 2002. Care should be taken around the margins especially on the western side of the proposed development site so as not to disturb potential *P. spinifera* habitat. Dust and weed controls should also be implemented as part of the quarry management plan.

It is believed that the information provided in this document fulfils the request for additional information received in the comments made by the various government departments as detailed in the beginning of the report.

8.0 BIBLIOGRAPHY

- Augee, M.L. and Ford, D. (1999). Radio-tracking studies of Grey-headed Flying-foxes *Pteropus poliocephalus*, from the Gordon colony, Sydney. *Proceedings of the Linnaean Society of NSW*, Vol. 121, pp 61-70.
- Barker, J., Grigg, G.C. and Tyler, M.J. (1995). *A Field Guide to Australian Frogs*. Surrey, Beatty & Sons, New South Wales.
- Brooker, M.I.H and Kleining, D.A. (1983). *Field Guide to the Eucalypts of South-eastern Australia*. Inkata Press, Sydney.
- Brouwer, J. & Garnett, S. (Eds) (1990). *Threatened Birds of Australia: An Annotated List*. Royal Australasian Ornithologists Union (RAOU) Report Number 68.
- Carolin, R.C. and Tindale, M.D. (1994). *Flora of the Sydney Region*. Reed, New South Wales.
- Catterall, C.P., Storey, R.J. and Kingston, M.B. (1997). Reality versus rhetoric: a case study monitoring regional deforestation. In: Hale, P. and Lamb, D. (Eds). *Conservation Outside Nature Reserves*, pp 367-377. Centre for Conservation Biology, University of Queensland, Brisbane.
- Churchill, S. (1998). *Australian Bats*. Reed New Holland, Sydney.
- Cogger, H.G. (1992). *Reptiles and Amphibians of Australia* (5th edn.). Reed International, New South Wales.
- Davey, S.M. (1993). Notes on the Habitat of Four Australian Owl Species. In Olsen, P.D. (Ed) (1993). *Australian Raptor Studies*. Australasian Raptor Association, RAOU, Melbourne, pp 126-42.
- Debus, S.J.S. and Rose, A.B. (1994). The Masked Owl *Tyto novaehollandiae* in New South Wales. *Australian Birds*, 28 (Supplement): pp 40-64
- Dennis, A.J. and Johnson, P.M. (1995). Rufous Bettong (*Aepyprymnus rufescens*). In: *The Mammals of Australia*, pp: 285-287. Strahan, R. (Ed). Reed Books, Australia.
- Eby, P. (2000). The results of four synchronous assessments of relative distribution and abundance of Grey-headed Flying-fox *Pteropus poliocephalus*. In: Richards, G. and Hall, L. (Eds). *Proceedings of a Workshop to Assess the Status of the Grey-headed Flying-fox*. Australasian Bat Society, Canberra.
- Halls, L.S. and Richards G.C. (1979). *Bats of Eastern Australia*. Queensland Museum Booklet No.12.
- Harden, G. (Ed) (1991). *Flora of New South Wales Vol. 2*. New South Wales University Press, Sydney.
- Harden, G. (Ed) (1992). *Flora of New South Wales Vol. 3*. New South Wales University Press, Sydney.
- Harden, G. (Ed) (1993). *Flora of New South Wales Vol. 4*. New South Wales University Press, Sydney.

- Harden, G. (Ed) (2000). *Flora of New South Wales Vol. 1 (2nd edn.)*. New South Wales University Press, Sydney.
- Hunter Bird Observers Club (1999). *Hunter Region of New South Wales: Annual Bird Report Number 6 (1998)*. HBOC Inc., August 1999.
- Kavanagh, R.P. (1993). *Project 149: Ecology and Management of Large Forest Owls*. Unpublished Progress Report to World Wide Fund for Nature, Sydney.
- Kavanagh, R.P. (2000). Conservation and Management of Large Forest Owls in South-eastern New South Wales. *Proceedings of Owls 2000: Thirds International Conference on the Biology, Conservation and Cultural Significance of Owls*.
- Kavanagh, R.P. and Murray, M. (1996). Home Range, Habitat and Behaviour of the Masked Owl *Tyto novaehollandiae* near Newcastle, New South Wales. *Emu*, 96: pp 250-7.
- Kavanagh, R.P. and Peake, P. (1993). Distribution and Habitats of Nocturnal Forest Birds in South-eastern New South Wales, In Olsen, P.D. (Ed) (1993). *Australian Raptor Studies*. Australasian Raptor Association, RAOU, Melbourne.
- Kavanagh, R.P. and Stanton, M. A. (2000). Response to Habitat Fragmentation by the Powerful Owl, Sooty Owl, Masked Owl and other Nocturnal Fauna in South-eastern New South Wales. *Proceedings of Owls 2000: Thirds International Conference on the Biology, Conservation and Cultural Significance of Owls*.
- Marchant, S. and Higgins, P.J. (1993). *Handbook of Australian, New Zealand & Antarctic Birds*. Oxford University Press, Melbourne.
- NPWS Database (2000). Fauna Species Lists for Protected Areas in NSW, at '<http://www.npws.nsw.gov.au/wildlife/species.htm>'.
- Olsen, P.D. (Ed) (1993). *Australian Raptor Studies*. Australasian Raptor Association, RAOU, Melbourne.
- Pizzey, G. and Knight, F. (1997). *Field Guide to the Birds of Australia*. Angus and Robertson, Sydney.
- Reader's Digest (1982). *The Complete Book of Australian Birds*. Reader's Digest Services Pty. Ltd., Sydney.
- Robinson, L. (1994). *Field Guide to the Native Plants of Sydney* (2nd edn.). Kangaroo Press Pty. Ltd., New South Wales.
- Robinson, M. (1996). *A Field Guide to Frogs of Australia*. Reed Books Australia, Melbourne.
- Simpson, K. & Day, N. (1984). *Field Guide to the Birds of Australia*. Lloyd O'Neil Pty. Ltd. South Yarra, Australia.
- Slater, P., Slater, P. and Slater, R. (1995). *The Slater Field Guide to Australian Birds*. Lansdowne Publishing, Sydney.
- Specht, R. L. (1981). Major vegetation formations in Australia. In *Australian Soil and Land Survey*. Inkata Press, Melbourne.

- Strahan, R. (Ed) (1995). *The Mammals of Australia*. Reed Books, Australia.
- Tidemann, C.R. (1995). Grey-headed Flying-fox (*Pteropus poliocephalus*) In: Strahan, R. (Ed) (1995). *The Mammals of Australia*, pp 439-441. Australian Museum / Reed Books.
- Triggs, B. (1984). *Mammal Tracks and Signs-A Field Guide for South-eastern Australia*. Oxford University Press, Melbourne.
- Tyler, M.J. (1992). *Encyclopedia of Australian Animals-Frogs*. Angus & Robertson, Sydney.
- Webb, N. and Tidemann, C.R. (1995). Hybridisation between Black (*Pteropus alecto*) and Grey-headed (*P. poliocephalus*) Flying-foxes. *Australian Mammalogy*, Vol 18, pp 19-26.
- Young, J. (1998). *Assessing the likely impacts, if any, on the sedentary pair of Masked Owl*. Report to Sinclair Knight Mertz Pty Ltd, October 1998.
- Young, J. (1999). *Northlakes Forest Owl Project*. Report to Lake Macquarie City Council, January 1999.

