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Project Name: **Flora and Fauna Impact Assessment for the Quarrying of Aeroplane Hill**

Project number: **3001330**

Report for: **Northern Hume Alliance – on behalf of RTA**

PREPARATION, REVIEW AND AUTHORISATION

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1 Introduction

1.1 Background

The Northern Hume Alliance (NHA), acting on behalf of the NSW Roads and Traffic Authority (RTA) are undertaking activities to upgrade sections of the Hume Highway between the Sturt Highway intersections at Tarcutta through to Holbrook. During this project, four sections of existing single carriageway along the Hume Highway at Tarcutta (Zone N1), Kyeamba Hill (Zone N2), Little Billabong (Zone N3) and Holbrook (Zone N4) will be upgraded to dual lane carriageway. This project, known as the Northern Hume Highway Duplication Project, has been previously subject to detailed environmental impact assessment and subsequent approval under Part 3a of the Environmental Planning and Assessment Act 1979 (EP&A Act),

However, large projects of this nature often require the sourcing of general fill material, and for this project, material is required for the Kyeamba Hill section (Zone N2). To source the fill required for this section of highway, the Northern Hume Alliance (NHA) proposes to reactivate a former RTA quarry located at between Zones N2 and N3 (Little Billabong), in the locality of Kyeamba Gap. The proposed quarry site, locally referred to as Aeroplane Hill, was originally excavated in the early 1990's during previous duplication works along the Hume Highway.

The quarry property is owned by the RTA but is currently leased to Mr Russ Locke and used for grazing purposes. The RTA has agreed to the use of the quarry by the NHA for the proposed construction of the current Hume Highway duplication works.

SMEC, as part of the NHA, has been commissioned to prepare a flora and fauna impact assessment for the proposed works to remove general fill material from the former Aeroplane Hill Quarry.

This flora survey and fauna habitat assessment has been completed to assess the ecological features of the area in question and to determine the impact of activities required for reinstatement of the quarry on these features. This document details the methodologies used and findings of the flora survey and habitat assessment. An impact assessment in accordance with Section 5a of the *Environmental Planning and Assessment Act* 1979 is also included. Particular emphasis has been placed on the occurrence of threatened species, populations and ecological communities and any potential impacts resulting from the proposed works.

It is of note that this document has been prepared on the assumption that the existing project approval for the Northern Hume Highway Duplication Project will be modified to incorporate activites required for the reinstatement of the Aeroplane Hill quarry.

1.2 The Proposed Activity

The proposed works at the former Aeroplane Hill quarry include extracting soil material for general fill to satisfy construction demands of the Kyeamba Hill section (N2) of the Northern Hume Highway Duplication. It is estimated that 150 000m^3 (300 000 tonnes) of material will be extracted from the remaining slopes of the former quarry using a D10 bulldozer, via a staged campaign. Works would commence on the southern end of the site to expand the existing turning and loading area to the north, before establishing the batters. Batter work would then progress from the western side in an easterly direction, breaking up the current long exposed slope to produce a final benched landform.

The proposed excavation activity is expected to be confined to the central 2ha area, which will be contained within the existing 3.6ha of land previously used during the operation of the former quarry. The proposed works will occur in the following order:

- Expansion of the existing turning area at the southern end of the site;

- Expansion of the loading area to the north of the site;
- Establishment of batters, progressing from the west through to the east by breaking up the current long exposed slope to produce a final landform with benched batters.

The proposed quarry operations are expected to experience cycles of intense activity followed by periods of relative inactivity, depending on the scheduling of road construction. A minimal amount of dust will be generated from the proposed activity due to the limited amount of topsoil remaining on site, with no issues expected in the periods of inactivity due to the secluded nature of the site and the distance to sensitive receptors. The proposed quarry activity is expected to last for about 2 years from December 2007 to the end of the Hume Highway duplication project, roughly September 2009.

The existing sediment ponds on site are considered suitable for the purposes of sediment capture if the proposed works are approved. As such, these basins would only require minor upgrades to correspond with the current design specifications established by the original Hume Highway duplication project. Appropriate erosion and sediment controls will be implemented prior to the commencement of activity and will remain in place for periods of intense activity and inactivity. These controls are discussed in further detail in the Quarries Environmental Assessment.

It is proposed that the existing access track to the quarry will require maintenance in the form of grading and resheeting. No widening of the existing road surface is expected, however some low lying branches or overhanging timber that may present a safety or impact hazard to vehicle activity will be lopped to facilitate vehicle movement. The existing bitumen road on the southern end of the access track would be used as a truck waiting station as vehicle movement into the site is expected to be one way. The existing gravel stockpiles in these areas would need to be removed to accommodate this activity and will be potentially recycled as general fill material along the road alignment.

It is expected that if the proposed quarry operations are approved and the necessary fill material is removed, the remaining batters will be ripped on the contour and left in a rough condition to enable natural seed bank from the surrounding woodlands to regenerate. To ensure site stability, finalised areas will be progressively seeded with seasonal temporary revegetation mix consisting of fertiliser, rye corn or Japanese millet and perennials. Due to the high degree of disturbance, topsoil is completely absent from the site. Thus, stockpiling of topsoil and respreading is not required.

1.3 Study Area and Surroundings

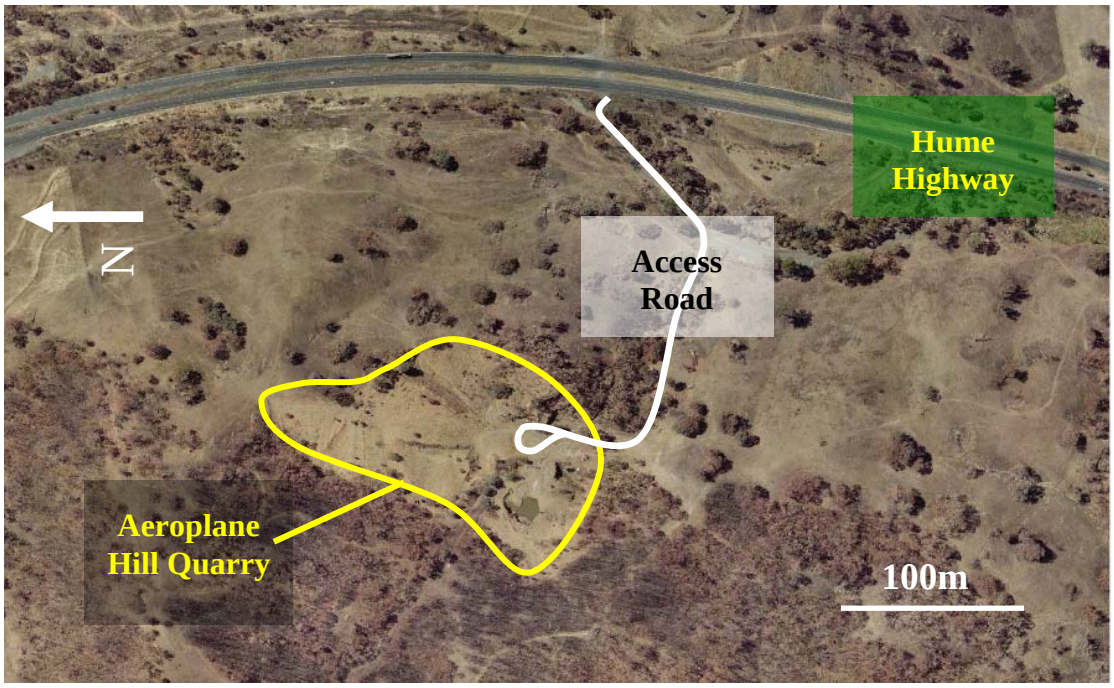
Aeroplane Hill (hereafter referred to as the study area) is located within the Wagga Wagga Local Government Area (LGA) approximately 30km south of the Tarcutta Township, on the western side of the existing Hume Highway. The land is currently owned by the RTA and leased out to Mr Russ Locke for grazing purposes.

Little information exists pertaining to the history of the study area, as no investigations have been undertaken prior to this ecological assessment. What is known from recent oral history is that the study area and its broader surroundings were heavily impacted by a high intensity fire in February 2006. In particular, the western side of the existing quarry area received the greatest impact. This area formerly contained intact open woodland but now only burnt trees remain with no canopy, midstorey or ground cover vegetation. The study area also contains a natural, and moderately vegetated ephemeral drainage line on the western side of the proposed truck waiting station. A small artificial drainage line is also present, running on the southern side of the existing access track. The site was formerly used for quarry operations however this activity was abandoned in the late1990's.

The environs surrounding the study area comprise a mix of low undulating hills and floodplains associated with the Tarcutta and Little Billabong Creeks in the Wagga Wagga and Greater Hume LGA's. This wider area has a long history of vegetation clearance

associated with agricultural activity and rural settlement. Much of the remaining vegetation exists as a mosaic of small, fragmented woodland remnants, linear roadside reserves, and narrow strips of riparian vegetation along watercourses on private land. However, large tracts of vegetation are conserved in the two travelling stock reserves between the localities of Kyeamba and Holbrook.

Figure 1: Aeroplane Hill Quarry with Respect to Hume Highway



2 Methodology

The flora survey and fauna habitat assessment was designed to gather as much information as required to assess the impact of the proposed activity, which may involve the removal of vegetation in discrete areas. This assessment included an initial desktop review followed by a field inspection and survey with particular emphasis on threatened flora and fauna species that may inhabit the site.

2.1 Desktop Review

Desktop research included a review of literature relevant to the ecology of the study area, particularly:

- NPWS Wildlife Atlas Database (2006) NSW National Parks & Wildlife Service, Department of Environment & Conservation, Hurstville. Accessed August 2007;
- DECC Endangered Ecological Community and Threatened Species Profiles;
- DPI (Agriculture) Noxious Weeds Declarations for the Wagga Wagga LGA;
- EPBC Sprat Database (2006) Commonwealth Department of Environment and Heritage, accessed online, http://www.deh.gov.au. Accessed August 2007.

2.2 Field Survey

The site inspection and field survey were carried out on the 5th September 2007. The weather was cool, windy and overcast. A minimum temperature of approximately 0.2°C was recorded on the day, and a maximum of approximately 16.5°C with wind speeds of 52km/hr (BOM 2007). A total of four (4) person hours were spent searching the study area by Cassandra Thompson and Melina Budden, trained and experienced ecologists. The assessment included a detailed flora survey and fauna habitat assessment.

2.3 Flora Survey

A flora survey was undertaken to identify and assess the vegetation of the study area, with emphasis on the potential occurrence of threatened species. The proposed quarry access route, truck waiting bay and the activity area was walked, utilising the "Random Meander" method of flora survey (Cropper 1993), with all significant flora species recorded and identified. In addition, the vegetation along the proposed access route, truck waiting bay and the quarry area where the activity is to occur was documented. Dominant species were noted, and an assessment was undertaken of the floristic and structural composition of vegetation along and adjacent to the study area. Weed species were noted. Targeted searches for threatened flora, locally significant plants and ROTAP (Rare or Threatened Australian Plants) species were undertaken as part of the survey.

The floristic structure and composition of vegetation within the study area was compared to assessment guidelines (developed by DECC) and the NSW Scientific Committee's final determination to determine if the vegetation met the description of White-box, Yellow-box, Blakely's Red Gum Grassy Woodland and Derived Native Grassland Endangered Ecological Community ("Box Gum Woodland").

A habitat assessment was undertaken for all threatened flora species previously recorded within five (5) kilometres of the study area. Where appropriate, further impact assessment was undertaken for threatened flora species considered likely to occur.

2.4 Fauna Habitat Assessment

An assessment of the habitat types and their quality was undertaken of the study area. Habitat assessments were made for threatened and more common species known to occur within the locality, or in similar habitat to that observed along the alignment.

Observations of all fauna species were recorded and identified. Searches were carried out for signs of fauna activity, this included searches for tracks, scats, feathers, scratches as well as for active searches under rocks and similar habitat features.

The habitat assessment included identifying habitat required for all threatened fauna species previously recorded within five (5) kilometres of the study area. Where appropriate further impact assessment has been carried out for threatened fauna species, in accordance with the assessment of significance test under Section 5a of the EP&A Act, whose range included the study area but had not been recorded locally, considered likely to occur or utilise the study area as habitat.

3 Findings

3.1 Flora

3.1.1 Flora and Vegetation Communities

Extension of Existing Access Track in to Quarry Site

The proposed extension of an existing access track into the old quarry site traverses a previously disturbed, though regenerating area of woodland. This area appears to have been moderately affected by the fires in early 2006. The canopy layer is short (4-8m) and is dominated on the southern side by Long-leaved Box (*Eucalyptus goniocalyx*), dominated on the western side at the top of the access track by Red Box *(Eucalyptus polyanthemos)* with the occasional Candlebark (*Eucalyptus rubida*) and Brittle Gum (*Eucalyptus mannifera)* occurring along the track.

The species observed during the flora survey are consistent with the Mugga-Iron Bark-Red Stringybark Woodland as described by Priday and Mulvaney (2005). This community is associated with higher elevated rocky hill areas. The dominant tree species varies throughout this community, however it is dominated by either Mugga Ironbark *(Eucalyptus sideroxylon)*, Red Stringybark (*Eucalyptus macrorhyncha*), Red Box (*Eucalyptus polyanthemos)* or Grey Box (*Eucalyptus macrocarpa*), or a combination of these species.

The shrub layer is generally sparse or absent, although in some areas a sparse cover of native shrubs are present, including Kangaroo Thorn (*Acacia paradoxa*), Sifton Bush (*Cassinia arcuata*) and Hoary Guinea Flower (*Hibbertia obtusifolia*) which persists in grazed areas.

The northern side of the existing access track consists of a slope previously modified and disturbed by the quarry activity at the site. As a result of previous activities, topsoil is absent and an exposed, rocky slope remains. Despite the high degree of modification, juvenile Long-leaved Box *(Eucalyptus goniocalyx)* grow in sparse distribution on the slope. However, their growth will be severely impeded due to the lack of topsoil on this exposed, rocky slope.

Vegetation on the southern side of the existing access track has been moderately disturbed by previous activities at the study area. A mix of dead stags, mature and juvenile canopy species occur in this area, the most dominant including Candlebark *(Eucalyptus rubida)* and Brittle Gum *(Eucalyptus mannifera).* The ground cover vegetation on the edge of the access track is largely dominated by exotics including Capeweed (*Arctotheca calendula),* Paterson's Curse (*Echium plantagineum*), Onion Grass (*Romulearosea var australis*) and Clover (*Trifolium spp*.); however some native species including Wallaby Grass *(Austrodanthonia sp.)* and Geranium *(Geranium solanderi)* occur with increasing distance from the access track.

Species recorded during the random meander survey of this location were compared with the Identification Guidelines for Box-Gum Woodland Endangered Ecological Community (EEC) provided by the NSW National Parks and Wildlife Service. Floristics were also compared with the NSW Scientific Committee's final determination for the community. Box-Gum Woodland has been recorded in locations surrounding the study area; however it is unlikely that it occurs within this part of the study area due to the high degree of past disturbance. Species associated with, but not indicative of the presence of Box-Gum Woodland were recorded such as Candlebark *(Eucalyptus rubida)* and Brittle Gum *(Eucalyptus mannifera).* Species that are indicative of the presence of the Box-Gum Woodland such as White Box *(Eucalyptus albens),* Yellow Box *(Eucalyptus melliodora)* and Blakely's Red Gum *(Eucalyptus blakelyi)* were absent at the study area, the vegetation communities present do not qualify as Box-Gum Woodland under the *Threatened Species Conservation Act 1995* (TSC Act) or the *Environment Protection and*

Biodiversity Conservation Act 1999 (EPBC Act). The assessment of the vegetation community on site against the Box-Gum Woodland guidelines established under the *TSC Act* is discussed in greater detail in section 3.1.2.

Appendix 2 provides a full list of flora species on the study area.

Modification of Existing Gravel Pit to a Truck Waiting Bay Area

The proposed works at this location include the removal of the existing gravel pit to provide a waiting bay area for trucks when quarry operations commence. This location runs parallel to a moderately steep drainage line seemingly unaffected by the intense fires at the study area in early 2006. A variety of mature canopy species occurs along the drainage line including Long-leaved Box *(Eucalyptus goniocalyx),* Red Stringybark *(Eucalyptus macrorhyncha)* and Apple Box *(Eucalyptus bridesiana).*

This location was also assessed for the presence of Box-Gum Woodland. However, species that are indicative of the presence of the Box-Gum Woodland such as White Box *(Eucalyptus albens),* Yellow Box *(Eucalyptus melliodora)* and Blakeley's Red Gum *(Eucalyptus blakelyi)* were absent at the study area. Thus, the vegetation community present at this location does not qualify as Box-Gum Woodland under the *Threatened Species Conservation Act 1995* (TSC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This activity may require the lopping of branches to accommodate for the truck waiting bay area; however no trees will be removed.

Appendix 2 provides a full list of flora species on the study area.

Reactivation of disused Quarry Site

Vegetation at the disused quarry site is sparsely distributed resulting from the high degree of disturbance during previous quarry operations. All topsoil has been removed or eroded away from the study area, and what remains is a loose aggregation of rocky material forming a south-east facing slope. Such disturbance has limited the ability of native plant species to re-establish much of the study area.

On the less disturbed slopes, some mature Brittle Gum *(Eucalyptus mannifera)* and Candlebark *(Eucalyptus rubida)* remain, however these are very few in number. The mid and lower slopes of the disused quarry site are dominated by exposed and unstable rock; however shrubs such as Silver Wattle *(Acacia dealbata),* Kangaroo Thorn *(Acacia paradoxa)*, Hickory Wattle *(Acacia implexa),* Chinese Shrub *(Cassinia arcuata)* and Dolly Bush *(Cassinia aculeata)* are sparsely distributed across this large area.

This location was also assessed for the presence of Box-Gum Woodland. However, species that are indicative of the presence of the Box-Gum Woodland such as White Box *(Eucalyptus albens),* Yellow Box *(Eucalyptus melliodora)* and Blakeley's Red Gum *(Eucalyptus blakelyi)* were absent at the study area. Thus, the vegetation community present at this location does not qualify as Box-Gum Woodland under the *Threatened Species Conservation Act 1995* (TSC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

It is likely that these shrubs will be slashed and/or pruned prior to the commencement of quarry operations. However, a revegetation strategy will be implemented when works are complete.

Appendix 2 provides a full list of flora species on the study area.

3.1.2 Endangered Ecological Communities

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland) is listed as an endangered ecological community in NSW under the TSC Act and Critically Endangered at a national level under the EPBC Act. This vegetation community has been recorded in close vicinity to the study area during flora

surveys undertaken for the original Environmental Assessment for the Hume Highway Duplication Project.

Box-Gum Woodland remnants were recorded along the existing Hume Highway from Tarcutta to Little Billabong, as described in the Environmental Assessment for the Hume Highway Duplication Project (Sinclair Knight Merz 2006). However, the quarry was not investigated during this initial assessment.

The Box-Gum Woodland community is characterised by the presence or prior occurrence of White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and/or Blakely's Red Gum (*E. blakelyi*) which may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (*Themeda australis*) Poa Tussock (*Poa sieberiana*), wallaby grasses (*Austrodanthonia spp*.), spear-grasses (*Austrostipa spp*.), Common Everlasting (*Chrysocephalum apiculatum*), Scrambled Eggs (*Goodenia pinnatifida*), Small St John's Wort (*Hypericum gramineum*), Narrow-leafed New Holland Daisy (*Vittadinia muelleri*) and Blue-bells (*Wahlenbergia spp*.). Shrubs are generally sparse or absent, though they may be locally common (NSW NPWS 2002).

Box-Gum Woodland is typically associated with more fertile lower parts of the landscape where resources such as water and nutrients are abundant.

According to the 'Box Gum Woodland' Guidelines (NSW NPWS 2002), if the following ecological attributes occur then the vegetation community in question qualifies as 'Box-Gum Woodland'; these include but are not limited to:

- The site occurs within the listed bioregions for known distributions;
- The site is treeless, but is likely to have supported White Box, Yellow Box or Blakely's Red Gum prior to clearing; and
- The site is predominantly grassy.

The flora species found within the proposed quarry area easement were compared to the characteristic species listed for this community. Based on the key for identifying 'Box-Gum Woodland' in this guide, it was concluded that although the study area occurs within NSW South western Slopes Bioregion (known distribution area), this community does not occur in the study area. The assessment was based on the following criteria:

- The absence of characteristic canopy and understorey flora species; and
- The sparse distribution of grassy groundcover throughout the study area.

Only canopy species that commonly occur in association with Box-Gum Woodland such as Candlebark *(Eucalyptus rubida),* Apple Box *(Eucalyptus bridesiana),* and Brittle Gum *(Eucalyptus mannifera)* were recorded at the study area.

Due to the absence of characteristic canopy and understorey species recorded during the assessment, for the purposes of this report the vegetation within the vicinity of the proposed works is not considered to meet the description of the Box-Gum EEC. Thus, a 7-part test was not required. The Box-gum woodland criteria established under the EPBC Act was not considered during this community assessment due to absence of these characteristic species.

3.1.3 Threatened Flora

Several threatened flora species listed under the TSC Act and EPBC Act have been recorded as occurring within five kilometres of the study area or in similar habitat in the vicinity. An assessment has been carried out to determine the potential for five of these flora species to occur within the subject site, as well as an assessment of habitat available within the study area for each species. The assessment (see Table 1, Appendix 2) found that due to the high degree of previous disturbance, the study area is not likely to provide suitable habitat for the Yass Daisy (*Ammobium craspedioides*), Pine Donkey Orchid

(*Diuris tricolor*), Austral Pilwort (*Pilularia novae-hollandiae*), Austral Toadflax *(Thesium australe)*, or the Button Wrinklewort *(Rutidosis leptorrhynchoides).*

In addition, no threatened flora species under the TSC Act and EPBC Act were found to study area during this ecological assessment. Thus, no further assessment was required.

3.1.4 Weeds

Eight weed species were found to occur within the study area, the most common including the Capeweed *(Arctotheca calendula),* Onion Grass *(Romuleanrosa var. australis)* and Paterson's Curse *(Echium plantagineum).* See Appendix 2 for complete list of flora recorded on site. Paterson's Curse is listed as a noxious weed within the Wagga Wagga Local Government Area under the *Noxious Weeds Act* 1993. As this species is listed as category 4, the growth and spread of this weed must be controlled according to the measures specified by the local control authority.

3.2 Fauna

3.2.1 Fauna and Fauna Habitat

Much of the study area provides limited habitat for fauna species due to the high degree of previous disturbance from quarry operations. In addition, the recent fires would have severely impacted functionality of the intact open woodland areas as wildlife corridor linkages to other areas of higher quality habitat. However, the sparse vegetation remaining at the study area may provide a dispersal corridor for more mobile species favouring open habitats, such as birds, through this sub-optimal habitat to surrounding areas of higher quality habitat.

The drainage line, running parallel to the existing gravel pits, is less disturbed that the remainder of the study area. Mature canopy trees occur in this area, as well as other habitat features including the ephemeral drainage line itself, dead stags, fallen logs, large rocks and tussock grasses.

Reptiles & Amphibians

The study area would provide limited habitat for reptile and amphibian species. Much of the study area has been highly disturbed due to previous quarry operations, leaving loose aggregations of rock unfavourable to the re-colonisation of reptile species and preventing the re-establishment of tussock grasses which would provide shelter habitat.

Some reptile habitat may be present along the drainage line present in the proposed truck waiting bay area in the form of embedded rocks and tussock grasses for the Pink-tailed Worm Lizard *(Aprasia parapulchella)* and the Striped Legless Lizard *(Delma impar).* Habitat may also be provided for common amphibian species such as the Striped Marsh Frog *(Limnodynastes peronii)* or the Common Eastern Froglet *(Crinia signifera)* in the existing sediment ponds lined with sedges such as *Carex appressa* and the ephemeral drainage line.

Mammals

The study area provides limited habitat for mammals due to the minimal number of hollow bearing trees at the study area. However, it is considered likely that the study area may provide a corridor for the dispersal of arboreal mammals such as the Squirrel Glider *(Petaurus norfolkensis)* given their local abundance in the region areas surrounding the proposed works. Additionally, the study area may also provide foraging habitat for the highly mobile species such as the Spotted-tailed Quoll *(Dasyurus maculatus).*

Birds

The study area provides limited foraging resources for both insectivorous and nectivorous birds, limited to some sparsely distributed flowering and fruiting shrubs and canopy trees (mainly *Eucalyptus* species). Parts of the study area including the ephemeral drainage line and parts of the access track also provides resources for some ground-foraging birds with an array of grasses and forbs, as well as the insects that inhabit these areas. Common fauna species such as the Variegated Wren *(Malurus lamberti)* and the Brown Thornbill *(Acanthiza pusilla)* were observed within the study area during the site visit.

See Appendix 2 for fauna species recorded during this assessment.

3.2.2 Threatened Fauna

A number of threatened fauna species listed under the TSC Act and/or EPBC Act have been recorded within the locality or in similar habitat to the study area. A habitat assessment for each species was completed to determine if suitable habitat is available and thus these threatened fauna species are likely to utilise the study area (see Table 2, Appendix 2).

Potentially suitable foraging or dispersal corridor habitat was found to occur within the proposed works areas for the Brown Treecreeper *(Climacteris picumnus victoriae),* Grey-crowned Babbler *(Pomatostomus temporalis),* Pink-tailed Worm Lizard *(Aprasia parapulchella)* and the Squirrel Glider *(Petaurus norfolkensis)* (Table 2, Appendix 2).

Seven-part tests of significance under Section 5A of the *Environmental Planning and Assessment Act* 1979 were completed for the aforementioned species to determine the significance of any impacts associated with the proposed quarry activities. The assessment found that due to the small areas of vegetation to be removed and/or disturbed and the availability of more suitable and less disturbed habitat within adjacent conservation areas that the proposed works will not have a significant impact on these species such that any local populations will be placed at risk of extinction (Appendix 3).

3.2.3 Introduced Species

The modification of bushland areas to agricultural land favours the establishment of introduced predatory species such as the European Fox *(Vulpes vulpes)*. Fox scat was observed within the disused quarry area at the western end of the study area. An abundance of European Sheep *(Ixodes ricinus)* scat was also found in the disused quarry area, confirming the study area's strong agricultural history. The proposed activity will not further encourage the establishment of pest or predatory species due to the restoration works that will occur following the finalisation of the activity.

4 Discussion

The proposed works will be focused on a previously operated quarry site. The quarry will be reactivated and soil will be extracted for the purposes of providing fill material to the Hume Highway Duplication Project until 2009. This area has been extensively cleared and disturbed by previous quarry operations for past duplications of sections of the Hume Highway in the 1990's, hindering the re-establishment of locally native vegetation.

The vegetation present on the southern side of the existing access track is currently in a moderately disturbed condition. It is unlikely that the access track will be widened in this area to provide machinery access to the quarry area. However, branches overhanging the existing access track may need to be lopped to allow for safe vehicle movement.

The vegetation adjacent to the proposed truck waiting bay is considered to be only lightly disturbed, and unaffected by the previous clearing operations or the fire in early 2006. Gravel stockpiled on this existing track will be removed prior to the commencement of quarry operations to accommodate a truck waiting bay due to the 1-way traffic flow through the study area. The creation of a truck waiting bay does not require the widening of the access track or the clearing of vegetation. It is considered that indirect effects of the truck waiting bay area may impact upon the small woodland remnant and ephemeral drainage line present in this area, however these will be minimised if the recommended mitigation measures are implemented prior to the commencement of the activity.

The study area was found to contain limited habitat for a range of common flora and fauna species. Several threatened flora and fauna species have previously been recorded within the study area and its surrounding environs; however none of these were recorded during the current survey due to the high degree of past disturbance.

The reactivation of the former quarry and associated upgrades of access tracks and waiting bay areas are not considered to represent a significant loss of habitat for threatened species within the locality. In addition, the implementation of the recommended mitigation measures within this report will ensure that any potential impacts to threatened and common species within the study area are minimised.

5 Conclusions

This ecological report has been prepared as an amendment to the original Environmental Assessment carried out for the Hume Highway Duplication Project to assess the impact of the quarry reactivation, its associated access track upgrade works truck waiting bay area. It describes the flora and fauna values at the study area at the time of survey, and specifies a number of on-going management recommendations to protect and restore the natural values of the study area.

The flora of the study area was surveyed and a fauna habitat assessment was undertaken to determine the diversity of species occurring or with the potential to occur within the study area. In addition, an assessment of the likelihood for the potential occurrence of threatened species, populations and communities within the study area was undertaken.

The proposed new access track works will impact an area of no more than 2 hectares of the 3.6 hectare site. The majority of vegetation within this area has been cleared for past quarry operations for the Hume Highway Duplication Projects during the 1990's, and most of what vegetation remains has been severely impacted by the intense fires in early 2006.

The vegetation remaining at the study area was assessed against the identification guidelines for the Box-Gum Woodland and was found not found to be consistent with this endangered ecological community due to a lack of characteristic canopy and ground cover species. Some good quality native vegetation was found to occur adjacent to the proposed truck waiting bay area; however this will not be directly impacted by the activity.

Although the proposed works will disturb some areas of native vegetation and thus fauna habitat, the areas to be impacted are already disturbed to varying degrees due to indirect effects from access tracks and previous activity relating to quarry operations. In addition, it is considered likely that the study area will improve in condition from its current state as a result of revegetation and restoration activities that will be implemented following the finalisation of the activity.

Although several threatened flora and fauna species have previously been recorded in the locality, the study area was found to contain minimal habitat for flora and fauna species due to the high degree of previous disturbance. In addition, no threatened flora or fauna species were recorded during the targeted site survey in the study area. Further, the Box-Gum Woodland endangered ecological community was not found to occur within the study area.

Despite its poor condition, it is considered likely that the study area still provides some foraging habitat and dispersal habitat for a number of threatened fauna species that have previously been recorded in the locality. These include the Brown Treecreeper *(Climacteris picumnus victoriae),* Grey-crowned Babbler *(Pomatostomus temporalis)* Pink-tailed Worm Lizard *(Aprasia parapulchella),* Striped Legless Lizard *(Delma impar)* Squirrel Glider *(Petaurus norfolkensis)* and the Spotted-tailed Quoll *(Dasyurus maculatus maculatus).*

The impact of the proposed quarry reactivation, access track upgrade, and the modification of the existing gravel pits to accommodate a truck waiting bay on threatened flora, fauna and communities known or with the likelihood of occurrence within the study area was undertaken. The assessment of significance (7-part test) found that the proposed works is unlikely to have a significant impact on these species and communities, provided the mitigation measures outlined in this report are implemented.

6 Recommendations

- Removal and disturbance of any existing fallen timber or rocks, throughout the study area, should be minimised or prevented. If these habitat features are to be removed, they should be placed in an appropriate site nearby.
- Fallen logs and branches provide valuable habitat for a range of ground-dwelling fauna. It is recommended that, in as far as practical, any lopped branches removed should stay on site to provide habitat. To achieve this, branches and logs could be sawn down to a manageable length and simply left *in situ.* Chipping and spreading chipped material is also an appropriate alternative, particularly as a weed suppressant on the access track.
- Monitoring of weed infestation is recommended at regular intervals after works have been undertaken. If required, weed control should be undertaken as appropriate. This is particularly important on the edge of works, to prevent spread into adjacent intact vegetation.
- All machinery brought onto site will be washed to remove any seeds from tyres to prevent further weed invasion;
- It is recommended that works on the access track avoid the removal of large branches on mature canopy trees as much as possible. These branches may provide potential nesting sites for threatened woodland birds, foraging habitat and platforms to the enable the movement of squirrel gliders. In addition, all canopy trees to be retained in proximity to the works are to be appropriately fenced off prior to works commencing within this area.
- Removal of vegetation on the access tracks for widening should be minimised as much as practicable.
- Access is to be restricted to the ephemeral drainage line and surrounding vegetation by fencing or parawebbing prior to the commencement of works.
- Appropriate erosion and sediment controls e.g. bunding or silt fences should be installed prior to the commencement of works.
- All site personnel are to be briefed on the occurrence of threatened species, prior to commencing works as part of the site induction. It is recommended that areas where these species are known to occur are clearly identified to site personnel, and restricted as much as practical during operation of the quarry to minimise the potential for direct impact to these species

7 References

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APPENDIX 1 : Threatened Species Habitat Assessment

TABLE 1: HABITAT ASSESSMENT FOR THREATENED FLORA RECORDED WITHIN 5 KILOMETRES OF THE STUDY AREA

Flora Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
Yass Daisy *Ammobium craspedioides*	V	V	This species is found in dry forest, Box-Gum Woodland and secondary grassland derived from clearing of these communities. It grows in association with a large range of eucalypts (*Eucalyptus blakelyi, E. bridgesiana, E. dives, E. goniocalyx, E. macrorhyncha, E. mannifera, E. melliodora, E. polyanthemos, E. rubida*). The species is apparently unaffected by light grazing, as populations persist in some grazed sites. Found in a number of cemeteries in the region.	This species was not observed during field survey at the site, nor was it recorded during intensive pre-clearing surveys of the Northern Hume Duplication Project. Although some of the commonly co-occurring species such as *Eucalyptus mannifera, E. macrorhyncha* and *E. goniocalyx* were recorded within the proposed quarry site, suitable ground cover habitat was not present for the Yass Daisy. Ground cover species are generally limited within the proposed footprint of works due to rocky subsoil that remains in these highly impacted areas. Thus, it is unlikely that this species or its habitat occurs within the most impacted areas of the study site. However, the remnant grassy woodland that surrounds the proposed truck waiting station on eastern side of the study area may provide some suitable habitat for the species. This area it not likely to impacted directly by any proposed development. However, indirect impacts such as erosion, weed infestation, etc should be mitigated. If the recommended mitigation measures (refer to Section 6) are implemented, there is not likely to be impact to any potential habitat areas. *Thus it is considered that this species is unlikely to occur. No further assessment is required.*

Flora Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
Pine Donkey Orchid *Diuris tricolor*	V	V	This species grows in association with species such as *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta*, Ironbark and Acacia shrubland. The understorey is often grassy with herbaceous plants such as Bulbine species. Flowers from September to November or generally spring. The species is a tuberous, deciduous terrestrial orchid and the flowers have a pleasant, light sweet scent. Disturbance regimes are not known, although the species is usually recorded from disturbed habitats. The Pine Donkey Orchid grows in sclerophyll forest among grass, often with native Cypress Pine (*Callitris* spp.). It is found in sandy soils, either on flats or small rises. Also recorded from a red earth soil in a Bimble Box community in western NSW. Usually recorded as common and locally frequent in populations, however only one or two plants have also been observed at sites. The species has been noted as growing in large colonies.	This species was not observed during field survey nor was it recorded during intensive pre-clearing surveys of the Northern Hume Duplication Project. None of the associated species or ecological communities were recorded within the proposed quarry site. Although this species is often recorded in disturbed sites, it is normally recorded as growing in large colonies. Considering that no individuals of the species were located, despite the survey occurring within the known flowering period, this species is not likely to occur on site. In addition, the rocky sub-soil remaining within the footprint of the proposed works does not provide suitable soil/ habitat components for the species to become established. *Thus it is considered that this species is unlikely to occur. No further assessment is required.*
Austral Pilwort *Pilularia novae-hollandiae*	-	E	Austral Pillwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. Most of the records in the Albury-Urana area were from table drains on the sides of roads. The ACT record was from a subalpine grassy plain. This species is probably ephemeral (especially in the drier parts of its range), appearing when soils are moistened by rain.	This species was not observed during field survey nor was it recorded during intensive pre-clearing surveys of the Northern Hume Duplication Project. No natural swamps or permanent waterways occur within the study area. A number of ephemeral drainage lines and two ponds, created from the previous excavation of the site, occur within the footprint of the proposed works. There may be some potential for the species to occur in or around the pond on the lower south west section of the quarry, amongst the sedges and grasses. However, as the only known population for NSW occurs at Lake Cowal, a further 164 km to the north and the strong agricultural history at the site, the occurrence of this species is

Flora Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
				considered unlikely. *Thus it is considered that this species is unlikely to occur. No further assessment is required*
Austral Toadflax, Toadflax *Thesium australe*	V	V	The Austral Toadflax occurs in grassland or grassy woodland. It is often found in damp sites in association with Kangaroo Grass (*Themeda australis*). A root parasite takes water and some nutrients from other plants, especially Kangaroo Grass.	This species was not observed during the field survey, nor was it recorded during intensive pre-clearing surveys of the Northern Hume Duplication Project. Although there were some damp sites along parts of the easement, *Themeda australis* was not recorded on site. The typical grassland environment associated with this species does not occur on site. This species is not considered likely to occur on site. *Thus it is considered that this species is unlikely to occur. No further assessment is required*
Rutidosis leptorrhynchoides Button Wrinklewort	E	E	Occurs in Box-Gum Woodland, secondary grassland derived from Box-Gum Woodland or in Natural Temperate Grassland; and often in the ecotone between the two communities. Grows on soils that are usually shallow, stony red-brown clay loams; tends to occupy areas where there is relatively less competition from herbaceous species (either due to the shallow nature of the soils, or at some sites due to the competitive effect of woodland trees). Exhibits an ability to colonise disturbed areas (e.g. vehicle tracks, bulldozer scrapings and areas of soil erosion). Normally flowers between December to March; plants do not usually flower until their second year.	This species was not observed during the field survey nor was it recorded during intensive pre-clearing surveys of the Northern Hume Duplication Project. There is some potential for this species to occur due to its ability to colonise disturbed areas such as vehicle tracks and areas of soil erosion. However, as this species tends to grow in shallow, stony red-brown clay loams which do not resemble the remaining stony-sand based sub-soils present on within the footprint of the proposed works, the suitability of the habitat is limited. This species is not considered likely to occur on site. *Thus it is considered that this species is unlikely to occur. No further assessment is required*

TABLE 2: HABITAT ASSESSMENT FOR THREATENED FAUNA RECORDED WITHIN 5 KILOMETRES OF THE STUDY AREA

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
Australian Painted Snipe *Rostratula australis*	V	-	Usually found in shallow inland wetlands, either freshwater or brackish, that is either permanently or temporarily filled. A cryptic bird that is often overlooked. Usually only single birds are seen, though larger groups of up to 30 have been recorded. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds. The Murray–Darling drainage system appears to have been a key area for this species, as many records of this species come from this region.	This species was not observed during the field survey. Due to the lack of wetlands, freshwater or brackish water within the site, this species or its habitat is not likely to occur on site. *Thus it is considered that this species is unlikely to occur. No further assessment is required.*
Barking Owl *Ninox connivens*	-	V	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as *Acacia* and *Casuarina* species, or the dense clumps of canopy leaves in large *Eucalypts*. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Breeding occurs during late winter and early spring. The Barking Owl is found throughout Australia except for the central arid regions and Tasmania. It is quite common in parts of northern Australia, but is generally considered uncommon in southern Australia. It has declined across much of its distribution across NSW and now occurs only sparsely. It is most frequently recorded on the western slopes and plains. It is rarely recorded in the far west or in coastal and escarpment forests (DECC 2007).	This species was not observed during the field survey. Due to the absence of permanent creek lines within the proposed quarry site, it is considered unlikely that the site provides suitable roosting habitat for this species. The greater study area is considered likely to contain some suitable foraging resources for this species, however as large tracts of bushland occur to the east and south east of the site with an abundance of watercourses, it is considered likely that this species would utilise the less disturbed habitat further to the east across the Hume Highway. *Thus it is considered that this species is unlikely to occur. No further assessment is required.*
Black-chinned Honeyeater (eastern subsp.) *Melithreptus gularis gularis*			Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*Eucalyptus albens*), Grey Box (*Eucalyptus microcarpa*), Yellow Box (*Eucalyptus melliodora*) and Forest Red Gum (*Eucalyptus tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. The	This species was not observed during the field survey. Additionally, vegetation types that the Black-chinned Honeyeater is often associated with do not occur at the site. Although the proposed quarry site is within the species known range, the ecological community that exists within the footprint

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
			nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage. It is a compact, suspended, cup-shaped nest. The subspecies is widespread, from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond River district. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions (DECC 2007).	of the proposed works does not provide suitable nesting habitat for this species. The vast majority of canopy species remaining in these areas are not mature and/ or have been impacted by recent fires, only providing limited foliage cover for nesting. The greater study area and the grassy woodland surrounding the truck waiting station is considered likely to contain some suitable foraging/ nesting resources for this species, however as large tracts of bushland occur to the east and south east of the site with an abundance of mature canopy trees it is considered likely that this species would utilise the less disturbed habitat further to the east across the Hume Highway. *Thus it is considered unlikely that suitable habitat occurs within the study area and no further assessment is required.*
Diamond Firetail *Stagonopleura guttata*	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting. Has been recorded in some towns and near farm houses.	This species was not observed during survey. Optimal nesting habitat in the form of shrubby understorey is not available due to the highly modified and open nature of the site. Additionally, the site is not likely to support the appropriate food resources for this species. Diamond Firetails feed exclusively on seeds and insects in grassy groundcover habitat. This type of habitat is extremely limited within the footprint of the proposed works, thus their occurrence is unlikely. *Thus it is considered unlikely that suitable habitat occurs within the study area and no further assessment is required.*
Brown Treecreeper	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other	This species was not observed during survey. However, there is some potential for this species to occur considering the presence of stringybarks and

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
Climacteris picumnus victoriae			rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. When foraging in trees and on the ground, they peck and probe for insects, mostly ants, amongst the litter, tussocks and fallen timber, and along trunks and lateral branches; up to 80% of the diet is comprised of ants; other invertebrates (including spiders, insects larvae, moths, beetles, flies, hemipteran bugs, cockroaches, termites and lacewings) make up the remaining percentage; nectar from Mugga Ironbark (E. sideroxylon) and paperbarks, and sap from an unidentified eucalypt are also eaten, along with lizards and food scraps; young birds are fed ants, insect larvae, moths, craneflies, spiders and butterfly and moth larvae. Hollows in standing dead or live trees and tree stumps are essential for nesting.	box gum in the surrounding canopy vegetation. It is likely that these areas may provide suitable foraging habitat. The proposed works will not however impact upon these potential foraging areas as no large rough barked canopy trees will be removed. No suitable hollows in trees or stumps were observed within the area of proposed works or in the surrounds. This indicates that there is no nesting habitat for the species in around the site. A number of individuals have been observed foraging in the woodlands in close vicinity to the quarry, thus it is likely that this species may use the sub-optimal habitat provided by the drainage line as a dispersal corridor to higher quality habitat. Due to known occurrence of this species within the greater area an ***Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed activity on this species (Appendix 2).***
Gang Gang Cockatoo *Callocephalon fimbriatum*	-	V	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. May also occur in sub-alpine Snow Gum Eucalyptus pauciflora woodland and occasionally in temperate rainforests. Move to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting.	This species was not observed during survey. The dry woodlands surrounding the proposed truck waiting station may provide foraging and shelter habitat for the species during the winter months considering the species preference for box woodlands during this period. After recent fires the vegetation surrounding the existing quarry site would not provide suitable foraging habitat for the species, however in the following months, food resources are likely to return with the canopy regrowth. These communities are not likely to be affected by the proposed works as only the occasional branch will be lopped in these areas. No old growth canopy vegetation with hollows is available to provide nesting habitat for the species.

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
				Thus it is consider unlikely that any significant impacted will be incurred on the areas of suitable habitat. No further assessment is required.
Grey Crowned Babbler *Pomatostomus temporalis*	-	V	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Flight is laborious so birds prefer to hop to the top of a tree and glide down to the next one. Birds are generally unable to cross large open areas. Live in family groups that consist of a breeding pair and young from previous breeding seasons. A group may consist of up to fifteen birds. All members of the family group remain close to each other when foraging. A soft 'chuck' call is made by all birds as a way of keeping in contact with other group members. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. They build and maintain several conspicuous, dome-shaped stick nests about the size of a football. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, and old nests are often dismantled to build new ones. Breed between July and February. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year. Territorial disputes with neighbouring groups are frequent and may last up to several hours, with much calling, chasing and occasional fighting.	This species was not observed during field survey. The small section of grassy woodland that occurs in close vicinity to the truck waiting station and along the access track may provide some foraging and nesting habitat for this species. As no direct works has been proposed for these areas, it is unlikely that this habitat will be impacted. The species is generally unable to cross large open spaces; hence it is unlikely that the species would utilise the bordering vegetation surrounding the area of proposed works in the existing quarry. Although the suitable foraging/ nesting habitat available on site it is not likely to be impacted by the proposed works, the potential for the species to occur on site and within the greater study area is likely. In addition the species has recently been observed along the proposed Hume Highway alignment. Thus, an ***Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed activity on this species (Appendix 2).***
Regent Honeyeater *Xanthomyza phrygia*	E	E1	Inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. These habitats must have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are	This species was not observed during field survey. The access track area contains some suitable open Eucalypt vegetation as a foraging resource for this species, although no key Eucalypts commonly associated with the Regent Honeyeater occur. The study area is outside of the known breeding range for this species, thus resources provided by the site are unlikely to be suitable for breeding

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
			seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. This species is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: *Eucalyptus microcarpa*, *E. punctata*, *E. polyanthemos*, *E. moluccana*, *Corymbia robusta*, *E. crebra*, *E. caleyi*, *C. maculata*, *E. mckieana*, *E. macrorhyncha*, *E. laevopinea*, and *Angophora floribunda*. Nectar and fruit from the mistletoes *Amyema miquelii*, *A. pendula*, *and A. cambagei* are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings. A shrubby understorey is an important source of insects and nesting material. The species can undertake large-scale nomadic movements in the order of hundreds of kilometres. It is likely that movements are dependent on spatial and temporal flowering and other resource patterns (DECC 2007).	habitat. Although some limited potential foraging habitat occurs within the study area, it is considered likely that the surrounding bushland areas with greater tracts of vegetation would provide more suitable habitat for this species. In addition, as the proposed works will only remove a small amount of potential foraging habitat, it is unlikely to affect this species. *Thus the proposed works is not considered likely to impact foraging resources in the locality for this highly mobile species. No further assessment required.*
Superb Parrot *Polytelis swainsonii*	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Nest in small colonies, often with more than one nest in a single tree. Breed between September and January. May forage up to 10 km from nesting sites, primarily in grassy box woodland. Feed in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants. Also eaten are fruits, berries, nectar, buds, flowers, insects and grain.	This species was not observed during field survey. The grassy woodland vegetation along the access track and on the eastern side of the truck waiting station may provide some foraging habitat for the species in the form of flowering *Eucalypt* species and grass seeds. However, considering this vegetation is not likely to be removed during the proposed quarry works and the Superb Parrot's high degree of mobility and activity whilst foraging, no impact is considered likely to occur. Additionally, hollow bearing trees or known nesting trees were not observed during the survey, rendering the site unsuitable for roosting or breeding habitat. *Thus as no nesting habitat occurs on site and considering the species is high mobile in its foraging habits, no impact is likely to occur. No further assessment required.*

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
Swift Parrot *Lathamus discolor*	E	E1	Migratory to south-eastern mainland in Australia in February-April to feed on winter blossoms, and returns to breed in Tasmania between September and November. On the mainland they occur in a wide variety of habitats, depending on where there are flowering blossoms. They feed alone and in parties, mostly within the topmost branches of eucalypt trees. If sufficient food is available within an area they may remain for about a week, returning to the same tree each night to roost. Breeding occurs in Tasmania and nearby islands. The details of their breeding cycle are not well known. The nesting period is long and only one brood is reared per season. The nest is in a hollow limb or hole often high in a tree. Incubation lasts about 20 days and young fledge in about 6 weeks. Principal foods are eucalypt nectar and pollen, as well as sugary lerps; although banksia nectar, insects and their larvae, seeds (e.g. grass) fruits and berries (including cultivated species) and some vegetative matter are also eaten. These parrots only venture onto the ground when drinking and feeding on fallen seeds and flowers. In Western Sydney, it feeds in winter flowering eucalypts in remnant woodlands and isolated strands of mature trees in urban areas: *Eucalyptus crebra* and *E. robusta.*	This species was not observed during the field survey. The site is clearly outside the geographic range for nesting for this species, as nesting is restricted to Tasmania. Potential foraging habitat exists within the vicinity of the site in the form of grass nectar/ seeds and *Eucalyptus/ Acacia sp*. However, as the proposed works only require the removal of a few juvenile *Acacia* and *Eucalytpus* trees, impacts upon the species local foraging habitat are unlikely. *As such further assessment is not deemed necessary*.
Speckled Warbler *Pyrrholaemus sagittatus*	-	v	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense	This species was not observed during field survey. Although this species occurs in a wide range of *Eucalytpus* dominated communities, Speckled Warblers tend to prefer large, relatively undisturbed remnant patches. As the site and the surrounding woodland area is highly disturbed from previous quarry practices and a high intensity fire in 2006, this species is unlikely to utilise the habitat available on site in its present condition. The small sections of grassy woodland retained close to the truck waiting station and along the access track may provide some limited foraging habitat for the species. Optimal nesting habitat is not available on site as no low dense vegetation or clusters of fallen branches appeared to occur on site or in its close surrounds. It is likely that the majority of the fallen

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
			plant, often among fallen branches and other litter. Speckled Warblers often join mixed species feeding flocks in winter, with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills.	timber would have been removed by the intense fires. Larger tracts of woodland occur on the eastern side of the Hume Highway, thus it is more likely that this species would utilise these areas for foraging rather than the sub-optimal habitat provided by the study area. *As such further assessment is not deemed necessary*.
Turquoise Parrot *Neophema pulchella*	-	V	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	This species was not observed during field survey. The small sections of grassy *Eucalytpus* woodland retained close to the truck waiting station and along the access track may provide some limited foraging habitat for the species. However as larger tracts of grassy *Eucalyptus* woodland occur on the eastern side of the Hume highway and lightly wooded farmland with creek lines in the greater area, it is more likely that this species would utilise these areas for foraging rather then areas available on site. No hollowing bearing trees were observed on site. Therefore, no nesting or denning habitat is available on site for the species. *As such further assessment is not deemed necessary*.
Southern Bell Frog *Litoria raniformis*	V	E	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn (Sept to April) following a rise in water levels. During the breeding season animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crops.	No permanent or ephemeral swamps occur within the vicinity of the site. Two man-made ponds on site would be too small and stagnant to provide viable foraging/ shelter habitat for the species. *Thus it is considered unlikely that suitable habitat occurs within the study area and no further assessment is required.*

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
			Tadpoles require standing water for at least 4 months for development and metamorphosis to occur but can take up to 12 months to develop. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks. Prey includes a variety of invertebrates as well as other small frogs, including young of their own species.	
Booroolong Frog *Litoria booroolongensis*	-	E	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Sometimes bask in the sun on exposed rocks near flowing water during summer. Breeding occurs in spring and early summer and tadpoles metamorphose in late summer to early autumn. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	This species was not observed during survey. No permanent streams with rocky and vegetated edges occur within the study area. *Thus it is considered unlikely that suitable habitat occurs within the study area and no further assessment is required.*
Macquarie Perch *Macquaria australasica*	V	-	Macquarie perch are found in both river and lake habitats; especially the upper reaches of rivers and their tributaries. They are quiet, furtive fish that feed on aquatic insects, crustaceans and molluscs. Macquarie perch spawn in spring or summer in shallow upland streams or flowing parts of rivers. Females produce around 50,000-100,000 eggs which settle among stones and gravel of the stream or river bed.	No permanent lakes or rivers occur within the vicinity of the site. The man-made ponds on site would be too small to provide viable foraging/ shelter habitat for the species and would not provide linkages to larger rivers for this highly migratory and mobile species. *Thus it is considered unlikely that suitable habitat occurs within the study area and no further assessment is required.*
Murray Cod *Maccullochella peelii peelii*	V	-	Murray cod habitat varies greatly, from quite small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow-flowing, often silty rivers in the alluvial lowland reaches of the Murray-Darling Basin. It should be noted that Murray cod are not just inhabitants of the lowland reaches of the Murray Darling Basin (MDB), as is commonly believed. Murray cod had, and in some cases still do have, a significant presence in the upland reaches of the MDB. At the time of European settlement Murray cod appear to have had an altitudinal limit of around 700 metres in the southern half of the MDB, and around 1000 metres in the northern half. Murray cod prefer deep holes with cover in the form of large rocks,	No permanent lakes or rivers occur within the vicinity of the site. The man-made ponds on site would be too small to provide viable foraging/ shelter habitat for the species and would not provide linkages to larger rivers for this highly migratory and mobile species. *Thus it is considered unlikely that suitable habitat occurs within the study area and no further assessment is required.*

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
			fallen trees, stumps, clay banks and overhanging vegetation.	
Striped Legless Lizard *Delma Impar*	V	V	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Its habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, spear-grasses *Austrostipa* spp. and Poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter. The species actively hunts for spiders, crickets, moth larvae and cockroaches. Two papery eggs are laid in early summer. Goes below ground or under rocks or logs over winter.	This species was not observed during field survey. However, there may be some limited habitat for this species in the ephemeral drainage line with rocky outcrops and surrounding grassy woodland on the eastern side of the truck waiting station. Potential habitat also occurs along the more vegetated parts of the access track. Within the footprint of the proposed works there is an abundance of loose surface rock which may also provide limited shelter habitat for the species. This species is sometimes found in modified grasslands with significant surface rock. Additionally, remnant box-gum woodland and tussock grasslands in which this species occurs are found within the greater surrounding areas. Thus based on these findings, there is potential for the species to occur on site. Thus, ***an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed activity on this species (Appendix 2).***
Pink-tailed Worm Lizard *Aprasia parapulchella*	V	V	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows.	This species was not observed during field survey. Predominately grassy ground layers were not present within the proposed footprint of works. Some short- grazed grasses occurred along the access track entry and on the eastern side of the truck waiting station; however this type of grassland would not provide the appropriate shelter habitat for the species. Within the footprint of the proposed works there is an abundance of loose surface rock which may provide limited shelter habitat for the species. However, some large rocky outcrops occur in the ephemeral drainage line close to the truck waiting station which may provide some shelter habitat for this species. Thus, based on these findings there

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
				is some potential for the species to occur on site. Thus, ***an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed activity on this species (Appendix 2).***
Squirrel Glider *Petaurus norfolcensis*	-	V	The species inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. They prefer mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. The species require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	This species was not observed during field survey. Although areas surrounding the existing quarry may provide foraging habitat and a wildlife corridor to den/ shelter sites, the quarry itself is not likely to provide adequate habitat features for the species to utilise given that this area only contains minimal flower resources for foraging. No hollow bearing trees were observed on site or in the close surrounds. Thus no den habitat is available on site. Considering the proposed works is expected to be kept within the existing footprint from previous quarry practices, it is not likely to impact local population of the species. However, as the species has been recorded in surrounding areas along the Hume highway during recent monitoring surveys, the vegetation surrounding the proposed truck waiting station is expected to provide a wildlife corridor for the species. Thus, ***an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed activity on this species (Appendix 2).***
Eastern Long-eared Bat *Nyctophilus bifax*	-	V	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. Roosts in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage of rainforest trees and under bark.	Sub-tropical rainforest, moist *Eucalyptus* forest and swamp forest vegetation does not occur within the site, or in its surrounding areas. Suitable hollows in trees or stumps were not observed within the area of proposed works or in the surrounds. This indicates that there is no roosting habitat for the species in and the around the site.

Fauna Species Name	National Status	NSW Status	Habitat Requirements	Likelihood of Occurrence
				Thus it is considered unlikely that suitable habitat occurs within the study area and no further assessment is required.
Spotted-tailed Quoll *Dasyurus maculatus maculatus*	E	V	The Spotted-tailed Quoll has been recorded across a range of habitats, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. It is mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and may raid possum and glider dens and prey on roosting birds. This species uses 'latrine sites', often on flat rocks among boulder fields and rocky cliff-faces; these may be visited by a number of individuals; latrine sites can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. It consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects; also eats carrion and takes domestic fowl. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares; usually traverse their ranges along densely vegetated creek-lines. Average litter size is five; both sexes mature at about one year of age (DECC 2007).	Suitable sheltering/ nesting habitat is considered unlikely to occur within the proposed area of works provides suitable due to the lack of over mature trees, fallen logs and rock crevices. It is considered likely that the grassy woodland that occurs along the access track and on the eastern side of the truck waiting station provides suitable foraging resources for the Spotted-tailed Quoll, particularly due to their non-specific habitat requirements and large home ranges. Thus, ***an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed activity on this species (Appendix 2).***

TSC: Threatened Species Conservation Act (1995), EPBC: Environment Protection and Biodiversity Conservation Act (1999).
V – Listed as a vulnerable species, E - Listed as an endangered species.

APPENDIX 2 : Flora and Fauna Species Recorded Onsite

Flora Species Recorded for Aeroplane Quarry

Family	Scientific Name	Common Name
FABACEAE - MIMOSOIDEAE	*Acacia dealbata*	Silver Wattle
FABACEAE - MIMOSOIDEAE	*Acacia paradoxa*	Kangaroo Thorn
FABACEAE - MIMOSOIDEAE	*Acacia implexa*	Hickory Wattle
MYRSINACEAE	*Anagallis arvensis* *	Scarlet Pimpernel
ASTERACEAE	*Arctotheca calendula* *	Capeweed
POACEAE	*Austrodanthonia spp.*	Wallaby Grass
POACEAE	*Austrostipa spp.*	Spear Grass
POACEAE	*Bothriochloa macra*	Red Grass
POACEAE	*Briza maxima**	Quaking Grass
CYPERACEAE	*Carex appressa*	Tall Sedge
ASTERACEAE	*Cassinia arcuata*	Chinese Shrub
ASTERACEAE	*Cassinia aculeata*	Dolly Bush
POACEAE	*Dichelachne micrantha*	Shorthair Plumegrass
BORAGINACEAE	*Echium plantagineum**	Paterson's Curse
POACEAE	*Enneapogon nigricans**	Nineawn Grass
GERANIACEAE	*Erodium brachycarpum*	Heronbills
MYRTACEAE	*Eucalytpus polyanthemos*	Red Box
MYRTACEAE	*Eucalyptus bridesiana*	Apple Box
MYRTACEAE	*Eucalytpus rubida*	Candlebark
MYRTACEAE	*Eucalytpus mannifera*	Brittle Gum
MYRTACEAE	*Eucalytpus macrorhyncha*	Red Stringybark
MYRTACEAE	*Eucalytpus goniocalyx*	Long-leaved Box
DILLENIACEAE	*Hibbertia obtusifolia*	Grey Guinea Flower
ASTERACEAE	*Hypochaeris radicata* *	Catsear
POACEAE	*Hordeum leporinum* *	Barley Grass
GERANIACEAE	*Geranium solanderi*	Native Geranium
FABACEAE - FABOIDEAE	*Pultenaea subspicata*	Low Bush Pea
POLYGONACEAE	*Rumex browneii* *	Dock species
IRIDACEAE	*Romulearosea var australis* *	Onion Grass
ASTERACEAE	*Senecio hispidulus*	Hill Fireweed
ASTERACEAE	*Senecio quadridentatus*	Cotton Fireweed
CARYOPHYLLACEAE	*Scleranthus biflorus*	Cushion-bush
FABACEAE - FABOIDEAE	*Trifolium sp.* *	Clover

**Denotes introduced species ^Denotes threatened species*

Fauna Species Recorded within the Study Area

Common Name	Scientific Name	Record Type
Variegated Wren	*Malurus lamberti*	Observed
Red Capped Robin	*Petroica goodenovii*	Observed
Flame Robin	*Petroica phoenicea*	Observed
Brown Thornbill	*Acanthiza pusilla*	Observed
Common Wombat	*Vombatus ursinus*	Scat
European Sheep	*Ixodes ricinus*	Scat
European Fox	*Vulpes vulpes*	Scat
Macropod species	*Macropodia spp.*	Scat

APPENDIX 3 : Assessment of Significance (7-part tests)

The following threatened species, as listed under the NSW *Threatened Species Conservation Act* 1995, have been assessed in this report using the Seven Part Assessment of Significance under Part 5A of the *Environmental Planning & Assessment Act* 1979.

The Department of Environment and Heritage, in its Information Circular No 2 (NPWS Threatened Species Management, 1996) states that "species known to occur or considered likely to occur within the study area can either be assessed individually or as groups of similar species based on taxonomic similarity or habitat specialisation". Therefore, where appropriate, the following Seven Part Tests of Significance will cover groups of similar species likely to occur on the site.

1) Threatened Woodland Birds: Diamond Firetail (*Stagonopleura guttata*), Brown Treecreeper (*Climacteris picumnus victoriae*), Grey Crowned Babbler (*Pomatostomus temporalis temporalis*), and Hooded Robin (*Melanodryas cucullata cucullata*)

The Diamond Firetail (*Stagonopleura guttata*) is listed as vulnerable under the *Threatened Species Conservation Act* (1995).

The Diamond Firetail is a most striking finch with a bright red bill, and red eyes and rump. The white throat and lower breast are separated by a broad black breast-band that extends into the strongly white-spotted, black flanks. It has a grey back and head, and ashy-brown wings. The call is a plaintive, drawn-out, nasal 'twoo-wheee'. Flight is low and direct, with slight undulations.

The Diamond Firetail occupies eucalypt woodlands, forests and mallee where there is a grassy understorey. Firetails build bottle-shaped nests in trees and bushes, and forages on the ground. This species is often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. It feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season) (DECC 2007).

The Brown Treecreeper (*Climacteris picumnus victoriae)* is listed as vulnerable under the *Threatened Species Conservation Act* (1995).

The Brown Treecreeper, Australia's largest treecreeper, is a grey-brown bird with black streaking on the lower breast and belly and black bars on the undertail. Pale buff bands across the flight feathers are obvious in flight. The face is pale, with a dark line through the eye, and a dark crown. Sexes differ slightly in all plumages, with small patches of black and white streaking on the centre of the uppermost breast on males, while the females exhibit a rufous and white streaking. Juveniles differ from adults mainly by the pattern of the under-body, and by their pale bill and gape. Subspecies *victoriae* is distinguished from subspecies *picumnus* by colour differences on the face, body and tail markings (DECC 2007).

This species is found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains (DECC 2007).

When foraging in trees and on the ground, they peck and probe for insects, mostly ants, amongst the litter, tussocks and fallen timber, and along trunks and lateral branches; up to 80% of the diet is comprised of ants; other invertebrates (including spiders, insects larvae, moths, beetles, flies, hemipteran bugs, cockroaches, termites and lacewings) make up the remaining percentage; nectar from Mugga Ironbark (E. sideroxylon) and paperbarks, and sap from an unidentified eucalypt are also eaten, along with lizards and food scraps; young birds are fed ants, insect larvae, moths, craneflies, spiders and butterfly and moth larvae. Hollows in standing dead or live trees and tree stumps are essential for nesting (DECC 2007).

The Grey Crowned Babbler (*Pomatostomus temporalis temporalis)* is listed as vulnerable under the *Threatened Species Conservation Act* (1995).

The Grey-crowned Babbler is the largest of the four Australian babblers, reaching to 30 cm long. Its distinctive bill is scimitar-shaped, long and heavy. The broad white eyebrow and a pale grey crown-stripe are other distinguishing characters. A dark band passes from the bill through the eye, separating the pale throat and brow to giving a 'masked' look. It has dark greyish-brown upperparts and is paler brown on the underparts, grading to a whitish throat. It is distinctive in flight, showing white tips to the tail feathers, and orange-buff patches in the broad, rounded wings. Young birds have dark brown eyes, with the iris becoming paler with age, reaching a yellow colour by about three years (DECC 2007).

The Grey Crowned Babbler inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. There flight is laborious so birds prefer to hop to the top of a tree and glide down to the next one. Birds are generally unable to cross large open areas. The species lives in family groups that consist of a breeding pair and young from previous breeding seasons. A group may consist of up to fifteen birds. All members of the family group remain close to each other when foraging. A soft ‘chuck’ call is made by all birds as a way of keeping in contact with other group members (DECC 2007).

The species feeds on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. They build and maintain several conspicuous, dome-shaped stick nests about the size of a football. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, and old nests are often dismantled to build new ones. They generally breed between July and February (DECC 2007).

Territories range from one to fifty hectares (usually around ten hectares) and are defended all year. Territorial disputes with neighbouring groups are frequent and may last up to several hours, with much calling, chasing and occasional fighting.

The Hooded Robin (*Melanodryas cucullata cucullata)* is listed as vulnerable under the *Threatened Species Conservation Act* (1995).

The Hooded Robin is a large Australian robin reaching 17 cm in length. The male is strikingly marked in black and white, with a bold black hood extending down a white breast. The back is black with distinct white shoulder and wing-bar. The tail is black, with prominent white side-panels. Females and juveniles are duller, with light brownish-grey upperparts, but the same striking black and white wings. Flight is short and swiftly undulating. The call is a series of descending, fading, mellow notes.

The Hooded Robin prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. The species requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. They often perch on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey. Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season. The species may breed any time between July and November, often rearing several broods. The nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground (DECC 2007).

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,"

These species are known to nest in bushes, the forks of trees or in hollows. No nests or hollows were observed during the survey of the site. In addition, due to the limited mature canopy species present within the footprint of the proposed works and the sparse nature of the shrubs and immature canopy trees present, it is considered that only minimal potential nesting habitat occurs within the area of proposed works and its surrounds. The proposed works will remove a small amount of already disturbed ground vegetation and a small section of regrowth vegetation. However, it is considered that the less disturbed remnant open box/ stringybark woodland with grassy understorey on the eastern side of the proposed truck waiting station and the southern side of the access track, provides better quality habitat for breeding for the species. Furthermore, the remaining grassy woodlands on the eastern side of the Hume Highway in close vicinity to the quarry has higher quality habitat with intact vegetation structure. This vegetation community would also provide better quality nesting habitat for these species. Thus it is considered unlikely that the proposed works will remove any potential breeding habitat and will not cause significant adverse effects on the aforementioned species lifecycles such that any local populations of the are placed at risk of extinction.

b) "in the case of an endangered population, whether the action proposed is likely to have an adverse affect 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,"

No endangered populations of the Diamond Firetail, Hooded Robin, Brown Treecreeper and Grey-crowned Babbler have been identified in the locality.

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

- *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*
- *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, Hooded Robin, Brown Treecreeper and Grey-crowned Babbler are listed as a threatened species; therefore this question is not applicable.

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

- *the extent to which habitat is likely to be removed or modified as a result of the action proposed,*
- *whether an area of habitats is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

- *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 regrowth canopy and ground cover vegetation that is likely to be removed during the proposed works may provide very limited foraging and nesting habitat for these species. Given that this vegetation is in a highly disturbed state, and is unlikely to represent significan habita for these speces due to past quarry practices and high intensity fires that occured in the area, the proposed works are not likely to cause a significant impact on local populations of these species. Considering that large tracts of less disturbed grassy woodland communities with greater diversity of vegetation structure occur outside of the footprint of the proposed works. Hence, it is not expected that the vegetation to be removed constitutes a large amount of potential habitat vital to the survival of local populations of Diamond Firetail, Hooded Robin, Brown Treecreeper and Grey-crowned Babbler.

Due to the existing high degree of previous disturbance in the proposed area of works, it considered unlikely that such works will fragment or isolate any known or potential foraging/ shelter habitat for the Diamond Firetail, Hooded Robin, Brown Treecreeper and Grey-crowned Babbler. As mentioned previously, the large tracts of less disturbed grassy woodland communities are likely to provide more optimal habitat for the species and these communities are also continuous with other potential habitat areas via the Kyeamba creek riparian communities. Thus, it is considered unlikely that the proposed works will have a significant impact on the aforementioned species' habitat such that the long-term survival of the species is compromised in the locality.

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

Critical habitat has not been declared for the Diamond Firetail, Hooded Robin, Brown Treecreeper and Grey-crowned Babbler.

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 to consider the requirements of these species. However, strategies that have been identified to help the recovery of this species, which are relevant to the proposed activity include:

- Retain and protect woodland, open forest, grassland and mallee habitat from clearing, fragmentation and disturbance; areas of 200 hectares or greater within woody vegetation are particularly significant, though this species also uses treeless grasslands in the Southern Tablelands.

The proposed works is consistent with this strategy, as removal of habitat will be constrained to areas of low importance to the long-term survival of these species. In addition, no woodland or natural grassland areas are to be cleared for the proposed works. Additionally, a revegetation strategy will be implemented following the finalisation of works.

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"

The proposed works may constitute "Clearing of Native Vegetation", which is recognised as a Key Threatening Process under Schedule 3 of the TSC Act. The area where native vegetation will be removed for the proposed works, has already been previously cleared and disturbed through past quarry practices.

Given the array of more suitable, less disturbed habitat surrounding the proposed area of works, it is considered that the removal of a small amount of disturbed potential foraging

and nesting habitat in these areas does not constitute a threatening process for these species.

Conclusion

Potential, though limited, foraging habitat for the Diamond Firetail, Hooded Robin, Brown Treecreeper and Grey-crowned Babbler occurs within the proposed works area. It is considered unlikely that potential nesting habitat occurs within the study area due to the array of more suitable habitat surrounding the site and the lack of over mature hollow bearing trees on site. The proposed works may affect an area of degraded potential foraging habitat for these species through the loss of small patches of disturbed ground and regrowth canopy vegetation and disturbance from indirect impacts. A range of mitigation measures will be implemented, to ensure that any potential impacts to this species are minimised. It is considered unlikely that the proposal will result in a significant impact on the Diamond Firetail, Hooded Robin, Brown Treecreeper and Grey-crowned Babbler or their habitats.

A Species Impact Statement is not required.

2) Threatened Lizards: Striped-Legless Lizard (*Delma impar*) and the Pink-tailed Worm Lizard (*Aprasia parapulchella*)

The Striped-Legless Lizard (*Delma impar)* is listed as vulnerable under the *Threatened Species Conservation Act* (1995) and the *Environment Protection and Biodiversity Conservation Act* (1999).

The Striped Legless Lizard differs most obviously from a snake in having external ear openings, small scaly flaps for hind limbs, a long tail and a broad, undivided tongue. It is pale grey-brown above, with a darker head, and almost white below. The most distinguishing characteristic is a pattern of light and dark parallel lines running along the length of the body, although these may be very pale or even absent in some individuals. This parallel stripe pattern breaks up into a diagonal pattern on the tail. They grow to about 30 cm in length, with up to three-quarters of this being the tail.

The Striped Legless Lizard is found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, spear-grasses *Austrostipa* spp. and Poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter. They actively hunt for spiders, crickets, moth larvae and cockroaches. The species lays two papery eggs in early summer. The species goes below ground or under rocks or logs over winter.

The Pink-tailed Worm Lizard (*Aprasia parapulchella)* is listed as vulnerable under the *Threatened Species Conservation Act* (1995) and the *Environment Protection and Biodiversity Conservation Act* (1999).

The Pink-tailed Worm-lizard is worm-like, with a dark-brown head and nape, gradually merging with the pale grey or grey-brown body. The tail, nearly as long as its body, is pink or reddish-brown towards the tip. Its snout and tail are both rounded. There are no external ear openings. The broad, non-forked tongue, frequently used to wipe the eyes, and the presence of small hind-limb flaps, distinguishes it from a juvenile snake. Specimens grow to about 25 cm in length.

The species inhabits sloping, open woodland areas with predominantly native grassy ground-layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. The species feeds on the larvae and eggs of the ants with which it shares its burrows. It is thought that this species lays 2 eggs inside the ant nests during summer; the young first appear in March.

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,"

There are several factors that may affect the lifecycle of these threatened reptile species. The main factor in the context of this project is the reduction of suitable habitat through clearing for quarry practices and the loss of potential dwellings in logs, rock crevices and tussock grasses etc.

The proposed works to remove 150 000m^3 of earth from the existing quarry, will require the clearing of some disturbed regrowth canopy and ground vegetation, however it is not anticipated that these works will result in long-term or major loss of habitat resources such as potential prey or shelter material for the species. Additionally, the proposed works will be restricted to the existing disturbed areas within the borders of the original quarry and along the existing access track. The majority of these areas do not provide optimal nesting, shelter or foraging habitat for these species as the ground cover vegetation in these areas is highly limited and consists mostly of exotic species. In addition, suitable embedded rocks/ outcrops do not occur in these areas and the loose sub-soil rocks that do remain would not provide optimal shelter habitat for the species.

It is considered that the less disturbed remnant open box/ stringybark woodland with grassy understorey and some rocky outcrops on the eastern side of the proposed truck waiting station and the southern side of the access track, provides better quality habitat for breeding, foraging and shelter for the species. Furthermore, the remaining grassy woodlands on the eastern side of the Hume highway in close vicinity to the quarry contain higher quality habitat with an intact vegetation structure. This vegetation community would also provide better quality habitat resources for these species. Thus, the potential habitat that is likely to be removed during the development of the quarry is sub-optimal and the surrounding areas are more likely to provide more suitable habitat for these species.

It is therefore considered that the proposed works will not have an adverse affect on the life cycle of these species such that viable local populations of the species are likely to be placed at risk of extinction.

b) "in the case of an endangered population, whether the action proposed is likely to have an adverse affect 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,"

No endangered populations of the two species are known to occur in the locality of the study area.

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

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

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 two species are listed as threatened species; therefore this question is not relevant.

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

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

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

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 area of proposed works is located within the highly modified, previously established quarry site. The area of proposed works generally only contains poor quality habitat in the form of loose rocky sub-soil and very limited and predominately exotic ground cover. The available habitat in this area is not likely to be readily used by these species as it would not provide sufficient foraging or nesting habitat resources. The majority of suitable habitat features such as grassy overstorey interspersed with embedded rock/ outcrops occurs outside of the footprint of proposed works. This proposed area of works may provide some poor quality shelter habitat for the species, however no evidence of use was found at the site.

Only limited poor quality foraging and shelter habitat will be removed during the clearing of highly modified ground cover vegetation for quarry practices. Given that the vegetation that is to be removed is considered highly disturbed and modified due to the past quarry practices and high intensity fires that occured in the area, no important habitat is likely to be removed or to become fragmented by the proposed works.

Therefore, it is considered unlikely that the removal of the existing ground cover vegetation and loose rocky sub-soil will greatly affect any significant habitat area of the species local population, such that the populations may become fragmented or isolated, and given that more suitable habitat is likely to be present in the surrounding areas.

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

Critical habitat has not been declared for any of these 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 to consider the requirements of these species. However, strategies that have been identified to help the recovery of this species, which are relevant to the proposed activity include:

- Habitat protection

The proposed works is consistent with this strategy, as removal of habitat will be constrained to areas of low importance to the long-term survival of the 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"

The key threatening process under Schedule 3 of the TSC Act that is most relevant to the proposed activity is habitat loss and fragmentation through the “clearing of native vegetation’, ‘removal of habitat elements’, such as rocks and fallen timber and ‘invasion of habitat by weeds’ or escaped pasture species that degrade habitat. However, it is considered that the area where native vegetation and habitat features such as rocky sub-soil will be removed for quarry practices is an area that has already been previously cleared and disturbed through previous quarry practices and a high intensity fire.

Additionally as habitat features such as rocky outcrops, that are present in the surrounding areas, will not be removed during the proposed works and all machinery brought onto site will be washed to remove any seeds from tyres to prevent further weed invasion, the proposed works are not likely to increase the impact of key threatening processes.

Conclusion

Poor quality shelter habitat for the species occurs within the footprint of the proposed works. It is considered that no suitable foraging habitat occurs within this area due to the lack of tussock grasslands in unison with rocky outcrops/ embedded rock. No observations or evidence of use by these species was recorded during the field survey.

The proposed works may affect an area of degraded poor quality habitat for this species through the loss of small patches of exotic ground vegetation and disturbance from indirect impacts. A range of mitigation measures will be implemented, to ensure that any future impacts will not adversely affect the study area through quarry operations. It is considered unlikely that the proposal will result in a significant impact on either of the threatened reptile species or their respective habitats.

A Species Impact Statement is not required.

3) Squirrel Glider (*Petaurus norfolcensis)*

The Squirrel Glider is listed as a vulnerable species on the *Threatened Species Conservation Act 1995*.

Adult Squirrel Gliders have a head and body length of about 20 cm. They have blue-grey to brown-grey fur above, white on the belly and the end third of the tail is black. There is a dark stripe from between the eyes to the mid-back and the tail is soft and bushy averaging about 27 cm in length. Squirrel Gliders are up to twice the size of Sugar Gliders, their facial markings are more distinct and they nest in bowl-shaped, leaf lined nests in tree hollows. Squirrel Gliders are also less vocal than Sugar Gliders.

The species inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. They prefer mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. The species require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein (DECC 2007).

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 Squirrel Glider has been recorded within the greater surrounding areas along the Hume Highway. Suitable foraging habitat and wildlife corridors are available in the grassy woodland communities on the eastern side of the proposed truck waiting station and to a lesser degree along the southern side of existing access track. However, it is not considered that suitable nesting habitat is contained within the site as no hollow-bearing trees are present within the study site. A large area of burnt open box woodland occurs on the southern side of the existing quarry. In its present condition, this vegetation is not likely to provide potential foraging or shelter habitat and/or wildlife corridors for the species due to the poor quality of the foliage regrowth. However, the condition of this community is likely to improve over time and is expected to provide better quality foraging habitat and passage for the species in the future. No proposed works are expected to occur in the grassy woodland close to the proposed truck waiting station or in the woodland

community on southern side of the quarry. Some branch lopping is expected along the access track. However, these works are not likely to significantly impact the movement or foraging practices of the species within these areas.

The proposal works will remove some regrowth canopy and disturbed ground cover vegetation within the footprint of the existing quarry. The regrowth canopy vegetation may provide some limited foraging resources (flowering *Acacias* and *Eucalyptus)* however it is not likely that any nesting/ den habitat will be removed as apart of the proposed works. Suitable nesting habitat may be available further to the north along the riparian vegetation corridor (Kyeamba Creek).

Given the above, the life cycle of this species is not likely to be disrupted by the proposed works to the point that a viable population would be placed at risk of extinction.

b) "in the case of an endangered population, whether the action proposed is likely to have an adverse affect 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,"

No endangered populations of the species are known to occur in the locality of the study area.

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

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

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 species is listed as threatened species; therefore this question is not relevant.

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

- *the extent to which habitat is likely to be removed or modified as a result of the action proposed,*
- *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 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 area of proposed works is located within highly modified and previously established quarry site. This area contains limited foraging habitat in the form of flowering *Acacias* and *Eucalyptus* species. However, the food resources in these areas are not likely to be readily used by these species given their relative isolation in the wider landscape. No hollow bearing trees were observed on site. Thus no nesting/ den/ shelter habitat is available for the species on site.

Given that the regrowth vegetation to be removed is not continuous with other canopy trees, this limited foraging habitat is not likely to be fragmented any potential habitat for the species.

Therefore it is considered unlikely that the removal of the regrowth canopy vegetation constitutes a loss of significant habitat, nor will the loss of this area fragment or isolate any areas of habitat such that it will greatly affect the species local population, given that more suitable habitat is likely to be present in the surrounding areas.

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

Critical habitat has not been declared for this 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 to consider the requirements of these species. However, strategies that have been identified to help the recovery of this species, which are relevant to the proposed activity include:

- Habitat protection

The proposed works is consistent with this strategy, as removal of habitat will be constrained to areas of low importance to the long-term survival of the 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"

The key threatening process under Schedule 3 of the TSC Act that is most relevant to the proposed activity is habitat loss and fragmentation through the "clearing of native vegetation. This has the potential to adversely affect the Squirrel Glider, mainly through the loss of foraging sites. However, considering the quality and location of the vegetation to be cleared as part of the proposal and the presence of more suitable and mature habitat within the immediate locality of the site, the likelihood of adverse impacts to the species as a result of this process is not significant.

Conclusion

Potential, though limited, foraging habitat for the Squirrel Glider occurs within the area of proposed works. No potential nesting habitat occurs within the study area due to the lack of array of over mature hollow bearing trees on site. The proposed works may affect an area of degraded potential foraging habitat for these species through the loss of small patches of regrowth canopy vegetation. However as this vegetation is not continuous with other canopy trees it is not likely to be readily utilised by the species. A range of mitigation measures will be implemented, to ensure that any potential impacts to this species are minimised. It is considered unlikely that the proposal will result in a significant impact on the Squirrel Glider or its habitat.

A Species Impact Statement is not required.

4) Spotted-tailed Quoll *(Dasyurus maculatus)*

The Spotted-tail Quoll (*Dasyurus maculata*) is listed as vulnerable under the *Threatened Species Conservation Act* (1995) and endangered on the *Environment Protection and Biodiversity Conservation Act* (1999).

The Spotted-tailed Quoll is about the size of a domestic cat, from which it differs most obviously in its shorter legs and pointed face. The average weight of an adult male is about 3500 grams and an adult female about 2000 grams. It has rich-rust to dark-brown fur above, with irregular white spots on the back and tail, and a pale belly. The spotted tail distinguishes it from all other Australian mammals, including other quoll species (DEC 2006).

The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. It consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and

insects; and also eats carrion and takes domestic fowl. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares; and they usually traverse their ranges along densely vegetated creek lines (DEC 2006).

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 works area does not contain suitable den habitat for this species given that hollow-bearing trees, fallen logs and other den habitat resources are generally absent at the site. Additionally, the works at this location will occur primarily within highly disturbed areas, and only involve the lopping of overhanging branches in higher quality habitats such as the ephemeral drainage line. Thus, the works are unlikely to have a significant impact on this species in terms of denning habitat.

It is possible that the study area is being utilised as foraging habitat for this species given its opportunistic and non-specific foraging habits. However, potential foraging habitat onsite would only represent a small portion of any individual's home range and the vegetation surrounding the easement would be more likely to provide greater habitat resources for the species, such as hollow logs and a greater diversity of prey.

Due to the lack of suitable den habitat provided by the study site, it is considered that the proposed works will not have an adverse affect on the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

b) "in the case of an endangered population, whether the action proposed is likely to have an adverse affect 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,"

No endangered populations of the Spotted-tailed Quoll have been identified within the locality.

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

- *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*
- *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 listed as threatened species; therefore this question is not applicable.

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

- *the extent to which habitat is likely to be removed or modified as a result of the action proposed,*
- *whether an area of habitats is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
- *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 study area may contain potential foraging habitat for this species. Although small portions of vegetation, (approximately 2 hectares) containing potential moderate quality foraging habitat will be removed, the importance of these areas is lessened by the potential habitat quality of the surrounding vegetation. In addition, evidence of use of the study area by this species was not observed during the survey.

Given the availability of alternate and better quality habitat within vegetation surrounding the easement and the lack of important habitat features, the habitat available within the study area is felt to be of low importance to this species. Further, the proposed works will not isolate or fragment potential habitat surrounding the study area. Thus, it is considered unlikely that the removal of this limited habitat will not affect the long-term survival of this species within the locality.

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

Critical habitat has not 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 to consider the requirements of this species. However, strategies that have been identified to help the recovery of this species, which are relevant to the proposed activity include:

- Retain and protect large, forested areas with hollow logs and rocky outcrops, particularly areas with thick understorey or dense vegetation along drainage lines.

The proposed action is consistent with this strategy, as removal of habitat will be constrained to areas of low importance to the long-term survival of the 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"

The key threatening process under Schedule 3 of the TSC Act that is most relevant to the proposed activity is the “Clearing of native vegetation”. The area where native vegetation will be removed vegetation management along the existing access track, is an area that has already been previously cleared and disturbed. Given the array of more suitable, unmodified habitat surrounding the easement and this species large home range, it is considered that the removal of a small amount of disturbed potential habitat in the works area does not constitute a threatening process for this species.

Conclusion

Potential denning sites do not occur in the study area. Potential foraging and dispersal habitat for the Spotted-tailed Quoll may occur within the proposed works areas in the ephemeral drainage line adjacent to the proposed truck waiting bay. However, vegetation surrounding the easement is considered likely to provide more suitable habitat for this species. The proposed works may affect an area of degraded potential foraging habitat for this species within close vicinity to the proposed truck waiting bay through disturbance from indirect impacts. However, a range of mitigation measures will be implemented, to ensure that any potential impacts to this species are minimised. It is considered unlikely that the proposed works will significantly impact on the Spotted-tailed Quoll or its habitat.

A Species Impact Statement is not required.