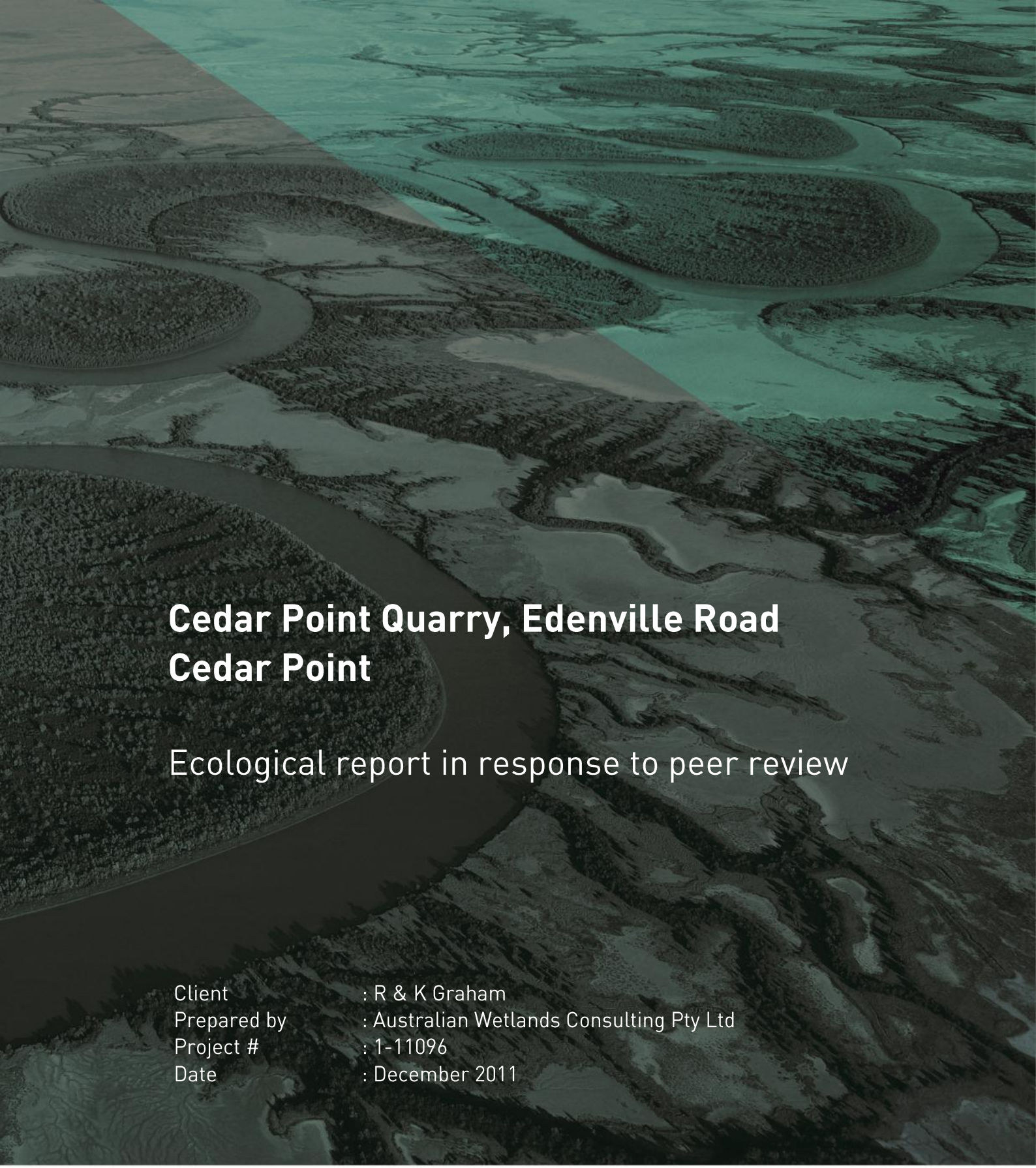

Cedar Point Quarry, Edenville Road Cedar Point

Ecological report in response to peer review

Client	: R & K Graham
Prepared by	: Australian Wetlands Consulting Pty Ltd
Project #	: 1-11096
Date	: December 2011

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AWC

Cedar Point Quarry
Edenville Road, Cedar Point

Ecological Report in response to peer review

Project control

Project name: **Cedar Point Quarry**
Ecological Report

Job number: 1-11096a
Client: R & K Graham
Contact: Wendy Attrill (Greg Alderson & Associates)

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Disclaimer: The information and subsequent recommendations contained within this report have been informed by information made available to AWC at the time of preparation and is assumed to be accurate. The intention of the report is to assist Council's decision making concerning the development of management responses and detailed designs and should not be acted upon without further consultation with appropriately qualified practitioners.

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1 Introduction and Background

Australian Wetlands Consulting (AWC) have been commissioned by R & K Graham to complete an ecological report for the proposed Cedar Point Quarry project in response to the peer review by Umwelt Environmental Consultants (September 2011) for the Joint Regional Planning Panel (JRPP).

A Flora and Fauna Assessment was completed for the proposed quarry by LandPartners Limited (LPL) in September 2010. As the author of that document I am responding to the issues raised by Umwelt Environmental Consultants which include:

- Survey methodology;
- SEPP 44 assessment;
- Assessments of Significance under Section 5A of the EP&A Act; and
- Ecological offsets.

Based on the Umwelt report it appears that the review consultants have not visited the site and have prepared a desktop assessment only. Further information is provided to address all these matters in the following sections.

The aim of this report is to clarify matters with regard to ecology and provide sufficient information to the JRPP to assist in its assessment of the proposal.

2 Additional Ecological Information

2.1 Survey methodology

The Umwelt report states that flora survey methods utilized in the LPL report were not consistent with the methodology in the DEC Threatened Biodiversity Survey and Assessment Guidelines (2004) and that the single quadrat completed was not adequate.

The random meander method used in the LPL assessment may not have completed quadrat surveys as recommended in the Guidelines however it is still considered appropriate for the site given the significant disturbance and modification to native vegetation which has been historically cleared and under-scrubbed and with these disturbances ongoing. It is noted that random meander traverses are liosted as a valid survey methodology for flora assessment in the DEC Guidelines.

Both dry and swamp sclerophyll communities at the site have been highly impacted from a long history of grazing, combined with vegetation clearance, pasture improvement and weed establishment. While the random meander technique does not provide specific quantitative data with regard to detailed floristics within a community, it provides a prescriptive list of key species, determines the boundaries of vegetation communities, allows an assessment of disturbance and weed invasion and enables targeted searches for threatened flora species. The random meander covered the majority of forested areas of the site and traversed each vegetation community several times enabling the collection of data (Braun-Blanquet index) by which the various communities could be described. Particular effort/coverage was completed within the rainforest community and adjacent areas of sclerophyll forest. As noted in the LPL report, an inventory of all trees within the proposed quarry footprint was completed. While the Umwelt report states that numbers of trees removed are inconsistent in the EIS documentation, reporting of this matter is consistent in the LPL report. Other reports which comprised the EIS report were not reviewed and no comment can be made with regard to consistent reporting of trees requiring removal.

Completion of survey quadrats within the various vegetation types present would be unlikely to result in describing the subject communities any differently, nor would it be likely to change the outcomes of assessing characteristic Endangered Ecological Communities (EECs). A single quadrat was completed in the (degraded) rainforest community as this area was one of the few areas of the site with established structure and varying strata. It is noted that Umwelt do not question the outcomes of the vegetation survey (mapping, description, identification of EECs), but rather only query methods, which as described above are appropriate given the condition of vegetation communities at the site.

The vegetation assessment is considered adequate in describing vegetation, determining vegetation boundaries and determining EECs. It would be unlikely that use of alternative survey methods (i.e. transects) would result in any significant additional information which would influence vegetation community descriptions, classifications or mapping and hence the outcomes or recommendations made in the previous Flora and Fauna Assessment by LandPartners Limited

(2010) would remain unchanged.

2.2 SEPP 44 Assessment

Umwelt considered that there was a lack of information in the LPL report to support the conclusion that the site is not potential Koala habitat (as defined by SEPP 44) and that a more detailed SEPP 44 assessment is required. This has been completed below with reference to Circular B35 (DUAP 1995).

Does the subject land occur in a Local Government Area identified in Schedule 1?

The site is within the Kyogle Local Government Area, which is listed in Schedule 1.

Is the land to which the development application applies smaller than 1 hectare in area?

The site is approximately 83 ha in area.

Does the site contain areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15 percent of the total number of trees in the upper or lower strata of the tree component?

Three species listed under Schedule 2 occur at the site (Forest Red Gum, Swamp Mahogany, Tallowwood) as follows:

- Forest Red Gum occurs infrequently to occasionally within vegetation communities 2 and 3 (refer Landpartners Figure 5) where the dominant species are not Schedule 2 species (Broad-leaved Apple, Pink Bloodwood, Swamp Box).
- Swamp Mahogany and Tallowwood occur as part of a small mixed windrow of planted trees around the blasting hole within the quarry footprint. No naturally occurring trees of either species occur at the site

Given the infrequent to occasional occurrence of Forest Red Gum within vegetation communities dominated by non-schedule 2 species, it would be unlikely that these trees would exceed more than 15% of the upper or lower strata of those forest types. However, the small number of planted Tallowwood and Swamp Mahogany within a single windrow is likely to exceed 15% of the total number of trees within the windrow.

Is the land potential Koala habitat?

Yes, based on the occurrence of planted Koala feed trees within the windrow where they comprise >15% of canopy species.

Is there core habitat on the subject land?

The Policy defines core habitat as *"...an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population".*

Searches for Koala scats did not record any signs of Koalas at the site based on random scat searches of various Koala feed trees (inclusive of planted Swamp mahogany and Tallowwood). A recent search of the NSW Atlas of Wildlife still indicates only one documented Koala record within 5km of the site (from 1977, as noted in the LPL report). The site landowner did not report any Koala records when discussing other threatened species at the site during the on-site assessment.

Further, the site does not occur within any well-connected corridor of sclerophyll forest due to significant historical land clearing and fragmentation which has reduced sclerophyll tree cover which may provide habitat for Koalas to open woodland or stands of isolated trees. Connectivity to the one area of consolidated habitat (Eden State Forest) approximately 2.5 km to the west is also very poor.

In combination these matters suggests there are not historical records of a population at the site. Given these findings it is maintained that core Koala habitat does not occur at the site, as defined by the Policy and therefore as per the guidelines in Circular B35, no further assessment under the Policy is required.

2.3 Assessments of Significance under Section 5A of the EP&A Act

The FFA by LPL completed assessments for EECs and threatened fauna species considered as potentially occurring at the site by considering the Draft Guidelines for Threatened Species Assessment under Part 3A of the Environmental Panning and Assessment Act. Using these guidelines was specifically requested by the Department of Planning (page 2 of the DGRs dated 23/11/09; Appendix A of the LPL report) for the EIS. As the project is being assessed under Part 4 of the EP&A Act, Umwelt considered that Assessments of Significance (7-part tests) (in Section 5A of the EP&A Act) should be completed.

Assessments of Significance were completed for four EECs and 11 threatened fauna species recorded at the site or considered as potentially occurring in the LPL report (refer to Appendix A). The Assessment concluded that the proposal was not likely to result in a significant impact on threatened species, communities or their habitats and hence a Species Impact Statement (SIS) is not required.

2.4 Ecological offsets

As noted in the LPL report a restoration area was proposed adjacent to the proposed access road of 20 metres width, with a total area of approximately 0.85ha to replace trees to be removed on a 1:1 basis using similar species to those removed ('like for like' replacement).

Umwelts review considered that the proposed ecological restoration works would not meet 'improve or maintain' principles for rehabilitation works and that the restoration works would not allow for consideration of the structure, function and composition of the affected ecological community. This is a spurious point as the structure and composition of the affected community within the quarry footprint has been significantly degraded by farming practices and replicating this community is not desirable. Planting a variety of trees and shrubs within the proposed offset area would result in an improved outcome where a more structurally intact community could be achieved with various strata layers developed and native ground cover species introduced. Over time, this would provide habitat of value to ground –dwelling fauna such as reptiles and mammals

and passerine birds which currently do not occur within the proposed quarry area. Further the offset would link the elevated forested ridge with lower floodplain forest and provide an opportunity for movement of less mobile species between these environments.

Umwelt also considered that a biodiversity offset should consider the ecological community as a whole, including habitat for threatened species, conservation status and opportunities for enhancement of same or similar values at the site.

As noted, the vegetation community to be affected by the proposed works has been cleared and modified to the extent that it is more a collection of scattered trees rather than a fully functioning community with a variety of strata with floristic diversity and having well-established fauna habitat value. Habitat values and floristic diversity that might ordinarily be present within such a vegetation type are absent through clearing, pasture improvement and regular grazing. As such, the value of the vegetation for threatened fauna is similarly compromised as little habitat complexity occurs, although it is acknowledged that such habitat modification is not significant in affecting habitat values for the Koala.

As noted in the LPL report, the conservation values of the vegetation to be cleared is classified as of high conservation value in the Draft Richmond Regional Vegetation Management Plan, while Biometric regards the community as being 60% cleared and hence is not an 'over cleared' (>70% cleared) vegetation type.

Replacement of the vegetation within the proposal footprint can be achieved by appropriate species selection and inclusion of a variety of tree and shrub species (inclusive of Koala feed tree species), with planting density able to achieve structural complexity. Ground layer habitat could also be improved by the placement of woody debris. While Umwelt considered that the location of the restoration area next to the access road put fauna at increased risk of vehicle strike, it must be considered that vehicle movements would only occur during daylight hours and that any vehicles would be moving very slowly due to the steep incline of the access road. As such, ground-dwelling mammals which mostly move at night would not be affected, as would mobile species such as birds, bats and macropods. In this sense the potential for any fauna species to be at significant risk of vehicle strike is very low.

The recommendation by Kyogle Shire Council with regard to the proposed restoration works are supported and could be accommodated in the proposed restoration works.

The proposed restoration is examined in response to the 'Principles for the use of biodiversity offsets in NSW' (OEH 2011). The Principles note that a range of mechanisms can be used to secure formal offsets including biobanking agreements, biodiversity certification agreements and property vegetation plans for:

- developments under the EP&A Act using the Biobanking Scheme
- land use planning under the EP&A Act using biodiversity certification
- native vegetation regulation under the Native Vegetation Act 2003.

The quarry proposal is not eligible under the first two initiatives, but is subject to the NV Act. The specific principles nominated by OEH are responded to below.

1. Impacts must be avoided first by using prevention and mitigation measures.

Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.

The quarry footprint avoids areas of better vegetation and high conservation value vegetation present as EECs. The affected vegetation is highly modified and as such, of reduced conservation value.

2. All regulatory requirements must be met.

Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).

No other approvals or assessments are sought to be addressed by the proposed offset.

3. Offsets must never reward ongoing poor performance.

Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.

The offset encourages the establishment and protection of native vegetation which will be fenced to protect it from disturbance by stock. All other areas of native vegetation at the site will be retained in situ.

4. Offsets will complement other government programs.

A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.

Not relevant to the proposal,

5. Offsets must be underpinned by sound ecological principles.

They must:

- *include the consideration of structure, function and compositional elements of biodiversity, including threatened species*
- *enhance biodiversity at a range of scales*
- *consider the conservation status of ecological communities*
- *ensure the long-term viability and functionality of biodiversity.*

Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

The proposed offset can achieve ecological function by selection of a range of appropriate species (including preferred Koala feed trees), fencing to exclude stock and will provide a linkage to the fragmented stand of subtropical floodplain forest EEC in the north-east of the site. Weed management and maintenance would be completed by the proponent to satisfy authorities that performance criteria have been met (eg. over 3-5 years) and this would be supported by annual assessments and reporting to relevant authorities by an independent ecologist/bush regenerator.

6. Offsets should aim to result in a net improvement in biodiversity over time.

Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.

Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation.

Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.

While the proposed offset area is relatively small in area, it is based on replacement of the trees which will be impacted by the proposal and hence would maintain the values relating to tree numbers over time. However when the life span of the quarry is considered in its entirety, whereby the quarry footprint itself would be rehabilitated, there would be a net gain in vegetation in the long term, provided replacement plantings are adequately maintained.

7. Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs.

As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.

The offset could be enforced by the conditions of consent and tied to ongoing performance criteria (monitoring and reporting) required for the quarry as part of general operations.

8. Offsets should be agreed prior to the impact occurring.

Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval.

If the concurrence of Council is received, offset plantings should be completed as soon as practically able, once any necessary works for the road or other matters have been completed.

9. Offsets must be quantifiable - the impacts and benefits must be reliably estimated.

Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include:

- *the area of impact*
- *the types of ecological communities and habitat/species affected*
- *connectivity with other areas of habitat/corridors*
- *the condition of habitat*
- *the conservation status and/or scarcity/rarity of ecological communities*
- *management actions*
- *level of security afforded to the offset site.*
- *The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where:*
- *they protect land with high conservation significance*
- *management actions have greater benefits for biodiversity*
- *the offset areas are not isolated or fragmented*
- *the management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).*

Management actions must be deliverable and enforceable.

The offset would compensate for the loss of trees within a highly disturbed community on a 1:1 basis. While this would occur within a reduced area, the plantings would link vegetation communities, replace vegetation on a 'like for like' basis and be maintained and monitored so that they achieve target criteria. This could all be achieved and enforced via the conditions of consent. Final rehabilitation of the quarry footprint at the exhaustion of the resource would result in the establishment of additional tree cover that would replace the open woodland community which is being removed.

While the proposed offsets do not specifically protect land of high conservation significance, all EECs will be retained and are not affected by the proposal. If greater protection and/or management of these areas is required (eg. fencing, weed control etc) they could also be enforced through the consent process.

10. Offsets must be targeted.

They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.

The vegetation to be removed will be replaced on a 'like for like' basis and will include species which benefit some of the potentially affected threatened fauna which might occur (eg. Koala). While other high conservation value vegetation at the site (EECs) are likely to fall within biodiversity priorities in the locality (particularly rainforest), these will not be affected by the proposal and so are not proposed for active management in any formalised way. As previously noted, the end result of the operational phase of the quarry will be a woodland community similar to that which already occurs.

11. Offsets must be located appropriately.

Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.

The proposed offset planting area is located in close proximity to the affected area and on-site conditions are suitable for the establishment of all of the proposed replacement species.

12. Offsets must be supplementary.

They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.

Not relevant to the proposal.

13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.

It is anticipated that the offset would be enforced through the consent conditions of Council, where Council have the authority to increase the compensation if deemed necessary.

3 Summary and Conclusion

Australian Wetlands Consulting have responded to the various ecological matters raised in the peer review by Umwelt Environmental Consultants (September 2011) for the proposed quarry at Edenville Road, Cedar Point. It is considered that information has been provided to satisfy any concerns about the Flora and Fauna Assessment by LandPartners Limited (2010) and to clarify the following matters:

- The vegetation survey methodology was adequate in describing vegetation types, determining vegetation boundaries and determining the presence of EECs. It would be unlikely that use of alternative flora survey methods would result in any significant additional information which would influence vegetation community descriptions, classifications or mapping and hence the outcomes or recommendations made in the Flora and Fauna Assessment by LandPartners Limited (2010) would remain unchanged.

- A revised SEPP 44 assessment was completed, and based on strict application of the Policy it is conceded that potential Koala habitat does occur at the site based on a small number of planted Schedule 2 tree species (Tallowwood and Swamp Mahogany) within a single windrow. However, core Koala habitat does not occur at the site as:
    - Searches for Koala scats did not record any signs of Koalas;
    - The NSW Atlas of Wildlife indicates only one documented Koala record within 5km of the site (from 1977);
    - The landowner has not reported any records of Koalas; and
    - The site does not occur within any well-connected corridor of sclerophyll forest which may provide habitat for Koalas and there is no connectivity to the one area of consolidated habitat (Eden State Forest) approximately 2.5 km to the west.

  In combination these matters indicate there are no historical records of a Koala population at the site. As core Koala habitat does not occur, a comprehensive Koala Plan of Management is not required.

- As suggested by Umwelt, but contrary to the DGR's, Assessments of Significance under Section 5A of the EP&A Act 1979 were completed for four EECs and 11 threatened fauna species recorded at the site or considered as potentially occurring in the LandPartners report. The Assessment concluded that the proposal was not likely to result in a significant impact on threatened species, communities or their habitats and hence a Species Impact Statement (SIS) is not required.

- Ecological offsets proposed were examined with respect to OEH principles. While it is acknowledged that the offset proposed is small in area, it provides a 'like for like' and 1:1 replacement of the trees to be affected. When considering the slow removal of vegetation over the life of the quarry and end rehabilitation of the quarry footprint itself, the compensation proposal can be broadly considered as meeting offset principles. The proposed offset would be issued as part of the conditions of consent for the project by Council.

4 References

Department of Environment and Conservation (DEC) (2004) Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (working draft). New South Wales Department of Environment and Conservation, Hurstville, NSW.

Department of Urban Affairs and Planning [DUAP] (1995) **Circular No. B35 State Environmental Planning Policy No. 44 – Koala Habitat Protection.** DUAP, Natural Resources Branch. Sydney.

LandPartners Limited (2010) **Flora and Fauna Assessment. Proposed quarry at Lot 1 DP366036 and Lot 12 DP582916 Edenville Road, Cedar Point.** Report on behalf of Rodney Graham.

Office of Environment and Heritage (2011) Principles for the use of biodiversity offsets in NSW. http://www.environment.nsw.gov.au/biocertification/offsets.htm

Umwelt Environmental Consultants (2011) **Peer Review of Cedar Point Quarry Assessment Report.** Report prepared on behalf of the Panel Secretariat.

Appendix A – Assessments of Significance

The *Threatened Species Conservation Amendment Act 2002* establishes the Assessment of Significance (7-part test) in Section 5A of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act), Section 94 of the *Threatened Species Conservation Act 1995* and Section 220ZZ of the *Fisheries Management Act 1994*. The Assessment of Significance is considered when determining whether a proposed action (development) is likely to have a significant effect upon listed threatened species, populations or ecological communities or their habitats, therefore determining if a Species Impact Statement is required.

An Assessment of Significance (7 part test) has been completed for four EECS (Lowland rainforest, Subtropical coastal floodplain forest, Swamp sclerophyll forest, Freshwater wetlands) and 11 fauna species (Glossy Black-cockatoo, Spotted Harrier, Varied Sittella, Black-necked Stork, Little Lorikeet, Brolga, Comb-crested Jacana, Koala, Grey-headed Flying-fox, Grass Owl, Masked Owl) with regard to the proposed works as follows:

Endangered Ecological Communities (EECs)

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*

Not relevant to EECs.

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

No threatened populations occur within Kyogle LGA.

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

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

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

Four EECs occur at the site:

- Lowland rainforest
- Subtropical coastal floodplain forest
- Swamp sclerophyll forest
- Freshwater wetlands.

None of the trees requiring removal occur within any of the subject EECs and none of these communities are likely to be indirectly affected by the proposed quarry establishment or operations. All of the subject communities are modified and/or degraded by vegetation clearance (under-scrubbing), fragmentation, grazing stock and weed invasion. The proposal would not increase any of these existing pressures on any of the subject communities whereby their composition might be adversely modified.

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

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

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

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

As noted, no trees loss will occur within any of the EECs at the site, and both the subtropical floodplain forest and swamp sclerophyll EECs are already highly isolated, fragmented and reduced in area.

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

No areas of critical habitat listed under the *TSC Act 1995* occur within Kyogle LGA.

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

An approved recovery plan has not been prepared for any of the subject communities.

Three approved threat abatement plans (TAPs) have been prepared to date:

- Invasion of native plant communities by bitou bush and boneseed;
- Predation by the red fox; and
- Predation by the plague minnow.

None of the approved TAPs have relevance to EECs at the site.

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 current list of Key Threatening Processes (KTPs) are listed at Table A.1 and discussed below.

TABLE A.1. KEY THREATENING PROCESSES

Threatened Species Conservation Act 1995 Schedule 3 Key threatening processes	Applicable to proposed works
Alteration of habitat following subsidence due to longwall mining	No
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	No
Anthropogenic Climate Change	No
Bushrock removal	No
Clearing of native vegetation	Yes
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)	No
Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758	No
Competition from feral honey bees, *Apis mellifera* L.	No
Death or injury to marine species following capture in shark control programs on ocean beaches	No
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	No
Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	No
Herbivory and environmental degradation caused by feral deer	No
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	No
Importation of Red Imported Fire Ants *Solenopsis invicta* Buren 1972	No
Infection by Psittacine Circoviral (beak and feather) disease affecting endangered psittacine species and populations	No
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	No
Infection of native plants by *Phytophthora cinnamomi*	No
Introduction of the Large Earth Bumblebee *Bombus terrestris* (L.)	No
Invasion and establishment of exotic vines and scramblers	No
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)	No
Invasion and establishment of the Cane Toad (*Bufo marinus*)	No
Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat)	No
Invasion of native plant communities by African Olive (*Olea europaea* L. subsp. *cuspidata*)	No
Invasion of native plant communities by *Chrysanthemoides monilifera*	No
Invasion of native plant communities by exotic perennial grasses	No
Invasion of the Yellow Crazy Ant, *Anoplolepis gracilipes* (Fr. Smith) into NSW	No
Loss of hollow-bearing trees	Yes
Loss or degradation (or both) of sites used for hill-topping by butterflies	No
Predation and hybridization by Feral Dogs (*Canis lupis familiaris*)	No
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)	No
Predation by the European Red Fox *Vulpes Vulpes* (Linnaeus, 1758)	No
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)	No
Predation by the Ship Rat *Rattus rattus* on Lord Howe Island	No
Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus*	No

Threatened Species Conservation Act 1995 Schedule 3 Key threatening processes	Applicable to proposed works
scrofa Linnaeus 1758	
Removal of dead wood and dead trees	Yes
Introduction and establishment of Exotic Rust Fungi	No

The proposed works are characteristic of three KTPs: clearing of native vegetation, loss of hollow-bearing trees and removal of dead wood and dead trees, with details as below:

- Up to 246 native trees may be removed within the quarry footprint. These trees form a disjunct woodland within a highly modified community which has been significantly cleared and underscrubbed and the ground layer replaced with pasture grasses. Management by grazing limits the potential for any significant native regeneration to occur.
- Two hollow-bearing trees will require removal for the proposal, with other hollow-bearing trees at the site retained in-situ.
- Twelve dead trees would be removed from within the quarry footprint and access road (no hollows occur).Dead trees elsewhere at the site will be retained in-situ.

None of the subject KTPs operate within any of the subject EECs.

Conclusion: The proposed works will not result in any significant impact to any of the subject communities and therefore a Species Impact Statement (SIS) is not required.

Threatened Fauna

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

Glossy Black-cockatoo	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m where stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. The species feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species) and depends on large hollow-bearing eucalypts for nest sites. One or two eggs are laid between March and August.
Sensitivities	The Glossy Black-cockatoo is at threat from: • Illegal bird smuggling and egg-collecting. • Reduction of suitable habitat through clearing for development. • Loss of tree hollows. • Excessively frequent fire which reduces the abundance and recovery of she-oaks and may also destroy nest trees.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. No feed trees (Forest Oak) of the Glossy Black-cockatoo will be removed, however the two hollow-bearing trees may comprise potential nest sites. All habitat outside the quarry footprint will be retained in-situ, would not be subject to any substantial disturbance from quarry operations and would continue to provide nesting and foraging habitat (albeit very limited) for the species.

Koala	Vulnerable - TSC Act 1995
Habitat description/ life cycle components	Koalas inhabit eucalypt woodlands and forests where preferred feed tree species occur. Home range size varies with quality of habitat, ranging from less than two hectares to several hundred hectares in size.Preferred tree species in north-eastern NSW include Forest Red Gum (*E. tereticornis*), Swamp Mahogany (*E. robusta*), Red Mahogany (*E. resinifera*), Grey Gum (*E. propinqua*) and Tallowwood (*E. microcorys*).Females breed at two years of age and produce one young per year.
Sensitivities	The Koala is at threat from: • Human-induced climate change, especially drought • Loss, modification and fragmentation of habitat. • Predation by feral and domestic dogs. • Intense fires that scorch or kill the tree canopy. • Road-kill. •
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. Twenty-one preferred feed trees of the Koala (Forest Red Gum) may be removed. No barriers to Koala movement or dispersal would apply. All habitat outside the quarry footprint will be retained in-situ, and provide a suite of secondary Koala browse species and occasional Forest Red Gum. These potential habitat areas would not be subject to any substantial disturbance from quarry operations and would continue to provide potential foraging habitat for the species.

Little Lorikeet	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Forages in the canopy of open Eucalyptus forest and woodland. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Nesting season extends from May to September.
Sensitivities	The Little Lorikeet is at threat from: • Clearing of woodlands for agriculture and small scale clearing for roadworks and fence construction. • The loss of old hollow bearing trees. • Competition with the introduced Honeybee for both nectar and hollows exacerbates these resource limitations.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. The loss of the subject trees represents a minor contraction in the availability of flowering eucalypts which may be utilised by the Little Lorikeet, however the two hollow-bearing trees may comprise potential nest sites. All habitat outside the quarry footprint will be retained in-situ, would not be subject to any substantial disturbance from quarry operations and would continue to provide foraging and nesting habitat for the species.

Spotted Harrier	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Occurs in grassy open woodland, inland riparian woodland, grassland and shrub steppe. Typically recorded in native grassland, but also known from agricultural land including edges of inland wetlands. A stick nest is built and eggs laid in spring (or sometimes autumn), with young remaining in the nest for several months. Prey items include terrestrial mammals, birds and reptile and occasionally insects and carrion.
Sensitivities	The Spotted Harrier is at threat from: • Clearing and degradation of foraging and breeding habitat, particularly that which affects prey densities. • Secondary poisoning from rodenticides. • Secondary poisoning from rabbit baiting.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. The loss of vegetation within the quarry footprint which may harbour prey and comprise potential nest sites represents a small contraction in the availability of resources which may be utilised by the Spotted Harrier, however the two hollow-bearing trees may comprise potential nest sites. All habitat outside the quarry footprint will be retained in-situ, would not be subject to any substantial disturbance from quarry operations and would continue to provide foraging and nesting habitat for the species.

Varied Sittella	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Inhabits eucalypt forests and woodlands, mallee and acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. A cup-shaped nest of plant fibres and cobwebs is constructed in an upright tree fork high in the living tree canopy, and is often re-used in successive years. Generation length is estimated to be 5 years.
Sensitivities	The Varied Sittella is at threat from: • Habitat isolation and simplification, including reductions in tree species diversity, tree canopy cover, shrub cover, ground cover, logs, fallen branches and litter. • Dominance of Noisy Miners in woodland patches. • Habitat degradation through small-scale clearing for fencelines and road verges, rural tree decline, loss of paddock trees and connectivity, farm maintenance and firewood collection.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. Habitat within the quarry footprint is poor for the Varied Sittella due to the absence of midstorey vegetation and structural complexity, with less disturbed vegetation at the site providing better quality habitat. The loss of trees from within the quarry footprint would represent a small contraction in the foraging ranges of any resident birds. All habitat outside the quarry footprint will be retained in-situ, would not be subject to any substantial disturbance from quarry operations and would continue to provide foraging and nesting habitat for the species.

Black-necked Stork	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Typically occur on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation, including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters, as well as extending into adjacent grasslands, paddocks and open savannah woodlands. They mainly forage in shallow, still water, preferring open wetlands and taking a variety of prey, including eels and other fish, frogs, turtles, snakes, and small invertebrates, such as crabs and small insects. Breeding in NSW takes place in late spring and summer, with most activity, between June and December. Nesting occurs in a tall, live and isolated paddock tree, but also in other trees, including paperbarks or lower shrubs within wetlands.
Sensitivities	The Black-necked Stork is at threat from: • Degradation of wetland habitats through pollution and salinisation. • Loss of paddock trees used for nesting, • Powerlines, are a significant cause of mortality and one of the most critical threats to the species in NSW. • Modification or degradation of wetlands through changes in natural water flows. • Loss of wetland habitat through clearing and draining for flood mitigation, agriculture and residential development.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. Suitable habitat for the Black-necked Stork occurs on lower wetter part of the site in the north-east and south-west. These areas will not be disturbed and would continue to provide potential foraging and nesting habitat for the species.

Brolga	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Typically found in wetlands, especially shallow swamps, although often feed in dry grassland or ploughed paddocks or even desert claypans, They primarily on sedge roots and tubers, but will also take large insects, crustaceans, molluscs and frogs. The nest comprises a platform of grasses and sticks, on an island or in the water. Two eggs are laid from winter to autumn.
Sensitivities	The Brolga is at threat from loss of wetland habitat through clearing and draining for flood mitigation and agriculture.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. Suitable habitat for the Brolga occurs on lower wetter part of the site in the north-east and south-west. These areas will not be disturbed and would continue to provide potential foraging and nesting habitat for the species.

Comb-crested Jacana	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Typically found in permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. They feed primarily on insects and other invertebrates, as well as some seeds and other vegetation. Breeding mainly occurs in spring and summer in NSW, with clutches recorded from September to April. The nest is a platform or shallow cup of vegetable material.
Sensitivities	The Comb-crested Jacana is at threat from: • Degradation of habitat from grazing livestock. • Loss of wetland habitat through clearing and draining for flood mitigation and agricultural and urban development.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. Suitable habitat for the Comb-crested Jacana occurs in the wetland in the south-west of the site. This habitat will not be disturbed and would continue to provide potential foraging and nesting habitat for the species.

Grass Owl	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Occur in areas of tall grass, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. They rest by day in a 'form' - a trampled platform in a large tussock or other heavy vegetative growth. Breeding occurs on the ground, with nests often accessed by tunnels through vegetation.
Sensitivities	The Grass Owl is at threat from: • Loss of habitat from grazing, agriculture and development. • Habitat disturbance and degradation by stock. • Pesticides use. • Frequent burning, which reduces ground cover needed for safe roosting and nesting, and can reduce prey abundance.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. Habitat within the quarry footprint is poor for the Grass Owl due to a reduced grass cover from grazing stock. The species may potentially forage around lower parts of the site, particularly in association with wetland areas. These habitats will not be disturbed and would continue to provide potential foraging habitat for the species.

Masked Owl	Vulnerable - *TSC Act 1995*
Habitat description/ life cycle components	Occurs in dry eucalypt forests and woodlands from sea level to 1100 m. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows (or sometimes caves) for nesting. The typical diet consists of tree-dwelling and ground mammals, especially rats.
Sensitivities	The Masked Owl is at threat from: • Loss of mature hollow-bearing trees and changes to forest and woodland structure. • Clearing of habitat for grazing, agriculture, forestry or other development. • A combination of grazing and regular burning is a threat, through the effects on the quality of ground cover for mammal prey, particularly in open, grassy forests. • Secondary poisoning from rodenticides. • Vehicle strike.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. The loss of vegetation within the quarry footprint which may harbour prey and comprise potential nest sites represents a small contraction in the availability of resources which may be utilised by the Masked Owl. The two hollow-bearing trees comprise very marginal nest sites due to their exposed position. All habitat outside the quarry footprint will be retained in-situ, would not be subject to any substantial disturbance from quarry operations and would continue to provide foraging and potential nesting habitat for the species.

Grey-headed Flying-fox	Vulnerable - TSC Act 1995
Habitat description/ life cycle components	Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands. The species forages on nectar and pollen of native trees, in particular Eucalypts, Melaleuca and fruits of rainforest trees and vines, in addition to cultivated gardens and fruit crops. Congregation camps of up to the tens of thousands are used for roosting, often in stands of riparian rainforest, Paperbark or Casuarina forest (NPWS 2002).
Sensitivities	The Grey-headed Flying-fox is at threat from: • Loss of foraging habitat. • Disturbance of roosting sites. • Unregulated shooting. • Electrocution on powerlines.
Likelihood of local extinction	The proposed development may result in the loss of up to 246 native trees from within the quarry footprint, inclusive of two hollow-bearing trees and twelve dead trees. The loss of the subject trees represents a minor contraction in the availability of flowering trees which may be utilised by Grey-headed Flying-fox as the species forages widely (up to 50km each night). Potential roost habitat within the rainforest community will not be affected by the proposal. All habitat outside the quarry footprint will be retained in-situ, would not be subject to any substantial disturbance from quarry operations and would continue to provide foraging and nesting habitat for the species.

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

No threatened populations occur within Kyogle LGA.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:
- *i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
- *ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

Endangered ecological communities are addressed in a separate Assessment of Significance.

d) in relation to the habitat of a threatened species, population or ecological community:
- *i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*

For wide-ranging mobile species such as the Little Lorikeet, Glossy Black-cockatoo, Spotted Harrier, Grey-headed Flying-fox, Grass Owl and Masked Owl the habitat to be removed represents a small part of a broader range in which these species foraging breeding and roosting

requirements would continue to be met. While the proposed works would result in some nominal loss of resources for these species (nectar, tree hollows, nesting sites, prey habitat) these attributes are retained on the balance of the site and within surrounding landscapes within the locality.

For wetland birds (Black-necked Stork, Brolga, Comb-crested Jacana), the proposed works will not result in any habitat removal or modification of habitat areas in the north-east and south-west of the site.

For the Varied Sittella the proposed works will remove poor quality habitat which may be utilised for occasional foraging, with better developed vegetation at the site retained.

Twenty-one preferred feed trees of the Koala (Forest Red Gum) may be removed within the quarry footprint, while the loss of other trees represents a loss of potential shelter sites. Retained vegetation in the north and south of the site would continue to provide potential shelter habitat for Koalas and contain Forest Red Gum and secondary browse species (Grey Ironbark, Pink Bloodwood) which may be utilised by the species.

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

The proposed works would not fragment or isolate any habitat which may be used by any of the subject species, particularly as many are highly mobile and range widely in the locality. For less mobile species such as the Koala and Varied Sittella, retained vegetation in the east of the site would enable movement between habitat areas in the north and south of the site. The staging of vegetation removal over the life of the quarry would also result in vegetation within the works footprint being removed gradually and hence northern and southern habitat areas would remain connected for much of the project and the current linkages would not be removed in a single event.

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

The habitat to be removed is of little importance to wetland birds (Black-necked Stork, Brolga, Comb-crested Jacana), the Varied Sittella and wide-ranging species with large home ranges (Little Lorikeet, Glossy Black-cockatoo, Spotted Harrier, Grey-headed Flying-fox, Grass Owl and Masked Owl). As noted the trees to be removed represent potential shelter trees for the Koala and an estimated 21 preferred Koala feed trees may be removed. Given that no signs of Koalas were recorded, that they are poorly known from the locality, that suitable habitat would be retained in the northern and southern part of the site and connectivity between these areas would be retained.

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

No areas of critical habitat listed under the *TSC Act 1995* occur within Kyogle LGA.

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

An approved recovery plan has been prepared for the Koala and Masked Owl. The proposed works are not inconsistent with the recommendations in these plans.

Three approved threat abatement plans (TAPs) have been prepared to date:

- Invasion of native plant communities by bitou bush and boneseed;
- Predation by the red fox; and
- Predation by the plague minnow.

While the TAP 'Predation by the red fox' has relevance to the site and foxes may impact on some of the subject species (e.g. young of Comb-crested Jacana), the proposed works are not inconsistent with the TAP and would not create conditions conducive to increasing resources for any locally occurring fox population.

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 current list of Key Threatening Processes (KTPs) are listed at Table A.2.and discussed below.

TABLE A.2. KEY THREATENING PROCESSES

Threatened Species Conservation Act 1995 Schedule 3 Key threatening processes	Applicable to proposed works
Alteration of habitat following subsidence due to longwall mining	No
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	No
Anthropogenic Climate Change	No
Bushrock removal	No
Clearing of native vegetation	Yes
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)	No
Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758	No
Competition from feral honey bees, *Apis mellifera* L.	No
Death or injury to marine species following capture in shark control programs on ocean beaches	No
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	No
Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	No
Herbivory and environmental degradation caused by feral deer	No
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	No
Importation of Red Imported Fire Ants *Solenopsis invicta* Buren 1972	No
Infection by Psittacine Circoviral (beak and feather) disease affecting endangered psittacine species and populations	No
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	No

Threatened Species Conservation Act 1995 Schedule 3 Key threatening processes	Applicable to proposed works
Infection of native plants by *Phytophthora cinnamomi*	No
Introduction of the Large Earth Bumblebee *Bombus terrestris* (L.)	No
Invasion and establishment of exotic vines and scramblers	No
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)	No
Invasion and establishment of the Cane Toad (*Bufo marinus*)	No
Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat)	No
Invasion of native plant communities by African Olive (*Olea europaea* L. subsp. *cuspidata*)	No
Invasion of native plant communities by *Chrysanthemoides monilifera*	No
Invasion of native plant communities by exotic perennial grasses	No
Invasion of the Yellow Crazy Ant, *Anoplolepis gracilipes* (Fr. Smith) into NSW	No
Loss of hollow-bearing trees	Yes
Loss or degradation (or both) of sites used for hill-topping by butterflies	No
Predation and hybridization by Feral Dogs (*Canis lupis familiaris*)	No
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)	No
Predation by the European Red Fox *Vulpes Vulpes* (Linnaeus, 1758)	No
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)	No
Predation by the Ship Rat *Rattus rattus* on Lord Howe Island	No
Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758	No
Removal of dead wood and dead trees	Yes
Introduction and establishment of Exotic Rust Fungi	No

The proposed works are characteristic of three KTPs: clearing of native vegetation, loss of hollow-bearing trees and removal of dead wood and dead trees, with details as below:

- Up to 246 native trees may be removed within the quarry footprint. These trees form a disjunct woodland within a highly modified community which has been significantly cleared and underscrubbed and the ground layer replaced with pasture grasses. Management by grazing limits the potential for any significant native regeneration to occur.
- Two hollow-bearing trees will require removal for the proposal, with other hollow-bearing trees at the site retained in-situ.
- Twelve dead trees would be removed from within the quarry footprint and access road (no hollows occur).Dead trees elsewhere at the site will be retained in-situ.

These KTPs have potential to impact on the subject species as follows:

- Clearing of native vegetation: relatively low impact on wetland birds (Black-necked Stork, Brolga, Comb-crested Jacana) and wide-ranging species with large home ranges (Little Lorikeet, Glossy Black-cockatoo, Spotted Harrier, Grey-headed Flying-fox, Grass Owl and Masked Owl). Similarly low importance for the Varied Sittella due to the highly modified nature of the subject vegetation and lack of shrub layer. Vegetation clearing would result in

the loss of potential shelter areas for Koalas and the loss of preferred feed tree species. Retained vegetation in the balance of the site would continue to provide resources for any Koalas which may occur in the locality.

The Final Determination of this KTP defines clearing as…*"the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation"*. The subject vegetation community to be cleared has been highly modified and structurally altered such that no native ground layer or shrub layer occurs

Impacts as a result of clearing native vegetation are noted as including:

- *destruction of habitat causing a loss of biological diversity, and may result in total extinction of species or loss of local genotypes;*
- *fragmentation of populations resulting in limited gene flow between small isolated populations, reduced potential to adapt to environmental change and loss or severe modification of the interactions between species;*
- *riparian zone degradation, such as bank erosion leading to sedimentation that affects aquatic communities;*
- *disturbed habitat which may permit the establishment and spread of exotic species which may displace native species; and*
- *loss of leaf litter, removing habitat for a wide variety of vertebrates and invertebrates.*

The proposed works would not be likely to result in any population fragmentation, riparian degradation or creation of conditions to enable infestation by exotic species. Further, no established litter layer occurs due to historic pasture improvement.

- Loss of hollow-bearing trees: loss of potential nest sites for the Little Lorikeet and Glossy Black-cockatoo. Other hollow-bearing trees in proximity to the works footprint and elsewhere on the site would be retained.
- Removal of dead wood and dead trees: Potential future nest sites for the Little Lorikeet and Glossy Black-cockatoo (as above) as trees decay over time. Trees removed would be placed on the ground within retained vegetation to provide habitat for ground-dwelling fauna.

Conclusion: The proposed works will not result in any significant impact to any of the subject threatened species, and therefore a Species Impact Statement (SIS) is not required.

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