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PROPOSED MODIFICATION - DIXON SAND, MAROOTA: RESPONSE TO OEH COMMENTS

Dear Neil,

The purpose of this letter report is to respond to requests by the Office of Environment and Heritage (OEH) for more information about the potential ecological impacts of the proposed modification (the "study area") at Old Northern Road Quarry, Maroota (Lots 1 and 2 DP 547255 and Lots 29 and 196 DP 752025) (**Figure 1.1**).

1. Background

As you are aware, Cumberland Ecology has previously prepared a Flora and Fauna Impact Assessment for the Dixon Sands site entitled:

Dixon Sands Maroota - Flora and Fauna Impact Assessment, *Cumberland Ecology (2013).*

Referred to hereafter as "the Flora and Fauna report", it addressed the ecological values of the proposed modification area for the sand quarry and assessed the impacts on flora and fauna, particularly threatened species, populations and communities as listed under the New South Wales *Threatened Species Conservation* (TSC) *Act 1995*. The report concluded that the proposed modification area contains four native vegetation communities, none of which are listed under the TSC Act. Previously, the Endangered Ecological Community (EEC) Shale/Sandstone Transition Forest was identified within the area. However, recent investigations determined that it is not present.

Two threatened flora species have been previously recorded within the proposed modification area. Deane's Melaleuca (*Melaleuca deanei*) has been recorded at

one location within the study area, and *Tetratheca glandulosa* has been recorded in the past but not during recent surveys.

Several threatened fauna species have been recorded within or adjacent to the proposed modification area. Large-eared Pied Bat (*Chalinolobus dwyeri*), East Coast Freetail Bat (*Mormopterus norfolkensis*), Little Bent-wing Bat (*Miniopterus australis*) and Eastern Bent-wing Bat (*Miniopterus orianae oceanensis*) have been recorded within/adjacent to the proposed modification area during surveys by Cumberland Ecology (2013). Foraging evidence of the Glossy Black-cockatoo (*Calyptorhynchus lathami*) is also present indicating that the study area is part of a larger foraging range.

The key issue raised by OEH is related to the loss of potential biodiversity values from the proposed modification area, as an area of 4.35ha will be mined, with 3.68ha comprising of native vegetation communities and the remaining 0.67ha supporting exotic grassland and cleared land.

The plant communities present on site are:

- *Banksia ericifolia – Leptospermum trinervium* Heath (1.86ha);
- *Angophora costata – Corymbia gummifera* Woodland (1.15ha);
- *Eucalyptus punctata – Acacia parramattensis* Woodland (0.67ha); and
- *Cynodon dactylon – Axonopus fissifolius* Exotic Grassland (0.62ha).

OEH has requested further clarification in relation to threatened flora, threatened fauna, fauna corridors, impacts to groundwater dependent ecosystems and the adequacy of proposed biodiversity offsets.

In order to respond, Cumberland Ecology staff reviewed the Flora and Fauna report, revisited the subject land to conduct a targeted survey of threatened plants, and have reviewed the groundwater report prepared for the site (Australian Groundwater Technologies report, written by Jason van den Akker in 2013).

The targeted threatened flora search was undertaken on the 16th January 2014 by David Thomas, a highly experienced botanist, familiar with the target species. He was assisted by the ecologist Emily Cave. They undertook a random meander survey across the study area as shown in **Figure 1.1**.

Targeted flora surveys had previously been undertaken for *Melaleuca deanei, Darwinia fascicularis* spp. *oligantha,* and *Tetratheca glandulosa*. During the January survey, fresh surveys were conducted for these species.

The OEH letter also mentioned that the following species were required to be investigated; *Acacia bynoeana, Asterolasia elegans, Darwinia fascicularis* spp. *oligantha, Eucalyptus* sp. *Cattai, Grevillea parviflora* spp. *supplicans, Hibbertia superans, Kunzea rupestris, Melaleuca*

deanei, Persoonia hirsuta, Pimelea curviflora var. curviflora, Tetratheca glandulosa and *Zieria involucrata* as they are found in similar habitats nearby.

The key findings are provided below:

2. Key Findings of Targeted Survey of Threatened Plants

The survey did not reveal the presence of any additional threatened flora species. The only species found in the study area was the single patch of *Melaleuca deanei* that was previously mapped by Cumberland Ecology (2013). The survey on the 16th January 2014 confirmed the findings of the February 2013 surveys.

i. Banksia ericifolia – Leptospermum trinervium Heath

Much of the habitat within the study area is unsuitable for the threatened species targeted. The majority of optimum habitat within the study area for the targeted species is within *Banksia ericifolia – Leptospermum trinervium* Heath. Based upon published threatened species habitat requirements, this community is considered unsuitable habitat for: *Asterolasia elegans, Persoonia hirsuta, Zieria involucrata, Tetratheca glandulosa* and *Grevillea parviflora* ssp *supplicans, Eucalyptus* sp. Cattai and *Pimelea curviflora* ssp *curviflora*.

Acacia bynoeana, Darwinia fascicularis ssp oligantha and *Kunzea rupestris* could theoretically occur as the heath is potential habitat, but they were not found during 2014, 2013 or previous surveys.

ii. Eucalyptus punctata – Acacia parramattensis Woodland

Much of the *Eucalyptus punctata – Acacia parramattensis* Woodland in the south eastern portion contains the exotic weed Lantana (*Lantana camara*) (**Photograph 1**). This community also has unsuitable habitat for all threatened species in the drainage line. Further upslope within this community, the habitat was unsuitable for most of the target species, with only a low possibility that it was suitable for *Tetratheca glandulosa* and *Persoonia hirsuta*.

iii. Angophora costata – Corymbia gummifera Woodland

Within the *Angophora costata – Corymbia gummifera* Woodland in the north eastern portion, a large section of the groundcover contains extensive leaf litter from Black She-Oak (*Allocasuarina littoralis*) (**Photograph 2**). These conditions provide unsuitable habitat for the targeted species as they prefer more open rocky ground.

iv. Cynodon dactylon – Axonopus fissifolius Exotic Grassland

Exotic grassland is aptly named and mapped and has essentially no native plants. It does not provide any suitable habitat for threatened plant species (**Photograph 3**).

3. Response to OEH Comments

The key OEH concerns regarding the potential impacts to the biodiversity values of the site are reproduced below in italics from the OEH letter dated the 25th November 2013, followed by our response.

3.1.1 Threatened Flora

> *It is not possible to conclude that the surveys demonstrate that threatened species are not likely to be affected by the proposal. Targeted flora surveys were undertaken for Melaleuca deanei, Darwinia fascicularis spp. oligantha, and Tetratheca glandulosa but there are a number of other threatened species that may also occur on site such as Acacia bynoeana, Kunzea rupestris, Grevillea parviflora spp. supplicans, Persoonia hirsuta, Asterolasia elegans, Zieria involucrata, Hibbertia superans, Eucalyptus sp. Cattai, and Pimelea curviflora var. curviflora. It is not clear why these other species were not included as subject species as they are found in similar habitats nearby and there is no explanation provided in the report for the choice of subject species.*

Although the Flora and Fauna report did not specify these additional threatened flora species as target species, they were considered during all surveys by experienced botanists.

We maintain that adequate surveys have been done and the additional survey undertaken on the 16th January 2014 also confirms the presence of only one threatened species (*Melaleuca deanei*) within the study area (**Figure 1.1**).

Tetratheca glandulosa may occur within the seedbank but is not apparent above ground. It has been recorded in the past but the most recent recording was by Hawkeswood (2010) of 5 individuals, whereas 40-50 plants had been recorded by Gunninah Environmental Consultants (Fanning *et al.* 1998). However, during current surveys undertaken in February (2013) and January (2014) by Cumberland Ecology, its presence was not detected. The species is conserved in the locality within Marramarra National Park and Dharug National Park, and within a number of other conservation reserves throughout the northeastern sandstone areas of the Sydney Basin Bioregion.

> *Furthermore, I note in the species list there is a Darwinia sp. that was recorded that Cumberland Ecology identifies may be the threatened D. biflora.*

The January survey verified that no threatened *Darwinia* species occur within the study area. The 2013 Cumberland Ecology report does not state anything about a potential *Darwinia biflora* identification. The only recorded *Darwinia* species is *Darwinia fascicularis* spp. *fascicularis* which is common in the study area and not a threatened species.

3.1.2 Threatened Fauna

> *Section 4.4 of the Cumberland Ecology report discusses the value of the vegetation on site as a wildlife corridor and states that the "corridor is not large enough to provide significant habitat for threatened species, but may be utilised by more mobile species such as birds and bats". However, the only threatened fauna found on site are birds and*

bats, so it probably does provide habitat for threatened species. In addition, the corridor is approximately 100m wide on site, and as such, OEH considers this is likely to be wide enough to allow movement of fauna and flora.

Four threatened bat species have been recorded in the study area as well as feeding evidence of a fifth species, the Glossy Black-cockatoo. The habitat is not considered "significant" as it is relatively small and would at most provide only a small proportion of the foraging habitat needed for these species. There are much larger known foraging ranges in the locality.

Such threatened birds and bats are quite mobile and would likely utilise habitat in conservation areas including Marramarra National Park, Dharug National Park, Parr State Conservation Area, Berowra Valley National Park and Cattai National Park. Staged clearance would be undertaken followed by rehabilitation so that this wildlife corridor will be preserved and threatened bird and bat species can continue to utilise the site.

Wildlife corridors are more important for ground dwelling species and none are known from the proposed impact area. Only mobile threatened species have been recorded in the study area and they would utilise other vegetated areas in the immediate vicinity.

We reiterate then, that the proposed development would remove a small area of foraging habitat for some mobile threatened species and that such species would retain extensive areas of potential habitat in the locality.

3.1.3 Groundwater Impacts

The proposal is likely to affect the quantity of groundwater, which will have impacts on remaining and surrounding vegetation. This impact is not addressed in the Cumberland Ecology report. OEH recommends the impacts of the proposal on groundwater be assessed, including the subsequent impacts on vegetation.

The quarrying of the proposed modification area will not be expected to affect the quantity of groundwater. The soil of the study area is largely sand with a very small portion of clay as seen in cross section along the northern boundary (**Photograph 4**). This lithology provides limited water storage capacity and is consistent with surrounding areas that are currently being mined.

Lots 1 and 2 contain shallow temporary perched storages with low permeability layers consisting of unconsolidated horizons of weathered clay, sandstone and shale. These zones are limited in extent and storage capacity and are discontinuous within the site. The layers only provide temporary storage at various shallow depths where water only remains for a short time after rainfall. These layers are not hydraulically connected to the regional groundwater level or the Maroota Tertiary Sands Groundwater source (RPS Aquaterra 2012, Akker 2013).

The Sydney Basin Central Groundwater Source (Hawkesbury Sandstone) will not be intercepted by the proposal and ongoing monitoring will be undertaken for the duration of the project. The development will not extend to the depth of the groundwater source as the pit floor will be at a minimum of 2m above the source. The aquifer will not be affected as the development will be occurring in an unsaturated zone (RPS Aquaterra 2012).

The Maroota Tertiary Sands Groundwater Source was previously thought to be underlying Lot 1 and 2 based on the Water Sharing Plan (WSP) for the Greater Metropolitan Region Groundwater Source 2011. Further investigation proves that the boundary of this source seems to be a minimum of 2km further than indicated in the WSP (RPS Aquaterra 2012).

The removal of the shallow perched groundwater zones will not likely result in major impacts to the regional aquifer system or the local hydrogeological regime. The only potential impact would be the increase in rainfall rate recharge to the regional aquifer system. This is not predicted to have a substantial deleterious impact upon groundwater levels or groundwater quality. For this reason, it is considered that the potential to have significant indirect impacts upon groundwater dependent communities or species is negligible.

3.1.4 Offsets

> *OEH recommends the DP&I assess the proposed development against the NSW Offset Principles for Major Projects.*

In regards to the NSW Offset Principles for Major Projects in relation to this project, it can be demonstrated that the current offset package proposed is adequate (see analysis against the principles in **Appendix C)**.

The size and scale of the offset package is appropriate, particularly in relation to Principle 7 as the Old Northern Road Quarry has significant economic benefits to NSW. Principle 7 is as follows:

> ***7. Offsets can be discounted where significant social and economic benefits accrue to NSW as a consequence of the proposal.***
>
> *While an outcome in which biodiversity values are improved or maintained is preferred, it is acknowledged that in some circumstances flexibility may be required, especially in the context of a project providing significant social or economic benefits to NSW.*

According to this principle, the ecological impacts of the proposed development should be weighed against the economic importance of the proposed development when considering the need for offsets. That is:

- No endangered ecological communities are to be cleared for the proposed development and the relatively small area of native vegetation to be cleared does not support any narrow-range endemic species that are not represented in nearby conservation reserves.
- Supplies of sand for the Sydney market are limited and the proposed development would make an important contribution to the supply of construction sands within the Sydney market.

Plant communities of types within the proposed quarry extension are well represented in conservation reserves of the region.

We remain of the view that mitigation measures will sufficiently ameliorate impacts of quarrying activities within the proposed modification area. Creation of a 6.83ha revegetation corridor along the southern boundary of the site will replace a larger area than that cleared by the proposed modification area. This includes additional areas to be rehabilitated outside the proposed modification area. Staged clearing, re-use of topsoil (containing seed banks of native species and associated micro-organisms), and the development of an ecological monitoring program are other mitigation measures that will be undertaken. Dixon Sand Quarry has already undertaken rehabilitation work at 40 Haerses Rd, Lot 177 DP 752039 on the eastern side of the property. This site demonstrates the effectiveness of the restoration work that is proposed to occur (see **Photographs 5 and 6** in **Appendix B**). Topsoil has been used for the groundcover species in addition to plantings (canopy species). Exclusion fences are shown to be very effective at preventing grazing wallabies in order to increase the rate of rehabilitation.

4. Conclusion

We maintain that the proposed modification would have a small impact on the biodiversity values in the locality. There are no EECs occurring within the study area and only one threatened flora species is known to occur. Combined mitigation and compensatory measures will be implemented and will likely ameliorate impacts to the extent that no threatened species are likely to become extinct. Effective rehabilitation measures have already been demonstrated by Dixon Sand Quarry and will be undertaken to replace all vegetation that will be removed as a result of the proposed development.

Yours sincerely,

David Robertson
Director
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References

Akker, J.v.d. (2013). Groundwater Assessment for Dixon Sands Operation on Lot 1 and 2 – Groundwater Monitoring and Management, Australian Groundwater Technologies, Mile End South, SA.

Fanning, F. D., R. Hayes, M. Chambers, C. deLacey, and S. Chamberlain. (1998). Proposed Sand Extraction. Old Northern Road, Maroota. Flora and Fauna Constraints. Draft report. Gunninah Environmental Consultants, Crows Nest, NSW.

Hawkeswood, T. J. (2010). Flora and Fauna Survey and Assessment of parts of Lots 1 & 2, DP 547255, 4610 Wisemans Ferry Road, Maroota, New South Wales. T.J. Hawkeswood Scientific Consulting, Richmond, NSW.

RPS Aquaterra (2012). Groundwater Assessment for Dixon Sand Operations, Lot 1 and 2 DP547255, Maroota NSW, RPS Aquaterra, Chatswood, NSW.

Appendix A

Proposed Modification Area

Coordinate System: MGA Zone 56 (GDA 94)

N
Grid North

Image © 2014
NSW Land and Property
Management Authority,
SIX Viewer
(Dated 13 Apr 2011; Captured 17 Jan 2014)

CUMBERLAND ECOLOGY

50 0 50 100 150 200 m

I:\...\11011\Figures\Letter 7_20140117\Figure 1.1 Survey Location for Targeted Threatened Flora Search

Figure 1.1 Flora Survey Meander for Targeted Threatened Species

Appendix B

Photographs

Photograph 1 **Lantana infestation within *Eucalyptus punctata – Acacia parramattensis* Woodland**

Photograph 2 **Black She-Oak (*Allocasuarina littoralis*) leaf litter. Unfavourable conditions for threatened flora**

Photograph 3 Exotic grassland

Photograph 4 Northern boundary of the study area facing west

Photograph 5 **Rehabilitation in Lot 177 DP 752039**

Photograph 6 **Rehabilitation in Lot 177 DP 752039. Note the flourishing vegetation within the exclusion area.**

Appendix C

NSW Offset Principles for Major Projects

Table 1 Cumberland Ecology Response to NSW Offset Principles

Principle	Response
1. Before offsets are considered, impacts must first be avoided and unavoidable impacts minimised through mitigation measures. Only then should offsets be considered for the remaining impacts. Offsets sit within a hierarchy of "avoid, minimise, offset". The first priority in a development proposal is always to avoid any unnecessary impact to biodiversity. Where impacts cannot be avoided, a reasonable attempt should be made to minimise the impact as much as possible. After all feasible measures have been taken to avoid or minimise impacts to biodiversity, offsets should be used to compensate for any remaining impacts.	Avoidance has been considered but is not considered feasible or warranted in this circumstance given the nature of the flora and fauna that occur on the study area versus the economic importance of the sand resource. Such vegetation is well represented in local conservation reserves. The sand cannot be quarried without removal of the existing vegetation patch. For this reason offsets and mitigation are proposed.
2. Offset requirements should be based on a reliable and transparent assessment of losses and gains. Offsetting decisions should be based on a reliable and transparent assessment of the loss in biodiversity due to the development proposal and the likely gain in biodiversity through the offset. For terrestrial biodiversity, established assessment tools, such as the BioBanking Assessment Methodology, are considered best practice. This methodology is currently being reviewed and refined to ensure it is as robust as possible.	BioBanking is not being used for this process but the end result will entail revegetation of a significant area of landscape, larger than the area of land to be cleared. This is appropriate given the flora and fauna values of the proposed quarry extension area.
3. Offsets must be targeted to the biodiversity values being lost or to higher conservation priorities. Offsets should reflect the biodiversity values, including threatened species and their habitat, that are being lost. This should be on a like-for-like basis for NSW-listed species and ecological communities that are also nationally listed. Like-for-like is preferable for ecological communities, threatened species and their habitat that are only listed in NSW. However, where offset sites that are exactly like-for-like are not reasonably available, offsets may include vegetation communities of a similar type or a type of a higher conservation priority, or threatened species	Local native plants will be replanted and regenerated so as to ensure that flora and fauna similar to the existing vegetation develops on the rehabilitation. As discussed in our report (2013), topsoil will be stockpiled for use in rehabilitation. Seeds and cuttings of the endangered *Melaleuca deanei* will be used to establish a population. The area will be rehabilitated to result in high quality habitat, incorporating weed and feral animal control, additional planting with native species and inclusion of fauna habitat such as dead trees and logs. Effective rehabilitation is already being demonstrated at Lot 177 DP 752039.

Table 1 Cumberland Ecology Response to NSW Offset Principles

Principle	Response
of a higher conservation priority.	
4. Offsets must be additional to other legal requirements. The biodiversity protection and management requirements of an offset must be in addition to any legal requirements already in place for biodiversity on that land. This includes, for example, any existing legal restrictions on clearing under the Native Vegetation Act 2003. Improvements in the condition of native vegetation not currently required by other legislation would count as an offset.	There is no covenant on the existing site but in future the revegetation will be permanently protected.
5. Offsets must be enduring, enforceable and auditable. Offset sites must be subject to good governance arrangements to ensure they are not inadvertently developed in the future. This includes having an appropriate plan of management, resourcing for management, legal security and accountability mechanisms. For terrestrial offsets, a BioBanking Agreement or addition to the NSW national parks system are the preferred mechanisms for securing an offset site. The purchase and retirement of biodiversity credits under the BioBanking Scheme, where appropriate credits are available, also meets the requirement for good governance arrangements. Suitable offsets must be determined prior to approval. However the offset does not need to be finalised (e.g. be purchased or have relevant protection over it) prior to approval, providing it is subject to a suitable mechanism that will remain enforceable after the project has been completed.	A Rehabilitation Management Plan (RMP) will be prepared and implemented prior to commencement of construction. This document will guide all aspects of biodiversity management and will provide clear objectives and actions. It will be enforceable and auditable.
6. Supplementary measures can be used in lieu of offsets. For terrestrial offsets, supplementary measures can be used in lieu of offsets in situations where land based offsetting is not feasible or practical. The supplementary measure must be relevant to the	N/A

Table 1 Cumberland Ecology Response to NSW Offset Principles

Principle	Response
biodiversity value being impacted. The monetary value of a supplementary measure is to be determined by an appropriate method that is repeatable and transparent. Examples of supplementary measures include the provision of funds for: • Biodiversity research or surveys • Recovery of threatened species • Community education and awareness programs Supplementary measures may also be used to compensate for impacts on aquatic biodiversity.	
7. Offsets can be discounted where significant social and economic benefits accrue to NSW as a consequence of the proposal. While an outcome in which biodiversity values are improved or maintained is preferred, it is acknowledged that in some circumstances flexibility may be required, especially in the context of a project providing significant social or economic benefits to NSW.	This principle applies to the Old Northern Road Quarry as this is a valuable site that has economic potential to NSW. Sand is becoming a limited resource in the Sydney region and the potential of fine and coarse aggregates that could be mined from this quarry is significant.