NSW GOVERNMENT | Office of Environment & Heritage

PCU038037

Our reference: DOC12/38797
Contact Peter Christie 6883-5317

Mr David Kitto
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Department of Planning and Infrastructure
GPO Box 39
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14 September 2012

Dear Mr Kitto,

The Office of Environment and Heritage (OEH) has reviewed the Proponent's Response to Submissions (RTS) following the public exhibition of the Coalpac Consolidation Project (10-0178, the Project) Environmental Assessment (EA). OEH has limited its review to the specific issues raised in its submission to the Department of Planning and Infrastructure (DoPI) dated 1 June 2012.

In summary, OEH raised concerns with regard to the:

- impact of the Project on the future reservation potential of Ben Bullen State Forest;
- calculation of impacts and consideration of derived native grassland and edge effects;
- impacts on Broad-headed Snake habitat;
- adequacy of threatened flora surveys; and the
- adequacy of the biodiversity offset proposal (BOP).

Since providing its submission on the exhibited EA, OEH has met with DoPI, the Commonwealth Department of Sustainability Environment Water Population and Communities (SEWPAC) and the Proponent on two occasions and provided responses with regard to specific issues and new information provided by the Proponent (and reproduced in the RTS), namely:

- *Summary of Project Impacts and Compensation Measures for Threatened Biodiversity*; and
- *Biodiversity Values of Gulf Mountain*.

OEH retains considerable concerns over the merits of the Project, chief amongst which is the significant encroachment of the proposed Project footprint on Ben Bullen State Forest, the whole of which has long been identified by OEH as being of suitably high conservation value for future reservation under the *National Parks and Wildlife Act*.

The OEH review of the RTS and response to the latter documents is detailed in the attached enclosure. Should you have any questions regarding this matter please contact me on 02-6883-5317.

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Yours sincerely,

**Peter Christie**
**Co-ordinator**
**Conservation and Regulation Division**

Enclosure 1. OEH Review of the Response to Submissions.

# Enclosure 1. OEH Review of the Response to Submissions

Unless otherwise stated, citations refer to the Coalpac Consolidation Project *Environmental Assessment Response to Submissions* (August 2012). OEH's submission on the Exhibited EA is reproduced in full in italics and reduced font (for which, unless otherwise stated, citations refer to Appendix J *Ecological Impact Assessment* of the Exhibited EA); OEH's review of the RTS addresses each matter.

## ASSESSMENT OF BIODIVERSITY IMPACTS

### 1. Overall Impacts and Derived Native Grassland

OEH Submission

*The proponent cites impacts on biodiversity resulting from the Project footprint of 957.98ha (Table 4.1, p. 4.3), which would include the removal of:*

- *835ha (834.62ha) of native vegetation (p. 4.2);*
- *18.44ha of TSC Act listed Box-Gum EEC (including 16.48ha of EPBC Act listed CEEC) (p. 4.14);*
- *278ha of Eucalyptus cannonii habitat (or an estimated 19,219 individuals) (p. 4.24);*
- *3.28ha of Persoonia marginata habitat (or an estimated 321 individuals) (p. 4.25);*
- *835ha of threatened and protected fauna habitat (pp. 4.26-4.35).*

*The proponent states that the remaining 123ha within the disturbance boundary includes Derived Native Grassland (DNG) "in various conditions" (p. S.6) and asserts that "Low Diversity Derived Native Grassland/Exotic provides very little ecological value" (p. S.6) and excludes these areas from the impact assessment; consequently, such areas "will not be offset" (p. 6.3). While the latter statement may be justified, other areas of higher diversity DNG which include Box-Gum EEC may indeed have ecological value. OEH therefore notes the following DNG impact totals, derived from Table 4.1 (pp. 4.2-4.3):*

- *Total DNG (including high and low diversity DNG, and Box-Gum EEC) = 123.35ha*
- *Total higher diversity DNG (including Box-Gum EEC) = 79.78ha*
- *Total non-EEC higher diversity DNG (excluding Box-Gum EEC) = 77.55ha*
- *Total Box-Gum EEC DNG = 2.23ha*

*The corresponding impact on native vegetation excluding all DNG is 834.62ha, and excluding only "Low Diversity" is DNG 914.4ha. The proponent has therefore excluded 79.78ha of DNG that is not "Low Diversity" from consideration as an impact, which includes 2.23ha of Box-Gum EEC. OEH again recommends that the proponent provide justification for not including this area of higher diversity DNG in their calculation of impacts, and asserts that as a minimum impacts on native vegetation should include the DNG portion of Box-Gum EEC, which would increase the impact to 836.85ha.*

*In Section 6, in the proponent's discussion of offsets, Table 6.2 (p. 6.7) cites different impact totals to those presented in Table 4.1, namely: 818.71ha of "Non-C/EEC (native only)" compared with 818.41ha, respectively; and a total disturbance of 837.15ha compared with 834.62ha. These figures are stated to exclude "areas of low diversity native grassland and exotic grasslands" (p. 6.7), when in fact, elsewhere in the EA, the proponent's figure of 835ha obviously excludes <u>all</u> areas of DNG, including Box-Gum EEC, and not just "low diversity" areas.*

*OEH assert that consideration of all impacts and conversely, justification for excluding certain impacts from consideration, is essential, particularly as it relates to determining the adequacy of offsets (see below).*

OEH Review of RTS

OEH note that the Proponent acknowledges a minimum impact area of 836.85ha (p. 100), as asserted by OEH in its submission.

OEH also note that as requested the Proponent provides justification for excluding areas of non-EEC derived native grassland (DNG) that were not specifically mapped as "low diversity" from impact calculations. OEH understand that the distinction between "low diversity" DNG and DNG was made on the basis of past land use and thus types of disturbance (e.g. pasture improvement), as well as the resultant persistence of perennial native ground cover species. Therefore, the recoverability of these two types is expected to be different: the latter being far greater than the former. Indeed, large areas of DNG within the BOP are predicted by the Proponent to provide adequate offsets for habitat removed as a result of the Project with the application of active management and protection. Therefore, DNG within the Project area clearly has biodiversity value, albeit less than that of areas that retain trees and shrubs and that have not been grazed. The Proponent's assertion that DNG "communities do not have conservation significance in their own right as they are not an EEC" is untrue and at odds with a key objective of their own BOP.

## 2. Broad-headed Snake

OEH Submission

> *At the request of OEH, the proponent has included consideration of the impact on the Broad-headed Snake in the EA, given that the species relies in equal measure on both rocky winter habitat and woodland forest areas containing hollow-bearing trees in summer. However, the proponent considers that the Project has "potential to have a significant short-term impact" only (p. I.117). Given the duration required for eucalypts to develop hollows (120-150 years, as cited by the proponent on p. 4.16), OEH consider that the Project would have a long-term impact on this species, particularly so considering: the population's potential isolation (the nearest record is 11km away); the species' propensity for high site fidelity to fixed and exclusive home ranges; and the limited dispersal of juveniles. Further, the proponent states that in "summer the species typically migrates about 200m from the sandstone escarpments to hollows in large trees below" (pp. I 114-115). OEH notes that such movements by the Broad-headed Snake have been measured at up to 780m, with a mean of 318m (Webb and Shine 1997). As a result, impacts 50m from winter habitat may greatly affect the summer movements of these snakes.*

OEH Review of RTS

OEH note in Appendix F of the RTS (p. A.8) that the Proponent has calculated summer habitat on the basis of research alluded to by OEH in its submission.

## 3. Adequacy of Flora Surveys

OEH Submission

> *The EA cites the following threatened flora species that were targeted during surveys: Derwentia blakelyi, Eucalyptus aggregata, E. cannonii, E. pulverulenta, Grevillea evansiana, G. obtusiflora, Persoonia marginata, and Prostanthera cryptandroides (curiously, two species - Leionema sympetalum and Persoonia hindii - cited in a previous EA (July 2011) have now been excluded from this list). OEH note that the likelihood of occurrence of different threatened flora species has now been reappraised by the proponent in Appendix E. As a result, species identified by the proponent as having a "low" likelihood of occurrence (c.f. "moderate") have not been targeted for survey, irrespective of the occurrence of suitable habitat within the Project boundary. The following species that were identified in a previous EA (July 2011) as "could potentially occur" but which were not targeted for survey are: Acacia bynoeana, Prostanthera stricta, Darwinia peduncularis, Persoonia acerosa, Thesium australe and Euphrasia arguta.*

*Although for each of these species the proponent states "Not detected during past or current surveys", highly cryptic species that occur at low densities such as Acacia bynoeana are extremely unlikely to be detected unless they are targeted for survey.*

OEH Review of RTS

OEH notes the Proponent's justification for reappraising the likelihood of occurrence of certain threatened flora species from the draft EA to that exhibited. However, OEH assert that in order for cryptic species (e.g. *Acacia bynoeana*) to be adequately surveyed and considered, they need to be targeted. OEH understand that such species would not have been "excluded from surveys or consideration" (p. 132) because they would have been recorded if observed; however, the probability of detecting any species and in particular cryptic species is greatly improved through dedicated targeted surveys.

## 4. Indirect Impacts and Edge Effects

OEH Submission

*In addition to the direct impacts resulting from the removal of native vegetation and habitats, there will be indirect impacts (as conceded by the proponent): "ecological impacts of the open cut could extend beyond the areas to be cleared and into areas of forest and woodland that are being retained" (p. 4.19); "Clearing of vegetation may increase edge effects on the retained portion of Box Gum Woodland" (p. 4.13); "fragmentation and edge effects will have consequences for the integrity of the remaining hollow-bearing forest" (p. 4.16); and "fragmentation and associated edge effects reduce the availability and quality of refugia for native fauna and increase feral access" (p. 4.39) (note that this is at odds with the proponent's assertion that "the Project is not likely to increase the presence of effects of feral species" (p. 4.39)). While the proponent allows a 20m area of influence around the edge of the P. marginata habitat to be removed, which increases the impact by 0.19ha, no other such recalculation of impact is presented.*

*The proponent states that edge effects will be mitigated by the implementation of "best practise measures to control impacts from erosion, sedimentation and associated weed invasion" (p. 4.19), in addition to the development of a Biodiversity Management Plan that would include feral animal control (p. 4.39). As stated above, however, an accurate estimation of the full impact of the Project remains essential.*

OEH Review of RTS

OEH acknowledges the difficulty faced by the Proponent in estimating an explicit area of impact arising from edge effects across the entire Project area. However, OEH note (and support) the Proponent's ability to estimate the impact of edge effects on an area containing *Persoonia marginata*.

In the RTS, the Proponent alludes to abiotic edge effects (noise, light, nutrient run-off), and the low likelihood that such edge effects would have a significant impact on retained vegetation upslope of mined areas. However, OEH reiterate that edge effects also include the promotion of edge-tolerant species, including feral predators and native competitors.

# BIODIVERSITY OFFSET PROPOSAL (BOP)

## 5. Financial Contributions as a Component of the BOP

OEH Submission

*OEH notes that the proponent is willing to contribute management funds for the development, implementation and management of GOS2 at a rate linked to coal production. This offer is*

*different to situations where management funds are paid to manage offset land bought by the proponent and transferred to OEH for reservation under the National Parks and Wildlife Act (that is, the land transfer to OEH is conditional on suitable management funds being provided). OEH's position is that any contribution to general parks management funding, whether or not linked to a land transfer, would need to be paid as an upfront lump sum or paid by instalments. If paid by instalments this must be backed up by a suitable form of security such as a bank guarantee. Moreover, any general parks management funding would need to be calculated on a measure that is not linked to coal production levels; the biocertification credit converter (OEH 2012) is available to calculate potential credit short falls and the amount of compensatory area and funds required to meet such short falls.*

*OEH acknowledge that up to 2.5 Million tonnes of coal p.a. of the total 3.5 Million tonnes p.a. of estimated production by the Project is intended for supply to the Mt Piper Power Station (EA Main Report, p. 216). In relation to this specific proposal, however, OEH does not believe supplementary measures or indirect offsets such as management funding should be considered by DoPI until it has been determined that no appropriate offset properties are available. OEH has provided details of potentially suitable properties to the proponent's consultants.*

OEH Review of RTS

OEH notes the following statement in the RTS regarding financial contributions: "provision of support to indirect offsets would be the Department's preferred option [i.e. given the accepted shortfall in offset quantum of the exhibited BOP]" (p. 145). This matter was discussed at the interagency meeting with the Proponent on 31 July 2012. OEH emphasise and reiterate, however, that indirect (non-land based) offsets should only be considered by DoPI when it has been demonstrated that appropriate offset properties are not reasonably available. OEH note that the Proponent provides an assessment of the availability of potential offset properties in Table 14 (pp. 105-109).

OEH notes that the Proponent would now commit to providing $300,000 in funding to contribute to recovery actions for the Broad-headed Snake, Brush-tailed Rock-wallaby, woodland birds, and the Koala (p. 116, and Statement of Commitments no. 37, p. 225), to be spent equally across all four "species" in the first five years of the Project (see Point 6, below).

## 6. Adequacy of the BOP

OEH Submission

*As alluded to previously, OEH considers that there is still considerable uncertainty as to the actual biodiversity impacts of the Project, chiefly: the encroachment of edge effects on adjacent and retained vegetation and habitats; and the removal of DNG not classified as "Low Diversity".*

*An absence of data that can accurately and readily be used under the Biobanking Assessment Methodology (BBAM) precludes a quantitative estimate of the credits required to offset biodiversity impacts arising from the Project. OEH has nevertheless calculated offset to impact ratios (offset ratios) using raw area figures under different offset scenarios (Table 1). The following scenarios offer different interpretations of both the amount of impact and the amount of biodiversity proposed to be offset.*

*Scenario 1*
*Takes into account all areas with vegetation, including DNG at the Project site.*

- *Total offset ratio = 1.8*

*Scenario 2 (best case scenario)*
*As presented by the Proponent, DNG is excluded from consideration as an impact, but not as an offset; the Proponent includes the future rehabilitation of such areas in the BOP.*

- *Total offset ratio = 2.1*

- *EEC offset ratio = 13.7*

*Scenario 3*
*Excludes all DNG from consideration as an impact and an offset; the future rehabilitation of such areas is thus excluded from the offset ratio and only areas with an intact canopy are included. Similar to Scenarios 4 and 5 (below), this compares the current ecological condition of both the Project and Offset sites.*

- *Total offset ratio = 1.3*
- *EEC offset ratio = 3.0*

*Scenario 4*
*Only considers native vegetation that retains trees or areas of Box-Gum DNG EEC, and therefore excludes all future rehabilitation of non-EEC areas from the BOP.*

- *Total offset ratio = 1.5*
- *EEC offset ratio = 12.0*

*Scenario 5*
*Considers impacts and offsets for all areas that retain trees, areas of Box-Gum EEC, and all areas of DNG that were not typed as "Low Diversity" and which therefore retain tangible ecological value.*

- *Total offset ratio = 1.5*
- *EEC offset ratio = 12.0*

*OEH supports the proponent's intention to rehabilitate previously cleared and disturbed lands that constitute the BOP. However, the BOP currently depends on a high proportion of future rehabilitation (38.4%, 672.11ha), and this is emphasized when under Scenario 3 in the absence of rehabilitation the total offset ratio decreases to only 1.3, and the offset ratio for Box-Gum EEC decreases to only 3.0. OEH considers that the proponent's interpretation of the offset ratio (Scenario 2) is very low and does not account for "time-lag effects, and the uncertainties and risks associated with actions such as revegetation", as cited under Principle 6 in the OEH Principles for the use of biodiversity offsets in NSW. To account for such risks and to compensate for the considerable time lag in achieving a net improvement in biodiversity, a higher ratio is required.*

OEH Review of RTS

OEH notes the inclusion of the Gulf Mountain offset in the amended BOP (p. 109, and Appendix E). OEH have updated its assessment of raw offset quanta under different scenarios (as presented previously in its submission) to include Gulf Mountain (Table 1), and notes the following:

- the Gulf Mountain offset would not contribute additional areas of Box-Gum EEC to the BOP, and offset ratios for this component would not change;

- generally, raw offset ratios would obviously be improved: e.g. under the best case scenario whereby all DNG is excluded as an impact but included as an offset, the ratio would increase from 2.1 to 3.6;

- when considering impacts and offsets of intact (non-DNG) vegetation only, the offset ratio would increase from 1.3 to 2.8 (as noted in the RTS, p. 115); and

- the BOP would still depend on a large proportion of land requiring rehabilitation, although the inclusion of Gulf Mountain would reduce this considerably from 38.4% to 22.2%.

The Proponent informed OEH that a covenant under the Conveyancing Act 1919 exists over the Gulf Mountain property. OEH advised the Proponent that existing obligations relating to a given area would require a discount in the likely benefit of

offsetting that land. OEH have reviewed the relevant restrictions on land use prescribed by the covenant for Gulf Mountain with regard to the additionality rules in Appendix 9 of the Biobanking Operational Manual (Table 2). As a result, the conservation benefit from an offsetting perspective would require a proportional discount of 20%. Consequently, the offset ratios calculated in Table 1 would be reduced.

OEH notes the Proponent's analysis of impacts and offsets for individual threatened entities (Appendix F). Given the Proponent's assessment of habitat quantity and condition (Tables B.1 and B.2), OEH have distilled the impact and offsets for three of the threatened fauna (Table 3). Although none of these species were detected in the Project area during the preparation of the EA, the Project area contains potential habitat for all three. In particular, the fact that the Broad-headed Snake has been detected in its winter habitat immediately adjacent to the Project area, and given its propensity for high site fidelity to fixed and exclusive home ranges, it can be assumed that the project area contains known summer and winter habitat for this species. Table 3 demonstrates that the offset ratios for total habitat area for the Broad-headed Snake and Brush-tailed Rock-wallaby are extremely low, as are their temporal and spatial habitat components (winter and summer habitat, or forage and refuge habitat, respectively). Moreover, rehabilitation will not improve this situation. While the offsets may provide ample secondary feed tree resources for Koalas, even with rehabilitation the offset ratios for areas with primary feed trees are also very low.

Given the data provided by the Proponent, the only metric available to OEH for calculating a standard offset requirement for each species is that used in the BBAM to calculate species credit requirements. Table 4 presents these results for the latter three mammal species that could potentially occur in the Project area, and for the four species credit species that were positively identified in the Project area. Based on this metric, a shortfall in habitat is demonstrated for Broad-headed Snake, Brush-tailed Rock-Wallaby and Squirrel Glider, and for Koala primary feed-tree habitat; a surplus of habitat would be offset for the Capertee Stringybark, Clandulla Geebung and Large-eared Pied Bat.

The above assessment was conveyed to the Proponent at the most recent interagency meeting. In response, the Proponent has now committed to a financial contribution to the recovery of the Broad-headed Snake, Brush-tailed Rock-Wallaby, Koala and also "woodland birds" to the value of $300,000 (Commitment No. 37, p. 225). OEH note that these threatened entities are listed under the Commonwealth EPBC Act, although "woodland birds" is overly vague and may include species that are only listed under the TSC Act. OEH are yet to determine whether the proposed amount of funding provides adequate compensation for the shortfall in direct offsets, and how specifically this funding should be administered and to what activities the funding should be directed; consequently, OEH recommend that this matter be discussed in more detail following this review.

OEH do not consider the Proponent's commitment to undertaking targeted searches for the Squirrel Glider in offset areas and the provision of suitable nest boxes in mine rehabilitation areas (Commitment No. 38, p. 225) as constituting part of the BOP: the former is purely assessment to gauge the value of offset areas, and the latter is mitigation. As such, OEH consider that prior to Project approval the Proponent should demonstrate that offset areas provide adequate compensatory habitat for Squirrel Gliders; if surveys cannot demonstrate this, OEH recommend that the Proponent also consider additional land based offsets for this species.

As emphasised above, direct land-based offsets are preferred to indirect offsets, and OEH have asserted that the Proponent must demonstrate that suitable land-based offsets are not reasonably available before indirect offsets should be accepted by DoPI. An assessment of alternative offset properties is provided in the RTS; however, OEH contend that alternative offset properties may yet be available, while acknowledging that a timely determination of the merits of the Project by DoPI may be expedient.

## RESERVATION CONSIDERATIONS

### 7. Suitability of Proposed Offset Sites for Incorporation in the National Parks and Reserves System

OEH Submission

> *OEH sought internal advice from its Parks and Wildlife Group (PWG) regarding the suitability of the four offset properties in the BOP for future reservation in the National Parks and Wildlife Service Estate. PWG advised that at this point in time, none of the four properties would be suitable for this purpose. Consequently, OEH recommend that another form of in perpetuity conservation covenant would be required over all potential offset tenure.*
>
> *OEH understand that some confusion has arisen regarding previous discussion around the suitability of one of the four offset blocks "Hyrock-Hartley" for addition to the reserve system. OEH note that in its comments on the July 2011 draft EA (24 August 2011), OEH provided specific advice on only the "Yarran View" property. Further, in OEH's advice on additional potential offset areas (email to Cumberland Ecology, 9 December 2011), in which the "Hyrock-Hartley" site was noted, it was emphasized "that more detailed assessment would of course be required before consideration as reserve additions ... [and that] this advice purely concerns the priority of these properties as potential additions to the NPWS estate". Upon further consideration, given current concerns over discontinuity between this block and the existing reserve, PWG advised that this block is not suitable for reservation, at this time.*
>
> *OEH acknowledges the proposed east-west link that the Hillcroft property would contribute to once rehabilitated and managed for conservation. OEH notes that the rehabilitated mine site would be needed to complete the link post-mining. OEH acknowledges that the maximum potential conservation gains of this offset vision will be best realised by rehabilitation aiming to maximise conservation outcomes and to have all parcels under one land manager in the future.*

OEH Review of RTS

OEH reiterates its previous advice that none of the original four offset properties in the BOP would be suitable for addition to the NPWS Estate at this time. Further, as conveyed to the Proponent at the interagency meeting on 31 July 2012, the NPWS advised OEH that the Gulf Mountain offset would not be a suitable addition to the NPWS Estate at this time: while areas of native vegetation to the south of Gulf Mountain outwardly provide connectivity between it and Winburndale Nature Reserve, OEH understand that these areas include freehold tenure that are unlikely to be acquired for reservation in the near future and in which biodiversity values are not secured.

OEH note that offset properties "will be permanently conserved via a Voluntary Conservation Agreement (VCA), or other suitable arrangement" (p. 134). OEH have previously advised the Proponent of suitable mechanisms for securing offset tenure in perpetuity.

## 8. Suitability of Rehabilitated Mine Sites for Incorporation in the National Parks and Reserves System

OEH Submission

*Given the level of biodiversity loss and topographical change as a result of mining, OEH has strong doubts that the proposed rehabilitation of the mine site will contribute to the achievement of a Gardens of Stone Stage 2 reservation proposal. Accordingly, OEH does not support the addition of the rehabilitated areas to the national parks and reserves system at this time (see comment above).*

OEH Review of RTS

While OEH note the Proponent's assertion that "rehabilitated areas with[in] the Project Boundary and offset properties are considered to be an important contribution to the reservation of large areas in the long term" (p. 154), OEH reiterate that rehabilitated areas of the mine site are not likely to be suitable for reservation in the future.

## 9. Extent of Gardens of Stone Stage 2 Reservation Proposal

OEH Submission

*The environment groups' GoS2 reservation proposal which is referred to in the EA omits an area of Ben Bullen State Forest west of the Castlereagh Highway and north of Cullen Bullen. OEH confirms that its conservation interest is in the entirety of Ben Bullen State Forest, including areas not shown in the environment groups' proposals.*

OEH Review of RTS

OEH notes the Proponents' allusion to the relative small proportion of the GOS2 proposal that would be affected by the Project (p. 154). OEH assert that although the proportions are low (given the large extent of the GOS2 proposal), the impact of the Project on land of high reservation priority is nonetheless very large. Further, OEH reiterate that all of Ben Bullen State Forest is of reservation priority to OEH, and not just the area identified by the Colong Foundation that lies east of the Castlereagh Highway.

## 10. Pagodas

OEH Submission

*The sandstone pagodas around the top of the edges of the plateaus in the area are significant geodiversity features which provide a range of crevice, cave and other refugia habitat types for biodiversity. The pagodas on the boundary of the proposed mining area are good examples of a distinctive landform found only in the "Pagoda country", a 50 kilometre long (600 km$^2$) belt centred on the western edge of Wollemi National Park, Gardens of Stone National Park and Ben Bullen State Forest. A substantial part of the main Pagoda area is not reserved within parks. The pagodas in the Blue Mountains are recognised as distinctive features (with limited distribution) that are significant on a national level.*

*In recognition of the high scenic values of the plateau edge and pagodas it is important that: mining operations do not degrade the scenic amenity/vistas of the prominent line of dissected sandstone clifflines and pagodas in Ben Bullen State Forest and a sandstone plateau on the western side of the Castlereagh Highway north of Cullen Bullen; and mining operations/blasting will not cause collapse/subsidence cracks to the sandstone plateau edge, clifflines and pagodas. OEH notes that although the open-cut will not extend to within 50 metres of pagodas and escarpment areas, highwall mining will reach up to 300 metres beneath these features.*

*OEH notes that the report does not contain a detailed assessment/survey of geological and geodiversity values on the plateau edge and within the proposed mining area. However, mitigation and management measures are outlined in various sections of the report. OEH seeks clarification of the meaning and agreed definitions for pagodas, cliff lines, rock outcrops and other geodiversity elements, as interpreted by the Proponent.*

OEH Review of RTS

OEH notes the Proponent's commitment to: "a 50m buffer between mining operations and all pagodas or sandstone escarpments; and a 20m buffer from any other significant rock exposure (outcrop) that does not fall into the above category" (p. 147). Further, OEH notes the Proponent's commitment to a "Highwall Mining Plan" that would identify "surface features including pagodas and escarpments/cliffs and any other significant features" (p. 9). OEH notes the highwall mining method is proposed for the Project under sensitive escarpment and pagodas to minimise surface impacts to these features to less than 20 mm. OEH notes that the Proponent expects this to have a minimal impact on surface vegetation and habitats, but OEH remains concerned that this might still cause undesirable and irreversible surface impacts to pagodas, cliffs and overhangs.

In its submission, OEH requested clarification of the meaning and agreed definitions for geodiversity elements in order to ensure that standoff distances of highwall crests would be clearly delineated and implemented during operations. OEH can find no such additional clarification in the RTS and therefore reiterates the latter request.

**Table 1. Offset Scenarios for Proposed Impacts on Native Vegetation.**

| SCENARIOS | | IMPACT[1] | Hillcroft Offset[2] | Yarran View Offset[3] | Hillview Billabong Offset[4] | Hyrock Hartley Offset[5] | Gulf Mtn Offset[6] | OFFSET | OFFSET RATIO | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **Total Area** | **957.98** | 989.46 | 443.05 | 83.35 | 236.09 | 1,277.00 | **3,028.95** | **3.2** | Scenario 1 takes into account ALL areas with veg (including DNG at the Impact site). |
| 2 | **Total Veg** (excluding all DNG at Impact but including at Offset) | **834.62** | 989.46 | 443.05 | 83.35 | 236.09 | 1,277.00 | **3,028.95** | **3.6** | Scenario 2 is presented by the Proponent i.e. DNG is excluded from consideration as an Impact, but not as an Offset (the Proponent includes rehab. of such areas in the Offset). |
| 3 | **Total Veg with trees** (excluding all DNG from both Impact and Offset) | **834.62** | 534.15 | 262.76 | 46.84 | 236.09 | 1,277.00 | **2,356.84** | **2.8** | Scenario 3 excludes ALL DNG from consideration as an impact AND an offset (the rehab. of such areas is thus excluded from the Offset ratio and only areas with an intact canopy are included). |
| 4 | **Total Veg with trees &/or EEC** (excluding all DNG except Box-Gum EEC DNG at both Impact and Offset) | **836.85** | 534.15 | 406.53 | 76.18 | 236.09 | 1,277.00 | **2,529.95** | **3.0** | Scenario 4 only considers native veg that retains trees or areas of Box-Gum DNG EEC (and therefore excludes all non-EEC rehab. areas from the Offset). |
| 5 | **Total Veg of ecological value** (excludes only Low Diversity DNG at both Impact and Offset) | **914.4** | 665.19 | 406.53 | 83.35 | 236.09 | 1,277.00 | **2,668.16** | **2.9** | Scenario 5 considers impacts and offsets for all areas that retain trees, areas of Box-Gum EEC, and all areas of DNG that were not typed as "Low Diversity" and which therefore retain tangible ecological value. |
| 2a | **TSC Box Gum EEC** (excluding all DNG at Impact but including at Offset) | **16.21** | 0 | 186.78 | 34.87 | 0 | 0.00 | **221.65** | **13.7** | Scenario 2a assesses the separate Offset Ratios for EEC and non-EEC native veg under Scenario 2 i.e. that presented by the proponent. |
| | **Non-EEC Native Veg** (excluding all DNG at Impact but including at Offset) | **818.41** | 989.46 | 256.27 | 48.48 | 236.09 | 1,277.00 | **2,807.30** | **3.4** | |

| SCENARIOS | | IMPACT[1] | Hillcroft Offset[2] | Yarran View Offset[3] | Hillview Billabong Offset[4] | Hyrock Hartley Offset[5] | Gulf Mtn Offset[6] | OFFSET | OFFSET RATIO | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 3a | **TSC Box Gum EEC with trees** (excluding all DNG from both Impact and Offset) | **16.21** | 0 | 43.01 | 5.53 | 0 | 0.00 | **48.54** | **3.0** | Scenario 3a assesses the separate Offset Ratios for EEC and non-EEC native veg under Scenario 3. |
| | **Non-EEC Native Veg with trees** (excluding all DNG from both Impact and Offset) | **818.41** | 534.15 | 219.75 | 41.31 | 236.09 | 1,277.00 | **2,308.30** | **2.8** | |
| 4a | **TSC Box Gum EEC** (excluding all DNG except Box-Gum EEC DNG at both Impact and Offset) | **18.44** | 0 | 186.78 | 34.87 | 0 | 0.00 | **221.65** | **12.0** | Scenario 4a assesses the separate Offset Ratios for EEC and non-EEC native veg under Scenario 4. |
| | **Non-EEC Native Veg with trees** (excluding all DNG except Box-Gum EEC DNG at both Impact and Offset) | **818.41** | 534.15 | 219.75 | 41.31 | 236.09 | 1,277.00 | **2,308.30** | **2.8** | |
| 5a | **TSC Box Gum EEC** (excludes only Low Diversity DNG at both Impact and Offset) | **18.44** | 0 | 186.78 | 34.87 | 0 | 0.00 | **221.65** | **12.0** | Scenario 5a assesses the separate Offset Ratios for EEC and non-EEC native veg under Scenario 5. |
| | **Non-EEC Native Veg of ecological value** (excludes only Low Diversity DNG at both Impact and Offset) | **895.96** | 665.19 | 219.75 | 41.31 | 236.09 | 1,277.00 | **2,439.34** | **2.7** | |

**Table 2. Calculation of the proportional discount in benefit considering the covenant over the Offset Block "Gulf Mountain".**

| **Covenant: Restriction on Land Use** ["The following works must not be undertaken"] | **Equivalent Biobanking Conservation Measure or Action** (after Table A6, *Biobanking Operational Manual*) | **Percentage Discount in Benefit** (after Table A6, *Biobanking Operational Manual*) |
|---|---|---|
| "Clearing of native vegetation [including regrowth]" | Retain regrowth and remnant native vegetation | 7.5% |
| "Clearing or removal of standing or fallen dead timber" | Retain dead timber | 7.5% |
| "Removal of soil or inorganic material such as bush rock" | Retention of rocks | 5% |
| | **Total Discount** | **20%** |

**Table 3. Summary of specific impacts and offsets for the habitat of three fauna species (apparent shortfalls in offsets are highlighted).**

| Species | Impacts on Habitat | | Offset for Habitat | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CURRENT | | Offset Ratios | | | REHABILITATED | | Offset Ratios | | | TOTAL | | Offset Ratios | | |
| **Broad-headed Snake** | Winter Habitat | Summer habitat | Winter Habitat | Summer habitat | Winter | Summer | TOTAL | Winter Habitat | Summer habitat | Winter | Summer | TOTAL | Winter Habitat | Summer habitat | Winter | Summer | TOTAL |
| | 308.69 | 252.43 | 20.21 | 167.77 | 0.1 | 0.7 | 0.3 | 0 | 0 | 0 | 0 | 0 | 20.21 | 167.77 | 0.1 | 0.7 | 0.3 |
| **Brush-tailed Rock-wallaby** | Refuge & Shelter Habitat | Forage & Shelter Habitat | Refuge & Shelter Habitat | Forage & Shelter Habitat | Refuge | Forage | TOTAL | Refuge & Shelter Habitat | Forage & Shelter Habitat | Refuge | Forage | TOTAL | Refuge & Shelter Habitat | Forage & Shelter Habitat | Refuge | Forage | TOTAL |
| | 44.74 | 400.23 | 20.21 | 133.03 | 0.5 | 0.3 | 0.3 | 0 | 0 | 0 | 0 | 0 | 20.21 | 133.03 | 0.5 | 0.3 | 0.3 |
| **Koala** | Primary Forage Habitat | Secondary Forage Habitat | Primary Forage Habitat | Secondary Forage Habitat | Primary | Secondary | TOTAL | Primary Forage Habitat | Secondary Forage Habitat | Primary | Secondary | TOTAL | Primary Forage Habitat | Secondary Forage Habitat | Primary | Secondary | TOTAL |
| | 93.94 | 48.22 | 44.96 | 841.17 | 0.5 | 17.4 | 6.2 | 42.25 | 629.86 | 0.4 | 13.1 | 4.7 | 87.21 | 1471.03 | 0.9 | 30.5 | 11.0 |

**Table 4. Comparison of approximate biometric calculations of required offsets with that proposed in the BOP.**

| | Tg [1] | Impact Area (ha) | Species Credits Required [2] | Offset Area Required (ha)[3] | Metric Offset Ratio Required | Total Offset Area (ha) | Total Offset Deficit / Surplus (ha) |
|---|---|---|---|---|---|---|---|
| **Broad-headed Snake** | | | | | | | |
| Winter | 0.300 | 308.69 | 10,290 | 1,714.94 | 5.6 | 20.21 | -1,694.73 |
| Summer | 0.300 | 252.43 | 8,414 | 1,402.39 | 5.6 | 167.77 | -1,234.62 |
| Total | 0.300 | 561.12 | 18,704 | 3,117.33 | 5.6 | 187.98 | -2,929.35 |
| **Brush-tailed Rock-Wallaby** | | | | | | | |
| Refuge | 0.375 | 44.74 | 1,193 | 198.84 | 4.4 | 20.21 | -178.63 |
| Forage | 0.375 | 400.23 | 10,673 | 1,778.80 | 4.4 | 133.03 | -1,645.77 |
| Total | 0.375 | 444.97 | 11,866 | 1,977.64 | 4.4 | 153.24 | -1,824.40 |
| **Koala** | | | | | | | |
| Primary | 0.375 | 93.94 | 2,505 | 417.51 | 4.4 | 87.21 | -330.30 |
| Secondary | 0.375 | 48.22 | 1,286 | 214.31 | 4.4 | 1,471.03 | 1,256.72 |
| Total | 0.375 | 142.16 | 3,791 | 631.82 | 4.4 | 1,558.24 | 926.42 |
| **Capertee Stringybark** | | | | | | | |
| Total | 0.750 | 279.00 | 3,720 | 620.00 | 2.2 | 776.20 | 156.20 |
| **Clandulla Geebung** | | | | | | | |
| Total | 0.750 | 3.09 | 41 | 6.87 | 2.2 | 85.69 | 78.82 |
| **Large-eared Pied Bat** | | | | | | | |
| Total | 0.750 | 834.63 | 11,128 | 1,854.73 | 2.2 | 3,026.31 | 1,171.58 |
| **Squirrel Glider** | | | | | | | |
| Total | 0.450 | 834.58 | 18,546 | 3,091.04 | 3.7 | 2,979.08 | -111.96 |

1 *Tg* is calculated based on various autecological traits and indicates a species' ability to respond to improvement in site value; conversely, it compares the inherent difficulty of replacing a given species or its habitat, relative to another: a lower Tg indicates that a species is more difficult to replace.

2 BBAM Equation 13: *species credits required = (habitat area lost / Tg) x 10.*

3 Derived from BBAM Equation 14: species *credits generated at offset = current species habitat area at offset x proportional habitat gain x 10* (note, in absence of proportional habitat gain, default = 0.6); therefore *offset area required = species credits required / 6.*