Department of Planning

Addendum to Review of Ecological Assessments of Warkworth Extension EA and HVO South Modification Projects

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Umwelt
Environmental Consultants

Addendum to Review of Ecological Assessments of Warkworth Extension EA and HVO South Modification Projects

Prepared by

Umwelt (Australia) Pty Limited

on behalf of the

Department of Planning

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1.0 Introduction

1.1 Background

1.1.1 Project Context

This report refers to the Warkworth Extension Project and the HVO South Modification. Both of these are detailed in Umwelt (2011a, 2011b).

The Department of Planning and Infrastructure (DP&I) engaged Travis Peake, Ecology Manager and Associate of Umwelt (Australia) Pty Limited (Umwelt), to prepare a specialist technical assessment to review the potential biodiversity impacts of the two projects and the adequacy of the proposed offsets. This review, and the recommendations arising from the review, were fully documented in a draft report Umwelt (2011a) provided to DP&I on 23 June 2011, and finalised and provided to DP&I in August 2011 (Umwelt 2011b). No significant changes were made in the finalisation of the report. Rio Tinto Coal Australia (RTCA) provided additional commitments for the Warkworth Extension Project. These revised commitments are reviewed and assessed in this addendum report. They are not addressed in Umwelt (2011b).

1.1.2 Provision of Further Information by RTCA

On 30 June 2011, RTCA provided DP&I with a letter Re*: Warkworth Extension (09_0202) – Draft Independent Ecological Review* (Russo 2011). This letter was prepared by RTCA in response to the draft *Review of Ecological Assessments of Warkworth Extension EA and HVO South Modifications Project* (Umwelt 2011a). The letter specifically states that '[RTCA does] not intend to provide any comment on the draft report, but reserves [its] right to comment further on the final report.' The purpose of the letter was to:

- provide items of clarification for consideration in finalising the draft report; and
- provide additional offsets investigation for the Central Hunter Grey Box – Ironbark – Spotted Gum Vegetation Communities and new commitments in relation to offsetting the ecological impacts of the proposal.

1.2 Purpose of this Addendum Report

This addendum report provides an assessment of the additional information provided by RTCA in Russo (2011), specifically the items of clarification and the additional offsets noted in **Section 1.1.2**, together with new commitments regarding rehabilitation design and funding for rehabilitation research.

2.0 Additional Information Provided by RTCA

2.1 Summary of Revised Rehabilitation and Offset Package from RTCA

In the concluding part of the letter, Russo (2011) summarises the additional offset components and other new commitments that have been put forward. In summary, the proposed amendments to the biodiversity offset package are:

- Commitment to the re-establishment of vegetation in the areas of BOAs that currently comprise derived native grasslands (excluding the derived native grassland component of the White Box CEEC at Goulburn Rover BOA).
- Addition to the offset package of three areas close to Bulga, which will contribute to offsetting for CHGBIW EEC – noting that the area could be underground-mined in future, and RTCA has not committed to the type or duration of offsetting.
- Substantial increase in the area of rehabilitation to be returned to CHGBIW EEC or CHISGGBF EEC.
- Commitment of up to $500,000 towards research in establishing groundcover for CHGBIW EEC in rehabilitation.
- Inclusion of the Hunt, O'Brien and Bowdidge properties in the offset package.

These are each addressed in the following sections.

2.2 Items for Clarification

2.2.1 Summary of RTCA Information

Russo (2011) refers to the statements in the Umwelt (2011a) report that no re-establishment of derived native grasslands in the Northern, Southern, Putty or Goulburn BOAs has been committed to by the proponent, as documented in correspondence from RTCA to DP&I dated 17 May 2011. Note that although not stated in Russo (2011), this is also the case for the Putty BOA.

Russo (2011) acknowledges that this was erroneous and states that this was subsequently corrected in a revised letter to DP&I on 27 May 2011 including the proponent's commitment to re-establishment in all Biodiversity Areas. A copy of this 27 May 2011 letter is provided in Russo (2011). The information provided regarding the target regeneration communities in the Southern (including Springwood), Northern and Putty BOAs is sufficient. It is noted, however, that RTCA do not indicate what the target regeneration communities would be for the 8.5 hectares of Derived Native Grassland and 160.2 hectares of Cassinia/Acacia Regeneration at Seven Oaks BOA.

Russo (2011) includes two letters from Cumberland Ecology dated 4 December 2009 and 23 December 2009, which document rapid ecological assessments that were undertaken at the Putty, Goulburn River and Seven Oaks BOAs. The methods documented included traversing the properties to determine vegetation communities, limited threatened searches for species and a small number of BioBanking plots were undertaken and was consistently applied across the three areas. In each case only one day of survey was undertaken on each property. This information was not previously supplied to Umwelt for the ecological review.

The table presented in Appendix 2 of Umwelt (2011a and 2011b) has been updated with the above information, and is now presented as a table in **Appendix 1** to this report.

2.2.2 Assessment of Ecological Benefit

The clarification regarding the commitment to fostering vegetation and fauna habitat recovery in areas of derived grassland within the BOAs is important. It is through means such as this that 'environmental gains' are often achieved for biodiversity outcomes. Although there are limited opportunities for environmental gain at Goulburn River, Seven Oaks and Putty BOAs, it is valuable to the project to ensure that such opportunities for environmental gain are maximised to compensate for impacts on threatened fauna species. As it is unclear in Russo (2011), it is recommended that RTCA clearly indicate the target regeneration communities for the 8.5 hectares of Derived Native Grassland and 160.2 hectares of Cassinia/Acacia Regeneration at Seven Oaks BOA. It is further recommended that RTCA clearly document the measures through which the re-establishment will be undertaken, how it will be measured, and how and when intervention will occur, when required, to ensure that the recovery is trending in the right direction. Measures for enhancing the recovery through timeline reductions should be clearly elucidated, for example through the provision of nest boxes, targeted plantings, feral/native herbivore management and strategic grazing management, where necessary and appropriate.

The provision of two letter reports from Cumberland Ecology (4 December and 23 December 2009) is noted. The reports do not serve to change an assessment outcomes documented in Umwelt (2011a and 2011b). Given initial surveys of these areas were conducted in 2009, it would have been beneficial, during the intervening time, for further ecological surveys to have been undertaken to provide more robust information on the sites and more certainty about their potential value as biodiversity offsets.

2.3 Provision of Additional Commitments by RTCA

2.3.1 Summary of Peake Review

2.3.1.1 Summary of RTCA Information

On pp. 2-4 of Russo (2011), RTCA provides a discussion on the relative merits and challenges associated with attempting to obtain further offsets for Central Hunter Box – Ironbark Woodland EEC and Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC in the Central Hunter Valley. Umwelt (2011a and 2011b) recommends that these communities should be treated together for the Warkworth assessment, and RTCA does not disagree with this approach. RTCA presents an exercise in which they undertook an assessment of 'potentially' available areas of this community for offsetting purposes, once other known competing land uses are removed. RTCA indicates that, as a result of this analysis there is some 2800 hectares of these communities present on some 280 lots which themselves cover close to 10,000 hectares. The average lot size given is between 50-150 hectares, however RTCA does not provide any size class analysis or a median lot size, which would be more instructive. In theory there would be enough land available to achieve the additional 1484 hectares of offsetting for this community (up-front and over time) that Russo (2011) suggests were recommended by Umwelt (2011a), however it is clearly noted that there are significant practical limitations to achieving this. Note that this figure of 1484 hectares is erroneous – this is discussed in **Section 2.3.1.2** below.

Russo (2011) indicates that if grasslands derived from the two subject communities are factored in the area of land potentially available (once competing land uses are factored out) would be substantially larger. Russo (2011) rightly states that no mapping of grassland is

available and that field verification of candidate areas could be onerous. However, as documented in **Section 2.3.1.2** below, the possibility of modelling the distribution of the derived grasslands is not explored.

2.3.1.2 Assessment of Ecological Benefit

Russo (2011, pp. 2-3) erroneously quotes a number of figures from Umwelt (2011a pp. 3.23-3.24). These include (p. 2) that the up-front offset for CHGBIW should include 543.3 hectares of CHGBIW. Umwelt (2011a and 2011b) states that 494.9 hectares of up-front offsetting offered by RTCA should be included. The same issue relates to regeneration of CHGBIW, where Russo (2011) erroneously quotes Umwelt (2011a) as requiring 13.7 hectares, while Umwelt (2011a and 2011b) in fact states 217.3 hectares. Finally, Russo (2011) erroneously quotes Umwelt (2011a) as stating that to meet the desired 4:1 offset ratio for this community a further 1484 hectares is required; Umwelt (2011a and 2011b) actually states that a further 1529.5 hectares would be required.

It is agreed that, based on the range of the two subject communities mapped by Peake (2006), while the additional 1529.5 hectares of these communities might in theory be available, in practice obtaining this area of these communities in that region would be challenging. Russo (2011) does not, however, recognise the geographic limitations of Peake's mapping, or advances in knowledge obtained since Peake's mapping. Both of these communities occur outside of the Peake (2006) study area. These occurrences extend south-east into Cessnock and Maitland local government areas (LGAs), to the north and south of the Peake study area along selected valleys, and more substantially to the west of the Peake study area. Many of these areas are likely to be outside of mining leases. Furthermore, advances in knowledge (as occurred for Warkworth Sands Woodland) support the revision of some components of Peake communities, and as a result there are likely to be more areas of these communities present in the central Hunter Valley floor. Finally, there has been significant regeneration of these communities, particularly in mining leases, and these changes since the Peake mapping have not been considered.

It is not necessarily appropriate to rule out mining leases from this exercise. Although in many cases it is appropriate to situate offsets outside of mining leases, there is still substantial justification for the location of offsets within mining leases, where there is a significant ecological driver, such as for an ecological entity that is becoming 'irreplaceable' in the landscape and is difficult to offset elsewhere. Use of select, well-targeted offsets within mining leases (including offsets in perpetuity) can be justified for such cases. It is possible that substantial areas of these communities that occur in mining leases are present in areas that could be afforded protection due to the likely unviability of future coal extraction or indeed in areas where coal has already been extracted (particularly above underground operations). Indeed, this is precisely what RTCA has committed to, as documented in **Section 2.3.2**

In this exercise RTCA has not appropriately considered the potential utility of 'similar' vegetation communities, as documented by Umwelt (2011a and 2011b), despite recognising this possible approach in Russo (2011). In short, the ability to offset these subject communities with similar communities in the central Hunter Valley is not explored. Rather, the possibility of using similar communities is only tenuously advocated in part 2.5 of Russo (2011).

It is accepted that there is no current available mapping of derived grasslands, and any exercise on the field validation of derived grassland areas would be onerous without there being any process of prior stratification of sampling/survey effort. However the letter fails to acknowledge that it would be a reasonably simple exercise to model the likely occurrence of grasslands derived from these communities, and that this could be done through a process of deduction based on the removal of areas (based on soil types and geomorphology) where

the communities would never have occurred. Indeed this exercise was done by Peake (2006) to derive the likely pre-European extents of these communities, with the resulting models being regarded as 'good'. These data are likely to be available from the Hunter – Central Rivers Catchment Management Authority. Based on Peake (2006) and the likely pre-European area occupied by these communities, it is possible that there is around 150 per cent or more derived grassland than woodland/forest of these communities.

Notwithstanding the above, it is agreed that it would be challenging to offset the entire additional 1529.5 hectares recommended for these communities with either existing CHGBIW or derived grassland. The Umwelt (2011b) report recommends that the suggested long-term 4:1 offset ratio can be achieved through the inclusion of the entire Goulburn River and Seven Oaks BOAs, subject to a further 821.1 hectares of CHGBIW being secured as an up-front offset. It is recommended here that this could be through a combination of both up-front offsets comprising CHGBIW, as well as up-front offsets comprising similar communities. Russo (2011) has not adequately explored the potential use of similar communities, except through the desired use of ironbark woodlands in the Goulburn River and Seven Oaks BOAs which are not 'similar' except in the broadest terms (see **Section 2.3.5.2**). It would have been appropriate and beneficial for RTCA to explore which other central Hunter Valley floor communities could be used as 'similar' communities to offset CHGBIW.

2.3.2 Proposed Additional Local Offsets

2.3.2.1 Summary of RTCA Information

Notwithstanding the limitations documented in Part 2.1 of Russo (2011), RTCA undertook an exercise in assessing lands under the control of MTW to assess offset opportunities for CHGBIW. Three areas, labelled Areas 1-3 in Russo (2011 – Attachment 5), are proposed as additional offset areas primarily for CHGBIW, although it is recognised that they would provide a range of other ecological and landscape benefits. These are displayed in **Figure 2.1** in this report and documented in the table in **Appendix 2** to this report. Table 1 (p. 5 in Russo 2011) documents the additional areas. The text provided in the subsequent paragraphs on p. 5 does not appear to reliably relate to either Table 1 or Attachment 5. It is the author's understanding that in combination Areas 1, 2 and 3 would provide:

- 57.4 hectares of existing CHGBIW (or spotted gum) community;
- potentially 83.7 of grassland derived from the above community;
- 17.9 hectares of Hunter Valley River Oak Forest;
- direct connectivity between the three areas and, through Area 3, with the Southern BOA; and
- potential habitat for a range of threatened fauna species that will be impacted by the Warkworth Extension Project.

RTCA recognises that Areas 1-3 could be subject to future underground mining. RTCA does not rule out open cut mining or other forms of significant disturbance, and do not propose the term over which the areas would be offset, e.g. temporary or in perpetuity.

2.3.2.2 Assessment of Ecological Benefits

Areas 1-3 would be valuable additions to the biodiversity offset package for the Warkworth Extension Project. However, there are some ambiguities in the information presented by RTCA. These include:

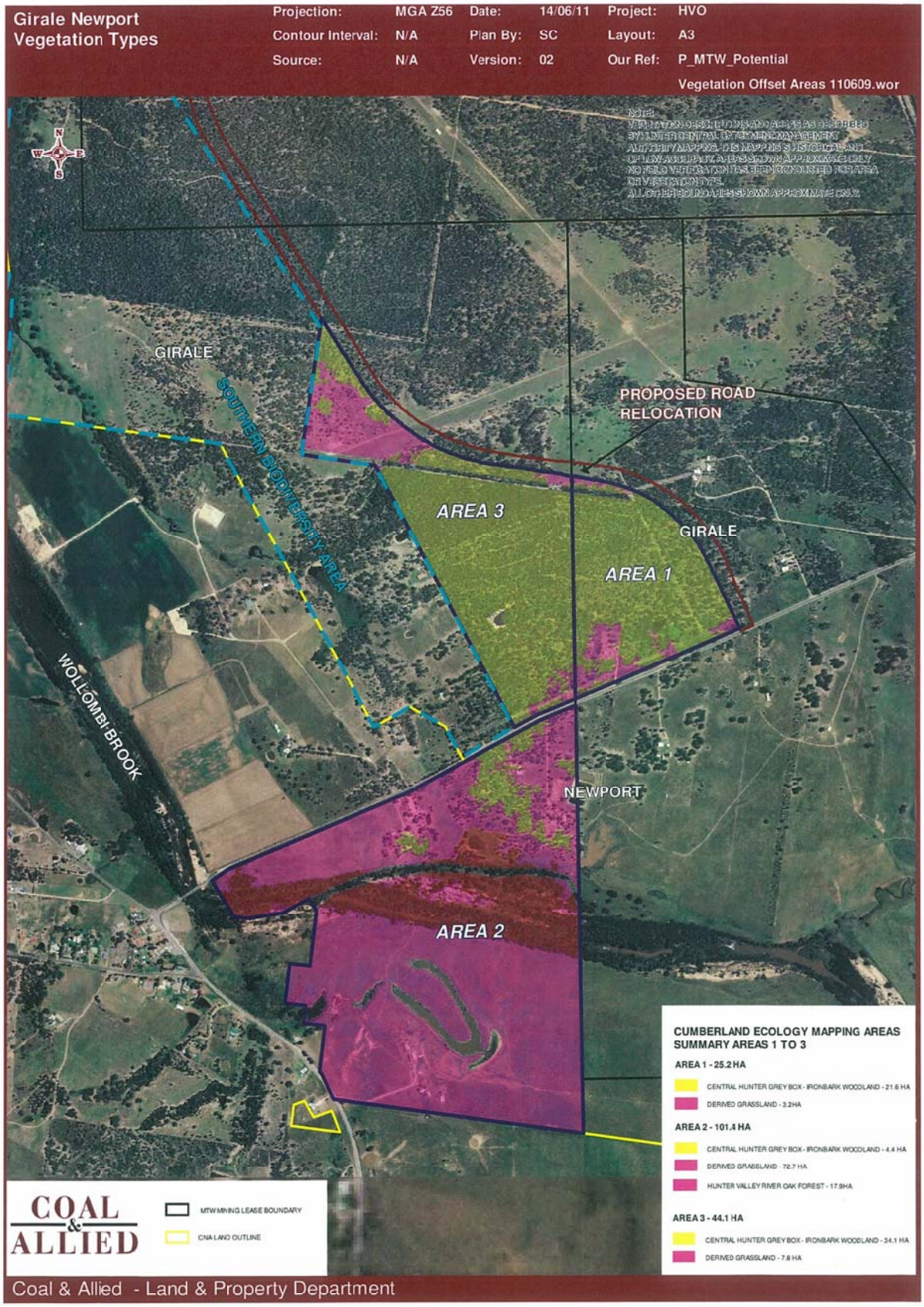

FIGURE 2.1

Proposed Additional Offset Areas

Source: Coal & Allied

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20110810 11.17

- The area mapped in Russo (2011, Attachment 5) as Derived Grassland will require robust field verification; it is the author's opinion based on local experience and analysis of soil mapping that a substantial part of the Derived Grassland will in fact not support CHGBIW, but would in fact support a floodplain woodland community, almost certainly Hunter Floodplain Red Gum Woodland EEC. Furthermore this area has been heavily cultivated and might require substantial effort to return a viable native ecosystem.

- It is not clear whether or not RTCA would be offering these properties as part of an in-perpetuity conservation arrangement.

- It is also not certain that the properties would not be subject to future open cut mining or other significant disturbance.

Nonetheless, Areas 1-3 would contribute in a small but important way to the offset package if secured appropriately, managed appropriately (environmental gain through regeneration, targeted revegetation, land management etc) and if appropriately connected with adjoining or nearby conservation land uses. Based on RTCA's understanding of the depth of cover, it is unlikely that any future underground mining operation would significantly affect the biodiversity of these areas through subsidence impacts, and provided no significant surface infrastructure was located on the properties. It is recommended that these properties are included within the offset package and that they are secured appropriately for long-term offsetting.

2.3.3 Rehabilitation

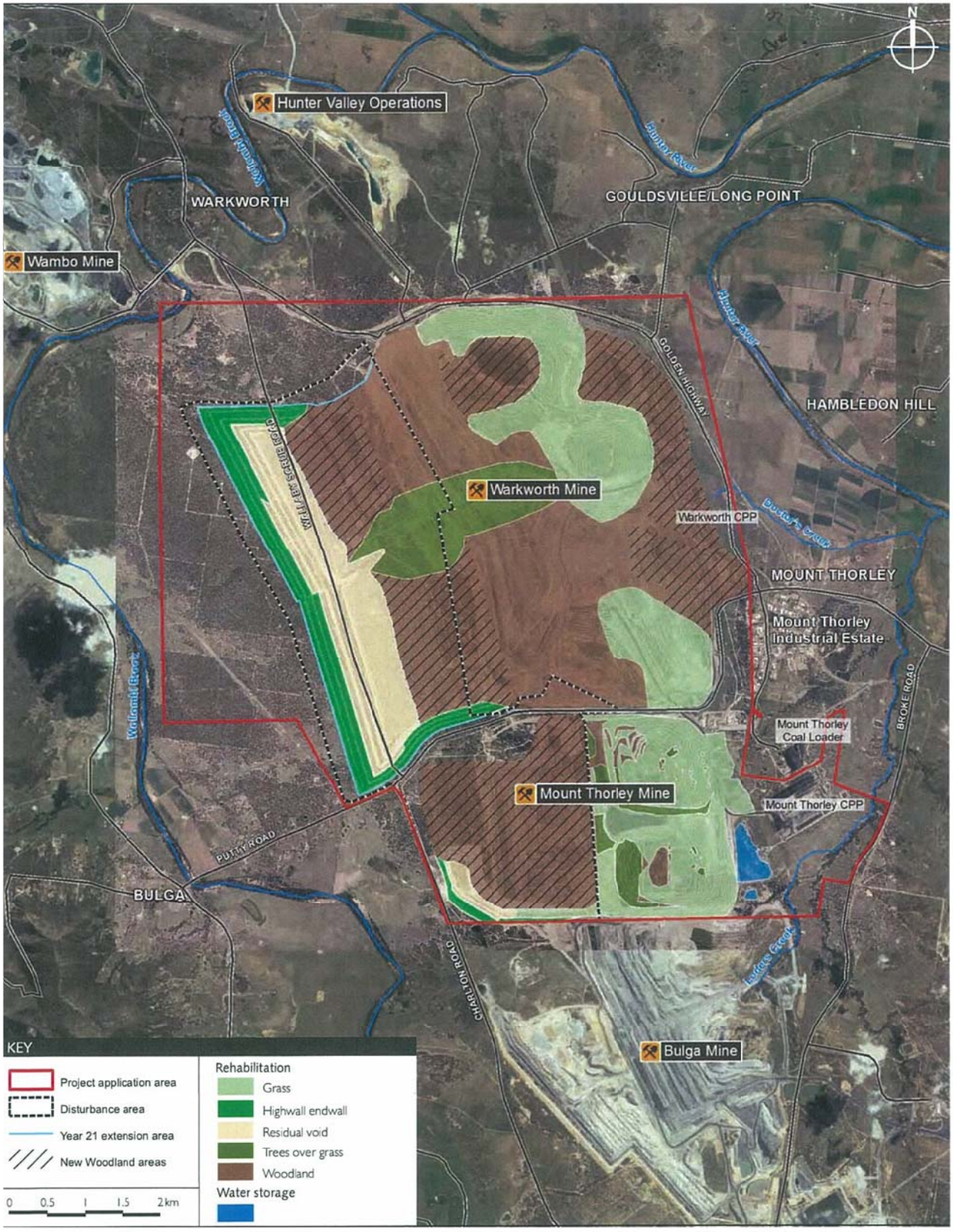
2.3.3.1 Summary of RTCA Information

RTCA has undertaken a review of rehabilitation commitments, which, based on the EA, comprise the rehabilitation of 780.6 hectares of CHGBIW EEC (or the CHISGBGF EEC). Russo (2011) indicates that an additional 1336 hectares of mine lands has been identified as suitable for the re-establishment of this community. The letter states that area is illustrated in Figure 1, however the letter does not contain Figure 1. For this assessment the author has assumed that what is listed as Figure 5.5 (opposite p. 6) in the letter is what the text refers to as Figure 1, although this figure does not clearly illustrate where the EEC would be rehabilitated. In this report the area is shown in **Figure 2.2**, and the associated areal extent is included in the tables in **Appendices 1** and **2** to this report. It is assumed that the areas mapped as 'Trees Over Grass' and 'Woodland' correspond to the areas proposed for EEC rehabilitation. It is recommended that RTCA re-issue this map to clarify where the EEC is proposed to be rehabilitated.

Russo (2011) states that this represents an approximate 160 per cent increase in the area previously committed to rehabilitation of this community, and that RTCA is now committed to rehabilitating a total of approximately 2114 hectares on mined lands. The letter is not entirely clear regarding the new commitment. It various states that an additional 1366 hectares is available for CHGBIW rehabilitation, but this and the existing commitment of 780.6 hectares add to 2116.6 hectares, not the stated 2114 hectares. Furthermore the letter says that the additional 1336 hectares 'represents an approximate 160 per cent increase…', however 160 per cent of 780.6 hectares comprises just 1249 hectares.

This review assumes that the stated 2114 hectares of rehabilitation will comprise the CHGBIW in a fashion that is, over the medium term, characteristic of the EEC. If this is incorrect the findings reached in this report will need to be revised.

The letter does not offer a commitment to how the rehabilitation of this community would be undertaken, how it would be measured, or contingency in the case of failure.



Source: Coal & Allied

FIGURE 2.2

Revised Rehabilitation Strategy

Russo (2011) notes that Dr David Robertson from Cumberland Ecology, has advised (as documented within Attachment 7 of the letter) that rehabilitating the overstorey of CHGBIW is well established on mined lands, however recommends further research on returning the ground stratum species to enable the full community to be represented in rehabilitation. To this end RTCA makes a further commitment to contribute up to $500,000 to research aimed at improving rehabilitation of ground stratum plant species of the Central Hunter Grey Box-Ironbark-Spotted Gum communities.

2.3.3.2 Assessment of Ecological Benefit

The additional commitments towards the redesign of rehabilitation and expansion of the CHGBIW community are substantial, as is the $500,000 commitments towards funding research into the rehabilitation of ground stratum species for this community. Together, these commitments are likely to contribute substantially towards mitigating the impact of the Warkworth Extension Project on CHGBIW and a range of threatened fauna species. It is recommended that these commitments are supported and that RTCA clearly documents how the rehabilitation of this community would be undertaken, how it would be measured, or contingency in the case of failure. It is recommended that RTCA document the measures that will be undertaken to improve the timeliness in which rehabilitation is likely to be colonised by threatened fauna species through the augmentation of habitat with appropriate artificial features, such as nest boxes, logs and other groundcover and microhabitats. It is also recommended that RTCA document broadly the key areas of research that the funding is likely to support. These matters should be addressed satisfactorily prior to project approval, with further necessary detail provided within a Biodiversity offset and Rehabilitation Management Plan.

2.3.4 Proposed/Potential Additional Strategic Regional Offsets

2.3.4.1 Summary of RTCA Information

RTCA has investigated three further strategic potential offset sites in the Goulburn River National Park region. These comprise the Bowdidge, Hunt and O'Brien properties, as shown in Figures 2 and 3 in Russo (2011). These are displayed in **Figure 2.3** in this report and documented in the table in **Appendix 2**.

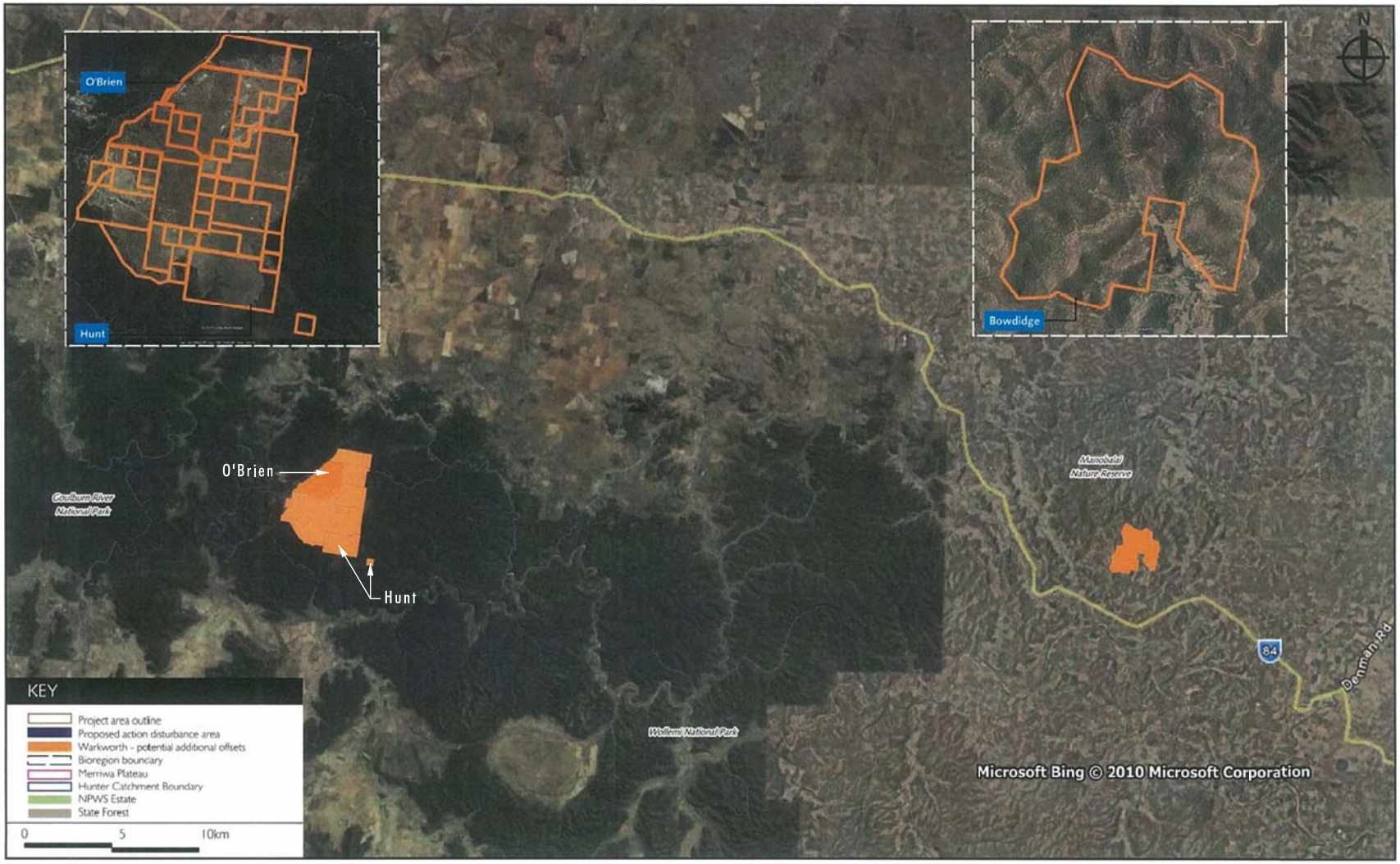
2.3.4.2 Assessment of Ecological Benefit

It is recognised that RTCA has taken further steps to investigate potential further strategic offset measures to compensate for residual impacts that would result from the Warkworth Extension Project. These properties are more fully assessed in **Section 2.3.5.2**.

2.3.5 Comparison of Ironbark Forest and woodland at MTW versus Strategic Regional Offsets

2.3.5.1 Summary of RTCA Information

RTCA states that all of the proposed Strategic Regional Offsets contain substantial areas of various forms of Ironbark-dominated forest and woodland, and provides a comparison (within Attachment 3 of the letter) of the Warkworth CHGBIW and CHISGGBF with the ironbark-dominated communities at the proposed BOAs. Russo (2011) suggests that the analysis of the ironbark forest and woodland within the strategic offset properties indicates that such vegetation has a high degree of similarity to the ironbark forests in the Warkworth disturbance area. It is noted by this author, however, that the survey effort expended at the Bowdidge property comprised one field day (for 519 hectares). The level of survey effort



Source: Coal & Allied

FIGURE 2.3

Potential Additional Strategic Offset Areas

expended at the O'Brien (498 hectares) and Hunt (1550 hectares) properties is not documented by RTCA, however the Cumberland Ecology letter forming Attachment 7 (in Russo 2011) states that 'a reconnaissance survey' of the two properties was undertaken.

Russo (2011) discusses the perceived similarities between the ironbark-dominated vegetation on the candidate offset sites and that in the Warkworth Extension Project Area. The letter also presents the likelihood of the candidate offset properties providing habitat for a number of the threatened fauna species that will be impacted by the project.

Russo (2011) discusses at length the proposition that the ironbark dominated vegetation in the upper Hunter Valley (including Bowdidge, Hunt and O'Brien), and indeed elsewhere in NSW including western Sydney and along the margins of the Great Dividing Ranges, should be eligible for consideration as offsets for the Central Hunter vegetation. This is based on the notion that the CHGBIW EEC and CHISGGBF EEC are communities that have a restricted distribution, while some other listings under the TSC Act (such as box-gum woodlands and several floodplain EECs) have much broader distributions and in reality comprise a number of communities within their 'umbrella' EEC listings.

2.3.5.2 Assessment of Ecological Benefit

The level of survey effort expended at the potential offset properties is minimal given their size and the statements made by RTCA claiming that there is a 'high degree of similarity' between the ironbark communities at these sites and the ironbark communities in the Warkworth Extension Project Area. The author considers that these communities are likely to be only distantly related in comparison to other more closely related communities occurring in the central Hunter Valley floor. This is based on the author's experience in surveying, mapping and describing vegetation communities in Goulburn River National Park (assisting Hill 2000 – areas that adjoin Hunt and O'Brien) and at Manobalai Nature Reserve (Peake 1999). While there will be obvious visual similarities between the ironbark communities, based on the presence of narrow-leaved ironbark (*Eucalyptus crebra*), and structural similarities, it is very highly likely that a detailed analysis of the floristics of the communities would show that they are dissimilar, largely based on groundcover and shrub strata flora. It would be necessary to undertake adequate stratified plot-based sampling and an agglomerative cluster analysis (or similar) of the data to properly resolve the relationship issue.

Although the analysis of the potential for the properties to provide habitat for the relevant threatened fauna species is somewhat restricted by the limited level of field survey undertaken, the anticipation that the properties would provide appropriate habitat for many of the threatened fauna impacted by the project is supported. Most of the threatened fauna species to be impacted are wide-ranging in woodlands, forests and, in some cases, grasslands throughout the Hunter Valley. Based on the evidence presented through a review of OEH Atlas of NSW Wildlife records, together with other anecdotal data from Cumberland Ecology, it is accepted that these properties are likely to provide suitable strategic offset opportunities for the relevant threatened fauna species.

The argument that offsetting of the CHGBIW EEC and CHISGGBF EEC should be less restrictive because some other EECs have a more general delineation (and are more 'umbrella' listings) is not supported. It is appropriate to consider each community and each impact-offset scenario on its merits. The author agrees that offsetting for different vegetation communities has been undertaken in different ways in NSW, but does not support this as justification for 'loosening up' the offsetting approach for EECs that have more restricted geographical coverage. In short, it is a tenuous claim that the ironbark communities present in the candidate offset areas are reasonably closely related to those to be impacted by the project. Nonetheless, it is appropriate to consider the overall ecological value of the three candidate offset areas, without any need for the ironbark communities to be closely related. It

is established that all three properties are likely to provide habitat for a range of threatened fauna species to be impacted. It is also agreed that the sites are strategically located in relation to conservation reserves (for Hunt and O'Brien, and indirectly for Bowdidge) or large tracts of Crown land (for Bowdidge), and all occur within the Great Eastern Ranges corridor. Hunt offers the greatest potential opportunity for environmental gain because some 1115 hectares comprises derived native grassland, while O'Brien supports 268 hectares and Bowdidge just 2.3 hectares.

It is assumed that RTCA is offering all three properties for inclusion in the offset package – subject to successful purchase – based on the final paragraph of Part 2.5 (Russo 2011, p. 9) and by the presentation of offset area calculations in Table 3 in Russo (2011, pp. 12-13). RTCA notes that if negotiations with current owners of these properties are unsuccessful, it will secure an alternative property to the acceptance of OEH.

The duration and type of offsetting agreement for these properties is not discussed, however the author assumes that the properties would be protected in perpetuity.

In principle all three properties offer valuable strategic additions to the offset package.

3.0 Key Findings and Recommendations

3.1 Key Findings

3.1.1 Warkworth Extension Project

3.1.1.1 Warkworth Sands Woodland

The additional information provided by RTCA in their letter dated 30 June 2011 does not provide anything new to reduce impacts on, or to offset, Warkworth Sands Woodland. Therefore, the findings and recommendations that relate to WSW presented in Sections 5.1 and 6.1 in Umwelt (2011a and 2011b) are unchanged.

3.1.1.2 Commitment to Regeneration/Re-establishment in Offset Areas

The correction of erroneous information in relation to commitments to regeneration/re-establishment of native vegetation on derived grasslands in offset areas is noted, and the changes implemented are supported. These changes help to provide 'environmental gain' in the offset areas.

3.1.1.3 Commitment to Improved Rehabilitation Outcomes for Central Hunter Grey Box – Ironbark Woodland EEC and Central Hunter Ironbark – Spotted Gum – Grey Box EEC

The re-design of the rehabilitation and the commitment to a much more substantial area of CHGBIW EEC and/or CHISGGBF EEC in the rehabilitation is substantial, and contributes towards reducing the reliance on up-front offsetting. No new information was provided however that could increase the certainty that the rehabilitated vegetation would, over the medium term, develop into vegetation communities that are characteristic of the two EECs.

The provision of up to $500,000 towards improving the rehabilitation of ground stratum plant species that typically occur in these two EECs is appropriate and would be of value.

3.1.1.4 Offsetting for Central Hunter Grey Box – Ironbark Woodland EEC and Central Hunter Ironbark – Spotted Gum – Grey Box EEC

The additional local offsets provided for CHGBIW EEC and CHISGGBF EEC at Areas 1, 2, and 3 will contribute towards meeting appropriate offsetting targets for these communities. Although the offset areas could be subject to underground mining in future, it is anticipated that this is likely to have minimal impact on the terrestrial vegetation and fauna habitats of these three areas. Although the areas have not been offered as in-perpetuity offsets, it is suggested that they should be secured for long-term conservation. This should constitute a period that enables confidence to be attained in the rehabilitation of CHGBIW EEC and/or CHISGGBF EEC in the post-mining landscape.

3.1.1.5 Proposed Additional Strategic Offsets

RTCA has put forward the potential of using three additional strategically-located properties to offset the impact of the Warkworth Extension Project. These properties comprise a range of sandstone-based vegetation communities and fauna habitats, together with a substantial area of derived grassland on two properties. RTCA has attempted to show that the ironbark-dominated vegetation communities on these (and other strategic) properties is similar to that which will be impacted by the Warkworth Extension Project. There are very strong ecological

grounds and data that do not support this argument however, and it is suggested here that this approach be discounted as it is tenuous and not ecologically compelling. The properties do each have strategic value, and they do or are likely to support habitat for a range of threatened fauna species that would be impacted by the project. They should be assessed for their appropriateness based on this, not on the provision of closely related vegetation types, as these are not likely to be present.

3.1.1.6 Overall Offsetting Package

As discussed in **Section 3.1.1.1** above, there is no new information regarding WSW, therefore there is further discussion on this community and the findings and recommendations presented in Umwelt (2011a and 2011b) are unchanged.

Apart from WSW, the other key vegetation community that was not satisfactorily avoided or offset was CHGBIW EEC (together with the closely related CHISGGBF EEC, treated together here). From Umwelt (2011a and 2011b) RTCA was proposing offsets that would provide for an up-front offset of 0.79:1 for this community. Umwelt (2011a and 2011b) recommended an up-front ratio of 2:1 and a ratio of 4:1 over time. RTCA has clarified that it intends to foster the re-establishment of CHGBIW EEC in areas of derived native grassland that are present in the Southern, Springwood and Northern BOAs. This contributes a further 217.3 hectares to the long-term offset target. It has also included a commitment to establish Areas 1, 2 and 3 (Russo 2011) as offsets, through which an additional 57.4 hectares and 83.7 hectares will be protected up-front and through regeneration/re-establishment, respectively. Further, RTCA now commits to the rehabilitation of 2114 hectares of CHGBIW EEC and/or CHISGGBF EEC, which is here discounted by 50 per cent to 1057 hectares due to the risks associated with rehabilitation of EECs in post-mined lands.

In summary, the amended package will result in the following outcomes for CHGBIW EEC/CHISGGBF EEC:

- The up-front offset ratio is now 0.88:1, increased from 0.79:1.
- The long-term (including regeneration/re-establishment) offset ratio is now 1.36:1, increased from 1.13:1.
- The long-term (including regeneration/re-establishment and discounted rehabilitation) offset ratio is 3.04:1, increased from 2.82:1.

Umwelt (2011a and 2011b) recommended the inclusion of the entire Goulburn River and Seven Oaks BOAs as strategic offsets for CHGBIW EEC, together with a range of threatened fauna species. It also recommended that a further 821.1 hectares of CHGBIW was required to meet the up-front 2:1 ratio for impacting 658 hectares of CHGBIW and CHISGGBF. This figure is now reduced to 763.7 hectares.

3.1.2 HVO South Modification

The additional information provided by RTCA in their letter dated 30 June 2011 does not provide anything new to appropriately offset the HVO South Modification Project, i.e. to replace the Archerfield offset.

It is suggested that at least one of the strategic offset properties proposed would be suitable to offset impacts from the HVO South Project. Umwelt (2011a and 2011b) recommended an up-front offset of 280 hectares primarily composed of CHGBIW EEC, with an overall long-term offsetting outcome of 560 hectares, primarily composed of CHGBIW EEC. In the absence of any offsetting opportunities that comprise CHGBIW EEC and/or CHISGGBF EEC, an offset that is strategically located, but also significantly larger than the proposed 560

hectares, is appropriate, particularly where there is significant opportunity for environmental gain. It is suggested that the Hunt property would provide an appropriate opportunity for this.

3.2 Recommendations

3.2.1 Warkworth Extension Project

3.2.1.1 Warkworth Sands Woodland

It is recommended that:

1. RTCA address the recommendations documented in Section 6.1 of Umwelt (2011b), as they pertain to Warkworth Sands Woodland.

3.2.1.2 Commitment to Regeneration/Re-establishment in Offset Areas

To ensure that the regeneration/re-establishment of native vegetation on BOAs is done appropriately and that there is adequate confidence that the desired vegetation communities will return, it is recommended that:

2. RTCA clearly indicate the target regeneration communities for the 8.5 hectares of Derived Native Grassland and 160.2 hectares of Cassinia/Acacia Regeneration at Seven Oaks BOA.

3. RTCA clearly document the measures through which the regeneration/re-establishment will be undertaken, how it will be measured, and how and when intervention will occur, when required, to ensure that the recovery is trending in the right direction. Measures for enhancing the recovery through timeline reductions should be clearly elucidated, for example through the provision of nest boxes, targeted plantings, feral/native herbivore management and strategic grazing management, where necessary and appropriate. Some level of detail should be required prior to project approval, with most being documented in a Biodiversity Offset and Rehabilitation Management Plan.

3.2.1.3 Commitment to Improved Rehabilitation Outcomes for Central Hunter Grey Box – Ironbark Woodland EEC and Central Hunter Ironbark – Spotted Gum – Grey Box EEC

To ensure the commitment to the rehabilitation outcomes achieves an overall ecological benefit and is measureable, it is recommended that:

4. The revised EEC rehabilitation targets be adopted.

5. RTCA re-issue the rehabilitation map to clarify where the EEC is proposed to be rehabilitated.

6. RTCA clearly documents how the rehabilitation of this community would be undertaken, how it would be measured, or contingency in the case of failure.

7. RTCA document the measures that will be undertaken to improve the timeliness in which rehabilitation is likely to be colonised by threatened fauna species through the augmentation of habitat with appropriate artificial features, such as nest boxes, logs and other groundcover and microhabitats.

8. The funding of $500,000 towards research into improving the rehabilitation of ground stratum plant species in the CHGBIW and CHISGGBF EECs be secured, and that the findings from the research are made publicly available through reports, presentation at conferences and the internet.

3.2.1.4 Offsetting for Central Hunter Grey Box – Ironbark Woodland EEC and Central Hunter Ironbark – Spotted Gum – Grey Box EEC

It is recommended that:

9. Areas 1, 2 and 3 are included within the offset package; they are secured appropriately for long-term offsetting; and the regeneration/re-establishment approach documented in Recommendation 3 above be applied to these properties.

3.2.1.5 Proposed Additional Strategic Offsets

To address the up-front CHGBIW EEC offsetting shortfall of 763.7 hectares, and taking into account the $500,000 commitment towards funding CHGBIW EEC rehabilitation research, it is recommended that:

10. The O'Brien property be included to specifically provide for an up-front offset for CHGBIW, and associated threatened fauna species, and that this property be ecologically improved over time to ensure a strong "environmental gain".

3.2.1.6 Overall Warkworth Extension Project Offsetting Package

It is recommended that:

11. The overall offset package for the Warkworth Extension Project include:

    i) Southern BOA;

    ii) Springwood BOA;

    iii) Northern BOA;

    iv) Goulburn River BOA (in its entirety);

    v) Seven Oaks BOA;

    vi) Areas 1, 2 and 3;

    vii) O'Brien property;

    viii) rehabilitation of 2114 hectares to CHGBIW EEC and/or CHISGGBF EEC;

    ix) $500,000 funding to research aimed at improving rehabilitation of ground stratum plant species of the CHGBIW EEC and/or CHISGGBF EEC; and

    x) the recommendations regarding the impact avoidance and offsetting for WSW documented in Section 6.1 of Umwelt (2011b) as it relates to WSW.

3.2.2 HVO South Modification

It is recommended that, in the absence of a more suitable offset opportunity:

1. The Hunt property be established as an offset to satisfy requirements for the HVO South Modification project, and that this property be ecologically improved over time to ensure a strong 'environmental gain'. RTCA clearly document the measures through which the regeneration/re-establishment will be undertaken, how it will be

measured, and how and when intervention will occur, when required, to ensure that the recovery is trending in the right direction. Measures for enhancing the recovery through timeline reductions should be clearly elucidated, for example through the provision of nest boxes, targeted plantings, feral/native herbivore management and strategic grazing management, where necessary and appropriate. Some level of detail should be required prior to project approval, with most being documented in a Biodiversity Offset and Rehabilitation Management Plan.

3.3 Overall Warkworth and HVO South Offsetting Package (excluding Warkworth Sands Woodland Outstanding Requirements)

To address all biodiversity offsetting requirements for the Warkworth Extension and HVO South Modification projects, it is recommended that the following offset package is secured:

2. All components listed under Recommendation 11, including outstanding requirements to avoid and/or offset WSW, to satisfy offsetting requirements for the Warkworth Extension Project.

3. The Hunt property to satisfy offsetting requirements for the HVO South Modifications Project.

It is suggested that the Putty BOA and the Bowdidge property are not required to address offsetting needs for either project. Neither property will provide satisfactory offsetting outcomes for WSW.

4.0 References

Hill, L. (2000) Goulburn River National Park and Munghorn Gap Nature Reserve: Vegetation Survey for Fire Management Purposes. Unpublished report to NSW National Parks and Wildlife Service, Upper Hunter District.

Peake, T.C. (1999) The Vegetation of Manobalai Nature Reserve. Unpublished report prepared for NSW National Parks and Wildlife Service, Muswellbrook.

Peake, T.C. (2004) *The Vegetation of the Central Hunter Valley. A Report on the Findings of the Hunter Remnant Vegetation Project*. Hunter – Central Rivers Catchment Management Authority, Tocal.

Russo, A. (2011) Warkworth Extension (09_0202) – Draft Independent Ecological Review. Letter to D. Kitto, Department of Planning, Sydney.

Umwelt (2011a) Draft Review of Ecological Assessments for Warkworth Extension EA and HVO South Modification Projects (June 2011). Prepared for the Department of Planning and Infrastructure

Umwelt (2011b) Review of Ecological Assessments for Warkworth Extension EA and HVO South Modification Projects (August 2011). Prepared for the Department of Planning and Infrastructure

APPENDIX 1

Updated Assessment Including New Re-establishment and Rehabilitation Commitments

Areas with realignment of Wallaby Scrub Road

WARKWORTH PROPOSED - IMPACTS AND OFFSETS (ALL EXCLUDING WALLABY SCRUB ROAD REALIGNMENT) - CALCULATIONS 11 August 2011

Vegetation Community (inc. TSC Act listing)	Proposed Area of Clearing (ha)	Proposed Offset Strategy (ha)																		Overall Offset Areas and Ratios						
		Southern Biodiversity Offset Area^^			Northern Biodiversity Offset Area#			Goulburn River Biodiversity Offset Area†			Seven Oaks##			Putty###			Springwood††			Buffer Lands†††						
		Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation (long-term dedicated offset)	Up-front Offset Area (ha)	Up-front Offset Ratio	Overall Offset Area (inc. committeed regeneration^^) (ha)	Overall Offset Ratio (inc. committed regeneration^^)	Committed Rehabilitation Area (ha) discounted by 50%^^^	Overall Offset Area (inc. committed regeneration^^ and rehabilitation^^^) (ha)	Overall Offset Ratio (inc. committed regeneration^^ and rehabilitation^^^)
Data Source	Table 4.1 in Ecology Study (Annex E of EA)	Table 4.1 in Ecology Study (Annex E of EA)	-	Table 5.7 in Ecology Study (Annex E of EA)and McLennan (2011)††	Table 5.7 in Ecology Study (Annex E of EA)	Table 5.8 in Ecology Study (Annex E of EA)	-	Table 5.7 in Ecology Study (Annex E of EA)	-	Table 5.7 in Ecology Study (Annex E of EA)	Table 2.1 of Response to Submissions	-	Table 2.1 of Response to Submissions	Table 2.1 of Response to Submissions	-	Table 2.1 of Response to Submissions	Letter to Department of Planning (dated 14 January 2011)	-	Letter to Department of Planning (dated 14 January 2011)		Section 5.11.3 of EA						
NATIVE WOODLAND																										
Warkworth Sands Woodland EEC	103.5	85.4	32.8	118.2	19.5	195.8	215.3	0	0	0	0	0	0	0	0	0	18.1	5.8	23.9	7.1	130.1	1.26	364.5	3.52	0	364.5	3.52
Central Hunter Grey Box – Ironbark Woodland EEC	627.5	368.7	140.1	508.8	103.8	23.1	126.9	0	0	0	0	0	0	0	0	0	22.4	54.1	76.5		494.9	0.79	712.2	1.13	1057	1769.2	2.82
Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC	30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0.00	0	0.00	0	0	0.00
Hunter Lowlands Red Gum Forest EEC	3.2	32.5	0	32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		32.5	10.16	32.5	10.16	0	32.5	10.16
Box Gum Woodland (includes White Box, Yellow Box and Blakely's Red Gum dominated communities) EEC	0	34.8	0	34.8	0	0	0	337.1	0	337.1	0	0	0	0	0	0	0	0	0		371.9	N/A	371.9	N/A	0	371.9	N/A
Hunter Valley Vine Thicket EEC	0	0.6	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.6	N/A	0.6	N/A	0	0.6	N/A
River Redgum Floodplain Woodland (Hunter Floodplain Red Gum Woodland EEC)	0	7.8	0	7.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		7.8	N/A	7.8	N/A	0	7.8	N/A
Hunter Valley River Oak Forest	0	4.8	0	4.8	0	0	0	25.1	0	25.1	0	0	0	0	0	0	3.5	0	3.5		33.4	N/A	33.4	N/A	0	33.4	N/A
Regenerating Blakely's Red Gum Shrubland	0	0	0	0	0	0	0	40.7	0	40.7	0	0	0	0	0	0	0	0	0		40.7	N/A	40.7	N/A	0	40.7	N/A
Rough-barked Apple Open Forest	0	0	0	0	0	0	0	25.1	0	25.1	0	0	0	0	0	0	0	0	0		25.1	N/A	25.1	N/A	0	25.1	N/A
Narrow-leaved Ironbark Woodland	0	0	0	0	0	0	0	566.7	0	566.7	0	0	0	0	0	0	0	0	0		566.7	N/A	566.7	N/A	0	566.7	N/A
Slaty Gum Open Forest VEC	0	0	0	0	0	0	0	68.8	0	68.8	0	0	0	0	0	0	0	0	0		68.8	N/A	68.8	N/A	0	68.8	N/A
River Peppermint, Mountain Blue Gum Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	34	0	34	0	0	0		34	N/A	34	N/A	0	34	N/A
Smooth Barked Apple, Yellow Bloodwood Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	139	0	139	0	0	0		139	N/A	139	N/A	0	139	N/A
White Stringybark, Narrow-leaved Ironbark Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	170.1	0	170.1	0	0	0		170.1	N/A	170.1	N/A	0	170.1	N/A
Regenerating River Peppermint, Mountain Blue Gum Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	23.5	0	23.5	0	0	0		23.5	N/A	23.5	N/A	0	23.5	N/A
White Box Shrubby Woodland	0	0	0	0	0	0	0	0	0	0	1.5	0	1.5	0	0	0	0	0	0		1.5	N/A	1.5	N/A	0	1.5	N/A
Red Gum Shrubby Woodland	0	0	0	0	0	0	0	0	0	0	44.9	0	44.9	0	0	0	0	0	0		44.9	N/A	44.9	N/A	0	44.9	N/A
Narrow-leaved Ironbark/Blue-leaved Ironbark Shrubby Woodland	0	0	0	0	0	0	0	0	0	0	284.4	0	284.4	0	0	0	0	0	0		284.4	N/A	284.4	N/A	0	284.4	N/A
Rough-barked Apple/Stringybark Open Forest	0	0	0	0	0	0	0	0	0	0	23.2	0	23.2	0	0	0	0	0	0		23.2	N/A	23.2	N/A	0	23.2	N/A
Central Hunter Bulloak Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0.00	0	0.00	0	0	0.00
Woodland (no community nominated)	0	0	0	0	0	0	0	0	0	0	0	168.7	168.7	0	12.2	12.2	0	0	0		0	N/A	180.9	N/A	0	180.9	N/A
Sub-total Woodland EEC/VEC	**764.7**	**529.8**	**172.9**	**702.7**	**123.3**	**218.9**	**342.2**	**405.9**	**0**	**405.9**	**0**	**0**	**0**	**0**	**0**	**0**	**40.5**	**59.9**	**100.4**	**7.1**	**1106.6**	**1.45**	**1551.2**	**2.03**	**1057**	**2608.2**	**3.41**
Sub-total Native Woodland	**764.7**	**534.6**	**172.9**	**707.5**	**123.3**	**218.9**	**342.2**	**1063.5**	**0**	**1063.5**	**354**	**168.7**	**522.7**	**366.6**	**12.2**	**378.8**	**44**	**59.9**	**103.9**	**7.1**	**2493.1**	**3.26**	**3118.6**	**4.08**	**1057**	**4175.6**	**5.46**
OTHER VEGETATION																											
Derived Native and Exotic Grassland	429.4	140.1	0	140.1	23.1	0	0	0	0	0	8.5	0	0	12.2	0	0	54.1	0	0		238	0.55	140.1	0.33	0	140.1	0.33
Cassinia/Acacia Regenerating Shrubland	0	0	0	0	0	0	0	0	0	0	160.2	0	0	0	0	0	0	0	0		160.2	N/A	0	N/A	0	0	N/A
Derived Native Grassland (EEC)	0	0	0	0	0	0	0	235.8	0	235.8	0	0	0	0	0	0	0	0	0		235.8	N/A	235.8	N/A	0	235.8	N/A
Warkworth Sands Grassland	18.1	32.8	0		195.8	0	0	0	0	0	0	0	0	0	0	0	5.8	0			234.4	12.95	0	0.00	0	0	0.00
Sub-total Grassland (Derived and Exotic)	**447.5**	**172.9**	**0**	**140.1**	**218.9**	**0**	**0**	**235.8**	**0**	**235.8**	**8.5**	**0**	**0**	**12.2**	**0**	**0**	**59.9**	**0**	**0**	**0**	**708.2**	**1.58**	**375.9**	**0.84**	**0**	**375.9**	**0.84**
Sub-total Grassland EEC	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**235.8**	**0**	**235.8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**235.8**	**N/A**	**235.8**	**N/A**	**0**	**235.8**	**N/A**
Sub-total Other Vegetation	**447.5**	**172.9**	**0**	**140.1**	**218.9**	**0**	**0**	**235.8**	**0**	**235.8**	**168.7**	**0**	**0**	**12.2**	**0**	**0**	**59.9**	**0**	**0**	**0**	**868.4**	**1.94**	**375.9**	**0.84**	**0**	**375.9**	**0.84**
Sub-total EECs & VECs	**764.7**	**529.8**	**172.9**	**702.7**	**123.3**	**218.9**	**342.2**	**641.7**	**0**	**641.7**	**0**	**0**	**0**	**0**	**0**	**0**	**40.5**	**59.9**	**100.4**	**7.1**	**1342.4**	**1.76**	**1787**	**2.34**	**1057**	**2844**	**3.72**
Totals	**1212.2**	**707.5**	**172.9**	**847.6**	**342.2**	**218.9**	**342.2**	**1299.3**	**0**	**1299.3**	**522.7**	**168.7**	**522.7**	**378.8**	**12.2**	**378.8**	**103.9**	**59.9**	**103.9**	**7.1**	**3354.4**	**2.77**	**3494.5**	**2.88**	**1057**	**4551.5**	**3.75**

Notes:

1. * Excluding the area to be cleared as part of the Wallaby Scrub Road Realignment, i.e. the area to be cleared has been removed from the calculations
2. ^Areas of Derived Grassland at the Southern BOA are proposed for restoration to woodland (Russo 2011) and are included as woodland offsets in this table. In total they comprise 140.1 ha of derived native and exotic grassland. The 32.8 ha of Warkworth Sands Grassland will be restored to WSW.
3. † Goulburn River BOA also includes an additional 140 ha of Narrow-leaved Ironbark Woodland proposed as an offset for HVO south, not included in this table.
4. # At the Northern BOA 195.8ha of Warkworth Sands Woodland will be re-established to Warkworth Sands Woodland. 23.1 ha of derived native grassland is proposed to be regenerated back to Central Hunter Box - Ironbark Woodland.
5. ## At Seven Oaks it is assumed that 8.5ha of Derived Native Grassland and 160.2ha of Cassinia/Acacia Regenerating Shrubland will regenerate to woodland, and RTCA has committed to its re-establishment.
6. ### At Putty RTCA commits to the re-establishment of 12.2ha of Derived Native Grassland to woodland.
7. The "Data Source" entries indicate the original source of the data, however many entries have been updated based on further advice from RTCA and further investigation of reports
8. These calculations do not include impacts or offsetting proposed in relation to the HVO South project.
9. ^^ Regeneration ratio - for the purposes of this analysis the natural regeneration (with assistance where required) of native vegetation communities is factored in as the same ratio as direct up-front offsetting of that community, i.e. it is valued the same. It is recognised that there is some risk associated with this.
10. ^^^ Rehabilitation area and ratio - for the purposes of this analysis the proposed rehabilitation to EECs is factored in at 50% of the ratio they would contribute if they were direct up-front offsets of their respective vegetation communities, i.e. they are valued at 50% of their area, as their is reasonable risk that the target vegetation communities might not be recreated. It is noted however that RTCA needs to demonstrate sufficiently that this is realistic and there needs to be appropriate performance monitoring - it is assumed here that this will be forthcoming.
11. For the proposed rehabilitation of EECs, it is assumed in that RTCA will aim to recreate the Central Hunter Box - Ironbark Woodland EEC and/or the Central Hunter Ironbark - Spotted Gum - Grey Box Forest EEC.
12. The Slaty Gum Open Forest proposed for offsetting at the Goulburn River BOA is likely to be covered by the VEC listing under the TSC Act. Although not explicity claimed to be the VEC in the Ecology Study (Annex E) it is assumed here that it corresponds with the VEC.
13. †† McLennan (2011) Proposed Warkworth Extension. Letter to A. Russo, Rio Tinto Coal Australia dated 17 May 2011.
14. ††† 5.8 ha of WSG will be restored back to WSW (McLennan 2011). No other parts of the Buffer Lands are committed to the formal offset package.

APPENDIX 2

Updated Assessment Including New Rehabilitation and Offset Commitments

WARKWORTH PROPOSED - IMPACTS AND OFFSETS (ALL EXCLUDING WALLABY SCRUB ROAD REALIGNMENT) - ASSESSMENT OF ADDITIONAL OFFSETS - CALCULATIONS 11 August 2011

Vegetation Community (inc. TSC Act listing)	Proposed Area of Clearing (ha)	Proposed Additional Offset Areas (ha)																		Current Offsets (from Sheet 1 "Warkworth Impacts & Offsets")				Overall Offset Areas and Ratios (including additional committed offsets & rehabilitation from 30 June 2011 RTCA letter)						
		Area 1			Area 2			Area 3			O'Brien			Hunt			Bowdidge												
		Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Existing Vegetation	Vegetation to be re-established to woodland	Long Term Dedicated Offset	Up-front Offset Area (ha)	Up-front Offset Ratio	Overall Offset Area (inc. committed regeneration^^) (ha)	Overall Offset Ratio (inc. committed regeneration^^)	Up-front Offset Area (ha)	Up-front Offset Ratio	Overall Offset Area (inc. committed regeneration^^) (ha)	Overall Offset Ratio (inc. committed regeneration^^)	Committed Rehabilitation Area (ha) discounted by 50%^^^	Overall Offset Area (inc. committed regeneration^^ and rehabilitation^^^) (ha)	Overall Offset Ratio (inc. committed regeneration^^ and rehabilitation^^^)
Data Source	Table 4.1 in Ecology Study (Annex E of EA)	Table 4.1 in Ecology Study (Annex E of EA)	-	Table 5.7 in Ecology Study (Annex E of EA)and McLennan (2011)[†]	Table 5.7 in Ecology Study (Annex E of EA)	Table 5.8 in Ecology Study (Annex E of EA)	-	Table 5.7 in Ecology Study (Annex E of EA)	-	Table 5.7 in Ecology Study (Annex E of EA)	Table 2.1 of Response to Submissions	-	Table 2.1 of Response to Submissions	Table 2.1 of Response to Submissions	-	Table 2.1 of Response to Submissions	Letter to Department of Planning (dated 14 January 2011)	-	Letter to Department of Planning (dated 14 January 2011)									Section 5.11.3 of EA AND Letter 30 June 2011		
NATIVE WOODLAND																													
Warkworth Sands Woodland EEC	103.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123	1.2	357.4	3.5	123.0	1.19	357.4	3.45	0	357.4	3.45
Central Hunter Grey Box – Ironbark Woodland EEC	627.5	21.6	3.2	24.8	4.4	72.7	77.1	31.4	7.8	39.2	0	0	0	0	0	0	0	0	0	494.9	0.8	712.2	1.1	552.3	0.88	853.3	1.36	1057	1910.3	3.04
Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC	30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.00	0.0	0.00	0	0.0	0.00
Hunter Lowlands Red Gum Forest EEC	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.8	0	18.8	32.5	10.2	32.5	10.2	51.3	16.03	51.3	16.03	0	51.3	16.03
Box Gum Woodland (includes White Box, Yellow Box and Blakely's Red Gum dominated communities) EEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	371.9	N/A	371.9	N/A	371.9	N/A	371.9	N/A	0	371.9	N/A
Hunter Valley Vine Thicket EEC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	N/A	0.6	N/A	0.6	N/A	0.6	N/A	0	0.6	N/A
River Redgum Floodplain Woodland (Hunter Floodplain Red Gum Woodland EEC)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.8	N/A	7.8	N/A	7.8	N/A	7.8	N/A	0	7.8	N/A
Hunter Valley River Oak Forest	0	0	0	0	17.9	0	17.9	0	0	0	0	0	0	0	0	0	0	0	0	33.4	N/A	33.4	N/A	51.3	N/A	51.3	N/A	0	51.3	N/A
Regenerating Blakely's Red Gum Shrubland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40.7	N/A	40.7	N/A	40.7	N/A	40.7	N/A	0	40.7	N/A
Rough-barked Apple Open Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25.1	N/A	25.1	N/A	25.1	N/A	25.1	N/A	0	25.1	N/A
Narrow-leaved Ironbark Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	566.7	N/A	566.7	N/A	566.7	N/A	566.7	N/A	0	566.7	N/A
Slaty Gum Open Forest VEC	0	0	0	0	0	0	0	0	0	0	6.5	0	6.5	0.2	0	0.2	0	0	0	68.8	N/A	68.8	N/A	75.5	N/A	75.5	N/A	0	75.5	N/A
River Peppermint, Mountain Blue Gum Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	N/A	34.0	N/A	34.0	N/A	34.0	N/A	0	34.0	N/A
Smooth Barked Apple, Yellow Bloodwood Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	N/A	139.0	N/A	139.0	N/A	139.0	N/A	0	139.0	N/A
White Stringybark, Narrow-leaved Ironbark Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	170.1	N/A	170.1	N/A	170.1	N/A	170.1	N/A	0	170.1	N/A
Regenerating River Peppermint, Mountain Blue Gum Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23.5	N/A	23.5	N/A	23.5	N/A	23.5	N/A	0	23.5	N/A
White Box Shrubby Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	N/A	1.5	N/A	1.5	N/A	1.5	N/A	0	1.5	N/A
Red Gum Shrubby Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44.9	N/A	44.9	N/A	44.9	N/A	44.9	N/A	0	44.9	N/A
Narrow-leaved Ironbark/Blue-leaved Ironbark Shrubby Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	284.4	N/A	284.4	N/A	284.4	N/A	284.4	N/A	0	284.4	N/A
Rough-barked Apple/Stringybark Open Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23.2	N/A	23.2	N/A	23.2	N/A	23.2	N/A	0	23.2	N/A
Central Hunter Bulloak Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	N/A	0.0	N/A	0	0.0	N/A
Woodland (no community nominated)	0	0	0	0	0	0	0	0	0	0	0	268.3	268.3	0	1115.8	1115.8	0	2.3	2.3	0	N/A	180.9	N/A	0.0	N/A	1567.3	N/A	0	1567.3	N/A
Ironbark-dominated communities	0	0	0	0	0	0	0	0	0	0	223.8	0	223.8	427.5	0	427.5	239	0	239	0	0.0	0.0	0.0	890.3	N/A	890.3	N/A	0	890.3	N/A
Forest Red gum - Grey Gum Dry Open Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	0	1.4	0	0	0	0	0.0	0.0	0.0	1.4	N/A	1.4	N/A	0	1.4	N/A
Yellow Bloodwood - Ironbark Shrubby Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0.0	0.0	0.0	3.0	N/A	3.0	N/A	0	3.0	N/A
Scribbly Gum - Yellow Bloodwood Woodland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256.7	0	256.7	0	0.0	0.0	0.0	256.7	N/A	256.7	N/A	0	256.7	N/A
Gully Rainforest VEC	0							0	0	0	5.7	0	5.7	0	0	0	0	0	0					5.7	N/A	5.7	N/A	0	5.7	N/A
Sub-total Woodland EEC/VEC	**764.7**	**21.6**	**3.2**	**24.8**	**4.4**	**72.7**	**77.1**	**31.4**	**7.8**	**39.2**	**6.5**	**0**	**6.5**	**5.9**	**0**	**5.9**	**18.8**	**0**	**18.8**	**1099.5**	**1.4**	**1551.2**	**2.0**	**1188.1**	**1.55**	**172.3**	**0.23**	**1057**	**1229.3**	**1.61**
Sub-total Native Woodland	**764.7**	**21.6**	**3.2**	**24.8**	**22.3**	**72.7**	**95**	**31.4**	**7.8**	**39.2**	**230.3**	**268.3**	**498.6**	**434.8**	**1115.8**	**1550.6**	**517.5**	**2.3**	**519.8**	**2486**	**3.3**	**3118.6**	**4.1**	**3743.9**	**4.90**	**2728**	**3.57**	**1057**	**3785**	**4.95**
OTHER VEGETATION																													
Derived Native and Exotic Grassland	429.4	3.2	0	0	72.7	0	0	0	0	0	268.3	0	0	1115.8	0	0	0	0	0	238	0.6	140.1	0.3	1698	3.95	140.1	0.33	0	140.1	0.33
Cassinia/Acacia Regenerating Shrubland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160.2	N/A	0.0	N/A	160.2	N/A	0.0	N/A	0	0	N/A
Derived Native Grassland (EEC)	0	0	0	0	0	0	0	7.8	0	0	0	0	0	0	0	0	2.3	0	0	235.8	N/A	235.8	N/A	245.9	N/A	235.8	N/A	0	235.8	N/A
Warkworth Sands Grassland	18.1	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0		234.4	13.0	0.0	0.0	234.4	12.95	0.0	0.00	0	0	0.00
Sub-total Grassland (Derived and Exotic)	**447.5**	**3.2**	**0**	**0**	**72.7**	**0**	**0**	**7.8**	**0**	**0**	**268.3**	**0**	**0**	**1115.8**	**0**	**0**	**2.3**	**0**	**0**	**708.2**	**1.6**	**375.9**	**0.8**	**2178.3**	**4.87**	**375.9**	**0.84**	**0**	**375.9**	**0.84**
Sub-total Grassland EEC	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7.8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2.3**	**0**	**0**	**235.8**	**N/A**	**235.8**	**N/A**	**245.9**	**N/A**	**235.8**	**N/A**	**0**	**235.8**	**N/A**
Sub-total Other Vegetation	**447.5**	**3.2**	**0**	**0**	**72.7**	**0**	**0**	**7.8**	**0**	**7.8**	**268.3**	**0**	**0**	**1115.8**	**0**	**0**	**2.3**	**0**	**0**	**868.4**	**1.9**	**375.9**	**0.8**	**2338.5**	**5.23**	**383.7**	**0.86**	**0**	**383.7**	**0.86**
Sub-total EECs & VECs	**764.7**	**21.6**	**3.2**	**24.8**	**4.4**	**72.7**	**77.1**	**39.2**	**7.8**	**39.2**	**6.5**	**0**	**6.5**	**5.9**	**0**	**5.9**	**21.1**	**0**	**18.8**	**1335.3**	**1.7**	**1787.0**	**2.3**	**1434**	**1.88**	**408.1**	**0.53**	**1057**	**1465.1**	**1.92**
Totals	**1212.2**	**24.8**	**3.2**	**24.8**	**95**	**72.7**	**95**	**39.2**	**7.8**	**47**	**498.6**	**268.3**	**498.6**	**1550.6**	**1115.8**	**1550.6**	**519.8**	**2.3**	**519.8**	**3354.4**	**2.8**	**3494.5**	**2.9**	**6082.4**	**5.02**	**6230.3**	**5.14**	**1057**	**7287.3**	**6.01**

Notes:

1. * Excluding the area to be cleared as part of the Wallaby Scrub Road Realignment, i.e. the area to be cleared has been removed from the calculations

2. ^Areas of Derived Grassland at the Southern BOA are proposed for restoration to woodland (Russo 2011) and are included as woodland offsets in this table. In total they comprise 140.1 ha of derived native and exotic grassland. The 32.8 ha of Warkworth Sands Grassland will be restored to WSW.

3. [†] Goulburn River BOA also includes an additional 140 ha of Narrow-leaved Ironbark Woodland proposed as an offset for HVO south, not included in this table.

4. [#] At the Northern BOA 195.8ha of Warkworth Sands Woodland will be re-established to Warkworth Sands Woodland. 23.1 ha of derived native grassland is proposed to be regenerated back to Central Hunter Box - Ironbark Woodland.

5. [##] At Seven Oaks it is assumed that 8.5ha of Derived Native Grassland and 160.2ha of Cassinia/Acacia Regenerating Shrubland will regenerate to woodland, and RTCA has committed to its re-establishment.

6. [###] At Putty RTCA commits to the re-establishment of 12.2ha of Derived Native Grassland to woodland.

7. The "Data Source" entries indicate the original source of the data, however many entries have been updated based on further advice from RTCA and further investigation of reports

8. These calculations do not include impacts or offsetting proposed in relation to the HVO South project.

9. ^^ Regeneration ratio - for the purposes of this analysis the natural regeneration (with assistance where required) of native vegetation communities is factored in as the same ratio as direct up-front offsetting of that community, i.e. it is valued the same. It is recognised that there is some risk associated with this.

10. ^^^ Rehabilitation area and ratio - for the purposes of this analysis the proposed rehabilitation to EECs is factored in at 50% of the ratio they would contribute if they were direct up-front offsets of their respective vegetation communities, i.e. they are valued at 50% of their area, as their is reasonable risk that the target vegetation communities might not be recreated. It is noted however that RTCA needs to demonstrate sufficiently that this is realistic and there needs to be appropriate performance monitoring - it is assumed here that this will be forthcoming.

11. For the proposed rehabilitation of EECs, it is assumed in that RTCA will aim to recreate the Central Hunter Box - Ironbark Woodland EEC and/or the Central Hunter Ironbark - Spotted Gum - Grey Box Forest EEC.

12. The Slaty Gum Open Forest proposed for offsetting at the Goulburn River BOA is likely to be covered by the VEC listing under the TSC Act. Although not explicity claimed to be the VEC in the Ecology Study (Annex E) it is assumed here that it corresponds with the VEC.

13. [††] McLennan (2011) Proposed Warkworth Extension. Letter to A. Russo, Rio Tinto Coal Australia dated 17 May 2011.

14. [†††] 5.8 ha of WSG will be restored back to WSW (McLennan 2011). No other parts of the Buffer Lands are committed to the formal offset package.

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