



MAULES CREEK COAL PROJECT

RESPONSE TO SUBSIDIARY SUBMISSIONS

for

Aston Resources

March 2012

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

MAULES CREEK COAL PROJECT ENVIRONMENTAL ASSESSMENT

RESPONSE TO SUBSIDIARY SUBMISSIONS

Prepared by:

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13 March 2012

For:

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Maules Creek Coal Project Response to Subsidiary Submissions

1 INTRODUCTION

Aston Coal 2 Pty Limited (Aston), a subsidiary of Aston Resources Limited (Aston Resources), is the owner of the Maules Creek Coal Project (the Project) located in the Gunnedah Coal Basin within the Narrabri Local Government Area (LGA).

Aston submitted an Application (PA 10_0138) for a contemporary Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 12 August 2010 to facilitate the development of the Project. Aston also submitted a Referral to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 6 July 2010.

The *Maules Creek Coal Project Environmental Assessment* (EA) was placed on public exhibition between 30 August 2011 and 11 October 2011. Department of Planning & Infrastructure (DP&I) received 111 submissions to the EA. A Response to Submissions document dated December 2011 was provided to the DP&I addressing the submissions raised on the Application.

On 16 August 2011, the Minister for Planning and Infrastructure referred the Project to the Planning Assessment Commission (PAC) to complete a review of the application. The PAC held a Public Meeting on 23 November 2011. The PAC is currently preparing their assessment report for the Project, which will be provided to DP&I for their assessment.

Since the Response to Submissions report was provided to DP&I in December 2011, further submissions have been received by DP&I on the Project and have been forwarded to Aston for review and response. This report has been prepared in an appropriate response to the additional submissions received from interested stakeholders since the public exhibition period and the PAC's public meeting. Input into the report has been provided by the relevant specialists involved in the preparation of the EA, where required.

2 SUBMISSIONS

At the time of preparing this report, DP&I had received a further four submissions in relation to the Project since the PAC's Public Meeting. These submissions were received from SEWPaC, NSW Environmental Protection Authority (EPA) (formerly Office of Environment and Heritage (OEH)), Namoi Catchment Management Authority (Namoi CMA), and the Maules Creek Community Council (this submission comprising of two reports, one by Economists at Large and the second by SoilFutures).

Copies of the additional submissions received by DP&I are included in **Appendix A**.

3 RESPONSE TO ISSUES

This section provides a response to each subsidiary submission where relevant.

3.1 SEWPAC

SEWPaC provided their additional queries in tabular format with a column for the proponent's response. The five points raised are technical in nature and have been addressed by Cumberland Ecology in their report entitled *Response to Supplementary Submissions* dated February 2012 (see **Appendix B**). To assist SEWPaC in their assessment of the Project, their table has been replicated below as **Table 1** with a reference inserted as to where each matter raised has been addressed in **Appendix B**.

Table 1
Table Reproduced from SEWPaC Submission with Company Response

Section No.	Reviewer Comment	Company Response
Impacts	<ul style="list-style-type: none"> The Maules Creek Coal Project Environmental Assessment Adequacy Report (February 2011) identified habitat for the Superb Parrot. Although this is identified in Appendix E, it is not discussed in the impacts section. If potential habitat for a threatened species is present on the proposed site, detailed information must be included to support a conclusion that the species will not be impacted. 	<ul style="list-style-type: none"> See Section 5.1.1 of Appendix B.
Appendix E - Draft Biodiversity Offset Management Plan (BOMP)	<p><i>General</i></p> <ul style="list-style-type: none"> The department accepts combined project offset areas, however, we require details of the individual proposed offsets for each project, for example, figure 2.4 of the Biodiversity Offset management Plan should clearly identify the area to be offset for the Maules Creek project within this shared offset. Section 3.1 Management Approach identifies areas within the offsets that will be set aside for conservation management and commercial livestock grazing. Please clarify if areas proposed for use for commercial grazing have been excluded from the total offset area and if so, provide details of area etc. <p><i>Northern Offset Areas</i></p> <ul style="list-style-type: none"> Please clarify if areas J and T on Wirradale offset area will be maintained as farming areas. Section 3.1 Management Approach states area T on Wirradale will be maintained as a core farming area however section 3.3 Grazing Plan refers to areas J and T on Wirradale will be maintained as farming areas. Section 3.1 Management Approach does not mention area S please provide further details on the proposed management of this area including whether it is likely to be retained for conservation management or commercial livestock grazing. Please provide the rationale behind using light grazing on rotation in areas that will be maintained for conservation rather than the proposed grazing cycle which allows for a rest period to promote natural regeneration. 	<ul style="list-style-type: none"> See Section 5.2.1 of Appendix B. See Section 5.2.1 of Appendix B. See Section 5.2.2 of Appendix B. See Section 5.2.2 of Appendix B. See Section 5.2.2 of Appendix B.

Section No.	Reviewer Comment	Company Response
	<ul style="list-style-type: none"> • Further details are required on proposed buffers around commercial livestock grazing areas J and C. <i>Eastern Offset Area</i> • The department notes that the Eastern and Western offset areas were not finalised at the time of the draft BOMP, however, it should be noted that the department will require further details of the proposed provision of 1000 hectares of land from the Eastern and Western Offset properties as part of the BOMP. Until the department is satisfied that the proponent has provided sufficient information on proposed offsets to demonstrate that the proposed impacts can be mitigated, consideration cannot be given to approval of the project. • It is noted that weeping willow control is proposed for the first five years of managing the Eastern and Western offset areas, please clarify if other weed management will be undertaken in the offset areas. 	<ul style="list-style-type: none"> • See Section 5.2.2 of Appendix B. • See Section 5.2.3 of Appendix B. • See Section 5.2.3 of Appendix B.

3.2 EPA

The two primary outstanding residual matters raised by the EPA relate to noise impacts on immediate neighbours and biodiversity related matters. Each is further addressed below.

3.2.1 Noise

EPA has recommended in their submission that a Project Specific Noise Criteria (PSNC) of 35 $L_{Aeq(15min)}$ day, evening and night and 45 $L_{A1(1min)}$ night be required as a condition of consent. Further, EPA has claimed that Aston has not demonstrated that controlling noise impacts from the Project is beyond their capacity (i.e. all feasible or reasonable mitigation and management measures have been applied) or that setting the PSNC as recommended by EPA will put this Project under jeopardy.

This is a new approach that has recently been introduced by the EPA (Armidale office) on some current mining projects that Hansen Bailey has been involved in. It is noted that this approach is not being consistently applied across all of NSW.

It is important to highlight that whilst the project's in and around the Leard State Forest have an advantage over other project's in that there are only a few residents surrounding the proposed operations, the land size and value of the land that is required to be purchased are substantial when compared to other projects. Further, the proponents have been criticised for segregating the farming community. This will be more the case if the criteria are set at 35 dBA at the residence as suggested by EPA.

EPA makes comment that there are only a few properties where noise and air quality predictions are likely to exceed the assessment criterion. Aston has committed to in Section 4.3.1 of the Response to Submissions document (Hansen Bailey 2011b) to continue ongoing consultation with all potentially affected private receivers to establish negotiated agreements prior to the worst case noise level predictions for the Project being experienced at the residence. It is noted, that during recent discussions with the remaining receivers to date, that a common request by residents has been to approach them once a Project Approval has been granted. This makes it difficult to reach an agreement with these receivers, prior to the receipt of Project Approval as has been requested by EPA (Armidale office).

Section 7.3.4 of the EA provides an in depth review of the possible options that could be implemented to reduce noise impacts from the Project. Further, it confirms that the proposed management and mitigation measures are feasible and reasonable.

In addition to the above, Section 4.3.1 of the Response to Submissions report provides further detail on how Aston proposes to implement all feasible and reasonable mitigation and management measures for the Project as described within the EA. Aston also provides a status of discussions with neighbouring landholders that are predicted to be affected by the Project, including those residences that are predicted to experience noise levels greater than 35 dBA on occasion.

The possibility of restricting mining operations to the day time only has been briefly explored as an option. This option was not considered feasible on economic grounds.

DP&I made some further requests in relation to the negotiations with potentially affected neighbours. Aston has held a number of meetings with the Morris family about their property and potential impacts from the Project. Correspondence from the latest meeting has been sent to the Morris family which outlines their position as we were informed during our meeting and that Aston supports and understands their current position. At this stage the Morris family have indicated that they will not be in a position to continue discussions with Aston until late 2012.

In regards to the Cooboobindi property which is predicted to be affected by noise from the joint operation of the rail spur with Boggabri Coal, Aston have been in contact with Joe Rennick and he is handling these negotiations on behalf of Boggabri Coal. Aston and Boggabri Coal have formed a joint venture agreement over the construction and operation of the proposed rail spur. Aston and Boggabri Coal have agreed in principal that a negotiated outcome with the current owners of the Cooboobindi property will need to be met. Feedback received from Boggabri Coal to date confirms that the owners of the Cooboobindi property are currently not willing to enter into an agreement until approvals are secured by the two projects.

3.2.2 Biodiversity

Cumberland Ecology has prepared a report entitled *Response to Supplementary Submissions* dated February 2012 to address all matters raise by the EPA in their submission dated 16 February 2012. A copy of this report is provided within **Appendix B**.

3.3 NAMOI CMA

3.3.1 CAP & EIP

The Namoi Catchment Management Authority (Namoi CMA) has expressed their concern that the Namoi Catchment Action Plan (CAP) and Extractive Industries Policy (EIP) have not been fully addressed within the EA.

Aston acknowledges the importance of supporting all Regional environmental and social objectives and has attempted to ensure consistency with the Narrabri LEP in consultation with the NSC. Aston has further reviewed the Namoi CMA CAP and EIP and believes the Project and proposed mitigation measures, including the Biodiversity Offset Strategy, does not contradict the objectives of these documents. To further address the Namoi CMA's concerns, **Table 2** below provides some detail on how Aston intends working with the Namoi CMA to ensure the Project is consistent with the relevant targets of the CAP.

The Namoi EIP has been developed to direct the Namoi CMA in its role in advising the NSW government on the impact of extractive industries within the Namoi Catchment to ensure that the catchment's assets are sustained. The Namoi CMA adopts the Precautionary Principle on extractive industries within their catchment.

Table 2
Namoi Catchment Action Plan Targets

CAP Target Ref*	CAP Target Description*	How the Project is to Address The Target
Catchment Target – People and their Communities (CTP)	From 2006, there will be continual improvement in the ability of the people in the catchment to implement the Namoi Catchment Action Plan (CAP)	Aston is committed to working closely with the Namoi CMA in order to ensure that its operations are able to be undertaken to meet the objectives of the CAP, where possible.
MTP1	From 2006, continually improve people's recognition of, and attitude to, NRM issues and appropriate management practices	Aston has made a commitment within the EA to undertake Leading Practice Environmental Management for its operations. Aston has prepared a robust EA assessing the potential impacts of the Project and where adverse impacts have been predicted, appropriate management and mitigation measures have been proposed. The Environmental Management Plans to be prepared for the operations will be undertaken in consultation with the Namoi CMA, which will enable the Namoi CMA to raise any further NRM issues that need to be addressed.
MTP2	From 2006, continually increase the level of participation in NRM activities and adoption of practices, which achieve the outcomes of the CAP	Aston is committed to working closely with the Namoi CMA across the various aspects of the Project. From time to time, Aston could assist the Namoi CMA to carry out programs with local landholders to improve land management practices to enable the community to strive towards achieving the outcomes of the CAP.
MTP3	From 2006, improve the economic stability and well being of people in the Namoi Catchment	The Project is proposed to recover a valuable NSW coal asset from an area that has previously been set aside by the Government for recreation, forestry and mineral extraction purposes. The EA has identified that the Project will provide a substantial net benefit to society. The Project will require approximately 470 employees, and Aston is committed to focus on sourcing employees from the local area, wherever possible. This will provide the opportunity for local farmers to be employed at the mine which will enable increased income to be put back into neighbouring farming enterprises.

CAP Target Ref*	CAP Target Description*	How the Project is to Address The Target
Catchment Target – The Landscape (CTL)	From 2006, there will be an increase in the extent of landscape managed sustainability	Aston has proposed a substantial Biodiversity Offset Strategy for the Project to compensate ecological impacts that will occur over a 21 year mine life. Aston has already secured a large proportion of this land to be part of the Biodiversity Offset Strategy and has commenced the management of the land in accordance with Leading Practice. The area of land within the Biodiversity Offset Strategy is of a substantial size in relation to the Project Boundary, hence creating a net increase in the amount of land being managed sustainably.
MTL1	From 2006, increase the area of land managed according to BMP	Aston has already secured a large proportion of this land to be part of the Biodiversity Offset Strategy and has commenced the management of the land in accordance with Leading Practice. The area of land within the Biodiversity Offset Strategy is of a substantial size in relation to the Project Boundary, hence creating a net increase in the amount of land being managed according to Leading Practice.
MTL2	From 2006, increase the area of land used in accordance with land capability	Aston has already secured a large proportion of this land to be part of the Biodiversity Offset Strategy and has commenced the management of the land in accordance with Leading Practice. The area of land within the Biodiversity Offset Strategy is of a substantial size in relation to the Project Boundary, hence creating a net increase in the amount of land being managed sustainably.
MTL3	By 2010, the planning strategies and instruments of state government and four local governments will be consistent with the objectives of the Namoi CMA	This target is beyond Aston's control. Aston is committed to working with the Namoi CMA in relation to the operations of the Project.
Catchment Target – Surface and Groundwater Ecosystems (CTW)	From 2006, there is an improvement in the condition of surface and ground water ecosystems	The design of the water management system for the Project is based on preventing the release of poor quality water from the mining areas and diversion of clean water from the catchment around the Project. Hence, the proposed mine water management system is aligned with this target in that measures are to be implemented to avoid the release of poor quality water to the environment.

CAP Target Ref*	CAP Target Description*	How the Project is to Address The Target
MTW1	From 2006, there will be an improvement in riverine structural stability, and the condition and extent of native riverine vegetation in priority riverine areas	<p>Further to this, part of the Biodiversity Offset Strategy is to comprise of the rehabilitation of riparian vegetation along some sections of the Namoi River. This will lead to an improvement in bank stabilisation and hence the quality of water for irrigation purposes.</p> <p>Aston recognises the Namoi CMA as an important stakeholder within the region and will continue consulting with this stakeholder during the development of the environmental management plans and into the construction and operation phases of the Project where appropriate.</p>
MTW2	From 2006, maintain or improve surface and ground water quality suitable for irrigation, raw drinking water and aquatic ecosystem protection at Goangra Gunnedah, Narrabri Target values are as determined by: a) ANZECC Guidelines 2000: Irrigation Water – EC range of 650 – 1300 µS/cm; and Aquatic Ecosystem Protection – mean values of Total Endosulphan < 0.03 µS/Litre and Atrazine < 0.7 µS/Litre	<p>Aston recognises the importance the structural stability of the neighbouring Namoi River. The design and construction of a pump and associated water pipeline in the Namoi River will be undertaken in consultation with the relevant Government departments and in accordance with the relevant guidelines.</p> <p>Aston has been in recent discussions with NSW Fisheries in relation to their Demonstration Reach Project. Aston has advised they are able to assist in providing some funding and to work with NSW Fisheries during the development of this project.</p>
		<p>The design of the water management system for the Project is based on preventing the release of poor quality water from the mining areas and diversion of clean water from the catchment around the Project. Hence, the proposed mine water management system is aligned with the CAP target in that measures are to be implemented to avoid the release of poor quality water to the environment.</p> <p>Further to this, part of the Biodiversity Offset Strategy is to comprise of the rehabilitation of riparian vegetation along some sections of the Namoi River. This will lead to an improvement in bank stabilisation and hence the quality of water for irrigation purposes.</p> <p>Aston recognises the Namoi CMA as an important stakeholder within the region and will continue consulting with this stakeholder during the development of the environmental management plans and into the construction and operation phases of the Project where appropriate.</p>

CAP Target Ref*	CAP Target Description*	How the Project is to Address The Target
	<p>b) MDBC: River Salinity of 550 µS/cm 50% of the time, and <1000 µS/cm 80% of the time at Goangra</p>	
MTW3	<p>From 2006, protect and assist the recovery of threatened or priority native aquatic species in identified priority areas</p>	<p>The relevant level of assessment has been undertaken within the Ecological Impact Assessment for the EA to determine any possible impacts on the neighbouring threatened or priority native aquatic species. This assessment confirmed that the Project is not likely to affect any of these species.</p>
MTW4	<p>From 2006, oversee and review water management plans and processes under the <i>Water Management Act 2000</i>, so that Water Management Plans, including Water Sharing Plans (WSPs), result in fair and reasonable access to surface and ground water sources for the environment (water dependent ecosystems), economic uses (agricultural, industrial, town water supply) and social values (recreation, cultural)</p>	<p>Relevant surface water and groundwater assessments were undertaken for inclusion within the EA. These assessments considered the requirements under the <i>Water Act 1912</i>, the <i>Water Management Act 2000</i> and the relevant WSPs. Aston has committed to seeking the licences as required under the provisions of the <i>Environmental Planning and Assessment Act 1979</i> and the <i>Water Management Act 2000</i>.</p>
Catchment Target – Native Plants and Animals (CTB)	<p>From 2006, there will be an improvement in the extent and condition of native plants and animals, and the environments in which they live, within each Interim Bio-Regional Assessment (IBRA) sub-region of the Namoi</p>	<p>A substantial Biodiversity Offset Strategy has been proposed to offset the potential impacts of the Project. This Strategy aims to maintain or improve biodiversity values within the region and will result in a substantial amount of high quality vegetation being enhanced and conserved.</p>

CAP Target Ref*	CAP Target Description*	How the Project is to Address The Target
MTB1	From 2006, maintain or improve the extent, distribution and condition of the existing native vegetation of the catchment.	Aston has already secured a large proportion of this land to be part of the Biodiversity Offset Strategy and has commenced the management of the land in accordance with Leading Practice. The area of land within the Biodiversity Offset Strategy is of a substantial size in relation to the Project Boundary, hence creating a net increase in the extent, distribution and condition of the existing native vegetation of the catchment.
MTB2	From 2006, support the recovery of priority fauna populations, and Threatened Species, Populations and Communities	The proposed Biodiversity Offset Strategy for the Project will result in a net increase in the quantity of habitat vegetation within the short to medium term.
MTB3	From 2006, reduce the economic and environmental impacts of invasive plants and animals	Aston has developed a draft Biodiversity Offset Management Plan for the Project which describes the weed and feral animal control that is proposed for the offset properties. These management activities will be undertaken in consultation with neighbouring landholders to ensure that any management activities are undertaken at a similar time across the area.

* Source: Namoi CMA (2007)

Section 3.13 of the EA for the Project applied the above Ecologically Sustainable Development (ESD) principle during the investigation of possible mine plan alternatives. The assessment of each environmental impact resulting from the Project has also applied the precautionary principle, where required, to ensure that appropriate management commitments are put in place to avoid any potential significant environmental impact.

Section 6 of the EA describes the detailed environmental risk assessment that was undertaken for the Project. The risk assessment covered the potential impacts for the Project on the four key regional assets that are explained within the EIP and have completed the relevant assessment to determine the impacts of the Project and to develop management and mitigation measures to put in place to minimise adverse environmental impacts. The detailed environmental impact assessment undertaken for the Project has not identified any significant environmental impacts which would result in the Project to be unacceptable.

The EIP states that the Namoi CMA will “*seek the reimbursement of public NRM investment funds, from the developer, where these investments are impacted upon by mining or exploration, for reinvestment within the Namoi Catchment to maintain or improve the four key regional assets*”. Aston has committed to implementing a substantial Biodiversity Offset Strategy which aims to maintain or improve biodiversity outcomes within the region in the medium to long term. The offset strategy will result in a considerable amount of land to be placed under conservation protection, whereby there will be a net improvement in the quantity of high value habitat for a number of threatened species. The offset properties are also located on creek systems neighbouring the Project with plans to restore riparian vegetation within the properties. This will provide positive outcomes for the Namoi River catchment in itself.

Aston is committed to ongoing consultation with the Namoi CMA in relation to the Project, and is willing to discuss possible opportunities to assist in NRM based community programs. During consultation with the Namoi CMA to date, there has been no request for such funding.

Aston has previously committed to consulting with the Namoi CMA in relation to the proposed management plans for the operation. This will ensure that the Namoi CMA confirms that the management plans have been prepared in order to address the objectives of the Namoi CAP and the EIP, wherever possible.

3.3.2 Biodiversity

The Namoi CMA raised concerns regarding the lack of detailed (biometric) condition assessment of individual vegetation types within Project Boundary. Further, the CMA has commented that without this assessment, it is difficult to prove that the proposed Biodiversity Offset Strategy will result in a maintenance or improvement in biodiversity outcomes within the region. Aston and its consultants believe the information provided within the EA was substantial and consistent with that typically required for planning approvals documents.

Whilst there is no legal requirement to provide a biometric assessment within the EA for the Project, Aston has provided the requested information within a report prepared by Cumberland Ecology which is contained within **Appendix B**.

3.3.3 Soils & Rehabilitation

Namoi CMA raised some outstanding concerns in relation to the quantity of topsoil and the rehabilitation methods that have been previously explained within the EA, Soils and Land Capability Assessment and the Response to Submissions document. All of these issues will be addressed during the preparation of the Rehabilitation Management Plan which will be undertaken in consultation with the Namoi CMA.

3.4 MAULES CREEK COMMUNITY COUNCIL

3.4.1 Economists at Large

Economists at Large has provided an additional submission to DP&I on the Economics Impact Assessment undertaken for the EA. Consistent with the previous submissions from this stakeholder, this submission continues to dispute the methodology, assumptions and conclusions drawn within the economic impact assessment undertaken for the Project. Gillespie Economics has previously provided comments on the Economists at Large submissions within Section 4.9 of the Response to Submissions report.

The Economics Impact Assessment for the Project has been prepared by Robert Gillespie of Gillespie Economics, who has over 15 years of experience in economic valuation of state significant projects. Rob Gillespie co-authored the current DP&I guidelines for completing an Economic Impact Assessment (i.e. *Guideline for Economic Effects and Valuation in EIA*) and has completed numerous work within NSW for state significant projects.

Aston has also commissioned an independent peer review of the assessment by preeminent expert Professor Jeff Bennett, who has previously assisted the NSW Government in independent peer reviews of economics impact assessments for state significant projects. This review work completed by Professor Bennett has shown that the assessment undertaken for the Project is robust and consistent with the requirements for NSW projects assessed under the EP&A Act.

We trust that the information previously provided within the Economics Impact Assessment and the Response to Submissions document provides the information required for DP&I to make an informed assessment over the merits of the Project and its ability to meet the objects of the EP&A Act.

3.4.2 SoilFutures

SoilFutures has provided an additional submission to DP&I in relation to the Soils and Land Capability Assessment undertaken for the Project. Consistent with the previous submissions from this stakeholder, this submission continues to dispute the methodology, assumptions and conclusions drawn within the Soils and Land Capability Impact Assessment undertaken for the Project.

GSSE, in particular, Mr John Lawrie who is a Certified Practicing Soil Scientist Level 3 and has approximately 40 years' experience in soil science and mapping, and has contributed significantly to the improvement of soil science and mapping in Australia over that time has previously provided clarification on their view on the previous issues raised within Section 4.11 of the Response to Submissions report.

We trust that the information within the Soil and Land Capability Assessment and the Response to Submissions report provides DP&I with the information required to make an informed assessment over the merits of the Project and its ability to meet the objects of the EP&A Act.

4 CONCLUSION

We trust that the above information provides DP&I and the PAC the appropriate information to complete an informed assessment of the Project.

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for
HANSEN BAILEY



James Bailey
Director

Cc: Megan Webb – Planning Assessment Commission

APPENDIX A

Copy of the Supplementary Submissions Provided by DP&I



Maules Creek Coal Project
(EPBC 2010/5566)
Aston Resources Pty Ltd
Document Review Comments Sheet

Reviewer: Department of Sustainability, Environment, Water, Population and Communities

Document Title: Maules Creek Coal project Environmental Assessment July 2011

Date of Review: 4 November 2011

Section No.	Reviewer Comment	Company Response
Impacts	<ul style="list-style-type: none">Section 3.4.3 and table 3.6 identifies threatened and migratory species that have a likelihood of occurring within the project boundary including, <i>Beryta opponens</i>, Great Egret, Cattle Egret, Spotted-tail Quoll, Border Thicktailed Gecko, Five-clawed Worm-skink and Murray Cod. These species are not discussed in section 4.6 or table 4.3 summary of project impacts on threatened species and ecological communities. Please clearly describe the quantity of suitable and potential habitat for <u>each</u> EPBC listed species and community within the project area, that is being impacted directly or indirectly, irrespective of whether the species was detected in surveys. How does this compare to suitable habitat found locally/regionally for each EPBC listed species and community?The Maules Creek Coal Project Environmental Assessment Adequacy Report (February 2011) also identified habitat for the Superb Parrot. Although this is identified in Appendix E, it is not discussed in the impacts section. If potential habitat for a threatened species is present on the proposed site, detailed information must be included to support a conclusion that the species will not be impacted.	
Biodiversity Offset Plan	<ul style="list-style-type: none">Further details are required on the proposed sharing arrangements for the offset property including responsibilities for management and details on management actions to enhance and protect the offset.	



Australian Government

Department of Sustainability, Environment, Water, Population and Communities

Section No.	Reviewer Comment	Company Response
	<p>Please note that although the department accepts combined project offset areas, we require details of the individual proposed offsets for each project, for example, a map showing the area to be offset for the Maules Creek project within this shared offset.</p> <ul style="list-style-type: none">• Figure 6.3 vegetation of eastern offset properties-The property boundaries are not clearly represented. Please provide a map clearly defining the property boundaries.• Please clarify whether the proposed offset areas provide habitat for EPBC listed species identified in table 4.3 Summary of project impacts on Threatened Species and Ecological Communities.	

Mr Howard Reed
Manager Mining
Major Development Assessments
GPO Box 39
SYDNEY NSW 2001

Attention: Stephen O'Donoghue

Dear Mr Reed

OEH Review of Submissions Report- Maules Creek Coal Project (10_0138)

The Environment Protection Authority (EPA) refers to the proposed Maules Creek Coal Project (10_0015) and the Submissions report received by the EPA on 8 December 2011.

From the information presented to date and the responses in the Submissions Report, OEH is of the opinion that its recommendations have not been adequately addressed and most importantly an adequate offset has not been identified. In summary:

- Noise impacts from the proposal;
- the assessment of the potential impacts on biodiversity has been inadequate; and
- there has been no progress to develop an adequate biodiversity offset.

Specific comments on OEH's recommendations are included in **Attachment 1**.

OEH strongly recommends that the Director General of the Department of Planning & Infrastructure (DoP&I) not make a final determination of the application, 10_0015, until such time as an appropriate offset is identified or alternatively that the application is determined conditionally to require that an offset is approved by OEH and implemented before construction commences.

Should you have any enquiries regarding this matter, please contact Mr Kharl Turnbull at the Armidale Office by telephoning (02) 6773 7000.

Yours sincerely



ROBERT O'HERN
Head Regional Operations Unit - Armidale
Environment Protection Authority

End: Attachment 1 – OEH review of submissions report for Maules Creek Coal Project (10_0138)

The regulatory responsibilities of the Office of Environment and Heritage are now carried out by the Environment Protection Authority

**ATTACHMENT 1 – EPA Review of Submission Report for Proposed Maules Creek Coal Project
(10 0138)**

A. NOISE ASSESSMENT

Issue 1: Operations are predicted to exceed noise criterion

Recommendations from OEH submission dated 11 October 2011:

1. *OEH recommends that a PSNL of 35 LAeq,15min day, evening and night and 45 LA1,1min night be required as a condition of consent.*
2. *OEH recommends that the Real Time Noise Monitoring System be required as a management tool to monitoring increasing noise impacts as the mine progresses and as a trigger for further noise mitigation measures and / or negotiated agreements or purchase of impacted receptors. A detailed operational procedure should be required for the RTNMS.*
3. *OEH recommends that where the PSNL is predicted to be exceeded at any residence, Aston be required to purchase or negotiate an agreement with the affected receptors in accordance with the Industrial Noise Policy prior to commencement of mining operations at the premises. (Note the INP does provide a process for OEH to consider an alternative PSNL for an individual receptor in the extraordinary situation where an exhaustive negotiation process can not reach agreement with an affected receptor and the success of the project is threatened. There is no evidence in the EA or through discussion with Aston that this is the case with the Maules Creek Coal Project.)*

The proponent has not demonstrated that controlling noise impacts from the project is beyond their capacity or that setting a PSNL of 35 LAeq,15min day, evening and night and 45 LA1,1min night will place the future of this project in jeopardy.

There are a small number of properties affected and the proponent indicates they are in negotiation with each of these to reach an agreement concerning noise impacts. The proponent has not suggested that there is any likelihood of the negotiation process not reaching agreement with each affected receptor and thereby threatening the success of the project.

RECOMMENDATIONS:

OEH's previous recommendations concerning noise limits remain.

Issue 2: Table 9 – Four Examined Noise Control Cases

Recommendations from OEH submission dated 11 October 2011:

1. *OEH recommends that further information be provided as to why the predicted noise levels for Case 2 (noise control) are higher than those for Case 1 (no noise control) for Residence ID 61, 256 and 259, and Property ID 120.*

RECOMMENDATIONS:

The proponent has provided further information to address concerns.

Issue 3: Rail Noise

Recommendations from OEH submission dated 11 October 2011:

1. OEH recommends that Rail traffic noise be reassessed against the criteria for rail-traffic generating developments on the DECCW website at: <http://www.environment.nsw.gov.au/noise/railnoise.htm>.
2. The AIA does not provide adequately consideration of the number of potentially affected residences along the "public" rail network, nor an assessment of feasible and reasonable measures to mitigate against the predicted rail noise increases.

RECOMMENDATIONS:

The proponent has identified the impacts. The ARTC will need to resolve.

Issue 4: Sleep disturbance

Recommendations from OEH submission dated 11 October 2011:

1. OEH recommends that the proponent implement all necessary noise mitigation measures to minimise sleep disturbance. Where the INP criteria of 45 LAeq1,(1min) can not be achieved at any receptor, Aston should be required to reach an agreement to purchase or negotiate agreements with that receptor to address the exceedance.

See additional comments in issue 1 above.

RECOMMENDATIONS:

OEH's previous recommendations concerning Sleep Disturbance noise limits remain.

Issue 5: Statement of Commitments for Noise

Recommendations from OEH submission dated 11 October 2011:

1. OEH recommends that the noise limits (i.e. PSNL of 35 LAeq,15min day, evening and night and 45 LA1,1min night) be applied to the Maules Creek Coal Project and Aston be required to implement all reasonable and feasible mitigation measures noise mitigation measures to reduce noise impacts and purchase or negotiate agreements with affected receptors where these limits can not be achieved.

See additional comments in issue 1 above.

RECOMMENDATIONS:

OEH's previous recommendations remain.

B. AIR MANAGEMENT

Issue 6: Use of appropriate meteorological data is evident

The meteorological data used for Maules Creek AQIA was queried by ATASU due to the lack of a complete year of data (7 months). Based on the dataset, the AQIA had claimed that Maules Creek is dominated by S-to-W winds, with a lack of dominant winds from the northern sector. It was further asserted that "this is an important consideration when assessing the cumulative impacts from the contemporaneous operations at both sites" (i.e. Boggabri Coal Mine).

In response to OEH submission comments, the Consultant (PAE Holmes) advises that: *Subsequent reviews of the more recent meteorological data collected from the Maules Creek meteorological data supports the view that there is a low occurrence of northerly winds at this site.* Though no additional evidence in the form of updated wind roses is presented, comments submitted from members of the public do provide anecdotal evidence and hence certainty of this wind regime.

RECOMMENDATIONS:

OEH has no further concerns on this aspect of the air quality impact assessment.

Issue 7: Aston has agreed to measures required by the OEH

3.1 A Cumulative Air Quality Management Protocol is being prepared between the three mining operations to ensure the ambient air quality monitoring in the region is sufficient to enable the mines to minimise the potential for adverse impacts at nearby sensitive receptors. The Protocol will:

- a) Aim to document the approach to be undertaken by the three miners to collaboratively manage cumulative air quality outcomes from the operations on the surrounding region.
- b) Combine a network of real-time monitors and meteorological data to enable regular assessment of air quality in the area and if necessary relocation, modification or cessation of operations to ensure compliance with any relevant conditions of consent. The meteorological monitoring will also enable predictive capability to forecast weather conditions and predict air quality predictions in advance to enable mine plans to be developed to limit adverse impacts to neighbouring receivers.
- c) Describe how the data will be managed in a central repository for validation and reporting by each mining operation. The monitoring network will be setup to contain:
 - . **A predictive component** – using forecast weather conditions and dispersion modelling to determine sensitive operations for days to come;
 - . **A reactive component** – using real time meteorology and air quality monitoring data to determine elevated impacts and the need to modify operations; and,
 - . **A non steady state dispersion model** – capable of processing data on a timely basis.
- d) Include trigger levels to enable the effective operation of this monitoring system. Trigger levels are currently being investigated to enable actions to be implemented to operations when measured air quality levels reach the trigger threshold. Various levels of trigger threshold are being developed according to the level of action that is required.
- e) Outline the staged implementation of the monitoring network. This will provide sufficient time for the purchase, installation and commissioning of the monitoring units whilst ensuring that the data is validated and the predictive system is suitably setup.

3.2 Aston will also prepare and implement an Air Quality Management Plan specifically for the Project. This Management Plan and Monitoring Program will:

- a) Be based on the objectives of the final *Cumulative Air Quality Management Protocol*, and incorporate a Best Management Practice (BMP) report and a Reactive Particulate Management Strategy as requested by the OEH.
- b) Include management measures for blasting activities, considering the potential for NO_x fumes to impact neighbours.
- c) Include measures listed in Table 1 below.

OEH is informed that a Tapered Element Oscillating Microbalance (TEOM) unit capable of monitoring Total Suspended Particulate (TSP), PM₁₀ and PM_{2.5}, has been installed at a representative location to the north of the Project Boundary in the vicinity of the Maules Creek Community Hall and Fairfax Public School. This monitoring unit is currently gathering baseline monitoring data for comparison with data to be collected during operations.

RECOMMENDATIONS:

Measures proposed by Aston for the Cumulative Air Quality Management Protocol and the site-specific Air Quality Management Plan are considered sufficient and as previously recommended, must form part of the Project's approval conditions.

Table 1: Site-specific air quality management measures proposed by Aston.

Air Quality – management of particulate sources	
Use largest practical truck sizes	At all times
Minimize ROM coal haul road haulage distances and overburden to the maximum extent achievable	
Maintain Level 2 watering of haul roads at all times (i.e. watering rate of greater than 2 L per m ² per hour)	
Water or apply a chemical suppressant on all unsealed roads (i.e. haul roads within disturbance area)	
Employ water or a dust suppression product on all active coal and overburden haul roads	
Use wind-activated automated water sprays on all coal handling areas and coal stockpiles	
Use motion-automated water sprays on all transfer points	
Conveyors must have enclosed transfer points. Install dust sprays/curtains at transition points from transfer station	
Water or apply chemical suppressants on access tracks used by topsoil stripping equipment during their loading and unloading cycle	
Include management measures for blasting activities, considering the potential for NO _x fumes to impact neighbours	
Limit blasting activities to occur only when necessary between the hours of 6 am and 6 pm	
Minimize disturbed areas by disturbing only the minimum area necessary for mining	
Minimize overburden dump area (OEA) to allow for increased rehabilitation	
Revegetate disturbed areas, including temporary rehabilitation of areas not being used for extended periods of time (e.g. western and southern ends of the Northern OEA) and obsolete haul roads as soon as practicable after the completion of overburden tipping.	
Apply revegetation as widely as practical and complete as soon as practical after disturbance (e.g. topsoil)	
Design the mine to ensure rehabilitation of external faces is completed as soon as practical	
Implement an air quality monitoring network (site-specific) to maintain compliance with Project Approval. This will include: <ul style="list-style-type: none"> Expanding the current network of 3 deposition gauges to include additional monitoring locations (at least five dust gauges) to monitor dust fall at the closest private residence to the northwest, north and southwest of the Project Boundary; and, Relocating the existing High Volume Air Sampler (HVAS). 	Before commencement

C. THREATENED SPECIES/ BIODIVERSITY

Summary

Based on our review of the Submissions Report and the Biodiversity Offset Management Plan (December 2011) (BOMP), OEH remain of the view that the proponent has not:

- Adequately detailed the impact assessment undertaken;
- Proposed offsets underpinned by sound ecological principles;
- Adequately quantified the loss in biodiversity and the gain in biodiversity from the offset with impact and benefits reliably estimated;

- d) Adequately demonstrated that the proposal will maintain or improve biodiversity values; or
- e) Fully demonstrated that the proposed offset has been appropriately targeted.

Much of the offset as currently proposed remains poorly communicated, with inadequate detail presented within the EA, Submissions Report and BOMP. Due to the omission of relevant information, and inclusion of conflicting data, significant questions regarding the offset remain.

OEH are particularly concerned about the poor offset design, insufficient information regarding vegetation condition and some vegetation types, the lack of quantitative assessment of losses and gains via use of a suitable metric, the inclusion of improved pasture and cultivation in the offset, and some of the proposed management strategies.

Detailed comments are provided below which assess the BOMP and Submissions Report provided by the proponent against our previous recommendations to the Department of Planning and Infrastructure (DoPI) (dated 11 October 2011). OEH have requested some additional information relating to our areas of concern directly from Cumberland Ecology and are currently awaiting their response.

Issue 8: Assessment of Impacts

The proponent has not addressed all of OEH's previous recommendations regarding the assessment of indirect impacts. These aspects of the impact assessment remain inadequately detailed.

Background:

In our previous submission (11 October 2011) OEH recommended that the proponent be required to:

- a) ***'Detail the methodology by which the extent of indirect impacts was calculated'***.

No additional information has been provided regarding this recommendation. However Table 7 of the submissions report seems to confirm that the area to be indirectly impacted has simply been taken to be the residual vegetation within the Project Boundary, outside of the direct impact footprint. This is not a suitable methodology for estimating indirect impacts. The indirect impacts of the project may extend beyond the Project Boundary.

- b) ***'Clarify the extent of impacts considered within the Assessment of Significance and cumulative impact assessment'***

The proponent states that indirect impacts have been considered within the Assessment of Significance, although no reasoning is provided as to why these assessments contain references to the hectare figures for direct impact only. The proponent does not clarify whether consideration of the cumulative impacts of mining proposals has included consideration of indirect impacts.

We remain concerned that the current EA is not a whole of life proposal with substantial additional mining interest stated to be within the lease area and other future new mines and expansions proposed by other parties. No cumulative impact of mining assessment can be done properly without the full extent of mining being clearly articulated.

c) 'Clarify the methodology used to determine the presence of the TSC Act listed Box-Gum Woodland EEC'.

The proponent has not clarified this methodology. The EA defines '*Derived Native Grassland*', which the proponent considers to be EEC, and '*Low Diversity*' derived native grassland (White Box Woodland), which it appears the proponent does not consider to be EEC. This terminology is also used within the BOMP.

It still appears that the assessment of which grassland constitutes the EEC was based on the Commonwealth guidelines. '*Low diversity*' derived native grassland which does not meet the Commonwealth criteria for the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listing may still meet the *Threatened Species Conservation Act 1995* (TSC Act) definition. The proponent has not provided any indication whether they have reassessed their conclusions regarding the EEC and derived native grassland considering the identification guidelines for the TSC Act listed community.

Issue 9: Offset Proposal

The EPA '*Principles for Biodiversity Offsets in NSW*' have not yet been met and there remain significant deficiencies in the offset design and supporting information. Overall the proponent has not provided sufficient information to support their claim that the proposal will maintain or improve biodiversity values.

Background:

In our previous submission, we recommended that the proponent be required to prepare a detailed offset strategy which:

- a) 'Proposes a clearly presented and well-designed offset, the quantum of which is justified by a suitable metric (preferably BBAM) and at a minimum properly considers OEH's '*Principles for Biodiversity Offsets in NSW*'.**

A new map has been included in the BOMP (Figure A.1) indicating those lands within the proposed offset properties that would actually be included within the offset. An updated table is also included which contains revised hectare estimates of the areas of the 'offset properties' that will be actually be included in the offset (Table 2.2).

From this new information we note that:

- *Methodology and adequacy of assessment*

Within the BOMP, no methodology is provided for the new flora and fauna surveys undertaken, and no maps of survey locations are included. Additional information has been requested from Cumberland Ecology to assist with the EPA review.

- *Vegetation*

No information is presented in the BOMP regarding the quantum of each vegetation type on the Shared Offset Property that will contribute to the offset for the Maules Creek Coal project.

The BOMP also includes an increased number of vegetation communities which the consultant has identified as the Box-Gum Woodland EEC. For instance within the EA the consultant considers '*White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest*' on the project site to not

conform to the EEC, however on the offset sites *'White Box - Narrow-leaved Ironbark – White Cypress Pine grassy and shrubby open forests'* combined are considered by the consultant to meet the EEC definition. The data provided within the BOMP is not sufficient for the EPA to be able to confirm this, or the other vegetation community conclusions. Additional data has been requested from Cumberland Ecology to assist the EPA in this assessment.

Furthermore, the proponent has not yet provided sufficient information regarding the provision of a 'like for like or better' conservation outcome. The BOMP does not draw conclusions about the adequacy of the matching between vegetation types of the development site and those within the offset sites, beyond general comments about threatened species habitat. When comparing the total figures for woodland and forest vegetation communities which the consultant does not consider to be EEC, it also appears that the offset is likely to be deficient for some fauna species (particularly birds and bats requiring either a shrubby understorey or a mid storey or both).

No information is provided about the quantum of each vegetation type to be included in the offset from the 'Shared Offset Property'. Similarly, little information is included about the vegetation communities to be targeted by regeneration of derived native grassland, beyond the matching of some derived native grassland to the Box Gum Woodland EEC. Further information has been requested from the consultant.

- *Inconsistencies*

Significant inconsistencies also exist in the data presented.

For instance the Section 4.1 of the BOMP states that the Eastern and Western Offsets *'are not finalised at the time of writing'*, and that *'Aston commits to the eventual provision of 1000ha of land from the Eastern and Western offset properties for conservation and management as part of this BOMP'*.

However whilst the area of vegetation per property that will actually contribute towards the offset is not stated in the BOMP, we understand from Table 2.2 that the proposed offset lands in total will be 8023ha. Whilst it is not clear from Table 2.2, it is assumed that an additional 355ha of native vegetation will also be included from the Shared offset property (hence a total of 8378ha).

If 1000ha will be the contribution from the Eastern and Western offsets combined, and this is subtracted from the total, a contribution of 7378ha is left to be supplied by the Northern Offsets (Mt Lindsay and Wirradale) and the Shared Offset. However 7378ha is 472ha more than the vegetation (native and exotic) within the Northern offset properties and Shared offset property in total, and not all of the land within these two northern properties will form part of the offset.

Without further information we assume that the vegetation to be included within the offset on the Eastern and Western offset properties has been over-estimated.

Similarly, there are some inconsistencies between the area of EPBC Act threatened species habitat within the offset in comparison to the estimated areas of remnant native vegetation (see comments below).

- *Quantitative assessment of the offset*

As noted in our previous submission here is no evidence that the proponent has applied a consistent quantitative methodology to both the development and offset sites to allow comparison of the expected losses and gains, beyond simple hectare comparisons. The EPA has sought further information from Cumberland Ecology regarding the plot data recorded on the development and offset sites in order to determine whether a metric assessment of the adequacy of the offset can be undertaken. Until this information is received, and the apparent inconsistencies in the offset description are clarified, the EPA cannot provide further detailed comments on the adequacy of the quantum of the offset offered.

- *Location and Design*

Some areas of land identified as contributing to the offset are located within the exploration lease boundary (Figure A.1.), which the BOMP also states will not form part of the offset due to future mining interests. These should be omitted from the map. These areas should also be omitted from the hectare estimates in Table 2.2 if the consultant has not already done so.

The majority of the Eastern offsets, and some of the Western offsets remain poorly designed with a high edge to area ratio and we question the likely success of the linkages proposed in these locations.

b) *'Incorporates consideration of the likely indirect impacts of the proposal'.*

As noted above no additional information has been provided.

c) *'Considers the conservation value of all vegetation types to be impacted'.*

Only the EEC and threatened species habitat have been considered. No other conservation status categories have been discussed.

d) *'Adequately assesses the condition of both the impact and proposed offset sites'.*

It is the likely change in condition of an offset site under a proposed management regime and improved security which constitutes the 'gain' in biodiversity. It does not appear that a quantitative assessment was undertaken which demonstrates that the complete loss in vegetation from the development site will be adequately compensated for by the gain in biodiversity (ie the improvement in vegetation condition and security) expected from the offset site.

The BOMP (table 2.4) estimates the area of woodland and derived native grassland which meets each of three condition classes specified by EPBC Act guidelines for the Box Gum EEC, as well as the amount of '*high condition remnant forest and woodland habitat*' and '*low condition derived native grassland habitat to be re-vegetated to moderate condition habitat...*' found '*in the Offsets*'. This information is only included in relation to the Box Gum EEC and three EPBC Act listed threatened species.

Table 2.4 in the BOMP states that a total of 8881ha of '*high condition remnant forest and woodland habitat*' is located in the offset (including the Shared Offset property). This appears to be 3180ha more than the amount of remnant woodland and forest stated elsewhere to be located within the actual offset, and 2733ha more than the total area of woodland and forest estimated to be available within the entire offset properties. Similarly, estimates in Table 2.4 for the extent of derived native grassland which does or does not meet the EPBC Act Box Gum Woodland EEC definition also seems to conflict with (Tables 2.1 and 2.2). Further information has been sought from Cumberland Ecology regarding these apparent inconsistencies.

e) *'Increases the proportion of the offset that involves protection, management and enhancement of existing remnant vegetation relative to rehabilitation/restoration works'.*

From the data included in the BOMP, it appears that approximately one third of the offset for the Box-Gum Woodland EEC consists of proposed regeneration in derived native grassland (including '*low diversity*' derived native grassland). Similarly it appears that approximately one third of the offset for non-EEC vegetation may consist of regeneration in derived native grassland, pasture and cultivation areas. However this will remain unclear until issues relating to the identification of EEC on the offset sites have been clarified and data obtained for the shared offset property.

Nevertheless we maintain the view that reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

- f) Provides details on the land use history of areas of any derived native grassland proposed as offsets, including cultivation history, fertilizer application and groundcover species present (native and exotic), along with information relating to elevated soil nutrients, such as with nitrate, ammonium, available phosphorus and total carbon, in order to inform the suitability of the sites for inclusion in the offset and understand the capacity of the system to respond to management.**

Little additional information has been supplied by the proponent. The BOMP indicates that the 'Derived Native Grassland – low diversity areas' have been pasture improved or have had superphosphate fertilizers applied and may have been heavily grazed. 'Derived Native Grassland – high diversity areas' are characterised in the BOMP as not having been pasture improved 'recently' or have had 'little fertiliser' applied, and may have been 'lightly to moderately' grazed. No further land use history information is supplied.

- g) Includes suitable legal, in-perpetuity protection of the offset.**

We note that the proponent now proposes to secure the offset via addition to the Office of Environment and Heritage (OEH) Estate and/or establishment of a Voluntary Conservation Agreement with OEH under the *National Parks and Wildlife Act 1974* (NPW Act).

Voluntary Conservation Agreements under the NPW Act are now known as Conservation Agreements (CA). Where a CA is sought the lands will need to meet the criteria under S69C (1) NPW Act for lands suitable for inclusion in a CA. Please note that there is an established assessment process for CAs and not all of the proposed offset lands will necessarily be deemed to meet the required standards. Conservation values, location, connectivity, remnant vegetation cover and condition are all important considerations. The Proponent has not yet contacted OEH directly to discuss the suitability of the offset for inclusion in a CA.

In particular, the BOMP (Table 2.2) indicates that the offset currently proposed will include 74 hectares of 'Improved Pastures' and 459ha of 'Cultivation' (although this is contradicted on page 2.11). These lands would not be considered suitable for inclusion within a CA, and the EPA also does not consider these lands to be suitable as an offset under other covenanting arrangements. Therefore it will not be possible to, as proposed in the BOMP, apply a CA 'across all management areas, including the core farming areas'. Such lands are also not suitable within an OEH Estate addition, unless they are necessary to form part of a boundary fire break or similar. Furthermore, any agricultural use of these lands may also constitute a threat to the adjacent offset. Limits should be placed on the species that can be cultivated in these areas (for example no invasive perennial native grasses should be grown).

Similarly, the OEH would not necessarily accept all of the derived native grassland within the offset for inclusion within a CA. The level of species diversity and the land use history would be important considerations.

Within the BOMP the proponent has now proposed grazing as part of the management of the offset sites. The potential addition of lands to the OEH Estate would impact upon this grazing plan. Furthermore, our vision for the remainder of the offset which is either derived native grassland or lightly treed, is that natural regeneration should be allowed to take place. In the absence of natural regeneration, assisted natural regeneration techniques should be implemented. Grazing in the short to medium term would generally be incompatible with these strategies.

Both the OEH and EPA have concerns about the level of monitoring that would be required to both ensure that any grazing implemented was strictly in accordance with an approved management plan, and to monitor the implementation and success of extensive areas of regeneration/revegetation.

RECOMMENDATIONS:

That the proponent be required to:

- Properly addresses all issues of concern raised above and the previous recommendations of the EPA (11 October 2011);
- Supply sufficient data to allow an accurate assessment of the adequacy of the offset to be undertaken; and
- Reconsider the eastern offset proposals immediately north of Leard SF. The EPA brings to the attention of DoP that this area is not currently identified as a link or as a priority offset landscape proposed by the NSW Government as part of the Strategic Regional Landuse Planning project.

D. OTHER ISSUES

Issue 10: Water deficit and estimated water for dust suppression

Recommendations from OEH submission dated 11 October 2011:

1. *The proponent should be required to acquire additional water through the market for use as a high security water supply in dry years.*

RECOMMENDATIONS:

This issue does not appear to have been addressed.

Issue 11: Final Mine Void

Recommendations from OEH submission dated 11 October 2011:

1. *The Proponent should be required to fully investigate mining plans and final rehabilitation plans that ideally remove the need for a final void at the end of the mines life. This is worlds Best Practice for mining.*

RECOMMENDATIONS:

General comments have made by the proponent. OEH expects regular review of the site operations against world best practice considering new technologies will adopted throughout the life of the mine.

Issue 12: Linkages with other mines in the vicinity of Maules Creek Coal Project

Recommendations from OEH submission dated 11 October 2011:

1. *The proponent be required the continue their work with adjoining mine operators / proposals to work toward minimising final landscape / biodiversity impacts and enhanced noise / air / water management and biodiversity outcomes.*

RECOMMENDATIONS:

General comments have made by the proponent. OEH expects the proponent will continue their work with adjoining mine operators / proposals to work toward minimising final landscape/ biodiversity impacts and enhanced noise / air / water management and biodiversity outcomes.



Response to the 'Response to Submissions' Maules Creek Coal Project Environmental Assessment

1. Introduction

Following the exhibition period for the Maules Creek Coal Project Environmental assessment (EA), Namoi CMA submitted a detailed report on the 11th October 2011 outlining our concerns, comments and recommendations resulting from the review of the EA. Aston Coal and Hansen Bailey have now responded to Namoi CMA's submission in their 'Response to Submissions' dated December 2011.

At the request of the Department of Planning and Infrastructure, Namoi CMA has examined the 'Response to Submissions', the relevant sections and appendices including the Draft Biodiversity Offset Management Plan (Dec'11). The following comments are provided on the adequacy of the 'Response to Submissions' and the Draft Biodiversity Offset Management Plan in addressing Namoi CMA's concerns.

This response basically follows the format of Namoi CMA's previous submission (11/10/11) and should be read in conjunction with that submission.

2. Catchment Action Plan 2007 and Namoi CMA Extractive Industries Policy

Namoi CMA has on a number of occasions requested that the Namoi CMA's Catchment Action Plan (CAP) and Extractive Industries Policy (EIP) be both considered and addressed by the Aston Coal and by Hansen Bailey.

Hansen Bailey in the EA and the 'Response to Submissions' in Section 4.14.3 has referred to Narrabri Shire Council's planning documents when considering and addressing the Namoi CMA Catchment Targets. Namoi CMA considers this third party approach inadequate and requests that Hansen Bailey make a more credible and serious attempt to address the Namoi CMA CAP Targets and Extractive Industry Policy in the 'Response to Submissions'.

Section 4.7.8 of the 'Response to Submissions' makes an inadequate attempt to address CAP Target MTW2 on surface water management. The response does not address how the CAP target will be improved or maintained as a result of the mining activities.

3. The Project

In Namoi CMA's earlier review of the EA in Section 3.2.2 we expressed concern about clearing native vegetation, managing the timber resource, project and landscape disturbance.

Sections 4.4.2 and 4.4.24 of the 'Response to Submissions' basically addresses these concerns through the proposed preparation of a 'Land Disturbance Protocol'. Namoi CMA looks forward to being consulted when the Flora and Fauna Management Plan is prepared which will include a revised Land Disturbance Protocol.

4. Regulatory Framework

In Namoi CMA's review of the EA in Section 4.4.3 concern was expressed about the extent of clearing native vegetation and we urged the proponent to avoid clearing and where possible minimise and mitigate clearing.

Section 4.4.3 of the 'Response to Submissions' and the Draft Biodiversity Offset Management Plan (Dec'11) addresses this concern via the greater detail contained in both of these documents. Namoi CMA is satisfied with the explanations provided and the mitigation actions planned.

Furthermore, in Namoi CMA's review of the EA in Section 4.4.5 we expressed concern about the water access and licensing. See Section 9 of this document for comments on this matter.

5. Stakeholder Engagement

In Namoi CMA's review of the EA in Section 5.3.2 we expressed concern about the issues raised by Namoi CMA being discounted.

Namoi CMA is satisfied with the response expressed in Section 4.14.3 of the 'Response to Submissions' and looks forward to continued consultation in the development of Environmental Management Plans.

6. Ecology

Namoi CMA has previously raised a number of issues relating to the way ecological issues were addressed in the EA. While some of these concerns have been adequately addressed within the 'Response to Submissions', others have not been and these are addressed below.

6.1 Condition Assessments and Biometric Benchmarking

In Namoi CMA's review of the EA in Section 7.6.2 concern was expressed that there were no condition assessments and/or biometric benchmarking for both the project disturbance area and the offset areas within the EA.

The 'Response to Submissions' in Section 4.4.25 states that 'the condition of the vegetation and associated habitats within the project boundary and offset areas

have been assessed within the EA in terms of understorey diversity, community structure, values for fauna, connectivity and historical land use’.

Namoi CMA believes that vegetation condition assessments (which can be a surrogate for habitat value) provide valuable information on whether equivalence (like for like) and sufficient gain has been achieved. Condition assessments should provide an assessment of the presence or absence of the following features:

- Tallest stratum, its health and projected foliage cover,
- Mid stratum, its health and projected foliage cover,
- Groundcover – grass cover, litter, bare ground, mosses and lichens,
- Species richness – number of native species, maturity, size,
- Regeneration,
- Weeds and pest animal impacts,
- Past land uses,
- Standing dead timber and fallen logs (habitat features),
- Numbers of hollows (habitat feature),
- Proximity to water, rocks caves and overhangs (habitat features).

Project Disturbance Area

In reviewing the EA and Appendix I which contain the descriptions of the vegetation communities, it is apparent that adequate vegetation condition assessments for the project disturbance area are lacking. Within each vegetation community description it mostly denotes the presence of certain condition and/or habitat features, however it is unlikely that those features will be consistent in their presence or absence for the whole of the vegetation community.

The vegetation condition assessments for the project disturbance areas are of a general nature and are not consistent between vegetation communities and consequently cannot be assessed against the offsets required. In most of the vegetation community descriptions it is left to Namoi CMA to make an intuitive assessment of the vegetation condition based on a few condition features.

Namoi CMA believes that it would be possible and certainly beneficial to rank areas within each vegetation community within the project disturbance area as being in good, average or poor condition based on a biometric benchmark.

Offset Areas

The draft Biodiversity Offset Management Plan (Dec’11) provides greater detail on the vegetation communities, management actions and monitoring than that provided in the EA. However, little condition assessment is undertaken of the offset vegetation communities. Again, intuitive assessments can be made based on condition features mentioned in the vegetation descriptions and the management actions. Namoi CMA believes that without adequate condition assessment it is not possible to balance the offsets against the vegetation lost through clearing.

6.2 Loss of Belah Woodland

In Namoi CMA's comments on the review of the EA in Section 7.6.3 we expressed concern that 100% of the Belah community (4.21ha) will be removed.

Namoi CMA is partially satisfied with the details in the draft Biodiversity Offset Management Plan (Dec 11) where 6.99ha of existing Belah Woodland on "Velyama" will be improved and protected. This is not ideal as there is insufficient gain. Namoi CMA would accept an expansion of the area to at least 11.2ha to enable regeneration and improved management which would eventually result in the offset for the loss.

6.3 Degradation of *Melaleuca riparian community* along Back Creek

In Namoi CMA's comments on the review of the EA in Section 7.6.3 concern was expressed that the *Melaleuca riparian community* along Back Creek would be degraded through changes in catchment hydrology and we requested that further monitoring and assessment is undertaken.

Namoi CMA is satisfied with the response expressed in Section 4. 4.26 of the 'Response to Submissions' which states that additional monitoring bores will be constructed along Back Creek and that mitigation and management measures will be implemented and developed in the Water Management Plan. Namoi CMA looks forward to being consulted during the development of the Water Management Plan.

6.4 Clearing impacts on Regional Vegetation Communities

In Namoi CMA's comments on the review of the EA in Section 7.6.3 we expressed concern that the impacts of clearing resulting from this project have not been adequately assessed against regional vegetation communities.

Section 4.4.10 in the 'Response to Submissions' provides some descriptive clarification of the regional impacts of clearing, mentioning staging of the clearing and that substantial mitigation and compensatory measures will be implemented.

Section 4.4.40 and Table 8 in the 'Response to Submissions' provides some comparison of the area of various vegetation communities to be cleared within the disturbance boundary to the current extent of that vegetation community within the Namoi Catchment. However, Table 8 does not examine the area of particular vegetation communities that are already at critical thresholds as a result of historic clearing.

The *White Box – Blakely's Red Gum – Melaleuca riparian forest* and the *Yellow Box - Blakely's Red Gum grassy woodland* vegetation communities have been 83% cleared in the past within the Namoi Catchment. Even though only 18.76ha of these vegetation communities will be cleared as a result of the mining development, the clearing still reduces the extent of an already highly stressed vegetation community. It is realised that the 18.76ha will be offset by 29.69ha of *White Box – Blakely's Red Gum – Melaleuca riparian forest* in the Northern Offset area, however, as this

29.69ha already currently exists there is a significant net loss of this vegetation community.

Furthermore, the *White Box – Narrow leaved Ironbark – White Cypress Pine grassy open forest*, the *White Box - White Cypress Pine grassy open forest* and the *White Box – Wilga – Belah Woodland* vegetation communities have been 73% cleared in the past. It is proposed to clear 439.23ha of these vegetation communities as a result of the mining development. It is realised that the clearing will be offset by 657.74ha of these vegetation communities in the Offset areas however; as most of this 657.74ha already currently exists there is a significant net loss of these vegetation communities.

Similar logic also applies to the *Belah woodland*, of which 73% has been cleared in the past. Even though only 4.21ha of this vegetation community will be cleared and this clearing will be offset by 6.99ha it still represents a net loss for this vegetation community.

Namoi CMA does not support any net loss of vegetation communities especially those that are above critical ecological thresholds. Namoi CMA has identified a number of critical threshold targets in the Namoi Catchment Action Plan 2010-2020. The main Terrestrial Biodiversity Catchment Targets are:

Biodiv 1: By 2020 there is an increase in native vegetation extent and vegetation does not decrease to less than 70% in less cleared sub catchments and 30% in over cleared sub catchments and no further Regional Vegetation Community decreases to less than 30% extent as identified by 2010 baseline.

Biodiv 2: By 2020 maintain sustainable populations of a range of native fauna species by ensuring that no further Regional Vegetation Community decreases to less than 30% extent as identified by 2010 baseline.

Namoi CMA recommends that

- **the proponent undertake a specific revegetation program within the offset properties of these vegetation communities to ensure that there is no net loss of these vegetation communities in the catchment.**

6.5 Land Disturbance Protocol

In Namoi CMA's comments on the review of the EA in Section 7.6.4 we expressed concern about the lack of Land Disturbance Protocols.

This concern has been addressed in Section 3 of this document and in Sections 4.4.2 and 4.4.24 of the 'Response to Submissions'.

7. Maules Creek Biodiversity Offset Strategy

Namoi CMA has examined the draft Biodiversity Offset Management Plan (BOMP) and concurs with the overall intent of the plan. There is significantly more detail in

the BOMP especially with regard to the Northern offset area. Namoi CMA would appreciate being consulted on the production of the final BOMP.

7.1 Offset Areas

In Namoi CMA's comments on the review of the EA in Section 7.7.3 we summarised Table 6.1 from Appendix I of the EA. A direct comparison between Table 6.1 and Table 2.1 in the draft BOMP is not possible (to see whether there are any significant differences). Namoi CMA realises that from an area perspective, there will be 8023ha of vegetation to be conserved within the offset properties which supposedly offsets the 2177ha to be cleared. However, without condition assessments it is not possible to state whether there has been sufficient gain (no net loss) and whether equivalence (like for like) has been achieved.

7.2 Security Arrangements

In Namoi CMA's comments on the review of the EA in Section 7.7.3 we expressed concern that there were no details of the security arrangements and environmental trusts.

Namoi CMA is satisfied with the details in the draft Biodiversity Offset Management Plan (Dec 11) in Sections 3.10 and 4.10 where tenure and protection mechanisms are detailed.

7.3 Agricultural Suitability of Offset Properties

In Namoi CMA's comments on the review of the EA in Section 7.7.3 concern was expressed that there were no agricultural suitability assessments for offset properties.

Namoi CMA is satisfied with the explanation provided in Section 4.11.6 of the 'Response to Submissions' and with the details in the draft Biodiversity Offset Management Plan (Dec 11) in Sections 3.1 and 4.1, and in Figures 3.1 and 4.1 which detail and depict the areas that will be set aside for core conservation, managed for conservation and core farming areas. Namoi CMA is supportive of the management approach where approximately 20% of the offset properties are set aside for core conservation and approximately 20% set aside for core farming activities and where possible existing farming areas will remain as core farming areas.

7.4 Condition Assessments for Vegetation Communities in the Offset areas

In Namoi CMA's comments on the review of the EA in Section 7.7.3 Appendix I, we expressed concern that there were no condition assessments or biometric benchmarking for vegetation communities within the offset properties.

This concern is still pending and has been discussed in Section 6.1 above.

7.5 Comparative Analysis of Vegetation Communities and Condition

In Namoi CMA's comments on the review of the EA in Section 7.7.3 under 'Reasons for Selection', we expressed concern that there was no comparative analysis of condition assessments or biometric benchmarking for vegetation communities between project disturbance area and offset properties.

Without thorough and complete condition assessments and biometric benchmarking of the vegetation communities in both the project disturbance area and offset properties it is not possible for this comparative analysis to take place. Table 2.2 in the draft BOMP provides a limited comparison by using broad vegetation structural formation classes qualified by the presence of shrub or grass cover.

Namoi CMA believes that comparative analysis is important to ensure there has been sufficient vegetation gain (no net loss) and whether equivalence (like for like) has been achieved.

7.6 Offset Ratios

In Namoi CMA's comments on the review of the EA in Section 7.7.3 under 'Management', we expressed concern that the ratio figures listed in Table 6.8 Appendix I are questionable.

Table 2.2 in the draft BOMP is presumed to be more accurate than Table 6.1 and Table 6.8 in Appendix I. Based on the information in Table 2.2 the offset ratio of total area of vegetation conserved to the project disturbance area is 3.68:1, however as mentioned above this is limited by the lack of condition assessments.

8. Aboriginal Archaeology and Cultural Heritage

In Namoi CMA's comments on the review of the EA in Section 7.8.3 under 'Mitigation and Management', we expressed a desire to be consulted when developing the Aboriginal Archaeology and Cultural Heritage Management Plan (AHMP).

Namoi CMA is satisfied that we will be consulted along with other Aboriginal groups and OEH as specified in Section 4.6.1 of the 'Response to Submissions'.

9. Surface Water

9.1 Existing Access Rights for Surface Runoff

In Namoi CMA's comments on the review of the EA in Section 7.10.1 under 'Background', we expressed concern that there was no mention of existing access rights for surface runoff.

Namoi CMA has read the submission from the NSW Office of Water and also Section 4.7.1 of the 'Response to Submissions'. Namoi CMA does not have any jurisdiction under the Water Management Act 2000 nor the Water Management (General) Regulation 2004, however it is known that the Water Management (General) Regulation 2004 was repealed and replaced with the Water Management

(General) Regulation 2011 on the 16th November 2011. Namoi CMA will leave comments on this matter to the NSW Office of Water.

9.2 Operation of the Highball Dams

In Namoi CMA's comments on the review of the EA in Section 7.10.2 under 'Modelling Methodology', we expressed concern that it is unclear how the high-wall dams will operate when considering their respective sizes, catchments and catchment yields.

Namoi CMA is satisfied with the response expressed in Section 4.7.1 and 4.7.2 of the 'Response to Submissions' which specifies how the high wall dams will operate.

9.3 Mine Water Storages

In Namoi CMA's comments on the review of the EA in Section 7.10.2 under 'Modelling Methodology', we expressed concern about whether the mine water storage dam would spill and if it did where it would spill.

Namoi CMA is satisfied with the response expressed in Section 4.7.3 of the 'Response to Submissions' which specifies how the mine water storage dams will operate and spill should an extremely large rainfall event occur.

9.4 Impacts of Catchment Loss from Back Creek

In Namoi CMA's review of the EA in Section 7.10.3 under 'Impact Assessment', we expressed concern that there would be catchment loss from Back Creek and subsequent potential impacts.

Namoi CMA is partially satisfied with the response expressed in Section 4.7.4 of the 'Response to Submissions' which specifies that there will be a permanent and residual impact on Back Creek as a result of this development. The proponent believes that these impacts will be minimised by the operation of the high wall dams and surface run off from the mine site.

Namoi CMA requests that it be consulted during the preparation of the Water Management Plan for the project area.

9.5 Definition of Water Types

In Namoi CMA's review of the EA in Section 7.10.3 under 'Impact Assessment' we expressed concern that there were inconsistent statements regarding water types.

Namoi CMA is satisfied with the response expressed in Section 4.7.5 of the "Response to Submissions" which clarifies the inconsistent statements.

9.6 Flooding Impacts on Back Creek

In Namoi CMA's review of the EA in Section 7.10.3 under 'Impact Assessment' we expressed concern that there would be a reduction in flooding and changes to flood behaviour along Back Creek which will have both positive and negative impacts.

Namoi CMA is satisfied with the response expressed in Section 4.7.4 and 4.7.6 of the 'Response to Submissions' which acknowledges that there will be a residual impact on Back Creek and the resultant impacts on flooding along Back Creek.

9.6 Catchment Effects resulting from Diversion of Natural Runoff

In Namoi CMA's review of the EA in Section 7.10.3 under 'Impact Assessment' we expressed concern that there would be significant catchment effects resulting from this large diversion of natural runoff.

Namoi CMA is satisfied with the response expressed in Section 4.7.7 of the 'Response to Submissions' which acknowledges that the high wall dams, clean water drains and future rehabilitation will mitigate these impacts.

9.7 Final Void Water Quality

In Namoi CMA's review of the EA in Section 7.10.3 under 'Final Void Assessment' we expressed concern that a significant final void lake will remain once the project ceases and that the lake will become quite saline over time.

Namoi CMA is satisfied with the response expressed in Section 4.12.1 of the 'Response to Submissions' regarding the requirement for a final void which indicates that it is expected that mining will continue beyond the 21 year conceptual final landform plan which will mean the void will be smaller than indicated at present.

Namoi CMA is satisfied with the response expressed in Section 4.8.6 of the 'Response to Submissions' which indicates that salinity within the final void lake will not be an ongoing issue.

9.8 Water Management Plan

In Namoi CMA's review of the EA in Section 7.10.3 under 'Final Void Assessment' we expressed a desire to be consulted during the production of the Water Management Plan. Namoi CMA is satisfied that that this consultation will occur, especially if the requirement for consultation is made a condition of consent.

10. Groundwater

10.1 Groundwater Monitoring and Mitigation

In Namoi CMA's review of the EA in Section 7.6.3, we expressed concern that the *Melaleuca riparian community* along Back Creek may be a groundwater dependent ecosystem and that further monitoring of groundwater would be required.

As detailed above in Section 6.3, Namoi CMA is satisfied with the response expressed in Section 4.4.26 of the 'Response to Submissions' which states that additional monitoring bores will be constructed along Back Creek and that mitigation and management measures will be implemented and developed in the Water Management Plan.

11. Soils and Land Capability

It is well known that the replacement of the topsoil and subsoil underpins an effective and successful rehabilitation project. Namoi CMA has revisited the Soil and Land Capability Sections in the EA, Appendix P and examined the 'Response to Submissions' and we still find these documents difficult to reconcile and confusing.

This difficulty in reconciling and the subsequent confusion stems from inconsistent area figures. We believe that all the assessment areas should equate to the project disturbance areas. The project disturbance area obviously includes those areas that will be disturbed and those areas that will need to be rehabilitated to a particular land class and covered with soil to a particular depth. Whilst it is "nice to know" the area breakdown in relation to the Project Area, it is more important to know the relationship to the Project Disturbance area.

The most consistent area for the Project Disturbance Area is 2177ha, (i.e. the area to be cleared). Consequently, the following information should be provided by the proponent:

- The soil assessment area should equate to 2177ha. According to Table 47 (stripping depths) in the EA it equals 1974ha and Table 46 (soil areas) uses 3550ha (Project Area),
- Land Capability Assessment area pre and post mining should equate to the project disturbance area. The information in Table 48 (land capability) in the EA tabulates to the whole project area, not the project disturbance area,
- Similarly, the Agricultural Suitability Assessment area pre and post mining should equate to the project disturbance area. The information in Table 49 (Agricultural Suitability) in the EA tabulates to the whole project area, not the project disturbance area,
- Top soil availability area should equate to 2177ha. According to Table 20 (topsoil balance) in Appendix P it equates to 1974ha,
- Top soil respreading area should also equate to 2177ha. According to Table 21 (topsoil balance) in Appendix P it equates to 1570ha.

It is understood that some areas will not be stripped of topsoil while some areas will not have topsoil replaced, and these areas have been partially accounted for on the soil balance tables, but the figures in many of the listed tables are inconsistent which makes reconciliation and assessment difficult.

11.1 Soil Assessment and Classification

In Namoi CMA's review of the EA in Section 7.15.3 under 'Impact Assessment' we expressed concern that the assessment of the soil type boundaries and resultant mapping in the EA appears to be inadequate and invalid.

Namoi CMA has re-examined Appendix P and read the response in Section 4.11.1 of the 'Response to Submissions'. We are partially satisfied with the explanation provided. We now believe it is not worth pursuing the issue as we believe the issues of soils suitability and availability for rehabilitation are more important issues.

11.2 Topsoil Availability and Suitability

In Namoi CMA's review of the EA in Section 7.15.3 under 'Impact Assessment' we expressed concern about the topsoil material assessment procedures used by the proponent.

Namoi CMA is satisfied with the explanation provided in Section 4.11.4 which acknowledges the various procedures that can be used.

In Namoi CMA's review of the EA in Section 7.15.3 under 'Impact Assessment' we also expressed concern about how the volumes of topsoil material required were determined.

Section 4.11.4 of the 'Responses to Submissions' just reiterates the information in Appendix P, Tables 20 and 21. Namoi CMA is not satisfied with the assessment of the volumes of topsoil required and the topsoil balance.

11.3 Subsoil Suitability and Re-use

In Namoi CMA's review of the EA in Section 7.15.3 under 'Impact Assessment' we expressed concern about the indiscriminate discarding of the sub-soils.

Namoi CMA is satisfied with the explanation provided in Section 4.11.5 which reiterates that the subsoils are only suitable as an intermediate layer between overburden and the final surface topdressing material. Namoi CMA looks forward to being consulted during the preparation of the Soil and Land Capability Procedure and the Rehabilitation Management Plan.

11.4 Topsoil Spreading Depths

In Namoi CMA's review of the EA in Section 7.15.3 under 'Impact Assessment' we expressed concern about the discrepancies in the spreading depths of top-soil.

Namoi CMA is satisfied with the spreading depths as specified in Section 4.11.4 in the 'Responses to Submissions'.

11.5 Land Capability Assessment

In Namoi CMA's review of the EA in Section 7.15.3 under 'Impact Assessment' we expressed concern that the assessment of land capability in the EA appeared to be inadequate and invalid.

Namoi CMA has re-examined Appendix P and read the response in Section 4.11.2 of the 'Response to Submissions'. We understand the explanation provided, however we are still concerned that soil type was the main and sometimes the sole determinant of land capability, which is generally not the case. As with soil assessment procedures noted above, we believe it is not worth pursuing the issue of land capability assessment as it will change with mine development and rehabilitation.

11.6 Agricultural Suitability

In Namoi CMA's review of the EA in Section 7.15.3 under 'Impact Assessment' we expressed concern that there were a number of discrepancies in the Agricultural Suitability Assessment which cast some doubt on the adequacy and validity of this assessment.

Namoi CMA is satisfied with the explanations provided in Sections 4.11.3 and 4.11.7 of the 'Responses to Submissions', both of which explain some of the discrepancies while providing further details on the Agricultural Suitability Assessment.

12. Rehabilitation and Final Landform

12.1 Final Land Slopes

In Namoi CMA's review of the EA in Section 7.16.3 under Final Landform we expressed concern that the final landform will consist of predominantly steep slopes (10°) with flat hill tops. Namoi CMA believes that 7° slopes would be easier to rehabilitate and manage into the future for biodiversity. Notwithstanding this, Namoi CMA understands that 10° slopes are more economic and result in a smaller disturbance footprint. Namoi CMA encourages the proponent to vary slope batters and limit batter lengths where possible to facilitate rehabilitation.

12.2 Requirement for Final Void

In Namoi CMA's review of the EA in Section 7.16.3 under 'Final Landform' we expressed concern that the final void will be relatively large and elongated with slopes approaching 37° .

Namoi CMA is satisfied with explanation provided in Section 4.12.1 of the 'Responses to Submissions' which provides details of future proposals for the void.

12.3 Rehabilitation Management Plan

In Namoi CMA's review of the EA in Section 7.16.6 under 'Rehabilitation Completion Criteria' we expressed a desire to be consulted during the production of the Rehabilitation Management Plan. Namoi CMA looks forward to being consulted during the preparation of the Rehabilitation Management Plan.

Report Date: 1st February 2012
Namoi Catchment Management Authority

Robert Banks
SoilFutures Consulting Pty Ltd
PO Box 582
Gunnedah NSW 2380
Wednesday, January 11, 2012

Attn: Mr Steve O'Donoghue, Ms Megan Webb
Mining & Extractive Industries
Major Development Assessment
Department of Planning
GPO Box 39
SYDNEY NSW 2001

**Response to "Response to Submissions – Maules Creek Coal Project" - Hansen Bailey,
December 2011**

Dear Mr O'Donoghue and Ms Webb

As you are probably aware I was one of the environmental contractors employed by the Maules Creek Community Council to review the soils section of the Environmental Assessment by Hansen Bailey for the Maules Creek Project. I have been working overseas and have now read the response to submissions received regarding this Environmental Assessment by Hansen Bailey.

I am very disappointed at the effort put in by Hansen Bailey in actually addressing these issues adequately so please find attached my response to Hansen Bailey's response to submissions. Following are a series of comments on Hansen Bailey's Response to Submissions to the Maules Creek Mine EA, with respect to soil issues raised by SoilFutures Consulting on behalf of the Maules Creek Community Council.

1 Groundwater and Groundwater Dependent Ecosystems (GDE's)

- The presence of springs in associated with the presence of *Mellaleuca bracteata* (a Groundwater Dependant Ecosystem) within the zone to be developed has was not covered in the EA, and in the response is only reported along Back Creek. The intention of raising this species as an issue is that it also occurs on spring sites within the EA area well away from the Back Creek. These are important, rare and very localised GDE's. Hanson Bailey has not addressed the issue of the spring site GDE's and what impact mining will have on these GDE's in terms of water supply, or how they will be managed if they are destroyed in the process of mining.

2 Methodology and Soil mapping reference material

- The soils section of the EA is based on work which is claimed to be original; however the work is clearly that of Banks and King (In Press) as given in NCMA (2009). This needs to be addressed. The referencing is incorrect and needs to be made clear.
- Methodology needs to be altered to state that NCMA (2009) was used as in its entirety as a reference base, of which some minor subdivisions were made. In short, the mapping presented by GSE and Hansen Bailey is **my own mapping** which I have done for Government agencies in the past and which I own part copyright of. The maps are identical with the addition of two lines, and this would be impossible if the maps were worked up as stated to form a “Reference Map” from first principles. In short, as a Certified Professional Soil Scientist, my accreditation would be removed for such a breach of professional and ethical conduct.
- Interestingly, aerial photograph interpretation was claimed to be used for the map. It happens that John Laurie – who Hansen Bailey claim to have made soil and land capability maps – cannot see in stereo, and is one of the few trained soil conservationists who was employed at a time when it was compulsory to have this skill.

3 Land Capability or Soil and Land Capability?

- Hansen Bailey claims that “the notion that the Land Capability Assessment is inadequate and invalid is rejected” (p113 response document). Interestingly, again, the boundaries of the Soil and Land Capability for the EA area are exactly as those published in NCMA (2009). This shows clearly that Hansen Bailey have not taken the time to review their own information. Regardless of which system is used, Land Capability has a soil depth component which is totally ignored in rehabilitation planning which is demonstrated in SoilFutures review quite adequately with maps and areas worked through. I should point out that Soil and Land Capability is now the State Standard (regardless of what Hansen Bailey has stated) and that they have failed to meet it.
- I should also point out that Soil and Land Capability is the means by which NSW Planning is delineating high value agricultural land (Casey Murphy *pers com*, NSW Office of Environment and Heritage).

4 Purpose of the Alluvial Soil Study

- The terrace referred to in the response does not in fact exist. The alluvial landscape mapped is clearly Driggle Draggel Stagnant Alluvial Landscape as copied directly from NCMA (2009).

5 Errors in interpretation of Laboratory Data

- No amendment of soil data interpretation has been made as per national standards. Please ignore any comments made on soil salinity in the EA – they are incorrect, and are derived from a water salinity ranking table and do not reflect soil salinity.

6 Inadequate Rehabilitation Planning

- I was under the impression that it is a requirement of open cut mining that land capability is to be restored to pre mining land capability, as has been done in the past in the district with Black Jack mine in Gunnedah.
- Post mining lands should be restored to the previous land capability which is derived from slope, terrain and soil attributes.
- Although Soil Landscape mapping has been used and an assessment of the suitability of the soils for top soiling has been made, no account has been taken of restoring both slopes and, more importantly soil depth to the rehabilitated terrain.
- No plan has been still been put forward as to how subsoils are to be managed to restore the soil depth required to achieve restoration of prior land capability.
- Modeled outcomes in the SoilFutures Review of the EA using real soil data
- Published soil landscapes and soil data (which have been used and modified in the EA) indicate that the rehabilitation proposal for mine spoil is inadequate to restore native vegetation at the site. The soil available water holding capacity of the site pre-mining estimated to be 5780 ML, and only 459 ML post mining, creating a 5321 ML soil Available Water Holding Capacity deficit. This has not been addressed at all

7 Concluding remarks

It is my professional and considered opinion that the issues raised in the review of the Maules Creek Project EA have not been addressed adequately by Hansen Bailey.

Further to this, Hansen Bailey has failed to acknowledge source material correctly when they have directly copied it from copyrighted sources, and the fact that their maps are identical to published maps show that it is in fact impossible that the maps are original. This is an ethical and professional consideration which needs to be very seriously considered.

Hansen Bailey has failed to address how land capability will be restored to former land capability post mining in the EA and in their responses. In fact they seem to confuse slope mapping with land capability, and have no fundamental understanding that soil depth and type contribute strongly to land capability. The pre and post mining landforms proposed, may maximize coal production, but do not consider this important requirement of Land Capability restoration.

As a consultant I have worked in both the mining, environmental and rural sectors; both nationally and internationally. I have an ethical and balanced approach to development and I believe that mining can proceed with minimised impacts when planned and carried out well. I believe that both the Environmental Assessment and the Response to Submissions by Hansen Bailey should be rejected as being inadequate in addressing issues required for planning approval to be granted at this time.

I would be happy to present or re-present any of these issues in person if you think it would be helpful in assessing this application for mining.

Yours Sincerely

A handwritten signature in black ink on a light-colored background. The signature is written in a cursive style and reads "Robert Banks".

Robert Banks
Principal Consultant
SoilFutures Consulting Pty Ltd



Discussion of Maules Creek Coal Project Response to Submissions and
Professor Jeff Bennett's review of Maules Creek Coal Project Economic
Assessment

Prepared by

Economists at Large Pty Ltd

December 2011

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Introduction

Economists at Large welcome Hansen and Bailey's response to our submission on the Maules Creek Coal Project environmental assessment and Professor Jeff Bennett's review of the economic impact assessment of the Maules Creek Coal Project proposal. We are pleased that Professor Bennett reinforces some of our main points, particularly relating to:

- Net production benefits
- Social value of employment

These issues have resulted in the overstatement of the value of the project by at least \$3.2 billion, as conceded by Hansen and Bailey. However, there are still major shortcomings of the economic assessment relating to:

- Input-output modelling
- Scope of the analysis
- Consideration of alternatives
- Timing
- Transparency

These shortcomings mean that the economic assessment, despite having been revised, is still unsuitable for decision making purposes. We urge the NSW government to fully review the economics of this project to make a decision in line with the interests of local, state and national public interest. This report will discuss each of the points above and the outstanding issues we see with the economic assessment for the Maules Creek Coal Project.

Net production benefits

Professor Bennett agrees with our observation that the net benefits of the project were overstated due to the profits that will be expatriated by foreign interests, finding that:

Where the shareholders are not citizens, their mine benefits are expatriated and should not be included in the BCA. Careful attention should therefore be given to the register of shareholders and adjustments made to the producer surplus benefit calculation. (Bennett 2011) p3

We are also pleased that as a result of Professor Bennett's review, Hansen and Bailey concede that Gillespie Economics' error has overvalued the project by \$3.2 billion (from \$8.7 billion to \$5.5 billion) or nearly 40%. We urge them to disclose their "careful consideration" on how they established this figure, given that our brief analysis of media and Bloomberg sources suggested foreign ownership of over 50%.

This point is also important for the neighbouring Boggabri Coal Project proposal, which is 100% owned by a foreign investor. We made the same point in submissions relating to that project and look forward to a similar correction.

Social Value of employment

We agree with Professor Bennett’s review which found:

[The] inclusion of the employment benefit as a component of the EIA is not recommended. Their inclusion would overstate the extent of proposal benefits.

It is disappointing that despite Professor Bennett’s recommendation, Hansen and Bailey continue to refer to figures that do include this inappropriate value in their response to submissions. We urge them to desist entirely from using this misleading value.

Professor Bennett noted that the nature of the jobs created and the existing high demand for mine labour in Australia meant that “*it is doubtful that people employed in the new mine would be drawn from the ranks of the unemployed.*” This point is reinforced by economic analysis of the China First Coal Project in Queensland, carried out for the proponents of that mine. (AEC group 2010) found that not only would that mine not carry social value of employment, but that proceeding with that project in the current labour market was likely to result in the loss of significant numbers of jobs in the agriculture and manufacturing industries:

Industry	Forecast decline in employment 2012-13	Forecast decline in employment to 2018	Forecast decline in employment to 2037
Agriculture (jobs)	-126	-192	-120
Manufacturing (jobs)	-188	-2,215	-1,666

Source: AEC Group 2010, page xvi

The output of these industries is also expected to decline due to factors including reduced availability of skilled labour and higher exchange rates caused by the coal project:

Industry	Forecast decline in annual output to 2012-13	Forecast decline in annual output to 2018	Forecast decline in annual output to 2037
Agriculture (\$M)	-42.0	-38.0	-15.2
Manufacturing (\$M)	-209.3	-1,249.4	-1,050.8

Source: AEC Group 2010, page xiii

Compare these results to those presented by Gillespie Economics:

Industry	Average direct effects	Production induced	Consumption induced	Total
Agriculture/forestry/fishing (jobs)	0	0	3	3
Manufacturing (jobs)	0	6	5	11

Source: (Appendix Q, page 23)

While the China First Project is larger than the Maules Creek proposal – looking to produce up to 28Mtpa compared to 9Mtpa – it seems odd that the China First Project will destroy thousands of jobs in agriculture and manufacturing, while the Maules Creek project will have a positive, albeit minor, effect. The reason negative impacts on other industries were not identified in Gillespie Economics’ analysis is due to their choice of methodology. Gillespie Economics used input-output

tables for their economic impact assessment rather than computable general equilibrium modelling. For an example of computable general equilibrium modelling, see AEC (2010).

Input-output modelling

Input-output modelling has fallen from favour with economists for many reasons, the main ones being explained by the Australian Bureau of Statistics (ABS 2011):

Lack of supply-side constraints: *The most significant limitation of [input-output modelling] is the implicit assumption that the economy has no supply-side constraints. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.*

Fixed prices: *Constraints on the availability of inputs, such as skilled labour, require prices to act as a rationing device. In assessments using multipliers, where factors of production are assumed to be limitless, this rationing response is assumed not to occur. Prices are assumed to be unaffected by policy and any crowding out effects are not captured.*

Or as (Abelson 2011) put it:

I–O models lack resource constraints and fail to capture significant welfare (consumer and environmental) impacts. They always produce a positive gain to the economy, however disastrous the event.

We urge Hansen and Bailey to revise their assessment of the Maules Creek Coal Project to eliminate all reference to social value of employment and to allow for proper consideration of the project's impacts on other industries.

Scope of the Analysis

We agree with Professor Bennett that conducting cost benefit analysis at the national level is appropriate and practical given the interconnected nature of the Australian economy. We note that in the original analysis Gillespie Economics suggested the scope was to be at the state level:

The NSW Department of Planning (DoP) Director-Generals [sic] Environmental Assessment Requirements (EARs) for the Project indicate that an economic assessment is needed as part of the EA. The EARs specifically require:

A detailed assessment of the costs and benefits of the Project as a whole, and whether it would result in a net benefit for the NSW community. (page 4)

Conducting project analysis at a national level is convenient, but Professor Bennett's assumption that others will do the same is problematic. Specifically, he suggests that:

The GHG emitted during the burning of the coal are not included in the EIA. Because any costs caused by these GHG are borne outside the jurisdiction of the BCA (Australia), this is the appropriate approach. They should be included in a BCA of say the power station proposed to burn the coal.

The assumption that the end user of the coal - most likely a power station in China or India - will conduct transparent cost benefit analysis at all seems optimistic. The real problem arises, however, with the logical conclusion that the Chinese and Indian economists will take the same approach and fail to consider any GHG cost “borne outside the jurisdiction of the BCA” – China or India. Let’s consider the cost benefit analysis of such a power station in more detail, loosely following the points made in Hansen and Bailey’s response to submissions page 98:

			Included in national level CBA?
Benefits	Financial	The revenue paid to the power station from users of its electricity	Yes
	Externalities	“There may also be external benefits of electricity for economic development, education and medical care.” Note that these would accrue to any type of electricity generation, not only coal.	Yes
Costs	Financial	Capital and operating costs	Yes
	Externalities	Reduced air quality, health impacts, acid rain, etc	Yes
		Climate change impacts	No – at least not those that accrue to other countries

The omission of this externality from both the cost benefit analysis of the mine and the power station results in an external cost borne by the rest of the world. The size of this externality is significant and demonstrated with even basic calculations:

Item	unit	value	Source
Coal production	tonnes/year	13,000,000	Appendix Q
Mine life	years	21	Appendix Q
Total output over mine life	tonnes	273,000,000	Ecolarge calculation
Coal to CO2 production ratio	ratio	3.0	Submission by Dr Ian Lowe to Boggabri Coal EIS ¹
CO2 produced	tonnes	819,000,000	Ecolarge calculation
CO2 price	dollars	30	Appendix Q
Total damage	dollars	24,570,000,000	Ecolarge calculation
Present value (21 years, 7%)	dollars	12,677,566,979	Ecolarge calculation

The existence of a \$12.7 billion dollar (present value) externality that is not internalised by either the coal producing or consuming country means that the world bears this loss; neither the mine nor the power plant is likely to be economically efficient in light of this cost. Keeping this cost external is the

¹ Available at http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3562

unfortunate truth on which the profitability of coal mining and coal-fired power generation industries are largely based. To paraphrase Hanson and Bailey (page 99):

Rent seeking is where stakeholders attempt to derive economic rent ...by manipulating the social or political environment...

Indeed. Rent seeking is what the coal industry does when it campaigns against carbon pricing, seeks compensation, or insists on externalities not being internalised in economic analysis of their activities.

Alternative projects

Both Professor Bennett and the proponents outline why cost benefit analysis can be appropriate with only project and base case scenarios, as the current situation:

involves the NSW Department of Planning using the BCA as an input to deciding if the mine proposal should go ahead. (page 94)

However, governments should be examine several options to maximise the benefit to its constituents rather than approving the only option put to them on the basis that it has a positive net present value. The logic here is that any project with a positive net present value should be approved, which is not the same as finding the project that has the highest value. It is unlikely that the proposal put forward by a proponent will be that which maximises value to society as they are rationally attempting to maximise their own returns, as we see from the response to submissions:

(response to submissions page 93)

Aston has conducted an extensive feasibility study into how the coal resource within its mining authorities could be mined. Following this, Aston has put forward a Project proposal that it considers is feasible for determination by the NSW Government.

In other words, Aston have sensibly put forward a proposal that maximises the benefits to their shareholders in a way that makes it feasible for the NSW Government to approve their project. The government assesses if the project should be approved, but at no stage does the government make an assessment of whether this is the best way of exploiting its resource.

Transparency of calculations

The public's faith in the economic assessment should be of the highest importance to governments, proponents and their consultants. However, the economic assessment includes calculated values that cannot be replicated using the data contained in it. Our attempt to replicate these calculations showed differences with the stated values of hundreds of millions of dollars. Our calculations, far from being "stylised", follow standard methodology and were reviewed by several practicing economists, none of whom could reconcile the difference between the figures.

Although we are pleased that Hansen and Bailey have outlined some of the assumptions behind Gillespie Economics' calculations on page 104 of the response to submissions, it is disappointing that Professor Bennett made no comment on this issue in his review. While the revealed assumptions

help explain the difference in estimates, unfortunately they repeat the same lack of transparency in calculating present values of royalty figures on page 97. Attempting to recreate these calculations without further information on the assumptions behind them also results in significantly different values.

The background to these calculations are not commercially sensitive and they could be included at no extra cost to consultants. Not explaining them serves only to weaken public confidence in their analysis.

Conclusion

In this short discussion we have seen that Gillespie Economics' assessment of the Maules Creek Project:

- Overstated production benefits by at least \$3 billion
- Included conceptually flawed social benefits of over \$200 million
- Understates the impact of the project on other industries
- Employed inappropriate modelling techniques
- Sets its scope to preclude discussion of climate change damage worth perhaps \$12 billion

For these reasons we do not share Professor Bennett's conclusion that the assessment was "basically sound but falls short" (page 5). Professor Bennett has himself called for an end to the attitude that such "basically sound" analysis was "good enough for government work" (Dobes and Bennett 2009) and we see no reason why this should not be extended to analysis of this project. We call on governments to encourage development of mineral resources in ways which maximise the public benefit and to thoroughly review commissioned analysis. We call on project proponents and consultants to provide transparent analysis which allows the public to make an assessment, not analysis that is "feasible" for the "approvals process".

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APPENDIX B

***Response to Supplementary Submissions
Maules Creek Coal Project (Cumberland Ecology 2012)***

RESPONSE TO SUPPLEMENTARY SUBMISSIONS

MAULES CREEK COAL PROJECT

For:

Hansen Bailey Environmental Consultants

February 2012

Final



PO Box 2474, Carlingford Court 2118
www.cumberlandecology.com.au



Report No. 9125RP6

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Approved by: Dr David Robertson

Position: Director

Signed: _____

David Robertson

Date: 25 February, 2012

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Executive Summary

S1 Introduction

The purpose of this report, 'Response to Supplementary Submissions', is to respond to comments raised concerning the ecological impacts predicted for the Maules Creek Coal Project (the 'Project') and in regards to offsetting measures proposed to ameliorate such impacts.

The supplementary submissions raised were from the following respondents:

- State/Private:
 - Namoi Catchment Management Authority (CMA) 1st February 2012;
 - Environment Protection Authority Armidale (EPA) 25th January and 6th February 2012; and
 - SoilFutures Consulting Pty Ltd for the Maules Creek Community Council (SoilFutures) 11th January 2012.
- Commonwealth:
 - Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) 20th January 2012.

This report provides supplementary information for a range of ecological issues; however the extra information presented in this report complements the Environmental Assessment (EA) and draft Biodiversity Offset Management Plan (draft BOMP). It does not alter the findings of the offsets results which are robust and considered by Cumberland Ecology to be more than adequate for the Project. In addition, the draft BOMP added significantly to previous information requests.

S2 Requests for Condition Assessments

It should be noted that under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), there is no legal requirement for a proponent to undertake a quantitative, numeric vegetation condition assessment such as the BioBanking assessment or the BioMetric assessment. Within the Director General's Requirements (DGRs) for the Project there was no requirement for a quantitative vegetation assessment, for BioBanking or for the BioMetric assessment. Moreover, the proponent has not elected to have the Project assessed under BioBanking legislation. Neither the NSW nor Commonwealth policies state

that a quantitative condition assessment is a requirement for the assessment or determination of biodiversity offsets.

However, the EPA and CMA have both requested a quantitative vegetation condition assessment be made for both the impact areas and for the proposed offsets that assess the ecological condition (health and integrity) of vegetation, relative to its original or undisturbed state, and also its potential values as fauna habitat, all of which are compared to “benchmark” values.

EPA – favours the BioBanking Assessment Methodology (BBAM) which uses BioBanking to trade in ecological “credits” for a proposed development. The BioBanking Assessment Methodology provides rules for the number and type of credits that a development site will require in order to offset its impacts and thus improve or maintain biodiversity values. “Credits” are the currency used within BioBanking and they are not specifically area measurements. Rather, they are a measure of the current quality of habitat for threatened flora and fauna. The methodology also provides rules for the number and type of credits that can be created from undertaking conservation management at a BioBank site;

CMA - favours the BioMetric Assessment, which are similar but not the same as the BBAM. BioMetric Assessments are designed for assessing clearing proposals, including ecological thinning. BioMetric is a tool that can be used to assess the impacts on terrestrial biodiversity of clearing remnant native vegetation and protected regrowth under the *Native Vegetation Act 2003* (NV Act).

Cumberland Ecology has undertaken a quantitative condition assessment of the impact area and the proposed offset lands. The quantitative condition assessment is similar to the BioMetric tool and relies on comparisons of site values against biometric benchmarks as explained in Chapter 3.

S3 Offset Ratios versus Recent Approvals

As stated in the EA (Hansen Bailey, 2011a) and within the previous Response to Submissions report (Hansen Bailey 2011b), the proposed offsets will result in a substantial area of offset vegetation that will provide or add to corridors of habitat around Leard State Forest (Eastern and Western Offsets) and will build upon conservation reserves (Northern Offsets/Mt Kaputar National Park; Eastern and Western Offsets/Leard State Conservation Area).

Offsets for major projects in NSW are not generally determined using a metric assessment. Rather, they are developed based upon a ratio method whereby for every hectare of habitat cleared, a multiple of habitat is provided as an offset. Recent approvals of mining projects in 2011 or 2012 that have included major ecological offsets have been determined in this way, as occurred for the Ulan mining and Duralie mining projects approved by the Land and Environment Court in 2011; and Warkworth mining project approved by the Planning Assessment Commission (PAC) in 2012.

The resultant ratios of habitat within the offset to habitat to be cleared by the Project compare favourably and consistently with other recent mining approvals, as shown in **Table S.1** below.

Table S.1 Project Offsets vs. that of Other Recently Approved Mining Projects

PROJECTS	IMPACT			OFFSET			OFFSET RATIO		
	non-EEC (ha)	EEC (ha)	Total	non-EEC (ha)	EEC (ha)	Total	non-EEC (ha)	EEC (ha)	Total
Maules Creek	1633	544	2177	4302	5032	9334	2.6	9.2	4.3
Boggabri Coal Modification	69	45	114	177	364	541	2.6	8.1	4.7
Boggabri Coal	761	624	1385	4677	3021	7698	6.1	4.8	5.6
Ulan Coal Mines Ltd	339	69	408	1150	464	1614	3.4	6.7	4.0
Duralie Coal Pty Limited	87	0	87	259	31	290	3.0	N/A	3.3
Warkworth Mine Extension	447	765	1212	1876	2915	4791	4.2	3.8	4.0

Source:

^aNSW Planning and Infrastructure Assessment Report: Boggabri Coal Mine Section 75W Modification (D/A 36/88 MOD 2). 19/10/2011

^bNSW Planning Assessment Commission Review Report: Boggabri Coal Project. February 2012

^cHunter Environment Lobby Inc v Minister for Planning NSWLEC 221 (24 November 2011)

^dNSW Planning Assessment Commission Warkworth Project Approval (09-202) 3 February 2012

Note:

The values in the above table do not include rehabilitation areas.

The Boggabri Coal project has not been formally approved but has recently been recommended by the PAC for approval.

S4 Quantitative Condition Assessment Results

The Quantitative Condition Assessment completed within this report clearly demonstrates the condition states of vegetation within both the impact area and the proposed offsets.

The area of forest and woodland proposed to be cleared is currently in good condition relative to CMA benchmarks. The Box Gum Woodlands and Ironbark Forests, and other related vegetation generally have moderate to high species diversity relative to benchmarks and they form part of a large block of habitat. Some areas of moderate and low habitat condition will also be cleared, but these constitute a lesser proportion of the vegetation within the impact area.

The quality of the areas of forest, woodland and grassland within the proposed offsets is variable, with some good, average and poor condition vegetation. Such a range of habitat

was selected in the offsets specifically because it can provide some good quality habitat of immediate value to native flora and fauna, but also provide extensive opportunities within areas of principally moderate condition to recover to a higher condition, offering better habitat values through active conservation management.

There is an estimated 51% of the offsets that can be regenerated to a higher condition state and this is consistent with the objectives of the draft National Recovery Plan for Box Gum Woodland and Derived Native Grassland (2010) and the objectives of the Namoi Catchment Action Plan (Namoi CMA 2011), which aim to increase the area of vegetation through active and assisted natural regeneration.

The results of the Quantitative Condition Assessment are consistent with what was written in the EA and the previous Response to Submissions. That is, they show that the offsets are substantial in size and that they have significant potential to be improved by active management, as is proposed within the draft BOMP.

S5 Conclusion

Although this report provides substantial additional information via several additional analyses requested by EPA and CMA, the original conclusions drawn by Cumberland Ecology about ecological impacts of the Project remain unchanged. Similarly, the offset package is also essentially unchanged bar some minor additions to areas of some offset lands. The offset package as initially proposed was robust and suitable for addressing the ecological impacts of the Project. The offsets proposed compare favourably with offsets for several recent mining projects that have gained approvals in the past twelve months.

Introduction

1.1 Purpose

Cumberland Ecology has been commissioned by Hansen Bailey on behalf of Aston Resources to provide a response to supplementary submissions raised concerning the ecological impacts predicted for the Maules Creek Coal Project (the 'Project') and the offsetting measures proposed to ameliorate such impacts.

The supplementary submissions raised were from the following respondents:

- State/Private:
 - Namoi Catchment Management Authority (CMA) 1st February 2012;
 - Environment Protection Authority Armidale (EPA) 6th February 2012 ; and
 - SoilFutures Consulting Pty Ltd for the Maules Creek Community Council (SoilFutures) 11th January 2012.

- Commonwealth:
 - Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) 20th January 2012.

State and Commonwealth threatened species issues are dealt with under separate legislation: the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) respectively. Consequently responses to State and Commonwealth supplementary submissions are separated into Chapters 5 and 6.

Although this report provides substantial additional information via several additional analyses requested by EPA and CMA, the original conclusions drawn by Cumberland Ecology about ecological impacts of the Project remain unchanged. Similarly, the offset package is also essentially unchanged bar some minor additions to areas of some offset lands. The offset package as initially proposed was robust and suitable for addressing the ecological impacts of the Project. The offsets proposed compare favourably with offsets for several recent mining projects that have gained approvals in the past twelve months.

1.2 Authorship of Response

This Response to Supplementary Submissions has been prepared by a team of ecologists at Cumberland Ecology led by Dr David Robertson as the senior author. He has previously been engaged to review offsets for other mining projects by Department of Planning and Infrastructure (DP&I), has advised DP&I about an offset policy for major projects and was an expert witness in the Land and Environment Court appeal in 2011 concerning Ulan mine. He was also senior ecologist in charge of investigations for the recently approved Warkworth Mine Extension, which had a similar scale of ecological impacts and offsetting requirements to the Project.

Dr Robertson also has extensive experience in woodland ecology, having completed his PhD on ecology and management of a variant of Box Gum Woodland in Victoria. He has also worked throughout NSW on such woodland habitats during the past 25 years. He is therefore well qualified to respond to comments on the draft BOMP, and on proposed future management of Box Gum Woodland and other related vegetation within the proposed offsets.

1.3 Background

1.3.1 EA Exhibition and draft BOMP

An Environmental Assessment Report (EA) was prepared and exhibited for the Project according to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Cumberland Ecology prepared the Ecological Impact Assessment within the EA (i.e. Appendix I) and provided responses to submissions received about the EA following the public exhibition in December 2011, as part of the Response to Submissions report.

The EA contains a summary of a proposal for major ecological offsets that included several offsetting areas: the Northern Offsets, the Eastern and Western Offsets and the Shared Offset. Within the EA commitments were also made by the proponent to manage these properties in perpetuity for conservation and to restore forest and woodland communities and threatened species habitats.

Following EA exhibition, a draft Biodiversity Offset Management Plan (draft BOMP) was prepared for the proposed future management of the offset lands based upon additional flora and fauna surveys of offset properties conducted in September 2011. The draft BOMP was attached to Response to Submissions report and was used in responses concerning ecological issues.

Since then, supplementary submissions have been received to respond to the Response to Submissions report. The EPA, CMA and SEWPaC have all commented on the draft BOMP within their supplementary submissions. CMA noted that the draft BOMP provides substantial additional information about the proposed offsets. In contrast EPA stated that the Response to Submissions, including the draft BOMP, provided no new information and had not progressed the assessment of offsets. SEWPaC requested additional information regarding the management of the proposed offsets.

1.3.2 *Requests for Condition Assessments*

The majority of ecological submissions fall into two broad topics being: the ecological impact assessment and the adequacy of offsetting. With regard to the adequacy of offsetting, the EPA and CMA have both requested a quantitative vegetation condition assessment be made for both the impact areas and for the proposed offsets. Both agencies have suggested in their supplementary submissions that they would prefer that the quantum of ecological offsets be informed by the results of such quantitative condition assessments.

For the purpose of this report Quantitative Condition Assessments are numeric assessments of the ecological condition (health and integrity) of vegetation relative to its original or undisturbed state. Such assessments typically measure a range of vegetation attributes such as numbers of layers, numbers of native species, numbers of tree hollows, etc because such data can be used to summarise the condition of vegetation relative to its original state and also its potential values as fauna habitat. The data obtained are then compared to what is referred to as “benchmark” values, taken from the most intact available vegetation of each given community type within the Namoi CMA.

There are a number of ways to provide a Quantitative Condition Assessment of vegetation. The EPA favours a method called the BioBanking Assessment Methodology (BBAM). The BBAM is designed specifically for BioBanking Assessments where a person or agency is considering using BioBanking to trade in ecological “credits” for a proposed development. The BBAM provides rules for the number and type of credits that a development site will require in order to offset its impacts and thus improve or maintain biodiversity values. “Credits” are the currency used within BioBanking and they are not specifically area measurements. Rather, they are a measure of the current quality of habitat for threatened flora and fauna. The methodology also provides rules for the number and type of credits that can be created from undertaking conservation management at a BioBank site.

The CMA, being responsible for administering the NSW *Native Vegetation Act 2003* (NV Act) favours BioMetric Assessments, which are similar but not the same as the BBAM. BioMetric Assessments are designed for assessing clearing proposals, including ecological thinning. BioMetric is a tool that can be used to assess the impacts on terrestrial biodiversity of clearing remnant native vegetation and protected regrowth under the NV Act.

Under Part 3A of the EP&A Act, there is no legal requirement for a proponent to undertake either BioBanking assessments or BioMetric Assessments. Elements of the TSC Act and the NV Act are essentially “turned off” under Part 3A, and are replaced by the Director General’s Requirements (DGRs) provided by the Department of Planning and Infrastructure (DP&I). The DGR’s list assessment of biodiversity impacts to be one of the key issues. Verbatim, the DGR’s state the following about what should be assessed for Biodiversity:

- ***Biodiversity*** – including:
 - *Measures taken to avoid impacts on biodiversity;*
 - *Accurate measurements on vegetation clearing;*

- A detailed assessment of the potential impacts of the project on any:
- Terrestrial or aquatic threatened species, populations, ecological communities or their habitats, including;
 - i. White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland;
 - ii. Regent Honeyeater; and
 - iii. Swift Parrot;
- Regionally significant vegetation, or vegetation corridors; and
- An offset strategy to ensure the project maintains or improves the biodiversity values of the region in the medium to long term (in accordance with NSW and Commonwealth policies);

Within the DGRs for the Project there was no requirement for a quantitative vegetation assessment, for BioBanking or for a BioMetric Assessment. Moreover, the proponent has not elected to have the Project assessed under BioBanking legislation. Neither the NSW nor Commonwealth policies state that Quantitative Condition Assessment is a requirement for the assessment or determination of biodiversity offsets.

Offsets for major projects in NSW are not generally determined using metric assessments. Rather, they are developed based upon a ratio method whereby for every hectare of habitat cleared, a multiple of habitat is provided as an offset. Recent approvals of mining projects in 2011 or 2012 that have included major ecological offsets have been determined in this way, as occurred for the Ulan mining and Duralie mining projects approved by the Land and Environment Court in 2011, and Warkworth mining project approved by the Minister in 2012. **Table 1.1** below shows the magnitude of the offset package of the Project compared with other recent approvals. A breakdown of the values presented for the Project in **Table 1.1** is provided in Chapter 2.

Table 1.1 Project Offsets vs. that of Other Recently Approved Mining Projects

PROJECTS	IMPACT			OFFSET			OFFSET RATIO		
	non-EEC (ha)	EEC (ha)	Total	non-EEC (ha)	EEC (ha)	Total	non-EEC (ha)	EEC (ha)	Total
Maules Creek	1633	544	2177	4302	5032	9334	2.6	9.2	4.3
Boggabri Coal Modification	69	45	114	177	364	541	2.6	8.1	4.7
Boggabri Coal	761	624	1385	4677	3021	7698	6.1	4.8	5.6
Ulan Coal Mines Ltd	339	69	408	1150	464	1614	3.4	6.7	4.0

Table 1.1 Project Offsets vs. that of Other Recently Approved Mining Projects

PROJECTS	IMPACT			OFFSET			OFFSET RATIO		
	non-EEC (ha)	EEC (ha)	Total	non-EEC (ha)	EEC (ha)	Total	non-EEC (ha)	EEC (ha)	Total
Duralie Coal Pty Limited	87	0	87	259	31	290	3.0	N/A	3.3
Warkworth Mine Extension	447	765	1212	1876	2915	4791	4.2	3.8	4.0

Source:

^aNSW Planning and Infrastructure Assessment Report: Boggabri Coal Mine Section 75W Modification (D/A 36/88 MOD 2). 19/10/2011

^bNSW Planning Assessment Commission Review Report: Boggabri Coal Project. February 2012

^cHunter Environment Lobby Inc v Minister for Planning NSWLEC 221 (24 November 2011)

^dNSW Planning Assessment Commission Warkworth Project Approval (09-202) 3 February 2012

Note:

The values in the above table do not include rehabilitation areas.

The Boggabri Coal project has not been formally approved but has recently been recommended by the PAC for approval.

Metric assessments such as BioBanking or the BioMetric Tool can be used to calculate an estimated quantum of offsets required for a project; however this generally calculates a higher quantum of offsets than is typically used (and approved) for mining projects. This is generally due to the weakness of these assessments in accounting for non-numeric values of the offset lands, such as permanent water for wildlife refugia, cliff lines with habitats for bats, adjacent land tenure (especially National Parks), etc that provide considerable ecological advantages if present in or around offset properties.

The Project has provided a high quantum of offsets using a ratio method and is comparable or greater in quantity than the recent aforementioned approvals. Furthermore, as reported in the EA and within the previous Response to Submissions report, the proposed offset is strategically located next to existing conservation reserves (i.e. Mt Kaputar National Park, Leard State Conservation Area), contains permanent and ephemeral streams, contains cliff lines with habitat value for fauna and has good restoration potential.

Notwithstanding the above and in response to ongoing requests from EPA and CMA, Cumberland Ecology has undertaken a quantitative condition assessment of the impact area and the proposed offset lands. The quantitative condition assessment is similar to the BioMetric tool in that it relies on comparisons of site values against biometric benchmarks. This condition assessment is explained in greater detail in Chapter 3.

1.4 Report Structure:

The remainder of this report is structured as follows:

- **Chapter 2:** updates the total areas of vegetation within the proposed offsets and compares the resultant ratios to offsets within recently approved mines in NSW;
- **Chapter 3:** presents the methodology and results of Quantitative Condition Assessments of vegetation within the Project Disturbance Area and Offset Properties;
- **Chapter 4:** provides detailed responses to the supplementary submissions received from State and private stakeholders; and
- **Chapter 5:** provides detailed responses to the latest SEWPaC supplementary submission.

1.5 Terminology and Abbreviations

This report uses the following terminology and abbreviations:

BBAM:	BioBanking Assessment Methodology;
BioMetric Tool:	is a tool that can be used to use metrics to assess the impacts on terrestrial biodiversity of clearing remnant native vegetation and protected regrowth under the NV Act;
DGR:	Director-general's Requirements;
DP&I:	NSW Department of Planning and Infrastructure;
CMA:	Namoi Catchment Management Authority;
draft BOMP:	draft Biodiversity Offset Management Plan;
EA:	Environmental Assessment, prepared by Hansen Bailey for the Maules Creek Coal Project;
EPA:	Environment Protection Authority, Armidale;
MCCC:	Maules Creek Community Council;
PAC:	Planning Assessment Commission;
Quantitative Condition Assessments:	numeric assessments of the ecological condition vegetation relative to its original or healthy undisturbed state;



- SEWPaC:** Department of Sustainability, Environment, Water, Population and Communities;
- SoilFutures:** SoilFutures Consulting Pty Ltd for the Maules Creek Community Council; and
- The Project:** Maules Creek Coal Project.

Further Information Regarding Vegetation Areas in the Biodiversity Offset Properties

The purpose of this Chapter is to provide tables of area values pertaining to the vegetation within the offset properties. This information supersedes and augments earlier drafts published in the EA and in the draft BOMP. The information in these tables has been reviewed, corrected for errors and presented here to address requests for clarification in the supplementary submissions. The following tables of information are provided:

- **Table 2.1** presents the areas of vegetation mapped within the entirety of each property involved in the Offset Strategy for the Project;
- **Table 2.2** itemises the vegetation areas that are to be conserved within each property;
- **Table 2.3** compares the areas of different vegetation communities to be conserved against the direct Project impacts and expresses this comparison as a ratio value;
- **Table 2.4** compares only the areas of different Box Gum Woodland communities against the direct Project impacts and again, expresses this comparison as a ratio value;
- **Table 2.5** is a table summarising the areas of Box Gum Woodland and habitat for threatened species of National Environmental Significance. Earlier drafts of this table were prepared at the request of SEWPaC and were exhibited in the EA and the draft BOMP. The numbers within this table has been reviewed for errors and consistency with other tables (i.e. **Tables 2.1 to 2.4**) and presented again in this Chapter; and
- **Table 2.6** summarises the areas of habitat for threatened species that are listed by the TSC Act.

The condition of habitat used in **Tables 2.5** and **2.6** for threatened biota is based on the condition assessments explained in Chapter 3. The condition values of Box Gum woodland numbers are underpinned by the EPBC Act Condition Classes described in the Conservation Listing for Box Gum Woodland and is an independent condition assessment to the quantitative condition assessment described in Chapter 3.

The submissions relating to the clarification of quantities of vegetation in the offset properties are reproduced in Chapters 3 and 4, where we have presented our written responses.

Table 2.1 Vegetation Areas within the Eastern, Western, Northern and Shared Properties

Vegetation Communities	Eastern Properties							Northern Properties				Shared Property				Western Properties					SubTotal (ha)						
	Blue Range	Cattle Plain	Teston North	Tralee	Wallandilly	Warriahdool	Mt Lindesay	Wirraldale	Shared Offset	Kelso	Louenville	Oliveleen	Teston South	Velyama	Teston North	Tralee	Wallandilly	Warriahdool	Mt Lindesay	Wirraldale		Shared Offset	Kelso	Louenville	Oliveleen	Teston South	Velyama
Cliff and scree Thickets (Rainforest Species)																							0.53				0.53
Manna Gum - Yellow Box - Blakely's Red Gum open forest																											385.53
Melaleuca riparian forest	9.04	2.68	6.18	14.63	66.55	35.16	139.68	245.85	4.61																		138.85
Narrow-leaved Ironbark - White Cypress Pine shrubby open forest																											1653.21
River Red Gum riparian woodlands and forests																											20.19
Stringybark - Blakely's Red Gum grassy open forest																											770.30
Stringybark - Blakely's Red Gum shrubby open forest																											84.94
White Box - Blakely's Red Gum - Melaleuca riparian forest	19.74		10.23	4.49																	11.09				4.82		50.37
White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest			0.05	0.01	53.29	58.32																					488.28
White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest						0.75															369.43						409.52
Belah woodland																											11.15
Dwyer's Red Gum - Ironbark woodland			2.84	8.62																							226.19
Dwyer's Red Gum woodland																					176.73						180.32
Pilgla Box - Poplar Box - White Cypress Pine grassy open woodland				1.75	161.61	16.05																					234.87
Regrowth - White Cypress Pine																											10.70
Rough-barked Apple - Blakely's Red Gum riparian grassy woodland																											248.56
Silver-leaved Ironbark heathy woodland						42.47																					111.89
Weeping Myall grassy open woodland																											0.15
White Box - White Cypress Pine grassy woodland																											1435.11
White Box - stringybark shrubby woodland																											331.51
White Box - White Cypress Pine grassy woodland (low condition)	2.26		35.98	48.74	16.96																						521.10
White Box - Wilga - Belah woodland																											72.56
Yellow Box - Blakely's Red Gum grassy woodland					0.02																						104.01
Total Forest and Woodland	31.04	38.66	68.04	46.46	380.74	243.89	1713.19	2627.73	709.93	342.81	188.70	13.25	946.85	138.57													7489.86
Tea-tree shrubland in drainage lines																											69.61
Total Shrubland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.61	0.00	0.00	0.00	0.00	0.00	0.00													69.61
Derived Native Grassland (Box Gum Woodland)																											69.61
Derived Native Grassland (Non-threatened)																											2161.48
Total Derived Native Grassland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00													168.19
Derived Native Grassland (Low Diversity - Box Gum Woodland)																											639.60
Improved Pastures																											2329.67
Low Diversity Native/Exotic Grassland and Cultivation	692.05	139.19	170.77	224.18	1471.60	687.11	131.98	87.94	2.44	134.31	270.19	177.90	426.16	4474.68													231.73
Total Other Grassland	692.05	242.28	222.46	293.66	1472.03	761.98	131.98	87.94	2.44	134.31	270.19	177.90	426.16	4474.68													5346.01
Total Vegetation in each Property (ha)	723.09	280.94	290.50	340.12	1852.77	1005.87	2422.73	4285.77	712.37	499.24	458.89	191.15	1272.52	919.19													15235.15
Total Box Gum Woodland (remnant vegetation and derived native grassland) (ha)	22.00	35.98	59.02	21.46	152.58	149.46	2066.60	2983.61	11.09	16.49	151.10	0.00	382.26	113.11													6164.76
Total Vegetation to be protected in Conservation Management Zones (ha)	127.42	154.27	204.53	103.17	822.53	202.52	2277.55	3536.06	356.18	499.24	303.62	45.08	302.76	398.77													9333.70
Total Box Gum Woodland (remnant vegetation and derived native grassland) in Conservation Management Zones (ha)	21.65	35.95	57.84	17.19	98.29	64.46	2035.89	2335.79	5.54	16.49	151.04	0.00	82.04	109.40													5031.57
% Total Vegetation to be conserved from each property	17.62	54.91	70.41	30.33	44.39	20.13	94.01	82.89	50.00	100.00	66.16	23.58	23.79	43.38													61.26
% Total Box Gum Woodland (remnant vegetation and derived native grassland) to be conserved from each property (ha)	98.41	99.92	98.00	80.10	64.42	43.13	98.51	78.29	49.95	100.00	99.96	N/A	21.46	96.72													81.62

Table 2.2 Vegetation to be Conserved within the Eastern, Western, Northern and Shared Properties

Vegetation Communities	Eastern Properties					Northern Properties					Shared Property					Western Properties					SubTotal (ha)						
	Blue Range	Cattle Plain	Teston North	Trailee	Wallandilly	Warrindahool	Mt Lindesay	Wirradale	Shared Offset	Kelso	Louenville	Ollivadeen	Teston South	Velyama	Teston North	Trailee	Wallandilly	Warrindahool	Mt Lindesay	Wirradale		Shared Offset	Kelso	Louenville	Ollivadeen	Teston South	Velyama
Cliff and scree Thickets (Rainforest Species)																							0.53				0.53
Manna Gum - Yellow Box - Blakey's Red Gum open forest																											385.53
Melaleuca riparian forest	9.04	2.68	5.47	9.30	56.17	25.19		4.61																			112.46
Narrow-leaved Ironbark - White Cypress Pine shrubby open forest																											1268.63
River Red Gum riparian woodlands and forests																											20.19
Stringybark - Blakey's Red Gum shrubby open forest																											770.30
Stringybark - Blakey's Red Gum shrubby open forest																											84.94
White Box - Blakey's Red Gum - Melaleuca riparian forest	19.39		10.23	0.23																							35.39
White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest			0.05	0.00	10.54																						210.41
White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest																											214.72
Belah woodland																											6.94
Dwyer's Red Gum - Ironbark woodland			2.84	8.62																							96.01
Dwyer's Red Gum woodland																											88.37
Filliga Box - Poplar Box - White Cypress Pine grassy open woodland					112.25																						164.71
Regrowth - White Cypress Pine																											5.35
Rough-barked Apple - Blakey's Red Gum riparian grassy woodland																											225.13
Silver-leaved Ironbark heathy woodland																											34.71
White Box - stringybark grassy woodland																											1389.71
White Box - stringybark shrubby woodland																											331.51
White Box - White Cypress Pine grassy woodland	2.26	35.95	47.56	16.96	87.75	64.46																					459.96
White Box - White Cypress Pine grassy woodland (low condition)																											36.28
White Box - Wilga - Belah woodland																											68.94
Total Forest and Woodland	30.69	38.63	66.15	35.11	266.71	89.65																					6010.72
Tea-tree shrubland in drainage lines																											35.96
Total Shrubland	0.00	0.00	0.00	0.00	0.00	0.00																					35.96
Derived Native Grassland (Box Gum Woodland)																											1486.20
Derived Native Grassland (Non-threatened)																											131.61
Total Derived Native Grassland	0.00	0.00	0.00	0.00	0.00	0.00																					1617.81
Derived Native Grassland (Low Diversity - Box Gum Woodland)																											295.83
Improved Pastures			101.59	51.69	38.78																						198.77
Low Diversity Native/Exotic Grassland and Cultivation	96.73	14.05	86.69	29.28	555.82	112.87																					73.97
Total Other Grassland	96.73	115.64	138.38	68.06	555.82	112.87																					1299.41
Total Vegetation to be protected in Conservation Management Zones (ha)	127.42	154.27	204.53	103.17	822.53	202.52																					1669.21
Total Box Gum Woodland (remnant vegetation and derived native grassland) in Conservation Management Zones (ha)	21.65	35.95	57.84	17.19	98.29	64.46																					5031.57

Table 2.3 Summary of Vegetation Areas to be Conserved Against Areas to be Cleared from the Project Boundary

Vegetation Communities	Area to be cleared from Project Boundary (ha) [A]	Area to be conserved in Eastern/ Western/ Northern/ Shared Properties (ha) [B]	Ratio of Offset area to area to be cleared [B]:[A]
Red Gum/ironbark forests			
Dwyer's Red Gum woodland	0.05	88.37	1767.4
Dwyer's Red Gum - Ironbark woodland	123.56	96.01	0.8
Narrow-leaved Ironbark - White Cypress Pine shrubby open forest	594.83	1268.63	2.1
Silver-leaved Ironbark heathy woodland	334.52	34.71	0.1
RF elements			
Cliff and scree Thickets (Rainforest Species)	0	0.53	n/a
Riparian forests			
Melaleuca riparian forest	0	112.46	n/a
River Red Gum riparian woodlands and forests	1.57	20.19	12.9
Rough-barked Apple - Blakely's Red Gum riparian grassy woodland	0	225.13	n/a
White Box - Blakely's Red Gum - Melaleuca riparian forest	10.12	35.39	3.5
White Box, Yellow Box, Blakely's Red Gum woodlands			
Manna Gum - Yellow Box - Blakely's Red Gum open forest	0	385.53	n/a
Regrowth - White Cypress Pine	0	5.35	n/a

Table 2.3 Summary of Vegetation Areas to be Conserved Against Areas to be Cleared from the Project Boundary

Vegetation Communities	Area to be cleared from Project Boundary (ha) [A]	Area to be conserved in Eastern/ Western/ Northern/ Shared Properties (ha) [B]	Ratio of Offset area to area to be cleared [B]:[A]
Stringybark - Blakely's Red Gum grassy open forest	0	770.30	n/a
Stringybark - Blakely's Red Gum shrubby open forest	0	84.94	n/a
White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest	406.97	210.41	0.5
White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest	136.43	214.72	1.6
White Box - stringybark grassy woodland	0	1389.71	n/a
White Box - stringybark shrubby woodland	0	331.51	n/a
White Box - White Cypress Pine grassy woodland	0.8	459.96	575.0
White Box - White Cypress Pine grassy woodland (low condition)	0	36.28	n/a
Yellow Box - Blakely's Red Gum grassy woodland	8.64	0	0
Belah associations			
Belah woodland	4.21	6.94	1.6
Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland	11.69	164.71	14.1
White Box - Wilga - Belah woodland	31.46	68.94	2.2
Total Forest and Woodland	1664.85	6010.72	3.6
Tea-tree shrubland in drainage lines	0	35.96	n/a
Total Shrubland	0.00	35.96	n/a
Derived Native Grassland (Box Gum Woodland)	86.48	1486.20	17.2

Table 2.3 Summary of Vegetation Areas to be Conserved Against Areas to be Cleared from the Project Boundary

Vegetation Communities	Area to be cleared from Project Boundary (ha) [A]	Area to be conserved in Eastern/Western/Northern/ Shared Properties (ha) [B]	Ratio of Offset area to area to be cleared [B]:[A]
Derived Native Grassland (Non-threatened)	0	131.61	
Total Derived Native Grassland	86.48	1617.81	18.7
Derived Native Grassland (Low Diversity - Box Gum Woodland)	210.89	295.83	1.4
Low Diversity Native/Exotic Grassland, Cultivation and Improved Pastures	215.22	1373.38	6.4
Total Other Grassland	426.11	1669.21	3.9
Totals	2177.44	9333.70	4.3

n/a - will not be cleared from the Project Boundary

Table 2.4 Summary of Box Gum Woodland Communities to be Conserved Against Areas to be Cleared from the Project Boundary

Vegetation Communities	Area to be cleared from Project Boundary (ha) [A]	Area to be conserved in Eastern/ Western/ Northern/ Shared Properties (ha) [B]	Ratio of Offset area to area to be cleared [B]:[A]
Riparian forests			
Rough-barked Apple - Blakely's Red Gum riparian grassy woodland	0	225.13	n/a
White Box - Blakely's Red Gum - Melaleuca riparian forest	10.12	35.39	3.5
White Box, Yellow Box, Blakely's Red Gum woodlands			
Manna Gum - Yellow Box - Blakely's Red Gum open forest	0	385.53	n/a
Stringybark - Blakely's Red Gum grassy open forest	0	770.30	n/a
White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest	406.97	210.41	0.5
White Box - stringybark grassy woodland	0	1389.71	n/a
White Box - White Cypress Pine grassy woodland	0.8	459.96	575.0
Yellow Box - Blakely's Red Gum grassy woodland	8.64	0	0
Belah associations			
White Box - Wilga - Belah woodland	31.46	68.94	2.2
Total Forest and Woodland	457.99	3545.37	7.7
Derived Native Grassland (Box Gum Woodland)	86.48	1486.20	17.2

Table 2.4 Summary of Box Gum Woodland Communities to be Conserved Against Areas to be Cleared from the Project Boundary

Vegetation Communities	Area to be cleared from Project Boundary (ha) [A]	Area to be conserved in Eastern/Western/Northern/ Shared Properties (ha) [B]	Ratio of Offset area to area to be cleared [B]:[A]
Total Derived Native Grassland	86.48	1486.20	17.2
Totals	544.47	5031.57	9.2

n/a - will not be cleared from the Project Boundary

Table 2.5 Summary of EPBC Matters - Condition Areas of Box Gum Woodland and Habitat for Threatened EPBC Fauna to be Conserved in the Eastern, Western, Northern and Shared Properties

Property (describe each discrete property separately)	OFFSETS		Box Gum Woodland and Derived Grasslands provided (ha)				HABITAT for EPBC Matters of National Environmental Significance (Regent Honeyeater, Swift Parrot and Greater Long-eared Bat)		
	Size property (ha)	Location property (map coordinates)	Current tenure (+security of acquisition)	Proposed long-term protection mechanism (covenant, CA, National Parks etc)	Condition 'A' (not included in EPBC listing)	Condition 'B' (patches of >0.1 ha with more than 12 species)	Condition 'C' (patches of >2 ha with at least 20 mature trees per ha)	Good condition vegetation (ha)	Low or moderate condition vegetation to be re-vegetated (ha)
		LATITUDE LONGITUDE							
Blue Range	748	30°31'7.3 S 150°54'7.4 E	Private ownership	CA or other	0	0	21.7	0	127.4
Cattle Plain	284	30°30'57.6 S 150°7'38.1 E	Private ownership	CA or other	0	0	36.0	36.0	118.3
Teston (nth)	292	30°31'58.8 S 150°6'38.7 E	Agreement in Place	CA or other	0	0	57.8	0.1	204.5
Tralee	342	30°32'2.6 S 150°7'26.2 E	Agreement in Place	CA or other	0	0	17.2	0	103.2
Wallandilly	1890	30°30'47.9 S 150°9'56.4 E	Private ownership	CA or other	0	0	98.3	122.8	699.7
Warriahdool	1011	30°31'22.5 S 150°8'40.7 E	Agreement in Place	CA or other	0	0	64.5	64.5	138.1
Mt Lindesay	2430	30°19'42.1 S 150°16'57.1 E	Aston Coal Owned	NP, CA or other	0	577.3	1458.6	1456.7	821.2
Wirradale	4321	30°22'54.6 S 150°15'47.8 E	Under option	NP, CA or other	0	818.7	1517.1	1942.2	1593.7
Shared Property	884	30°38'44.7 S 150°11'12.7 E	Boggabri / Aston Coal Owned	CA or other	0	0	5.5	124.1	232.1
Kelso	508	30°36'26.1 S 150°3'36.3 E	Private ownership	CA or other	0	0	16.5	342.8	156.4
Louenville	459	30°34'53.3 S 150°4'59.8 E	Agreement in Place	CA or other	0	0	151.0	188.6	115.0
Olivedeen	193	30°35'24.4 S 150°3'9.4 E	Aston Coal Owned	CA or other	0	0	0	13.2	31.8
Teston (sth)	1273	30°34'5.7 S 150°7'0.1 E	Aston Coal Owned	CA or other	0	18.6	63.4	175.1	127.6
Velyama	919	30°36'9.5 S 150°5'5.9 E	Aston Coal Owned	CA or other	0	71.6	37.8	83.0	315.8
TOTAL	15554				0	1486.2	3545.4	4549.1	4784.8

Table 2.6 Condition Areas of Habitat for Threatened Species to be Conserved in the Eastern, Western, Northern and Shared Properties

OFFSETS	[a] HABITAT for Wide-foraging Bird Species (White-throated Needletail, Fork-tailed Swift, Square-tailed Kite, Spotted Harrier, Little Eagle)		[b] HABITAT for Forest and Woodland Species*		[c] Potential HABITAT for Koala		[d] Potential HABITAT for <i>Pultenaea setulosa</i>		[e] Potential HABITAT for <i>Pomaderris queenslandica</i>	
	Property (describe each discrete property separately)	Good condition vegetation (ha)	Low or moderate condition vegetation to be re-vegetated (ha)	Good condition vegetation (ha)	Low or moderate condition vegetation to be re-vegetated (ha)	Good condition vegetation (ha)	Low or moderate condition vegetation to be re-vegetated (ha)	Good condition vegetation (ha)	Low or moderate condition vegetation to be re-vegetated (ha)	
	Blue Range	30.69	96.7	0	127.4	0	30.7	0	0	28.4
	Cattle Plain	38.6	115.6	36.0	118.3	36.0	2.7	0	0.0	2.7
	Teston (nth)	66.1	138.4	0.1	204.5	0.1	63.3	0.1	2.8	15.7
	Tralee	35	68.1	0.0	103.2	0	26.5	0	8.6	9.5
	Wallandilly	266.7	555.8	122.8	699.7	122.8	143.9	10.5	0	56.2
	Warriahdool	89.7	112.9	64.5	138.1	64.5	25.2	0	0.0	25.2
	Mt Lindesay	2260.4	17.5	1456.7	821.2	686.4	1.9	0	0	226.1
	Wirradale	3495.9	40.1	1942.2	1593.7	1088.9	432.9	853.4	0	420.1
	Shared Property	355.0	1.3	124.1	232.1	0	41.8	35.8	183.6	189.2
	Kelso	342.8	156.4	342.8	156.4	72.4	0	286.9	0	0.0
	Louenville	188.6	115.0	188.6	115.0	151.0	0	188.1	0	34.5
	Oliveveen	13.2	31.8	13.2	31.8	13.2	0	0	0	8.3
	Teston (sth)	246.6	56.2	175.1	127.6	10.6	52.9	175.1	0	83.1
	Velvama	116.9	281.9	83.0	315.8	25.2	16.1	79.5	0	57.8
	TOTAL	7546.3	1787.7	4549.1	4784.8	2271.1	837.9	1629.4	195.1	1355.1

- * Grey-crowned Babbler
- Speckled Warbler
- Little Lorikeet
- Swift Parrot
- Turquoise Parrot
- Banking Owl
- Masked Owl
- Rainbow Bee-eater
- Brown Treecreeper
- Black-chinned Honeyeater
- Regent Honeyeater
- Painted Honeyeater
- Varied Sittella
- White-browed Woodswallow
- Satin Flycatcher
- Hooded Robin
- Diamond Firetail
- Yellow-bellied Shearwater
- Little Pied Bat
- Eastern False Pipistrelle
- Eastern Bentwing-bat
- Greater Long-eared Bat
- Eastern Cave Bat

Black-necked Stork:
 It is difficult to estimate the area of habitat for the Black-necked Stork. The Black-necked Stork has foraging habitat on those properties where there are farm dams and shallow creeks supporting open, still water. Properties in the Eastern and Western offsets with frontage to the Namoi River and Back Creek (such as Kelso, Oliveveen and Warriahdool), containing such water frontages and comprising floodplain areas of the Namoi River, are suitable foraging areas for the species. The draft BOMP makes provision for the rehabilitation of creekline areas and riparian habitat in offset areas, which is intended to protect and improve the foraging habitat of this species.

The habitat estimates that appear in the above table are based on the following assumptions about habitat:

- [a] These are wide-foraging species that forage over forest, woodland and grassland areas and are fairly adaptable to modified habitats. These species have been detected, or are likely to occur in the offset areas from time to time;
- [b] These are species that rely on forest and woodland areas. These species have been detected, or are likely to occur in the offset areas;
- [c] Koalas were not detected within the Project Boundary despite an intensive survey. In spite of this, Koalas are anecdotally known to occur in the Project Boundary but at very low densities. Grassy box woodlands and riparian forests are potential habitat for the Koala in the offset areas;
- [d] *Pultenaea setulosa* is known to occur in ironbark forests. Ironbark woodland and forests in the offset areas provide potential habitat for the species; and
- [e] *Pomaderris queenslandica* has potential habitat in forest and woodlands where there is a shrubby understory, as well as in creekline vegetation.

Quantitative Condition Assessment

Chapter 3 presents the methodology and results of a Quantitative Condition Assessment of the vegetation within the Project Disturbance Boundary and the Offset Properties.

This condition assessment is intended to address a main theme of comments within the CMA and EPA supplementary submission, which requested a quantitative vegetation condition assessment that compares the vegetation to a biometric benchmark. It is not a mandatory part of the DGR's or the Part 3A assessment. The analysis provides limited value in relation to the information previously presented in the Response to Submissions report, draft BOMP and the original Ecological Impact Assessment report for the EA.

3.1 Aims and Objectives

The objectives of this Vegetation Condition Assessment are:

- Rank vegetation communities into good, average and poor quality;
- Back-up this ranking with field data by:
 - Matching each vegetation community with the corresponding Namoi CMA Regional Vegetation Community (RVC);
 - Comparing of ten plot data categories with the Namoi CMA RVC Benchmark; and
- Amalgamate the ten plot data values into one site attribute score per plot by using the BioBanking scoring and weighting methodology for site attributes (DECC 2009); and
- Create maps and tables to allow data to be scrutinised to the source (i.e. field survey plot data), i.e. **Figures 3.1- 3.4** and **Tables 3.1- 3.8**.

Table 3.1 below summarises the site parameters that CMA has requested (in their supplementary submission) to be included in the quantitative condition assessment and what data was used to address these parameters.

Table 3.1 Site Parameters for Vegetation Condition Assessment

Item #	Site Parameter	Type of Data Used	Origin of Data	BioBanking Code ¹	Comment
1	Tallest stratum, its health and projected foliage cover	Canopy Health is a non-measurable entity - see comment	N/A		The health of the canopy stratum depends on its location in the landscape, its vegetation community, past land uses. It cannot be addressed in an overall statement.
	Tallest stratum, its health and projected foliage cover	Canopy projected foliage cover	BioBanking Plots	NOS	See item number 1 in Table 3.5
2	Mid stratum, its health and projected foliage cover	Mid stratum health is a non-measurable entity - see comment on canopy health	N/A		See comment on canopy health
	Mid stratum, its health and projected foliage cover	Mid stratum projected foliage cover	BioBanking Plots	NMS	See item number 2 in Table 3.5
3	Groundcover – grass cover, litter, bare ground, mosses and lichens	Groundcover projected foliage cover	BioBanking Plots	NGC	See item number 3 in Table 3.5
	Groundcover – grass cover, litter, bare ground, mosses and lichens	% Bare cover	Survey Plots / BioBanking Plots		See item number 3 in Table 3.5
	Groundcover – grass cover, litter, bare ground, mosses and lichens	% Litter cover	Survey Plots / BioBanking Plots		See item number 3 in Table 3.5
	Groundcover – grass cover, litter, bare ground, mosses and lichens	% Rock cover	Survey Plots / BioBanking Plots		See item number 3 in Table 3.5

Table 3.1 Site Parameters for Vegetation Condition Assessment

Item #	Site Parameter	Type of Data Used	Origin of Data	BioBanking Code ¹	Comment
4	Groundcover – grass cover, litter, bare ground, mosses and lichens	% Log cover	Survey Plots / BioBanking Plots		See item number 3 in Table 3.5
	Groundcover – grass cover, litter, bare ground, mosses and lichens	% Bark cover	Survey Plots / BioBanking Plots		See item number 3 in Table 3.5
	Groundcover – grass cover, litter, bare ground, mosses and lichens	% Moss cover	Survey Plots / BioBanking Plots		See item number 3 in Table 3.5
	Species richness – number of native species, maturity, size	Species maturity	N/A		Species maturity is generally not recorded, due to a time-vs.-usefulness inefficiency. See "number of stags" and "canopy regen" for maturity information on canopy stratum.
	Species richness – number of native species, maturity, size	Species size	N/A		Species size was not recorded. Canopy species size can be assumed to be within benchmarks for each vegetation community in average/good condition.
	Species richness – number of native species, maturity, size	Canopy species richness	BioBanking Plots		See item number 4 in Table 3.5
	Species richness – number of native species, maturity, size	Midstorey species richness	BioBanking Plots		See item number 4 in Table 3.5
	Species richness – number	Groundcover species richness	BioBanking	NPS	See item number 4 in Table 3.5

Table 3.1 Site Parameters for Vegetation Condition Assessment

Item #	Site Parameter	Type of Data Used	Origin of Data	BioBanking Code ¹	Comment
	of native species, maturity, size		Plots		
5	Regeneration	% of Native canopy species recruiting	BioBanking Plots	REG	See item number 5 in Table 3.5
	Regeneration	Regeneration (i.e., small tree, saplings, etc.)	Flora Survey Species List		See item number 5 in Table 3.5
6	Weeds and pest animal impacts	Exotic Plant Cover	BioBanking Plots	EPC	See item number 6 in Table 3.5
	Weeds and pest animal impacts	Weed species richness	Flora Survey Species List		See item number 6 in Table 3.5
	Weeds and pest animal impacts	Not collected for each plot – this information was recorded qualitatively from inspection.	N/A		
7	Past land uses	Not collected for each plot – this information was recorded qualitatively from inspection.	N/A		
8	Standing dead timber and fallen logs	Total length of fallen Logs (metres)	BioBanking Plots	FL	See item number 8 in Table 3.5
	Standing dead timber and fallen logs	Number of stags with hollows (20 x 50m)	Flora Survey		See item number 8 in Table 3.5
9	Numbers of hollows	Number of trees with hollows	BioBanking	TH	See item number 9 in Table 3.5

Table 3.1 Site Parameters for Vegetation Condition Assessment

Item #	Site Parameter	Type of Data Used	Origin of Data	BioBanking Code ¹	Comment
			Plots		
	Numbers of hollows	Number of stags with hollows (20 x 50m)	Flora Survey		See item number 9 in Table 3.5
10	Proximity to water, rocks, caves and overhangs	Not collected for each plot – this information was recorded qualitatively from inspection.			
¹ Codes:					
	NOS – Native Overstorey Cover				
	NMS – Native Midstorey Cover				
	NGC – Native Ground Cover				
	NPS – Native Plant Species Richness				
	REG – Regeneration of Overstorey Species				
	EPC – Exotic Plant Cover				
	FL – Fallen Logs				
	TH – Tree Hollows				

3.2 Methodology

Initially, the vegetation communities were ranked into poor, average and good by following these general rules:

- **Grasslands/Other = Poor/Average:** Grassland within the Project Boundary and Offsets is generally the result of disturbance (including clearing) of what was originally a forest or woodland. Therefore, grassland can never be in good condition. Grassland in average condition generally contains sparse paddock trees of the original vegetation community, high native species richness and low weed species richness. Heavily degraded grassland with a low number of native species, cultivated land and grassland where it was impossible to make any connection to the original vegetation community was classified as poor;
- **Forests and Woodland = Average/Good:** Following the same logic as above, any forest or woodland has to be in average or good condition, due to the canopy layer still present; and
- **Riparian Vegetation:** Based on the botanists' field survey notes the majority of riparian vegetation is in average condition.

The vegetation condition for each survey plot is assessed by using the BioBanking site attribute scoring and weighting methodology outlined in Table 3 on page 25 in the *BioBanking Operational Manual* (DECC 2009). The detailed values and calculations for the site assessment scores for each plot are in **Table 3.5**. An example of the original field data for each vegetation plot is shown in **Table 3.6**.

Below is a step-by-step description of how the final site attribute score is achieved for each vegetation plot (i.e. the coloured dots on **Figure 3.3** and **Figure 3.4**):

- 1) Match each vegetation community with the closest-matching Namoi CMA RVC.
- 2) Retrieve Namoi CMA benchmark data for each RVC where available.
- 3) Calculate site attribute scores for ten data elements for each vegetation plot according to the BioBanking methodology (DECC, 2009):
 - **Item 1:** Native canopy projected foliage cover at 10 points along a 50m transect compared with Namoi CMA RVC benchmark values;
 - **Item 2:** Native midstorey projected foliage cover at 10 points along a 50m transect compared with Namoi CMA RVC benchmark values;
 - **Item 3:** Native groundcover projected foliage cover at 10 points along a 50m transect compared with Namoi CMA RVC benchmark values;
 - **Item 4:** Native species richness: The number of native species recorded within each stratum in each plot is obtained from the species list,

accumulated and compared with the total of the three Namoi CMA RVC benchmark values for each stratum;

- **Item 5:** Regeneration: For some survey plots the percentage of regenerating canopy species was recorded. Where this data was not available, the species list was analysed for tree species that appeared in the midstorey and groundcover strata (see purple rows in **Table 3.6**);
 - **Item 6:** Weed cover: The number of weed species per plot is retrieved from the species list and assessed as a percentage of ground and midstorey species richness;
 - **Item 8:** Fallen Logs: Total length in metres of fallen logs over 10cm in diameter within a 20x50m plot; and
 - **Item 9:** Number of tree hollows. Number of trees with hollows where entrance width is over 5cm and hollow is at least 1m above ground.
- 4) To obtain the final site attribute score, each individual attribute score is multiplied by its weight, summarised and the final result divided by 300. The overall site attribute score is a fraction of 1, where 1 means that the vegetation is within benchmark in every aspect.
- 5) The ranking for the site attribute score for each vegetation plot on **Figure 3.3** and **Figure 3.4** is:
- Poor = 0 to 29%;
 - Average = 30% to 50%; and
 - Good = >50%.

As a summary, the vegetation condition of “poor”, “average” and “good” vegetation condition scores reflect how closely the plot data matches the Namoi CMA Benchmark values.

3.3 Assumptions and Limitations

The vegetation maps in the impact assessment (**Figure 3.1** and **Figure 3.2**) were based on many person-days in the field by senior botanists. The vegetation maps are compiled from a combination of data such as plot data, photographs, GPS points and notes taken during the survey, but also from a general impression and description of the vegetation communities seen through the eyes of an expert.

Over a hundred flora survey plots were undertaken. Nevertheless, due to the large size of the area, it was impossible to do a survey plot in every vegetation patch. The survey effort was specifically concentrated on areas where the vegetation type and condition was not obvious. Hence the vegetation of poor quality (i.e. no canopy or midstorey and cultivated,

pasture improved or heavily degraded) and vegetation of good quality (i.e. dense forest on hills unaffected by agriculture) have fewer data points than the woodlands and buffer areas.

Some of the field surveys were undertaken in 2008 and pre-date the BioBanking methodology. The plot data for those surveys does therefore not contain the same detail as the ones undertaken later. Although a full species list was produced, and cover estimates made for each species using the Braun-Blanquet scale, the scaling does not necessarily reflect percentage foliage cover. In order to achieve the overall site attribute score for each plot, the missing data was extrapolated from plot data from the nearest neighbouring plot within the same vegetation community.

The CMA RVC benchmark data was missing for four vegetation communities. Therefore, a total of fourteen vegetation plots could not be compared to the Namoi CMA benchmark and the corresponding BioBanking Benchmark data was used instead for the four vegetation communities:

- RVC 04 Wilga - Western Rosewood shrubland, Darling Riverine Plains and Brigalow Belt South (contains survey five plots);
- RVC 58 Shrubby woodlands or mallee woodlands on stoney soils, Brigalow Belt South and Nandewar (contains six survey plots);
- RVC 63 - Tea-tree shrubland in drainage lines, Nandewar and New England Tablelands (does not contain any plots and no other Benchmark data was used); and
- RVC 87 - Silver-leaved Ironbark - White Cypress Pine on alluvial sandy loam, Darling Riverine Plains (contains three survey plots).

It is to be noted that under the BioBanking methodology, the ranking of vegetation community conditions is different from the ranking applied in this assessment. The BioBanking ranking allows two conditions only, i.e. vegetation is in low condition or in moderate/good condition. This ranking affects the patch size in the calculation of landscape values and ecosystem credits. Additionally, the BioBanking vegetation community nomenclature differs from the Namoi CMA RVC names. The two vegetation condition ranking methodologies (i.e. under the BioBanking scheme and the ranking produced in this chapter) cannot readily be compared.

The BioBanking benchmarks provide a range for some of the data, i.e. a lower benchmark value and a higher benchmark value. The Namoi CMA RVC benchmark values are all just one number. Where a benchmark range was required to complete the condition assessment score, 80% of the RVC benchmark was assumed to be the lower benchmark value and 120% of the RVC benchmark was assumed to be the higher benchmark value. Where Namoi CMA RVC benchmarks are missing and the BioBanking benchmarks were applied, the mean between lower and upper benchmark was used.

Over the years of survey work for the Project, the required plot size changed due to the introduction of the BioBanking Scheme, which uses different plot sizes to that used for

assessing Box Gum Woodland (i.e. 20 x 50 metre plots versus 20 x 20 metre plots). To standardise data from differing plots sizes, particularly where survey plot sizes are different from the benchmark plot size, the following conversion factor was used:

- For canopy and midstorey strata: The species richness was assumed to be the same for a 20x20m plot and a 20x50m plot. No conversion factor was applied. It is possible that there is a small margin of error in the resulting data, but when a conversion factor was applied, the error margin was a lot bigger; and
- For groundcover species: A conversion factor of 0.8 was applied for data collected in a 20x20m plot, i.e. it is assumed that a 20x20m plot contains 80% of the species found within a 20x50m plot.

The BioBanking methodology requires the Exotic Plant Cover (EPC) to be calculated as percentage foliage cover (PFC) of total ground and midstorey cover. Due to the fact that a cover-abundance score was assigned for each weed species in the plot rather than a total PFC value recorded for all weeds generally across the plot, the EPC value was calculated by considering weed species richness as a percentage of ground and midstorey native species richness.

3.4 Results

Vegetation mapping of the impact area, Eastern and Western Offset Properties, Northern Offset Properties and Shared Offset Properties is provided in **Figure 3.1** and **Figure 3.2**. The results of the Vegetation Condition Assessments are shown in **Figure 3.3** and **Figure 3.4**. Examples of the data utilised in these assessments is provided in the following tables:

The following tables are presented below:

- **Table 3.2:** shows a typical example for vegetation condition assessment – Poor;
- **Table 3.3:** shows a typical example for vegetation condition assessment – Average;
- **Table 3.4:** shows a typical example for vegetation condition assessment – Good;
- **Table 3.5:** shows an extract of the Site Assessment Scores for each vegetation plot (Note, that the full table is too large to be shown in a document and can be obtained electronically upon request);
- **Table 3.6** below shows an extract of the survey plot data, including a full flora species list (Note, that the full table is too large to be shown in a document and can be obtained electronically upon request);
- **Table 3.7:** shows the size of areas being categorised into good, average and poor vegetation conditions for the impact area and all offset properties per property; and

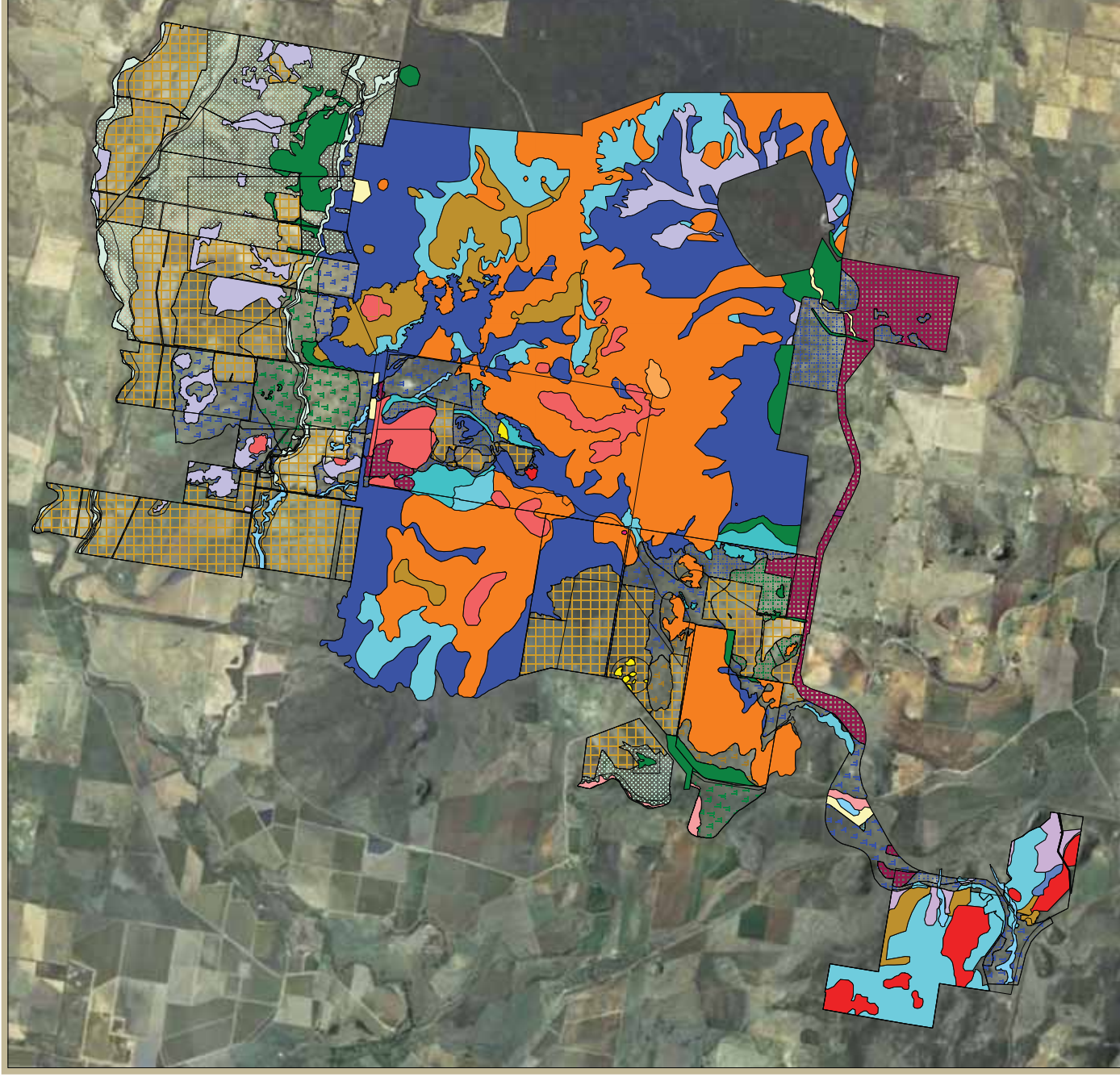
- **Table 3.8:** shows the size of areas being categorised into good, average and poor vegetation conditions for the impact area and all offset properties per vegetation type.

The results illustrate that the majority of the Project Boundary is in good condition at present, with smaller areas of vegetation that are in low and average condition.

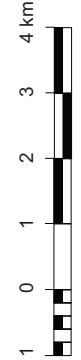
In most instances the BioBanking Site Assessment Score, i.e. the red, yellow and green dots on **Figure 3.3** and **Figure 3.4**, reflects and confirms the underlying vegetation condition mapping. The large patch of contiguous vegetation on **Figure 3.3**, which is mapped in good condition contains some plots with only an average BioBanking score. This is due to a low diversity in native groundcover and a low count of tree hollows.

A high proportion of the offset land is also in good condition, as shown in **Figure 3.3** and **Figure 3.4**. However, broad areas of the offsets are in average and to a lesser extent low, condition. What this means is that the offset areas will be able to be improved significantly in value as land use shifts from grazing to predominantly conservation, as explained in the draft BOMP.

In the medium to long term, with conservation management the current condition of the vegetation of the offsets will shift from a mixture of low, average and good condition, to predominantly good condition. An estimated 51% of the offset lands will be able to increase native vegetation cover and condition. This is consistent with the draft Recovery Plan for Box Gum Woodland, and also with the objectives of the Namoi Catchment Action Plan, which aim to increase the area of vegetation through active and assisted natural regeneration.



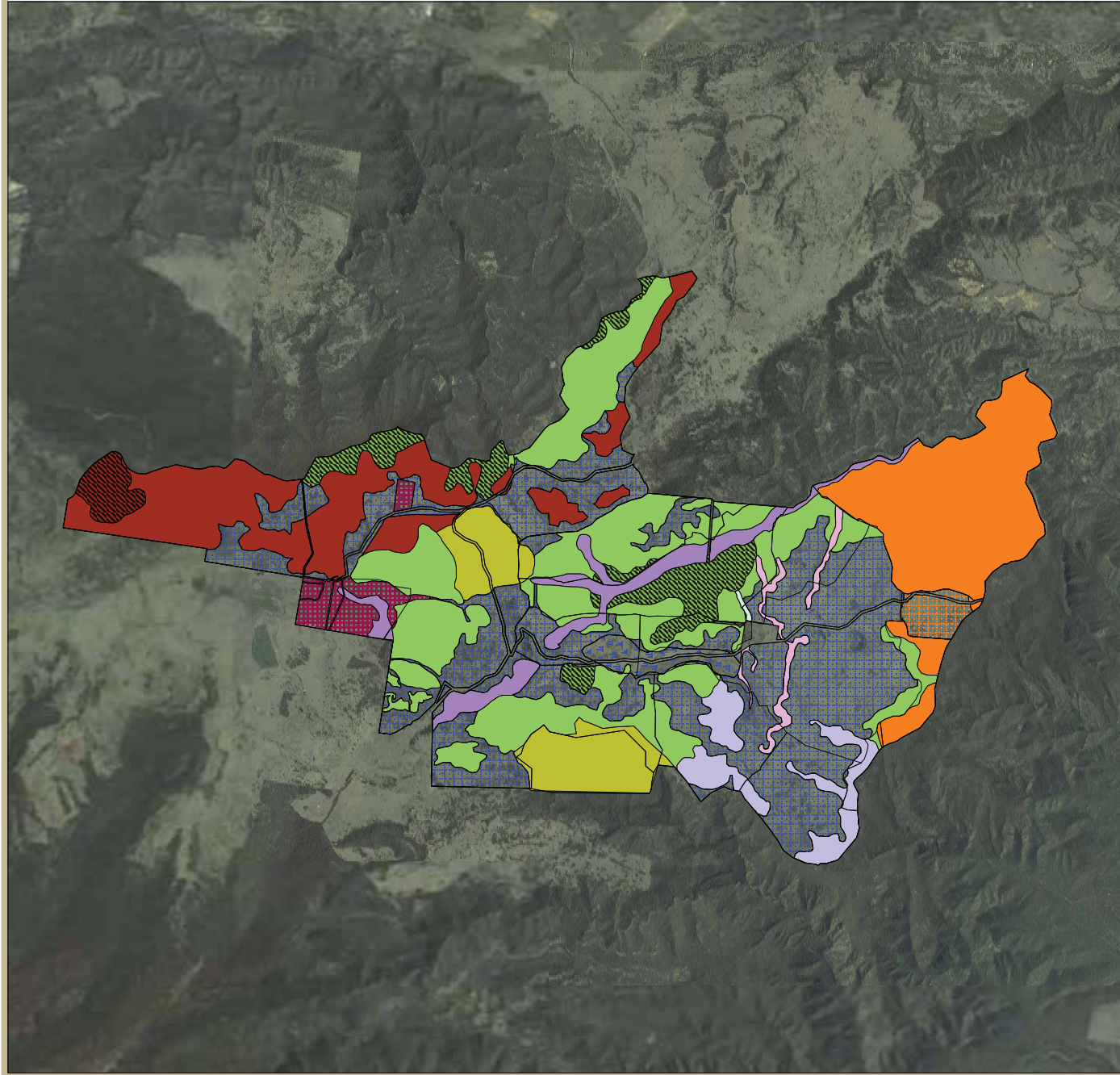
- Legend**
- Forest**
 - Cliff and scree Thickets (Rainforest Species)
 - Manna Gum - Yellow Box - Blakely's Red Gum open forest
 - Melaleuca riparian forest
 - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest
 - Narrow-leaved Ironbark - Brown Bloodwood - White Cypress Pine shrubby open forest
 - River Red Gum riparian woodlands and forests
 - Stringybark - Blakely's Red Gum grassy open forest
 - Stringybark - Blakely's Red Gum shrubby open forest
 - White Box - Blakely's Red Gum - Melaleuca riparian forest
 - White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest
 - White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest
 - Woodland**
 - Belah woodland
 - Dwyer's Red Gum - Ironbark woodland
 - Dwyer's Red Gum woodland
 - Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland
 - Silver-leaved Ironbark heathy woodland
 - Regrowth - White Cypress Pine
 - Rough-barked Apple - Blakely's Red Gum riparian grassy woodland
 - Weeping Myall grassy open woodland
 - White Box - stringybark shrubby woodland
 - White Box - stringybark grassy woodland
 - White Box - White Cypress Pine grassy woodland (low condition)
 - White Box - White Cypress Pine grassy woodland
 - White Box - Wilga - Belah woodland
 - Yellow Box - Blakely's Red Gum grassy woodland
 - Shrubland**
 - Tea-tree shrubland in drainage lines
 - Other**
 - Derived Native Grassland (Box Gum Woodland)
 - Derived Native Grassland (Low Diversity - Box Gum Woodland)
 - Derived Native Grassland (Non-Threatened)
 - Plains Grassland
 - Low Diversity Native/Exotic Grassland and Cultivation
 - Improved Pastures
 - Property Boundaries**
 - Offset Boundary



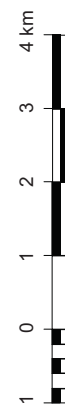
* Note: Vegetation Communities are listed for the Project Area and all Offset Areas

Figure 3.1 Vegetation communities within the Project Boundary, Eastern and Western Offset Properties and Shared Offset Properties



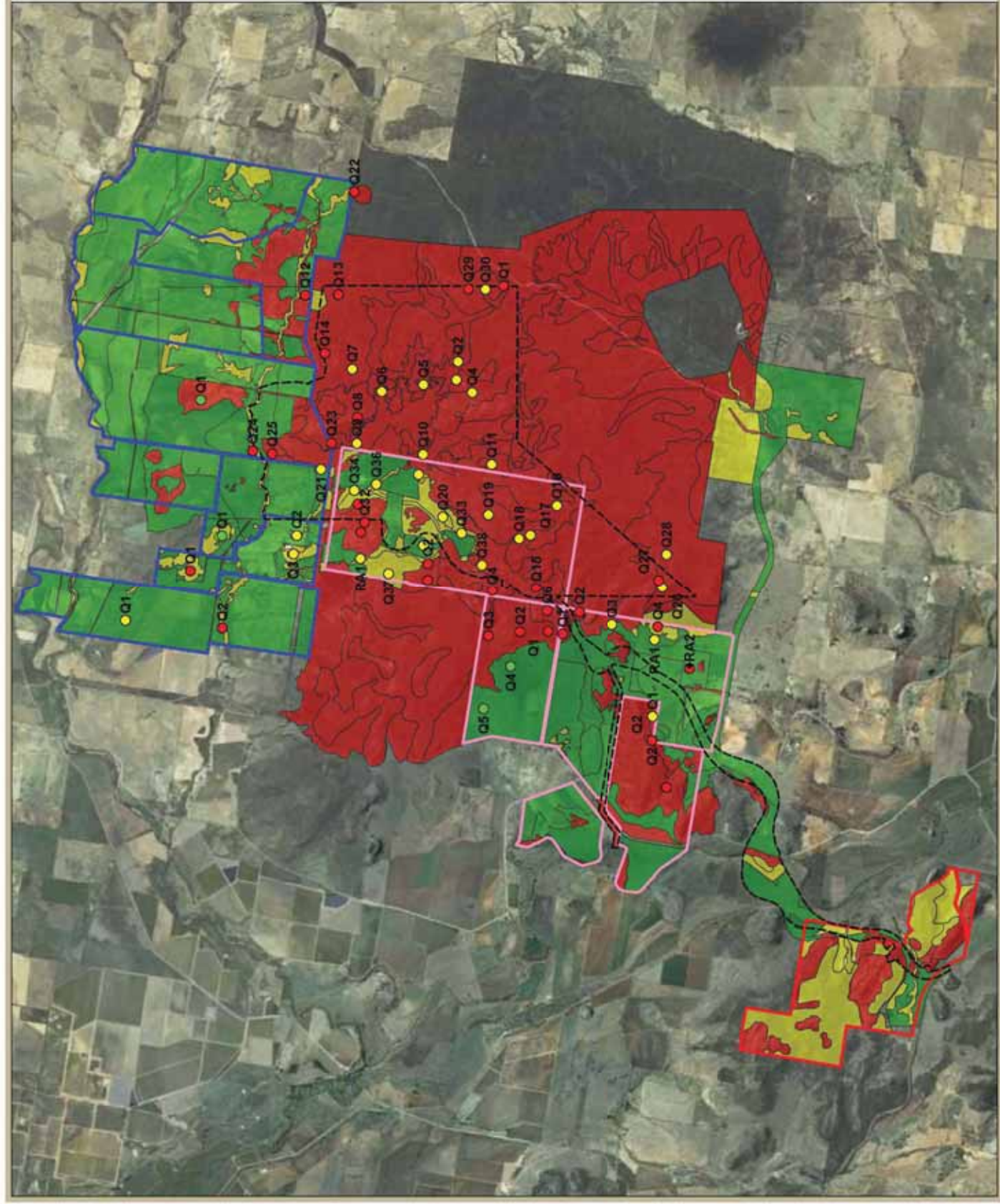


- Legend**
- Forest**
- Cliff and scree Thickets (Rainforest Species)
 - Manna Gum - Yellow Box - Blakely's Red Gum open forest
 - Melaleuca riparian forest
 - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest
 - Narrow-leaved Ironbark - Brown Bloodwood - White Cypress Pine shrubby open forest
 - River Red Gum riparian woodlands and forests
 - Stringybark - Blakely's Red Gum grassy open forest
 - Stringybark - Blakely's Red Gum shrubby open forest
 - White Box - Blakely's Red Gum - Melaleuca riparian forest
 - White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest
 - White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest
- Woodland**
- Belah woodland
 - Dwyer's Red Gum - Ironbark woodland
 - Dwyer's Red Gum woodland
 - Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland
 - Silver-leaved Ironbark heathy woodland
 - Regrowth - White Cypress Pine
 - Rough-barked Apple - Blakely's Red Gum riparian grassy woodland
 - Weeping Myall grassy open woodland
 - White Box - stringybark shrubby woodland
 - White Box - stringybark grassy woodland
 - White Box - White Cypress Pine grassy woodland (low condition)
 - White Box - White Cypress Pine grassy woodland
 - White Box - Wilga - Belah woodland
 - Yellow Box - Blakely's Red Gum grassy woodland
- Shrubland**
- Tea-tree shrubland in drainage lines
- Other**
- Derived Native Grassland (Box Gum Woodland)
 - Derived Native Grassland (Low Diversity - Box Gum Woodland)
 - Derived Native Grassland (Non-threatened)
 - Plains Grassland
 - Low Diversity Native/Exotic Grassland and Cultivation
 - Improved Pastures
- Property Boundaries**
- Offset Boundary



* Note: Vegetation Communities are listed for the Impact Area and all Offset Areas

Figure 3.2 Vegetation communities within the Northern Offset Properties



Legend
Vegetation Condition Assessment

- Average
- Good
- Poor

Biometric Vegetation Plot Assessment

Site Assessment Score

- Good (>50 Percent)
- Average (30 to 50 Percent)
- Poor (0 to 29 Percent)

- Project Boundary
- Northern Offset Boundary (see Figure 3.4)
- Northern Offset Boundary (see Figure 3.4)
- Eastern Offset Boundary
- Western Offset Boundary
- Shared Offset Boundary



Figure 3.3 Vegetation Condition Assessment of the Project Boundary, Eastern and Western Offset Properties and Shared Offset Properties





Legend
Vegetation Condition Assessment

- Average
- Good
- Poor

Biometric Vegetation Plot Assessment
Site Assessment Score

- Good (>50 Percent)
- Average (30 - 50 Percent)
- Poor (0 to 29 Percent)

- Northern Offset Boundary

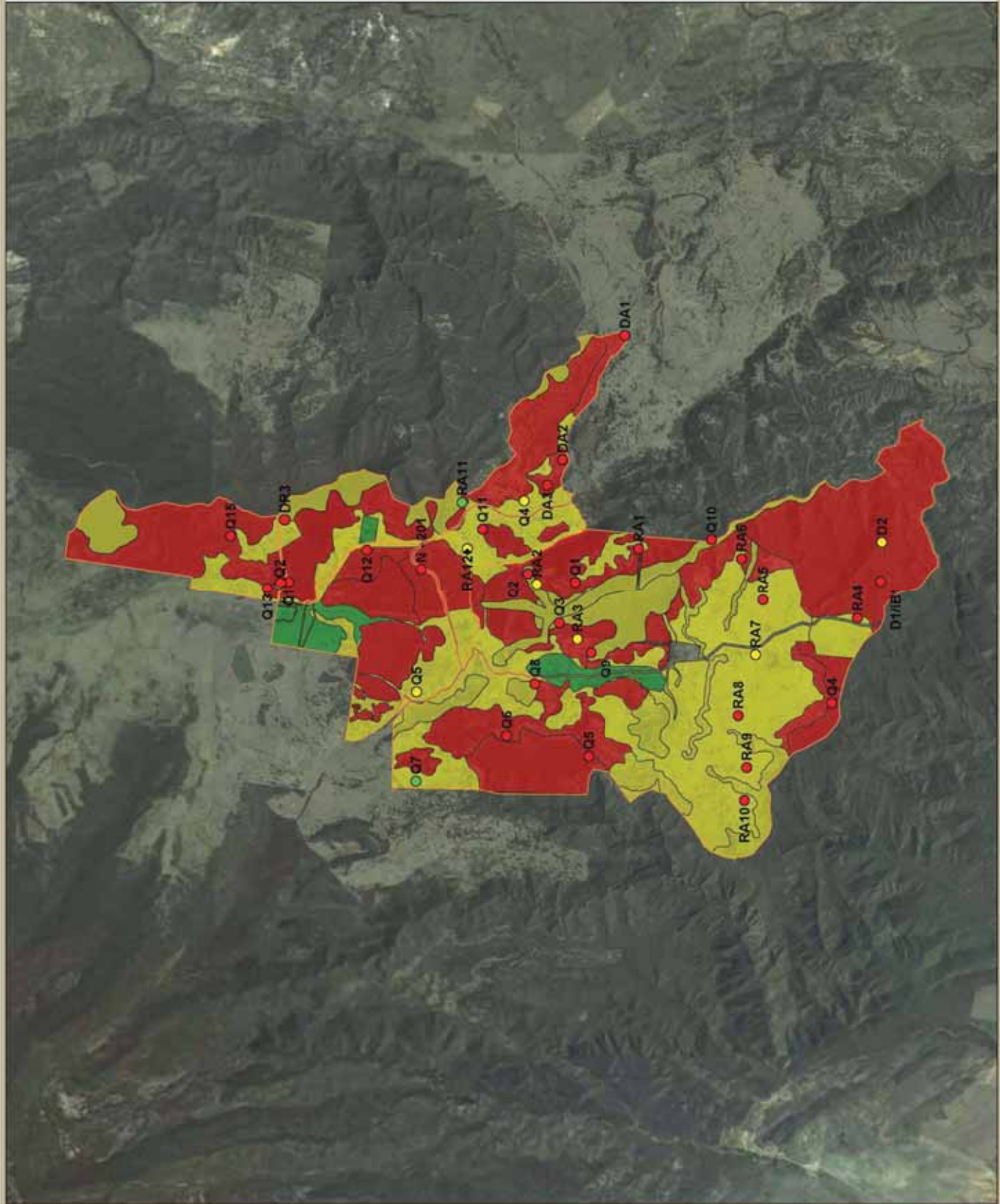


Figure 3.4 Vegetation Condition Assessment of the Northern Offset Properties

Table 3.2 Typical example for Vegetation Condition Assessment - Poor

Item	Location	Louenville	Louenville	Warriahdool
	Plot Size (20x50m or 20x20m)	20	20	20
	RVC Number	18	18	18
	Easting	220545	219655	225868
	Northing	6613245	6613774	6619738
	Data Category	Q4	Q5	Q1
1	Native over-storey cover (NOS)			
	Data Description			
	% Foliage Cover (i.e. 0 to 100)	0	25	8
	NOS Benchmark Values for this RVC	20	20	20
	Site Attribute Score NOS **	0	2	1
	Weighting NOS **	10	10	10
	Final NOS Score	0	20	10
2	Native mid-storey cover (NMS)			
	% Foliage Cover (i.e. 0 to 100)	0	1	0
	NMS Benchmark Values for this RVC	20	20	20
	Site Attribute Score NMS **	0	0	0
	Weighting NMS **	10	10	10
	Final NMS Score	0	0	0
3	Native groundcover (NGC)			
	% Foliage Cover (i.e. 0 to 100)	25	55	60
	NGC Benchmark Values for this RVC	20	20	20
	Site Attribute Score NGC **	2	0	0
	Weighting NGC **	7.5	7.5	7.5
	Final NGC Score	15	0	0

Table 3.2 Typical example for Vegetation Condition Assessment - Poor

Item	Location	Louenville	Louenville	Warriahdool	
4	Species richness - number of native species (NPS)	0	9	19	
	Benchmark Value (all strata) NPS	39	39	39	
	Site Attribute Score NPS **	1	1	1	
	Weighting NPS **	25.0	25.0	25.0	
5	Final NPS Score	25.0	25.0	25.0	
	Native species richness (canopy recruitment)	0	0	0	
	Native species richness (canopy)	0	1	3	
	% of Canopy species recruiting	0	0	0	
	Site Attribute Score REG **	0	0	2	
	Weighting REG **	12.5	12.5	12.5	
	Final REG Score	0.0	0.0	25.0	
	Weed species richness / plot	9	19	13	
	Total number of species in mid-/ground-cover	9	27	29	
	% of Total Ground/Mid-storey species	100.00	70.37	44.83	
6	Site Attribute Score EPC **	0	0	1	
	Weighting EPC**	5.0	5.0	5.0	
	Final EPC Score	0.0	0.0	5.0	
	Total length in metres	0	0	0	
	FL Benchmark Values for this RVC	6	6	6	
	Site Attribute Score FL **	0	0	0	
	8	Species richness - number of native species (NPS)	0	9	19
		Benchmark Value (all strata) NPS	39	39	39
		Site Attribute Score NPS **	1	1	1
		Weighting NPS **	25.0	25.0	25.0
Final NPS Score		25.0	25.0	25.0	
Native species richness (canopy recruitment)		0	0	0	
Native species richness (canopy)		0	1	3	
% of Canopy species recruiting		0	0	0	
Site Attribute Score REG **		0	0	2	
Weighting REG **		12.5	12.5	12.5	
Final REG Score	0.0	0.0	25.0		
Weed species richness / plot	9	19	13		
Total number of species in mid-/ground-cover	9	27	29		
% of Total Ground/Mid-storey species	100.00	70.37	44.83		
Site Attribute Score EPC **	0	0	1		
Weighting EPC**	5.0	5.0	5.0		
Final EPC Score	0.0	0.0	5.0		
Total length in metres	0	0	0		
FL Benchmark Values for this RVC	6	6	6		
Site Attribute Score FL **	0	0	0		

Table 3.2 Typical example for Vegetation Condition Assessment - Poor

Item	Location	Louenville	Louenville	Warriahdool
9	Number of trees with hollows (TH)			
	Weighting FL **	10	10	10
	Final FL Score	0	0	0
	Count of trees with hollows	0	1	1
	TH Benchmark Values for this RVC	6	6	6
	Site Attribute Score TH**	0	1	1
	Weighting TH**	20	20	20
	Final TH Score	0	20	20
	Total BioBanking Site Attribute Score	0.13	0.22	0.28

Codes:

NOS – Native Overstorey Cover

NMS – Native Midstorey Cover

NGC – Native Ground Cover

NPS – Native Plant Species Richness

REG – Regeneration of Overstorey Species

EPC – Exotic Plant Cover

FL – Fallen Logs

TH – Tree Hollows

Table 3.3 Typical example for Vegetation Condition Assessment - Average

Item	Location	Teston			
		Mine Site	North		
	Plot Size (20x50m or 20x20m)	50	50	50	50
	RVC Number	4	18	18	18
	Easting	223283	222757	236344	236344
	Northing	6614334	6617766	6640133	6640133
	Data Category	Q33	Q3	Q5	Q5
1	Native over-storey cover (NOS)	10	10	40	40
	% Foliage Cover (i.e. 0 to 100)	15	20	20	20
	NOS Benchmark Values for this RVC	2	1	1	1
	Site Attribute Score NOS **	10	10	10	10
	Weighting NOS **	20	10	10	10
	Final NOS Score	45	6	10	10
2	Native mid-storey cover (NMS)	2	20	20	20
	% Foliage Cover (i.e. 0 to 100)	0	1	1	1
	NMS Benchmark Values for this RVC	10	10	10	10
	Site Attribute Score NMS **	0	10	10	10
	Weighting NMS **	0	10	10	10
	Final NMS Score	65	95	80	80
3	Native groundcover (NGC)	29	20	20	20
	% Foliage Cover (i.e. 0 to 100)	0	0	0	0
	NGC Benchmark Values for this RVC	0	0	0	0
	Site Attribute Score NGC **	7.5	7.5	7.5	7.5
	Weighting NGC **				

Table 3.3 Typical example for Vegetation Condition Assessment - Average

Item	Location	Teston			
		Mine Site	North	Mt Lindsay	
4	Species richness - number of native species (NPS)	Final NGC Score	0	0	0
		Count of native species within plot NPS	11.2	37.6	30.8
		Benchmark Value (all strata) NPS	20.0	39.0	39
		Site Attribute Score NPS **	2	2	2
		Weighting NPS **	25	25	25
		Final NPS Score	50.00	50.00	50
		Native species richness (canopy recruitment)	0.0	0.0	
		Native species richness (canopy)	2.0	5.0	1
		% of Canopy species recruiting	0	0	100
		Site Attribute Score REG **	0	0	3
5	Regeneration (% of canopy species recruiting)	Weighting REG **	12.5	12.5	12.5
		Final REG Score	0	0	37.5
		Weed species richness / plot	7	13	6
		Total number of species in mid-/ground-cover	17	51	42
		% of Total Ground/Mid-storey species	41.18	25.49	14.29
		Site Attribute Score EPC **	1.00	2.00	2
		Weighting EPC **	5	5	5
		Final EPC Score	5	10	10
		Total length of fallen logs (FL)	23	85	24
		6	Exotic Plant Cover (EPC)		

Table 3.3 Typical example for Vegetation Condition Assessment - Average

Item	Location	Teston	
		Mine Site	North
9	Number of trees with hollows (TH)		
	FL Benchmark Values for this RVC	15	6
	Site Attribute Score FL **	3	3
	Weighting FL **	10	10
	Final FL Score	30	30
	Count of trees with hollows	2	0
	TH Benchmark Values for this RVC	1	6
	Site Attribute Score TH**	0	1
	Weighting TH**	20	20
	Final TH Score	0	0
	Total BioBanking Site Attribute Score	0.35	0.43
			0.49

Codes:

NOS – Native Overstorey Cover

NMS – Native Midstorey Cover

NGC – Native Ground Cover

NPS – Native Plant Species Richness

REG – Regeneration of Overstorey Species

EPC – Exotic Plant Cover

FL – Fallen Logs

TH – Tree Hollows

Table 3.4 Typical example for Vegetation Condition Assessment - Good

Item	Location	Wirradale	Blue Range	Louenville
	Plot Size (20x50m or 20x20m)	50	50	50
	RVC Number	59	20	18
	Easting	236358	221160	221157
	Northing	6632286	6619159	6613721
	Data Category	Q4	Q2	Q3
1	Native over-storey cover (NOS)			
	Data Description			
	% Foliage Cover (i.e. 0 to 100)	20	25	30
	NOS Benchmark Values for this RVC	25	30	20
	Site Attribute Score NOS **	2	3	2
	Weighting NOS **	10	10	10
	Final NOS Score	20	30	20
2	Native mid-storey cover (NMS)			
	% Foliage Cover (i.e. 0 to 100)	17	25	15
	NMS Benchmark Values for this RVC	25	30	20
	Site Attribute Score NMS **	2	3	2
	Weighting NMS**	10	10	10
	Final NMS Score	20	30	20
3	Native groundcover (NGC)			
	% Foliage Cover (i.e. 0 to 100)	15	50	10
	NGC Benchmark Values for this RVC	25	30	20
	Site Attribute Score NGC **	2	1	1
	Weighting NGC **	7.5	7.5	7.5
	Final NGC Score	15.0	7.5	7.5

Table 3.4 Typical example for Vegetation Condition Assessment - Good

Item	Location	Wirradale	Blue Range	Louenville
4	Species richness - number of native species (NPS)	41.4	33.2	44.2
	Count of native species within plot NPS	33	25	39
	Benchmark Value (all strata) NPS	3	3	3
	Site Attribute Score NPS **	25	25	25
	Weighting NPS **	75	75	75
5	Final NPS Score	0.00	0.00	0.00
	Native species richness (canopy recruitment)	3	5	4
	Native species richness (canopy)	0	0	50
	% of Canopy species recruiting	0	0	2
	Site Attribute Score REG **	12.5	12.5	12.5
	Weighting REG **	0	0	25
	Final REG Score	4	15	9
	Weed species richness / plot	50	49	56
	Total number of species in mid-/ground-cover	8	30.6	16.1
	% of Total Ground/Mid-storey species	2	2	2
6	Site Attribute Score EPC **	5.00	5.00	5.00
	Weighting EPC**	10	10	10
	Final EPC Score	65	72	119
	Total length of fallen logs (FL)	2	4	6
	FL Benchmark Values for this RVC	3	3	3
8	Site Attribute Score FL **			
	Site Attribute Score FL **			

Table 3.4 Typical example for Vegetation Condition Assessment - Good

Item	Location	Wirradale	Blue Range	Louenville
9	Number of trees with hollows (TH)	Weighting FL **	10	10
		Final FL Score	30	30
		Count of trees with hollows	7	15
		TH Benchmark Values for this RVC	2	4
		Site Attribute Score TH**	3	3
		Weighting TH**	20	20
		Final TH Score	60	60
		Total BioBanking Site Attribute Score	0.77	0.81
				0.83

Codes:

NOS – Native Overstorey Cover

NMS – Native Midstorey Cover

NGC – Native Ground Cover

NPS – Native Plant Species Richness

REG – Regeneration of Overstorey Species

EPC – Exotic Plant Cover

FL – Fallen Logs

TH – Tree Hollows

Table 3.7: Vegetation Condition Area Calculations (in hectares) for Impact Area and Offsets by Offset Area and Property

	Project Boundary	Eastern Offsets	Western Offsets	Northern Offsets	Shared Offset	Totals for All Offsets
Vegetation Condition	Direct Impacts	Total	Total	Total		
Good	1610	223	803	3399	124	4549
Average	141	304	105	2357	231	2997
Poor	426	1088	641	58	1	1788
Grand Total	2177	1614	1549	5814	356	9334

Details	Northern Offsets		Northern Offsets Total
	Mt Lindesay	Wirradale	
Good	1457	1942	3399
Average	804	1554	2357
Poor	18	40	58
Grand Total	2278	3536	5814

Details	Western Offsets				Western Offsets Total
	Kelso	Louenville	Olivedeen	Teston South	
Good	343	189	13	175	83
Average				71	34
Poor	156	115	32	56	282
Grand Total	499	304	45	303	1549

Details	Eastern Offsets						Eastern Offsets Total
	Blue Range	Cattle Plain	Teston North	Tralee	Wallandilly	Warriahdool	
Good		36	0	0	123	64	223
Average	31	3	66	35	144	25	304
Poor	97	116	138	68	556	113	1088
Grand Total	127	154	205	103	823	203	1614

3.5 Conclusion

The results of the Quantitative Condition Assessment are consistent with what was written in the EA and the previous Response to Submissions. That is, they show that the offsets are substantial in size and that they have significant potential to be improved by active management, as is proposed within the draft BOMP. Broad areas of partially cleared woodland and derived native grassland will, through conservation management, be gradually improved in condition to provide large good quality areas of woodland habitat in the offsets.

The area of forest and woodland proposed to be cleared is currently in good condition relative to CMA benchmarks. The Box Gum Woodlands and Ironbark Forests, and other related vegetation generally have moderate to high species diversity relative to benchmarks and they form part of a large block of habitat. Some areas of moderate and low habitat condition will also be cleared, but these constitute a lesser proportion of the vegetation within the impact area.

The quality of the areas of forest, woodland and grassland within the proposed offsets is variable, with some good, average and poor condition vegetation. Such a range of habitat was selected in the offsets specifically because it can provide some good quality habitat of immediate value to native flora and fauna, but also provide extensive recovery opportunities within areas of moderate and low condition vegetation through active conservation management.

There is an estimated 51% of habitat that can be regenerated to a higher condition state within the offsets and the intent to improve this vegetation is consistent with current guidelines for BBAM, the draft National Recovery Plan for Box Gum Woodland and Derived Native Grassland, and the objectives of the Namoi Catchment Action Plan, which all aim to increase the area of vegetation through active and assisted natural regeneration. The Box Gum Woodland is critically endangered because so much has been cleared in the past as it is essentially where "wheat and sheep" farming have occurred in the past. In order to recover such woodland, it is essential to recover land from old farmlands. This is anticipated within the draft National Recovery Plan and essentially, no other alternatives are available as the vast majority of remaining Box Gum Woodland and derived native grassland is within farmland.

Further detail about the contributions of vegetation communities within the offsets are provided in Chapter 2 and Chapter 4.

Response to State and Private Stakeholder Issues

This Chapter provides detailed responses to the submissions received from State and private stakeholders. The various issues raised in the supplementary submissions have been consolidated and grouped according to common underlying themes and addressed under each subheading below.

4.1 Inadequate Assessment of Indirect and Cumulative Impacts

EPA Comment:

In our previous submission (11 October 2011) OEHL recommended that the proponent be required to detail the methodology by which the extent of indirect impacts was calculated. No additional information has been provided regarding this recommendation. However Table 7 of the submissions report seems to confirm that the area to be indirectly impacted as simply been taken to be the residual vegetation within the Project Boundary, outside of the direct impact footprint. This is not a suitable methodology for estimating indirect impacts. The indirect impacts of the project may extend beyond the Project Boundary.

Response: Table 7 of the Submissions Report did imply that remaining forest and woodland vegetation within the Project Boundary could be subject to indirect impacts upon flora and fauna. The indirect impacts included those discussed within the Ecological Impact Assessment, including dust, noise, lighting, weeds, feral animals, fragmentation, etc. (No respondent criticised the list of indirect impacts discussed in the Ecological Assessment as being too narrow).

It is acknowledged that indirect impacts can potentially be significant for a variety of threatened species and for endangered ecological communities (Box Gum Woodland and Derived Native Grassland). It is also agreed that such impacts cannot be mapped or accurately calculated in advance. No attempt has been made to do this in the Ecological Assessment or the previous Response to Submissions report.

It is also agreed that potentially, the impacts of the proposed mining project could be felt indirectly outside the Project Boundary for some mobile species. For example, the threatened Square-tailed Kite forages widely and has large territories that may include the Project Boundary but would not be confined to it. Similarly, so do owls, such as the Masked Owl and Barking Owl – both of which have been detected within the Project Boundary during

surveys for the Ecological Assessment. Clearance of vegetation within the Project Boundary may potentially impact species with territories further afield.

The Project could potentially sever wildlife corridors if left unmitigated, un-remediated and without offsets. So, there would be potential to negatively impact fauna moving across the landscape to and from Leard State Forest. Such species that use corridors would include threatened woodland birds and bats listed in the Ecological Assessment, such as the Speckled Warbler and Yellow-bellied Sheathtail Bat.

The proposed offsets, mitigation measure and remediation of the mine site are all designed to counter potential indirect impacts. There will also be a monitoring program to monitor indirect impacts as mining and remediation progress and so address undesirable or unforeseen impacts as they arise. This was proposed in the EA and reiterated in the previous Response to Submissions. Such measures are typically used now for mining projects and are standard practice within the industry.

When mitigation and offsetting are considered, it was concluded that indirect impacts can be managed during mining. After cessation of mining, the combined areas of offsets and rehabilitated wooded areas are predicted to provide a greater area of habitat than currently occurs in the locality.

EPA Comment:

In our previous submission (11 October 2011) OEH recommended that the proponent be required to clarify the extent of impacts considered within the Assessment of Significance and cumulative impact assessment. The proponent states that indirect impacts have been considered within the AoS, although no reasoning is provided as to why these assessments contain references to the hectare figures for direct impact only. The proponent does not clarify whether consideration of the cumulative impacts of mining proposals has included consideration of indirect impacts.

We remain concerned that the current EA is not a whole of life proposal with substantial additional mining interest stated to be within the lease area and other future new mines and expansions proposed by other parties. No cumulative impact of mining assessment can be done properly without the full extent of mining being clearly articulated.

Response: As stated above, the EA has considered all direct and indirect impacts of the current mining proposal, as have the Assessments of Significance within the Ecological Assessment (Appendix I of the EA).

Assessments of Significance are threshold tests of significance that are specifically used for determining the significance of impacts for a proposal to ascertain the need for a Species Impact Statement. They are defined and provided by Part 5a of the EP&A Act.

Species Impacts Statements are a requirement of the TSC Act and are not generally required for projects being assessed under part 3A of the EP&A Act. Moreover, Assessments of Significance are not designed to be used as part of a part 3A assessment.

Cumberland Ecology prepared Assessments of Significance for each threatened species and endangered ecological community that has potential to be impacted by the Project to provide a broad indication of whether, considering amelioration and offsetting, any threatened flora and fauna would still be negatively impacted in the long term. The conclusions reached were that no species would remain significantly impacted in the long term provided the proposed level of offsetting, mitigation and remediation is implemented.

The Assessments of Significance contain reference to the areas of habitat that are proposed to be directly cleared. Indirect impacts have been considered and are assumed to have potential to occur by the authors. However, as explained above, indirect impacts cannot be mapped and measured. During the past 9 years, Cumberland Ecology has prepared numerous Assessments of Significance for various projects and such assessments generally entail consideration of potential indirect impacts. However, indirect impacts are assessed qualitatively and are generally not mapped or measured.

It is acknowledged that there is potential for other mining to take place within the Project Boundary in the longer term. However, such mining is not part of the current proposal and not required to be assessed under the current DGRs. Should any further proposals for mining be formulated in future, they will have to be assessed on merit based upon the legislative requirements of the time. Any future mining proposals will need additional offsetting, safeguards and mitigation measures separate to and beyond the current proposal.

4.2 Impacts on Vegetation Communities

4.2.1 Loss of Belah Woodland

CMA Comment:

In Namoi CMA's comments on the review of the EA in Section 7.6.3 we expressed concern that 100% of the Belah community (4.21ha) will be removed. Namoi CMA is partially satisfied with the details in the draft Biodiversity Offset Management Plan (Dec 11) where 6.99ha of existing Belah Woodland on "Velyama" will be improved and protected. This is not ideal as there is insufficient gain. Namoi CMA would accept an expansion of the area to at least 11.2ha to enable regeneration and improved management which would eventually result in the offset for the loss.

Response: The area of approximately 7 ha of Belah community marked within the Western Offsets is the area of existing community. The offset proposal will include a revegetation area around the existing patch that will increase the future extent of this community from 7 ha to at least 12 ha within the offset properties.

4.2.2 Net Loss of Vegetation Communities

CMA Comment:

In Namoi CMA's comments on the review of the EA in Section 7.6.3 we expressed concern that the impacts of clearing resulting from this project have not been adequately assessed against regional vegetation communities. Section 4.4.10 in the 'Response to Submissions' provides some descriptive clarification of the regional impacts of clearing, mentioning staging of the clearing and that substantial mitigation and compensatory measures will be implemented. Section 4.4.40 and Table 8 in the 'Response to Submissions' provides some comparison of the area of various vegetation communities to be cleared within the disturbance boundary to the current extent of that vegetation community within the Namoi Catchment. However, Table 8 does not examine the area of particular vegetation communities that are already at critical thresholds as a result of historic clearing.

The White Box – Blakely's Red Gum – Melaleuca riparian forest and the Yellow Box - Blakely's Red Gum grassy woodland vegetation communities have been 83% cleared in the past within the Namoi Catchment. Even though only 18.76ha of these vegetation communities will be cleared as a result of the mining development, the clearing still reduces the extent of an already highly stressed vegetation community. It is realised that the 18.76ha will be offset by 29.69ha of White Box – Blakely's Red Gum – Melaleuca riparian forest in the Northern Offset area, however, as this 29.69ha already currently exists there is a significant net loss of this vegetation community.

Furthermore, the White Box – Narrow leaved Ironbark – White Cypress Pine grassy open forest, the White Box - White Cypress Pine grassy open forest and the White Box – Wilga – Belah Woodland vegetation communities have been 73% cleared in the past. It is proposed to clear 439.23ha of these vegetation communities as a result of the mining development. It is realised that the clearing will be offset by 657.74ha of these vegetation communities in the Offset areas however; as most of this 657.74ha already currently exists there is a significant net loss of these vegetation communities.

Similar logic also applies to the Belah woodland, of which 73% has been cleared in the past. Even though only 4.21ha of this vegetation community will be cleared and this clearing will be offset by 6.99ha it still represents a net loss for this vegetation community.

Namoi CMA does not support any net loss of vegetation communities especially those that are above critical ecological thresholds. Namoi CMA has identified a number of critical threshold targets in the Namoi Catchment Action Plan 2010-2020. The main Terrestrial Biodiversity Catchment Targets are:

Biodiv 1: *By 2020 there is an increase in native vegetation extent and vegetation does not decrease to less than 70% in less cleared sub-catchments and 30% in over cleared sub catchments and no further Regional Vegetation Community decreases to less than 30% extent as identified by 2010 baseline.*

Biodiv 2: *By 2020 maintain sustainable populations of a range of native fauna species by ensuring that no further Regional Vegetation Community decreases to less than 30% extent as identified by 2010 baseline.*

Namoi CMA recommends that the proponent undertake a specific revegetation program within the offset properties of these vegetation communities to ensure that there is no net loss of these vegetation communities in the catchment.

Response: As described above, Belah communities within the offsets will be expanded to the area recommended by the CMA.

With regard to the other communities, the White Box – Narrow leaved Ironbark – White Cypress Pine grassy open forest, the White Box - White Cypress Pine grassy open forest and the White Box – Wilga – Belah Woodland the clearing will be offset by 657.74ha of these vegetation communities in the Offset areas. However; contrary to what is stated by the CMA, not all of the 657.74ha already currently exists in good condition (see results of condition assessment, Chapter 3). The offsets will be protected and enhanced by active management and the overall condition state improved.

Additionally, the mine area itself will be rehabilitated using species from these and other vegetation types with the intention of restoring similar forest and woodland on the mined area in the long term. Thus, with the proposed offsetting and rehabilitation combined there will be no net loss of these communities within the Namoi CMA.

4.3 Identification of TSC Act Listed Box Gum Woodland and Derived Native Grassland

EPA Comment:

In our previous submission (11 October 2011) OEH recommended that the proponent be required to clarify the methodology used to determine the presence of the TSC Act listed Box-Gum Woodland EEC. The proponent has not clarified this methodology. The EA defines 'Derived Native Grassland', which the proponent considers to be EEC, and 'Low Diversity' derived native grassland (White Box Woodland), which it appears the proponent does not consider to be EEC. This terminology is also used within the BOMP.

It still appears that the assessment of which grassland constitutes the EEC was based on the Commonwealth guidelines. 'Low diversity' derived native grassland which does not meet the Commonwealth criteria for the EPBC Act listing may still meet the TSC Act definition. The proponent has not provided any indication whether they have reassessed their conclusions regarding the EEC and derived native grassland considering the identification guidelines for the TSC Act listed community.

Response: Cumberland Ecology has re-evaluated the low diversity grasslands and checked that they do not meet TSC Act definition of Box Gum Woodland. This section provides the rationale for retaining this opinion. Further discussion of the issue is made in **Appendix A** of this report.

The TSC Act Final Determination of the Box Gum Woodland EEC does not provide a definitive description of what constitutes Box Gum Woodland Derived Native Grassland. In contrast, the EPBC Act guidelines for the identification of such grasslands, where the key criteria include the occurrence of at least 12 native herbaceous plants to be present within 1,000 m² sample that is dominated by native grasses. No such criteria or specific cut-off is provided by the TSC Act. However, guidelines exist to assist in the identification of Box Gum Woodland and indirectly, the identification of Box Gum Woodland Derived Native Grassland. These include qualitative descriptors that refer to the *natural regenerative ability* (assisted or unassisted) of degraded areas of the community.

Around Leard State Forest, extensive grasslands occur and most have been subject to periodic cropping for wheat and other crops for many years. In these areas, trees and shrubs are essentially absent, and to a large extent the diversity of native ground cover is low to absent. The composition of such areas varies depending upon the crop cycle and the intensity of use of the area for cropping in the past. Areas currently under crops are totally dominated by crop plants and exotic weeds.

In some of the crop fields that have been left to go fallow for a number of years, a cover of native and exotic herbaceous plants have been observed. A typical composition mix of some of these fallow fields are grasslands that are dominated by a few hardy native grasses (especially at sites where annual crops were sown) and a scattering of native herbs that appear to occur within a few years of cessation of cropping. Over this period, as natural regeneration takes place, the composition of such paddocks is likely to change from being crop and exotic-dominated to including a few native herb species and more hardy, grazing-tolerant native grasses such as *Austrostipa falcata*, *Austrodanthonia* spp. (Wallaby Grass) and *Bothriochloa macra* (Red-leg Grass). However, left fallow for many years, they would be *unlikely to naturally regenerate to native woodland*. Cumberland Ecology coined the term “low diversity native grasslands” to cover such fallow areas within the vegetation mapping.

The term '*Low Diversity' derived native grassland (White Box Woodland)* refers to the “low diversity native grasslands” that have been derived from Box Gum Woodland. This is a grassland unit that recognises where Box Gum woodland historically occurred, as evidenced by the position in the landscape and the occurrence of widely scattered trees (or sometimes only tree stumps). Such areas lack tree cover, shrub cover and have only a few native herbs and grasses. As discussed above, if left to go fallow for many years, they would be *unlikely to naturally regenerate to Box Gum Woodland* and would most likely require more active regeneration management, such as intensive planting of trees and shrubs, and major weeding.

For the purposes of making this response to the Supplementary Submission by the EPA, Cumberland Ecology has re-examined field data including photographs, quadrat data and incidental field notes. We conclude that the area in question neither conforms to the EPBC Act description for Derived Native Grassland, nor the more open ended TSC Act definition.

Notwithstanding such conclusions, low diversity native grasslands will still be actively restored as part of the management of the offsets. Restoration of such land would provide additional habitat for wildlife such as threatened woodland birds in the medium to long term.

It is possible that with active management, areas of 'Low Diversity' derived native grassland (*White Box Woodland*) could be restored to a less diverse woodland form of Box Gum Woodland. However, it must be stressed that tree and shrub cover would be unlikely to occur in these areas without active planting.

Photographs 4.1-4.4 show examples of the community from the Project.



Photograph 4.1 Cultivated paddock at Louenville property in the East-West Offsets. If left fallow for a few years the paddock is likely to regenerate to low diversity native grassland like that shown in Photograph 4.3.



Photograph 4.2 Fallow crop paddock at Teston South fringed by woodland in the background. Note the lack of habitat features and the abundance of small rocks that have been brought to the surface as a result of ongoing ploughing and crop rotation.



Photograph 4.3 Low diversity derived native grassland that has regenerated as a consequence of leaving the field fallow for a number of years and removing grazing pressures. Note the adjacent cultivated paddock and compare both to the extensive woodland on the other side of the fenceline (background) where agriculture did not take place to the same extent.



Photograph 4.4 Derived native grassland (EEC) with regenerating eucalypt canopy trees and shrub layer in the Northern Offsets. The native regeneration, unploughable rocky outcrops and woody ground debris indicate that the paddock is not suitable for agriculture (cropping). As such, the grassland community has not been modified to the extent of those portrayed in previous photographs and supports a high diversity of native groundcover species.

EPA Comment:

The BOMP also includes an increased number of vegetation communities which the consultant has identified as the Box Gum Woodland EEC. For instance within the EA the consultant considers 'White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest' on the project site to not conform to the EEC, however on the offset sites 'White Box - Narrow-leaved Ironbark - White Cypress Pine grassy and shrubby open forests' combined are considered by the consultant to meet the EEC definition. The data provided within the BOMP is not sufficient for the EPA to be able to confirm this, or the other vegetation community conclusions. Additional data has been requested from Cumberland Ecology to assist the EPA in this assessment.

Response: The draft BOMP distinguishes between the grassy and shrubby forms of the forest and woodland communities (Table 2.1 and 2.2 of the draft BOMP). We can confirm that only the grassy forms are considered to be Box Gum Woodland. Any woodland with shrub cover exceeding 30% has not been included in the calculations for offsetting of Box Gum Woodland impacts. **Table 2.4** in Chapter 2 of this response report does not include shrubby woodlands in calculations of Box Gum Woodland offsets.

4.4 Maules Creek Biodiversity Offset Strategy

EPA Comment:

The EPA 'Principles for Biodiversity Offsets in NSW' have not yet been met and there remain significant deficiencies in the offset design and supporting information. Overall the proponent has not provided sufficient information to support their claim that the proposal will maintain or improve biodiversity values.

Response: The Biodiversity Offset Strategy has been designed to comply with both the Commonwealth and State principles for biodiversity offset strategies. As shown in **Table 4.1** below, the offset strategy clearly complies with the principles of offsetting espoused by the EPA/OEH. Section 6.9 of the Ecological Impact Assessment prepared for the EA contained a similar table outlining how the principles for offsetting used by the EPA have been met. The table below has been updated using information from the draft BOMP and from the various additional assessments mentioned elsewhere in this report. Section 6.9 of the Ecological Impact Assessment stated:

“The offset package has been designed to comply with State and Commonwealth principles for offsetting (DEWR, 2007, DECC (NSW), 2008a). The Northern, Western and Eastern Offsets will all provide targeted, permanent conservation lands that will be progressively regenerated over time to increase the quality of flora and fauna habitats within them. Tables 6.7 and 6.8 explain how the offset package is compliant with current State and Commonwealth offsetting principles.”

Chapter 3 of this report has now provided substantial detail in the form of a quantitative condition assessment of vegetation within the offsets and impact areas. As explained within the conclusion to Chapter 3, the offsets will be managed to provide a significant net increase in the condition state of vegetation. In the long term this will result in a larger area of native vegetation of better quality than now occurs in the locality, in the Eastern and Western Offsets, the Northern Offsets and the Shared Offset.

Table 4.1 Compliance of the Offset Package with OEH Principles

OEH Principles		How the current offset package complies:
1	Impacts must be avoided first by using prevention and mitigation measures.	Avoidance and mitigation measures have been incorporated into the Project prior to offsetting and are detailed within Chapter 5 of the Ecological Impact Assessment. The Project has been designed to avoid flora and fauna habitats as much as practicable. In particular, the Project infrastructure and mine emplacements have been located in areas cleared of Box Gum Woodland.
2	All regulatory requirements must be met.	All regulatory requirements, both State and Commonwealth, will be met by the Project.

Table 4.1 Compliance of the Offset Package with OEH Principles

OEH Principles	How the current offset package complies:
<p>3 Offsets must never reward ongoing poor performance.</p>	<p>The Project is a new mining project and as such there is no operational data to demonstrate ongoing poor performance. The offsets will be managed according to the Biodiversity Offset Management Plan which has Performance Indicators that will require to be met in order to ensure that the Project attains a high environmental standard.</p>
<p>4 Offsets will complement other government programs</p>	<p>The proposed offsets complement other government programs - particularly the draft Recovery Plan for Box Gum Woodland and other similar threatened species Recovery Plans (e.g. for Spotted-tailed Quoll). The proposed offsetting will increase the area of Box Gum Woodland and other native forests under conservation tenure in the Region and will provide increased quality of habitat in the long term.</p> <p>In addition, the proposed offsets contribute to various conservation areas in the locality by providing vegetated linkages and buffers between the Project area and these conservation areas. The Northern Offsets provide links to Mount Kaputar National Park and are connected to Horton Falls National Park through private properties. The Eastern and Western Offsets connect to Leard State Conservation Area. The Eastern and Western Offsets are also intended to augment Boggabri Coal's proposed offsets.</p>
<p>5 Offsets must be underpinned by sound ecological principles.</p>	<p>The proposed offsets are underpinned by sound ecological principles. Firstly, they are designed to be "like for like" and will provide increased areas of Box Gum Woodland and other forest types in conservation tenure. Given the conservation status of Box Gum Woodland, high priority was given to providing a package of offsets that provided substantial areas of this community.</p> <p>Secondly, the offsets are located between a National Park and other areas of forest on Crown land. They will add to the size and viability of the Mount Kaputar National Park. Additionally, they are intended to form a link between the Project area and existing high quality forest and woodland</p>

Table 4.1 Compliance of the Offset Package with OEH Principles

OEH Principles	How the current offset package complies:
	<p>areas through existing vegetation and revegetation areas within the offset areas.</p> <p>Thirdly, the offsets provide habitat for a wide variety of plants and animals, including the threatened species of animals known to occur in the area of impact – particularly threatened birds and bats. All of the threatened species that are known to occur in the Leard State Forest also occur within the proposed offset areas. However, in addition, the proposed offsets have potential to support other species not previously recorded in Leard State Forest such as the Regent Honeyeater and Spotted-tailed Quoll.</p> <p>Finally, a draft Biodiversity Offset Management Plan (draft BOMP) has been developed for the Project to provide a plan for the rehabilitation and conservation management of the offsets. As the draft BOMP is implemented it is intended that forest, woodland and derived native grassland within the offsets will be maintained and improved, including increased areas of Box Gum Woodland and other affiliated threatened species habitat so that native vegetation within the offsets becomes self sustaining with minimal impacts from feral animals and weeds.</p>
<p>6 Offsets should aim to result in a net improvement in biodiversity over time.</p>	<p>The proposed offsets contain areas of both intact vegetation and derived grasslands with a high potential for regeneration.</p> <p>To provide offsets areas equivalent in biodiversity value to the Project Boundary, some areas of intact vegetation have been incorporated into the Biodiversity Offset Strategy. The vegetation within the intact offset areas are currently in reasonably good condition but are not managed for conservation and there is scope for improvement. The total impact area, which is largely but not entirely good condition native vegetation is 2177 ha in area. The offsets total 9334 ha, of which 49% or 4573 ha are estimated to be in good condition. The ratio of good condition offset land to the project impact (all vegetation condition classes combined) is 2.1: 1. Thus there is more than twice the area of good</p>

Table 4.1 Compliance of the Offset Package with OEH Principles

OEH Principles	How the current offset package complies:
	<p>condition in the offset lands. When low and moderate condition vegetation are included the ratio is 4.3:1.</p> <p>The proposed offsets also contain broad areas of derived native grassland with high potential for regeneration. These areas will be managed sustainably through implementation of the draft BOMP and weeds and feral animals will be controlled, as will grazing by livestock. Hence the landscape will be managed to facilitate an increase in forest and woodland as these vegetation types are regenerated.</p> <p>Inclusion of land which can be improved through management will assist in providing a net gain of habitat and other biodiversity values within the region. The quantum of offsets is provided within Chapter 2 of the draft BOMP.</p> <p>The proposed offsets will also improve connections between conservation areas in the locality by building corridors.</p>
<p>7 Offsets must be enduring and they must offset the impact of the development for the period that the impact occurs.</p>	<p>As stated in the draft BOMP the offsets will be conserved in the long term and protected by a Conservation Agreement to ensure that the conservation measures are permanent. Should some areas of the proposed offsets not be acceptable for inclusion within a Conservation Agreement, they will be protected by another appropriate mechanism such as a covenant.</p>
<p>8 Offsets should be agreed prior to the impact occurring.</p>	<p>The offsets have been proposed "up front" and will be made available prior to the impact occurring. Rehabilitation and management of the native flora and fauna within the offsets will commence at the beginning of the Project, prior to any mining.</p>
<p>9 Offsets must be quantifiable and the impacts and benefits must be reliably estimated.</p>	<p>Substantial information regarding the composition of the offsets including quantitative condition assessments is provided within Chapter 3 of the draft BOMP. Such information has guided the development of the offsets and</p>

Table 4.1 Compliance of the Offset Package with OEH Principles

OEH Principles	How the current offset package complies:
	<p>assisted in quantifying the benefits derived from the provision and management of such offsets.</p> <p>The total offset package will result in a net gain in woodland and open forest under conservation tenure and will likewise result in an increase in threatened species habitat. The areas of existing derived native grassland will be regenerated to woodland and this will provide a measureable increase in woodland and open forest habitat for threatened species.</p>
<p>10 Offsets must be targeted.</p>	<p>The Biodiversity Offset Strategy entails acquisition of offset properties for permanent conservation of native flora and fauna, including threatened flora and fauna predicted to be impacted by the Project.</p> <p>Each of the offsets have been selected for inclusion within the offsets package as they provide a variety of biodiversity values that contribute to offsetting the loss of biodiversity values within the disturbance area. Offsets have been specifically targeted to provide Box Gum Woodland and Derived Native Grassland, and other habitats such as Ironbark Forest. The offsets have also been targeted to provide habitat for all threatened species – particularly birds and bats - that are known to occur in Leard State Forest.</p>
<p>11 Offsets must be located appropriately.</p>	<p>The offsets proposed are located appropriately beside such Leard State Conservation Area and Mount Kaputar National Park and adjacent to forested Crown Land. They will form a continuous forest and woodland habitat between the National Park and the Crown Land.</p> <p>The Northern Offsets link to adjacent forest lands, including Mount Kaputar National Park and private properties to the east, which are in turn connected to Horton Falls National Park. The Northern Offset properties contain three permanent streams; Maules Creek, Horton River and Second Water Creek; and many smaller tributaries. They also contain cliffs and rock outcrops that provide excellent habitat for wildlife, including bats.</p>

Table 4.1 Compliance of the Offset Package with OEH Principles

OEH Principles	How the current offset package complies:
12 Offsets must be supplementary.	<p>The Eastern and Western Offsets link to Leard State Forest and Leard State Conservation Area. Portions of the offsets contain stretches of Back Creek, Maules Creek and the Namoi River.</p> <p>The Eastern and Western Offset properties are also intended to augment Boggabri Coal’s biodiversity offsets to add to the conservation network around the mining developments in the Leard State Forest.</p> <p>Offsets are supplementary to the avoidance and mitigation measures that have or will be deployed at the mine site. The mine site will be rehabilitated to forest and woodland in the long term and so the original area of forest and woodland will be recreated for flora and fauna. The offsets will be supplementary to these measures and will add sizeable areas of forest and woodland to conservation tenure in the longer term.</p>
13 Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.	<p>The proposed offsets will be readily enforceable through Project Approval conditions and will be auditable to ensure that required actions have been carried out.</p>

EPA Comment:

In our previous submission, we recommended that the proponent be required to prepare a detailed offset strategy which incorporates consideration of the likely indirect impacts of the proposal. No additional information has been provided.

Response: The Biodiversity Offset Strategy has been prepared with a view to addressing indirect impacts of the proposal. In particular, it addresses the existing and anticipated fragmentation of forest and woodland habitats. The proposed offsetting will provide for a much better connectivity around Leard State Forest than currently occurs. This will furnish new habitat connections to the habitats along the Namoi River and eastwards to the southern tip of the Nandewar Ranges.

The offsetting will progressively be linked to the rehabilitated and revegetated mined areas. As such revegetation takes place, it will address indirect impacts of the type discussed in the EA, including noise, dust, light, weeds, feral animals, etc. It will address it by replacing disturbed habitats with new habitats dominated by native vegetation.

Noise will extend into the Eastern and Western offset areas from the proposed development. However, as stated in the impact assessment of the EA noise is not anticipated to have a significant detrimental impact upon fauna. Moreover, post mining, noise impacts will cease. Offsets are intended to be permanent.

Cumberland Ecology has previously provided maps in the EA that show how the proposed offsets will link to rehabilitation and to offsets that are proposed by Boggabri Coal. The figure in the EA that shows this also illustrates how the offsets will link to Leard State Conservation Area. All such measures will definitely address the various forms of indirect impact that are discussed in the EA.

EPA Comment:

In our previous submission, we recommended that the proponent be required to prepare a detailed offset strategy which considers the conservation value of all vegetation types to be impacted. Only the EEC and threatened species habitat have been considered. No other conservation status categories have been discussed.

Response: This has now been addressed in detail within the information provided in Chapter 3. All vegetation communities, regardless of status are addressed.

The offset strategy, when combined with the rehabilitation strategy, will provide for a net increase in the quantum and condition of the major vegetation types impacted by the Project. As discussed in Chapter 4, all vegetation types within the Project Boundary are present in the offset lands. The community that is not represented in its exact form is a type of Yellow Box grassy woodland. Other forms of Yellow Box grassy woodland that are very similar are found in the offset areas (see Chapter 3 for further details).

4.4.1 Location and Design of the Offset Strategy

EPA Comment:

Some areas of land identified as contributing to the offset are located within the exploration lease boundary (Figure A.1), which the BOMP also states will not form part of the offset due to future mining interests. These should be omitted from the map. These areas should also be omitted from the hectare estimates in Table 2.2 if the consultant has not already done so.

Response: These figures are not included within the proposed offsets as stated in Chapter 2 of the draft BOMP:

“Some of the Eastern Offset properties lie partly within the Maules Creek exploration lease (A346). It is acknowledged that where these areas fall on land

that has been identified to comprise coal resources (the Maules Creek JORC Coal Reserves Pit Shell) they may potentially be considered for mining in the future. These areas have been excluded from the offset.”

The areas in the Eastern Offset Properties that have been excluded from the offset are those areas that fall over the JORC reserves. It does not refer to the total area of land that falls within the exploration lease boundary.

The areas to be retained as conservation management areas within the Eastern Offset properties will be secured under an appropriate mechanism. It is our understanding that the security agreement will preclude these management areas from any future development, despite some overlap with the exploration lease boundary (A346).

EPA Comment:

The majority of the Eastern offsets, and some of the Western offsets remain poorly designed with a high edge to area ratio and we question the likely success of the linkages proposed in these locations.

Response: Our responses to the above comment are as follows below.

High edge to area ratio

The conservation management areas within the Eastern and Western properties (which were developed to encompass the majority of the existing remnant woodland and forest) are of a reasonably large patch size and will support reasonably large interior habitat areas in the medium to long term when subject to ongoing conservation management. The management areas range from 8 hectares (only one management area) to over 600 hectares (the latter of which is located on an Eastern property). Minimum viable patches sizes recommended for pastoral landscapes involve 5 hectare patches in native pasture matrices and 10 hectares for more intensively farmed pastures (McIntyre *et al.* 2002). These recommended minimum patch sizes are particularly relevant to birds, which are in turn, highly relevant to the Project. The conservation management areas proposed for the Eastern and Western properties are consistent with these recommendations.

Furthermore, the conservation areas that are likely referred to by EPA as having high edge to area ratios are the linear corridors designed to encompass as much of the available creekline frontage along Back Creek and Maules Creek as possible. These conservation management areas are expectedly of a linear nature and will carry an inherent level of edge effects that are proposed to be mitigated actively through the management process (e.g. weeding, fencing, stock exclusion, replanting). Despite their appearance on a map, the creekline management areas will also be sizable in width (from 100 to over 500 metres) and will provide valuable habitat along creeklines.

Other conservation areas that appear to be small do abut or are situated close to existing areas of forest (i.e. buffer management areas that neighbour the non-Project areas of Leard State Forest and the Leard State Conservation Area) and can only improve interior habitat for fauna and flora.

Success of linkages

The proposed conservation management areas within the Eastern and Western properties will be capable of providing for the movement of species across the landscape and will improve the current connectivity values of the lands in several important ways:

- Vegetation will be planted in conservation management areas to connect existing patches of remnant vegetation that are currently isolated;
- Planting will increase the size of the existing remnant patches, which will decrease the distance between patches and provide better connectivity; and
- Planting will increase the size and number of patches in the existing landscape to provide better stepping stone corridors.

Despite the patchy appearance of some of the conservation management areas, they are substantial and, where not directly connected to each other, are reasonably proximate to each other. As aforementioned, the conservation management areas are sizable and range from 8 to over 600 hectares; these will provide substantial stepping stone corridors in the medium to long term when subject to ongoing conservation management. Other conservation management areas, when replanted, will provide a continuous corridor between remnant patches.

The widths of the proposed corridors to be established and/or improved in the conservation areas of the Eastern and Western properties will vary between approximately 100 metres to over 500 metres. These will represent a mixture of valuable local, sub-regional and regional corridors (NSW DEC 2004) that will connect (either continuously or through stepping stones) habitat in land surrounding the Leard State Forest to the Boggabri Coal offsets and the Leard State Conservation Area.

In the context of the existing fragmented landscape around Leard State Forest, we recognise that even stepping stone corridors will be very important in maintaining species' movement (Bennett 2003, Doerr *et al.* 2010). The species prevalent in the Leard State Forest, and which are most relevant to the Project, are mobile species such as birds and bats that will benefit from the provision of better stepping stone corridors to key areas of habitat surrounding the Leard State Forest, such as the Leard State Conservation Area. Revegetation of continuous corridors between existing remnant patches, augmentation of the existing remnant patches through revegetation and restoration of the creeklines will also greatly benefit these species.

EPA Comment:

We recommend that the proponent be required to reconsider the eastern offset proposals immediately north of Leard SF. The EPA brings to attention of DoP that this area is not currently identified as a link or as a priority offset landscape proposed by the NSW Government as part of the Strategic Regional Landuse Planning project.

Response: There is no requirement for the proposed offset to be covered by the Strategic Regional Landuse Planning Project. The proposed Eastern offsets north of Leard State Forest will protect and enhance Box Gum Woodland and other threatened species habitats to the north of the Leard State Forest. They will also protect and enhance riparian areas containing the GDE *Melaleuca bracteata* vegetation and provide benefit to threatened birds and bats.

4.4.2 Like for Like Matching of Vegetation**EPA Comment:**

The proponent has not yet provided sufficient information regarding the provision of a 'like for like or better' conservation outcome. The BOMP does not draw conclusions about the adequacy of the matching between vegetation types of the development sites and those within the offset sites, beyond general comments about threatened species habitat. When comparing the total figures for woodland and forest vegetation communities which the consultant does not consider to be EEC, it also appears that the offset is likely to be deficient for some fauna species (particularly birds and bats requiring either a shrubby understorey or a mid storey of both).

Response: The draft BOMP is a management plan designed to provide recommendations for future management of the offsets. It is not specifically designed to compare the vegetation within the impact areas and offset areas.

An updated comparison of vegetation within the impact areas and offset areas is now provided within Chapter 3.

Extensive areas of shrubby forest are present within the offset properties, including Eastern, Western and Shared Offsets. These include the following communities:

- Narrow-leaved Ironbark shrubby woodland of the Brigalow Belt South bioregion;
- Silver-leaved Ironbark - White Cypress Pine on alluvial sandy loam soils in central-north NSW (Benson 227);
- White Box - White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt South Bioregions; and
- Dwyer's Red Gum woodland on siliceous substrates in the Brigalow Belt South Bioregion (Benson 187).

The comment by EPA does not clearly indicate which species of birds and bats are at risk. Based upon the analysis of species found in the EA, most threatened species within the locality either survive well in grassy woodlands or actually prefer it to habitats within shrubby woodlands.

EPA Comment:

Similarly, little information is included about the vegetation communities to be targeted by regeneration of derived native grassland, beyond the matching of some derived native grassland to the Box Gum Woodland EEC. Further information has been requested from the consultant.

Response: It is clear from the vegetation maps within the draft BOMP and within this report what types of forest and woodland communities are to be reconstructed through active management of the offset areas. The communities to be regenerated will be based upon the original forest and woodland types, as indicated by the position in the landscape and the types of scattered trees that occur now. The majority of derived native grassland will be reconstructed as Box Gum Woodland.

4.4.3 Suitability of Security Arrangements

EPA Comment:

We note that the proponent now proposes to secure the offset via addition to the OEH Estate and/or establishment of a Voluntary Conservation Agreement with OEH under the NPW Act.

Voluntary Conservation Agreements under the NPW Act are now known as Conservation Agreements (CA). Where a CA is sought the lands will need to meet the criteria under S69C (1) NPW Act for lands suitable for inclusion in a CA. Please note that there is an established assessment process for CAs and not all of the proposed offset lands will necessarily be deemed to meet the required standards. Conservation values, location, connectivity, remnant vegetation cover and condition are all important considerations. The Proponent has not yet contacted OEH directly to discuss the suitability of the offset for inclusion in a CA.

In particular, the BOMP (Table 2.2) indicates that the offset currently proposed will include 74ha of 'Improved Pastures' and 459ha of 'Cultivation' (Although this is contradicted on page 2.11). These lands would not be considered suitable for inclusion within a CA, and the EPA also does not consider these lands to be suitable as an offset under other covenanting arrangements. Therefore it will not be possible to, as proposed in the BOMP, apply a CA 'across all management areas, including the core farming areas'. Such lands are also not suitable within an OEH Estate addition, unless they are necessary to form part of a boundary fire break or similar. Furthermore, any agricultural use of these lands may also constitute a threat to the adjacent offset. Limits should be placed on the species that can be cultivated in these areas (for example no invasive perennial native grasses should be grown).

Similarly, the OEH would not necessarily accept all of the derived native grassland within the offset for inclusion within a CA. The level of species diversity and the land use history would be important considerations.

Response: It is noted that Voluntary Conservation Agreements have changed title to Conservation Agreements. It is also noted that such agreements need to be determined in consultation with EPA in order to finalise them. Aston Resources has had discussions about dedicating land to National Parks and preliminary discussions about CAs although these discussions have not yet been progressed.

Whilst some areas of currently cultivated fields and improved pastures have been included as part of the offset package for the Project (namely in the Eastern and Western Properties), these areas in question surround remnant patches of woodland vegetation that have been retained in a cropping field or where cropping has extended to forest and woodland margins (e.g. in Louenville where cropping extends to the boundary with the Leard State Conservation Area). These areas of cultivation are included in the offset area to provide buffers between remnant vegetation and continuing farming land use. These areas will be replanted with trees and shrubs and will be managed for weeds and grazing. These areas will be an important part of the offset strategy as they will provide buffer plantings to protect existing areas of vegetation and supply additional habitat for fauna.

It is understood that conservation values, location, connectivity, remnant vegetation cover and condition are all important considerations. The inclusion of some improved lands and derived native grasslands are proposed within the offsets, such lands make up a small minority of the offset and are necessary to provide for connectivity of the overall package.

It is also understood that some small portions of the offsets proposed may not be accepted by EPA for formal conservation agreements. Where this is the case, other covenanting mechanisms will be used to achieve the same or similar outcome, namely protection of regenerated vegetation in the long term.

4.4.4 Suitability of Grazing in Conservation Management

EPA Comment:

Within the BOMP the proponent has now proposed grazing as part of the management of the offset sites. The potential addition of lands to the OEH Estate would impact upon this grazing plan. Furthermore, our vision for the remainder of the offset which is either derived native grassland or lightly treed, is that natural regeneration should be allowed to take place. In the absence of natural regeneration, assisted natural regeneration techniques should be implemented. Grazing in the short to medium term would generally be incompatible with these strategies.

Both the OEH and EPA have concerns about the level of monitoring that would be required to both ensure that any grazing implemented was strictly in accordance with an approved management plan, and to monitor the implementation and success of extensive areas of regeneration/revegetation.

Response: The use of grazing to assist with the rehabilitation of grassy woodlands for conservation is part of current best practice. If the draft BOMP were implemented, grazing management would be undertaken under strict controls of an Environmental Manager and Property Manager as indicated in the current draft of the BOMP. Under the proposal both would be suitably qualified and/or would engage the support of suitable consultants/practitioners. The management would take place during the life of the mine.

Areas proposed for handover to EPA as part of the National Parks Estate would not need to be grazed as they are already in good condition.

Assisted natural regeneration is an integral part of the draft BOMP strategy, but best practice for grassy woodland regeneration entails grazing management, as demonstrated in the draft BOMP and the literature cited therein. It is notable that the draft National Recovery Plan for Box Gum Woodland envisages grazing management to promote recovery, as do current guidelines for Grassy Woodland management.

The eventual prescriptions for assisted natural regeneration in the draft BOMP can be governed by a Project Approval for the Project. The proponent is not absolutely committed to the use of grazing as a regeneration tool, though it does form part of current best practice.

4.4.5 Regeneration of Grasslands in the Offsets

EPA Comment:

In our previous submission, we recommended that the proponent be required to prepare a detailed offset strategy which increases the proportion of the offset that involves protection, management and enhancement of existing remnant vegetation relative to rehabilitation/restoration works.

From the data included in the BOMP, it appears that approximately one third of the offset for the Box Gum Woodland EEC consists of proposed regeneration in derived native grassland (including 'low diversity' derived native grassland). Similarly it appears that approximately one third of the offset for non-EEC vegetation may consist of regeneration in derived native grassland, pasture and cultivation areas. However this will remain unclear until issues relating to the identification of EEC on the offset sites have been clarified and data obtained for the shared offset property.

Nevertheless we maintain the view that reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

Response: Broad areas of derived native grassland are proposed to be restored to woodland. This concept is entirely consistent with the theme of the draft National Recovery Plan for Box Gum Woodland and Derived Native Grassland. Moreover, it reflects the primary reason why derived native grasslands have been mentioned and covered in the Final Determinations for both the TSC Act and the EPBC Act. Namely, they have excellent recovery potential due to the diversity of native plants that occur within them.

The areas of forest, woodland and grassland within the proposed offsets are variable in quality, with some good, average and poor condition vegetation. Such a range of habitat was selected in the offsets specifically because it can provide some good quality habitat of immediate value to native flora and fauna, but also provide extensive opportunities within areas of principally moderate condition to recover to a higher condition, offering better habitat values through active conservation management.

There is a high proportion of habitat that can be regenerated to a higher condition state within the offsets and this is consistent with current guidelines for BBAM, the draft National Recovery Plan for Box Gum Woodland and Derived Native Grassland, and the Namoi CAP. The Box Gum Woodland is critically endangered because so much has been cleared in the past as it is essentially where “wheat and sheep” farming have occurred in the past. In order to recover such woodland, it is essential to recover land from old farmlands. This is anticipated within the draft National Recovery Plan and essentially, no other alternatives are available as the vast majority of remaining Box Gum Woodland and derived native grassland is within farmland.

EPA has expressed the view that “reconstruction” of grassy woodland communities has high risk. Cumberland Ecology notes that this view is not supported by any scientific literature. However, the draft National Recovery Plan for Box Gum Woodland and other manuals on restoration of grassy woodlands (e.g. McIntyre *et al* 2002, Rawlings *et al* 2010) clearly support the notion that woodland is quite feasible to recover or regenerate from derived native grassland, with correct management. Correct management can also be relatively simple and involve reductions or controls on grazing to promote recovery, fencing, weeding and monitoring. Many areas of grassland can be recovered to woodland in the long term without extensive replanting. While Cumberland Ecology acknowledges that there is a risk, such as from droughts, climate change, etc, it is maintained that such recovery is feasible and has been done at many sites throughout the range of Box Gum Woodland.

4.4.6 Further Information Required on Land Use History in Derived Grasslands

EPA Comment:

In our previous submission, we recommended that the proponent be required to prepare a detailed offset strategy which provides details on the land use history of areas of any derived native grassland proposed as offsets, including cultivation history, fertilizer application and groundcover species present (native and exotic), along with information relating to elevated soil nutrients, such as with nitrate, ammonium, available phosphorus and total carbon, in order to inform the suitability of the sites for inclusion in the offset and understand the capacity of the system to respond to management.

Little additional information has been supplied by the proponent. The BOMP indicates that the 'Derived Native Grassland - low diversity areas' have been pasture improved or have had superphosphate fertilizers applied and may have been heavily grazed. 'Derived native Grassland - high diversity areas' are characterised in the BOMP as not having

been pasture improved 'recently' or have had 'little fertiliser' applied, and may have been 'lightly to moderately' grazed. No further land use history information is supplied.

Response: This information is simply not available for most farmlands, including the offsets. Previous land owners did not keep detailed written records of the nature and extent of cropping. However, we have discussed the low diversity native grassland within Section 4.3 of this report and provided information about the way this changes with land use.

The grassland and grassy woodland composition does however, provide a much better indication of such history. The majority of derived native grasslands in the offsets are good quality and fit into the classification of the EPBC Act. By definition, this means that they have a high abundance of grazing sensitive herbs, meaning that they have not been too heavily grazed and modified in the past.

Additionally, the majority of derived native grassland in the study area, particularly the Northern Offsets, has many species that do not occur in regularly fertilised soils. These species include a wide variety of native grasses, orchids, lilies, daises, etc. Such species are evident in the data collected during Spring 2011 for the purposes of preparing the draft BOMP.

4.4.7 Methodology for Flora and Fauna Surveys of the Offset Properties

EPA Comment:

Within the draft BOMP, no methodology is provided for the new flora and fauna surveys undertaken, and no maps of survey locations are included. Additional information has been requested from Cumberland Ecology to assist with the EPA review.

Response: The methodology and survey locations of flora and fauna survey are described in **Appendix B** of this report.

4.5 Further Clarification of the Quantum of Vegetation in the Biodiversity Offsets

EPA Comment:

No information is presented in the BOMP regarding the quantum of each vegetation types on the Shared Offset Property that will contribute to the offset for the Maules Creek Coal project. No information is provided about the quantum of each vegetation type to be included in the offset from the 'Shared Offset Property'.

Response: All of the available vegetation within the Shared Property will be managed as a conservation area. The Shared Offset Property is intended to remain as a single property that will be funded and managed jointly by both the Maules Creek Coal Project and Boggabri Coal as per the current ownership of this property. The credit for half of the vegetation in this property will be attributed to the Maules Creek Coal Project.

Table 2.1 provides the quantum of vegetation within the Shared Offset Property that will be attributable to the Project as an offset. Each vegetation type found within the Shared Offset is summarised in that table.

The information within **Table 2.1** will be included within an updated version of the draft BOMP.

EPA Comment:

Significant inconsistencies also exist in the data presented. For instance, the Section 4.1 of the BOMP states that the Eastern and Western Offsets 'are not finalised at the time of writing', and that 'Aston commits to the eventual provision of 1000ha of land from the Eastern and Western properties for conservation and management as part of this BOMP'. However whilst the area of vegetation per property that will actually contribute towards the offset is not stated in the BOMP, we understand from Table 2.2 that the proposed offset lands in total will be 8023ha. Whilst it is not clear from Table 2.2, it is assumed that an additional 355 ha of native vegetation will also be included from the Shared offset property (hence a total of 8378ha).

If 1000ha will be the contribution from the Eastern and Western offsets combined, and this is subtracted from the total, a contribution of 7378ha is left to be supplied by the Northern Offsets (Mt Lindsay and Wirradale) and the Shared Offset. However 7378ha is 472ha more than the vegetation (native and exotic) within the Northern offset properties and Shared offset property in total, and not all of the land within these two northern properties will form part of the offset.

Without further information we assume that the vegetation to be included within the offset on the Eastern and Western offset properties has been over-estimated.

Response: The inconsistencies in the total vegetation areas have now been corrected and are provided within Chapter 2 of this report. We can confirm that the contribution from the Eastern and Western offsets will be greater than 1000ha.

EPA Comment:

Similarly, there are some inconsistencies between the area of EPBA Act threatened species habitat within the offset in comparison to the estimated areas of remnant native vegetation (see comments below).

The BOMP (Table 2.4) estimates the area of woodland and derived native grassland which meets each of the three condition classes specified by EPBC Act guidelines for the Box Gum EEC, as well as the amount of 'high condition remnant forest and woodland habitat' and 'low condition derived native grassland habitat to be re-vegetated to moderate condition habitat...' found 'in the Offsets'. This information is only included in relation to the Box Gum EEC and the three EPBC Act listed threatened species.

Table 2.4 in the BOMP states that a total of 8881ha of 'high condition remnant forest and woodland habitat' is located in the offset (including the Shared Offset property). This

appears to be 3180ha more than the amount of remnant woodland and forest stated elsewhere to be located within the actual offset, and 2733ha more than the total area of woodland and forest estimated to be available within the entire offset properties.

Similarly, estimates in Table 2.4 for the extent of derived native grassland which does or does not meet the EPBC Act Box Gum Woodland EEC definition also seems to conflict with (Tables 2.1 and 2.2). Further information has been sought from Cumberland Ecology regarding these apparent inconsistencies.

Response: The inconsistencies in Table 2.4 from the draft BOMP have now been corrected and are provided as **Table 2.5** within Chapter 2 of this report.

The condition classes referred to in this table are the condition classes defined in the Box Gum Woodland EPBC Conservation Listing and as such cannot be applied to other vegetation communities. Condition estimates for the remaining vegetation (i.e. vegetation that are not forms of Box Gum Woodland) are available from the quantitative condition assessment in Chapter 3.

With regards to the areas of threatened species habitat, the table now uses the results of the condition assessment in Chapter 3 to estimate areas of high condition and moderate to low condition habitat for threatened EPBC fauna. We have estimated the areas of high condition and moderate to low condition habitat for the remaining state-listed threatened species and these appear in **Table 2.6** in Chapter 2.

CMA Comment:

In Namoi CMA's comments on the review of the EA in Section 7.7.3 under 'Management', we expressed concern that the ratio figures listed in Table 6.8 Appendix I are questionable. Table 2.2 in the draft BOMP is presumed to be more accurate than Table 6.1 and Table 6.8 in Appendix I. Based on the information in Table 2.2 the offset ratio of total area of vegetation conserved to the project disturbance area is 3.68:1, however as mentioned [below] this is limited by the lack of condition assessments.

Response: The inconsistencies in the total vegetation areas have now been corrected and are provided within Chapter 2 of this report. The latest offset ratios for the Project are shown in the tables in Chapter 2. Condition assessments are provided within Chapter 3 of this report.

CMA Comment:

In Namoi CMA's comments on the review of the EA in Section 7.7.3 we summarised Table 6.1 from Appendix I of the EA. A direct comparison between Table 6.1 and Table 2.1 in the draft BOMP is not possible (to see whether there are any significant differences). Namoi CMA realises that from an area perspective, there will be 8023ha of vegetation to be conserved within the offset properties which supposedly offsets the 2177ha to be cleared. However, without condition assessments it is not possible to state whether there has been sufficient gain (no net loss) and whether equivalence (like for like) has been achieved.

Response: The inconsistencies in the total vegetation areas have now been corrected and are provided within Chapter 2 of this report. Condition assessments are provided within Chapter 3 of this report.

4.6 Condition Assessments in Assessing Adequacy of the Offset

CMA Comment:

In Namoi CMA 's review of the EA in Section 7.6.2 concern was expressed that there were no condition assessments and/or biometric benchmarking for both the project disturbance area and the offset areas within the EA.

The 'Response to Submissions' in Section 4.4.25 states that the 'condition of the vegetation and associated habitats within the project boundary and offset areas have been assessed within the EA in terms of understorey diversity, community structure, values for fauna, connectivity and historical land use.

Namoi CMA believes that vegetation condition assessments (which can be surrogate for habitat value) provide valuable information on whether equivalence (like for like) and sufficient gain has been achieved. Condition assessments should provide an assessment of the presence or absence of the following features:

- *Tallest stratum, its health and projected foliage cover;*
- *Mid stratum, its health and projected foliage cover;*
- *Groundcover:- grass cover, litter, bare ground, mosses and lichens;*
- *Species richness:- number of native species, maturity, size;*
- *Regeneration;*
- *Weed and pest animal impacts;*
- *Past land uses;*
- *Standing dead timber and fallen logs (habitat features);*
- *Numbers of hollows (habitat feature);*
- *Proximity to water, rock caves and overhangs (habitat features).*

Response: Condition assessments are provided within Chapter 3 of this report.

CMA Comment:

In reviewing the EA and Appendix I which contain the descriptions of the vegetation communities, it is apparent that adequate vegetation condition assessments for the project disturbance area are lacking. Within each vegetation community description it mostly denotes the presence of certain condition and/or habitat features, however it is unlikely that those features will be consistent in their presence or absence for the whole of the vegetation community.

The vegetation condition assessments for the project disturbance areas are of a general nature and are not consistent between vegetation communities and consequently cannot be assessed against the offsets required. In most of the vegetation community descriptions it is left to Namoi CMA to make an intuitive assessment of the vegetation condition based on a few condition features.

Namoi CMA believes that it would be possible and certainly beneficial to rank areas within each vegetation community within the project disturbance area as being in good, average or poor condition based on a biometric benchmark.

Response: Condition assessments are provided within Chapter 3 of this report.

CMA Comment:

The draft Biodiversity Offset Management Plan (Dec'11) provides greater detail on the vegetation communities, management actions and monitoring than that provided in the EA. However, little condition assessment is undertaken of the offset vegetation communities. Again, intuitive assessments can be made based on condition features mentioned in the vegetation descriptions and the management actions. Namoi CMA believes that without adequate condition assessment it is not possible to balance the offsets against the vegetation lost through clearing.

Response: Condition assessments are provided within Chapter 3 of this report.

CMA Comment:

In Namoi CMA's comments on the review of the EA in Section 7.7.3 Appendix I, we expressed concern that there were no condition assessments or biometric benchmarking for vegetation communities within the offset properties. This concern is still pending and has been discussed above.

Response: Condition assessments are provided within Chapter 3 of this report. The condition assessments assess the vegetation condition against Benchmarks and provide maps of vegetation condition.

CMA Comment:

In Namoi CMA's comments on the review of the EA in Section 7.7.3 under 'Reasons for Selection', we expressed concern that there was no comparative analysis of condition

assessments or biometric benchmarking for vegetation communities between project disturbance area and offset properties.

Without thorough and complete condition assessments and biometric benchmarking of the vegetation communities in both the project disturbance area and offset properties it is not possible for this comparative analysis to take place. Table 2.2 in the draft BOMP provides a limited comparison by using broad vegetation structural formation classes qualified by the presence of shrub or grass cover.

Namoi CMA believes that comparative analysis is important to ensure there has been sufficient vegetation gain (no net loss) and whether equivalence (like for like) has been achieved.

Response: As explained in Chapter 3, the Quantitative Condition Assessment clearly demonstrates the condition states of vegetation within both the impact area and the proposed offsets. The total impact area, which is largely but not entirely good condition native vegetation is 2177 ha in area. The offsets total 9334 ha, of which 49% or 4573 ha are estimated to be in good condition. The ratio of good condition offset land to the project impact (all vegetation condition classes combined) is 2.1: 1. Thus there is more than twice the area of good condition in the offset lands. When low and moderate condition vegetation are included the ratio is 4.3:1. For further information, see Chapter 3.

The area of forest and woodland proposed to be cleared is currently in good condition relative to CMA benchmarks. The Box Gum Woodlands and Ironbark Forests, and other related vegetation generally have moderate to high species diversity relative to benchmarks and they are part of a large block of habitat. Some areas of moderate and low habitat condition will also be cleared, but these constitute a lesser proportion of the vegetation within the impact area.

The areas of forest, woodland and grassland within the proposed offsets are variable in quality, with some good, average and poor condition vegetation. Such a range of habitat was selected in the offsets specifically because it can provide some good quality habitat of immediate value to native flora and fauna, but also provide extensive opportunities within areas of principally moderate condition to recover to a higher condition, offering better habitat values through active conservation management.

There is a high proportion of habitat that can be regenerated to a higher condition state within the offsets and this is consistent with current guidelines for BBAM, the draft National Recovery Plan for Box Gum Woodland and Derived Native Grassland, and other current literature. The Box Gum Woodland is critically endangered because so much has been cleared in the past as it is essentially where “wheat and sheep” farming have occurred in the past. In order to recover such woodland, it is essential to recover land from old farmlands. This is anticipated within the draft National Recovery Plan and essentially, no other alternatives are available as the vast majority of remaining Box Gum Woodland and derived native grassland is within farmland.

The results of the Quantitative Condition Assessment are consistent with what was written in the EA and Response to Submissions. That is, they show that the offsets are substantial in size and that they have significant potential to be improved by active management, as is proposed within the BOMP.

EPA Comment:

In our previous submission, we recommended that the proponent be required to prepare a detailed offset strategy which proposes a clearly presented and well-designed offset, the quantum of which is justified by a suitable metric (preferably BBAM) and at a minimum properly considers OEH's 'Principles for Biodiversity Offsets in NSW'.

Response: As shown in **Table 4.1**, the offsets have been designed to comply with the Principles for Biodiversity Offsets in NSW. The offsets comply with all of the principles, as explained in the table.

As stated in the introductory chapter, the proponent is has not elected to do a BioBanking assessment, nor is it required to do so under Part 3A of the EP&A Act. Also, BioBanking provides estimations of offset requirements that are effectively larger than are actually required, based upon recent approvals for mining projects (see Chapter 1).

EPA Comment:

As noted in our previous submission there is no evidence that the proponent has applied a consistent quantitative methodology to both the development and offset sites to allow comparison of the expected losses and gains, beyond simple hectare comparisons. The EPA has sought further information from Cumberland Ecology regarding the plot data recorded on the development and offset sites in order to determine whether a metric assessment of the adequacy of the offset can be undertaken. Until this information is received, and the apparent inconsistencies in the offset description are clarified, the EPA cannot provide further detailed commented on the adequacy of the quantum of the offset offered.

Response: Condition assessments are provided within Chapter 3 of this report. Plot data and other information will be supplied to the EPA by Cumberland Ecology.

EPA Comment:

In our previous submission, we recommended that the proponent be required to prepare a detailed offset strategy which adequately assesses the condition of both the impact and proposed offset sites. It is the likely change in condition of an offset site under a proposed management regime and improved security which constitutes the 'gain' in biodiversity. It does not appear that a quantitative assessment was undertaken which demonstrates that the complete loss in vegetation from the development site will be adequately compensated for by the gain in biodiversity (i.e. the improvement in vegetation condition and security) expected from the offset site.

Response: Condition assessments are provided within Chapter 3 of this report.

As explained in Chapter 1, there was no requirement within the DGRs to provide a quantitative condition assessment. However, we have now done this and it demonstrates the significant net gain that will occur as a result of the proposed offsets. This was previously explained in the EA Response to Submissions and draft BOMP.

4.7 Impacts on Groundwater Dependent Ecosystems (GDEs)

SoilFutures Comment:

*The presence of springs in association with the presence of *Melaleuca bracteata* (a Groundwater Dependent Ecosystem) within the zone to be developed was not covered in the EA, and in the response is only reported along Back Creek. The intention of raising this species as an issue is that it also occurs on spring sites within the EA area well away from the Back Creek. These are important, rare and very localised GDE's. Hansen Bailey has not addressed the issue of the spring site GDE's and what impact mining will have on these GDE's in terms of water supply, or how they will be managed if they are destroyed in the process of mining.*

Response: One minor patch of *Melaleuca bracteata* occurs within the area to be cleared. It totals 10 ha of grazed and degraded habitat. It occurs along a gully line and has potential to be partially groundwater dependent. The major occurrences occur along Back Creek and some other unnamed creeks outside the project boundary. As explained in the Response to Submissions, no major impact is predicted on the water supply for the main occurrences of *Melaleuca bracteata* along Back Creek. The proponent proposes to monitor this assertion as mining takes place and if necessary, to take remedial action. The CMA has stated it is satisfied with this approach in its latest Supplementary Response.

Response to Commonwealth Issues

This Chapter provides detailed responses to the submissions received from SEWPaC.

5.1 Impacts

5.1.1 Impacts on Superb Parrot

SEWPaC Comment:

The Maules Creek Coal Project Environmental Assessment Adequacy Report (February 2011) identified habitat for the Superb Parrot. Although this is identified in the Appendix E, it is not discussed in the impacts section.

If potential habitat for a threatened species is present on the proposed site, detailed information must be included to support a conclusion that the species will not be impacted.

Response: This comment references the earlier draft of the EA. The final EA report was dated July 2011.

On current data, there is essentially no potential to impact the habitats of the Superb Parrot. This is explained in detail within **Appendix C**.

While historically, the parrot was believed to have been an occasional visitor, there are no recorded sightings within 40 km of the Project Boundary. The maps of habitat and habitat use in the Recovery Plan for the species do not indicate that the vegetation within the Project Boundary would support the species.

5.2 Draft Biodiversity Offset Management Plan

5.2.1 General

SEWPaC Comment:

The department accepts combined project offset areas, however, we require details of the individual proposed offsets for each project, for example, figure 2.4 of the Biodiversity Offset Management Plan should clearly identify the area to be offset for the Maules Creek project within this shared offset.

Response: The Shared Offset Property is to remain as a single property that is owned and managed jointly by the Maules Creek Coal Project and Boggabri Coal. It will be managed as a single entity and 50% of the flora and fauna values will be attributed to each project. It is not possible to subdivide the Shared Offset Property, but it is possible to state that half of each vegetation type and area in the property will contribute to the offset package of the Project, as indicated in Chapter 2 of this report.

SEWPaC Comment:

'Section 3.1 Management Approach' identifies the areas within the offsets that will be set aside for conservation management and commercial livestock grazing. Please clarify if areas proposed for commercial grazing have been excluded from the total offset areas and if so, provide details of area etc.

Response: The areas proposed for commercial grazing on Wirradale and Mt Lindesay (i.e. Northern Offset properties), that is, management areas "T" and "C" have been excluded from the total offset areas for the Maules Creek Coal Project.

The quantity of land from Mt Lindesay and Wirradale that will be contributed to conservation is detailed in **Chapter 2**. There will be 2278 hectares conserved from Mt Lindesay and 3536 hectares from Wirradale (a total of 5814 hectares).

5.2.2 Northern Offset Areas

SEWPaC Comment:

Please clarify if areas J and T on Wirradale offset areas will be maintained as farming areas. 'Section 3.1 Management Approach' states area T on Wirradale will be maintained as a core farming area however, 'Section 3.3 Grazing Plan' refers to areas J and T on Wirradale will be maintained as farming areas.

Response: Only management area "T" on Wirradale has been proposed for core grazing. 'Section 3.3 Grazing Plan' in the BOMP will be amended to refer only to management area "T".

SEWPaC Comment:

'Section 3.1 Management Approach' does not mention area S please provide further details on the proposed management of this area including whether it is likely to be retained for conservation management or commercial livestock grazing.

Response: Management area "S" on Wirradale will be managed for conservation and is not intended to be grazed commercially. It will be managed under the grazing plan proposed for the Northern Offset Properties (Table 3.2 of the draft BOMP) to promote growth of native species and to reduce competition from weed species. It will be actively weeded for a period of time and monitored. Further action in this area will be subject to the response to management.

SEWPaC Comment:

Please provide the rationale behind using light grazing on rotation in areas that will be maintained for conservation rather than the proposed grazing cycle which allows for a rest period to promote natural regeneration.

Response: Cumberland Ecology has reviewed the draft BOMP and note that the grazing management proposed for the majority of the conservation areas in the Eastern, Western and Northern properties will involve resting periods as well as light grazing periods in sequence. The grazing cycle indicated in Tables 3.1 and 4.1 of the draft BOMP apply to conservation management areas and will be important for managing weeds as well as stimulating natural regeneration. The draft BOMP states for light rotational grazing (pp 3.5 and 4.7):

- *Exclude grazing from areas of native pastures during the growing season of target native tussock grass species to facilitate seed set as native tussock grasses are more grazing sensitive at these times; and*
- *Allow for rest periods to maintain adequate groundcover and litter, particularly at the time of season break of annual broadleaved weeds to reduce their germination.*

The only exceptions are Management Zones I, L, P and Q, which are core conservation areas containing intact vegetation where grazing will be excluded entirely, and the core farming areas (T and C) where commercial grazing will take place.

In the Eastern and Western properties, where land use has been more intensive, we have proposed that grazing is excluded from conservation areas for five years to allow the grasslands to recover.

The use of grazing to assist with the rehabilitation of grassy woodlands for conservation is part of current best practice. If the draft BOMP were implemented, grazing management would be undertaken under strict controls of an Environmental Manager and Property Manager as indicated in the current draft of the BOMP. Under the proposal both would be suitably qualified and/or would engage the support of suitable consultants/practitioners. The management would take place during the life of the mine.

Assisted natural regeneration is an integral part of the draft BOMP strategy, but best practice for grassy woodland regeneration entails grazing management, as demonstrated in the draft BOMP and the literature cited therein. It is notable that the draft National Recovery Plan for Box Gum Woodland envisages grazing management to promote recovery, as do current guidelines for Grassy Woodland management.

The eventual prescriptions for assisted natural regeneration in the draft BOMP can be governed by a Project Approval for the Project. The proponent is not absolutely committed to the use of grazing as a regeneration tool, though it does form part of current best practice.

SEWPaC Comment:

Further details are required on proposed buffers around commercial livestock grazing areas J and C.

Response: Buffer planting at the boundary line between core farming and conservation areas will be established. Understorey rehabilitation will aim to encourage large native tussock grasses (either through assisted regeneration or planting) as well as trees and shrubs to attenuate surface flows and transfer of material (i.e. nutrients, weed seeds etc) from farming areas to the conservation areas.

5.2.3 Eastern Offset Area

SEWPaC Comment:

The department notes that the Eastern and Western offset areas were not finalised at the time of the draft BOMP, however, it should be noted that the department will require further details of the proposed provision of 1000 hectares of land from the Eastern and Western Offset properties as part of the BOMP. Until the department is satisfied that the proponent has provided sufficient information on the proposed offsets to demonstrate that the proposed impacts can be mitigated, consideration cannot be given to approval of the project.

Response: The land for the Eastern and Western Offset Properties has now been finalised and the summary is provided within tables and figures of Chapter 2.

SEWPaC Comment:

It is noted that Weeping Willow control is proposed for the first five years of managing the Eastern and Western offset areas, please clarify if other weed management will be undertaken in the offset areas.

Response: African Boxthorn, *Lycium ferocissimum*, is also established beneath trees in some areas of the Eastern and Western offsets. It will be managed using methods provided within the draft BOMP.

Other potential weeds, not currently occurring, will be monitored for, and controlled if needed.

Conclusion

Although this report provides substantial additional information via several additional analyses requested by EPA and CMA, the original conclusions drawn by Cumberland Ecology about ecological impacts of the Project remain unchanged. Similarly, the offset package is also essentially unchanged bar some minor additions to areas of some offset lands. The offset package as initially proposed was robust and suitable for addressing the ecological impacts of the Project.

As stated in the EA and within the previous Response to Submissions report the proposed offsets will result in a substantial area of offset vegetation that will provide or add to corridors of habitat around Leard State Forest (Eastern and Western Offsets) and will build upon conservation reserves (Northern Offsets/Mt Kaputar National Park; Eastern and Western Offsets/Leard State Conservation Area).

The offsets proposed compare favourably with offsets for several recent mining projects that have gained approvals in the past twelve months.

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Appendix A

Low Diversity Grassland Interpretation

A.1 Introduction

The following sections provide further discussion about low diversity derived native grasslands and whether they conform to the TSC Act listed Box Gum Woodland and Derived Native Grassland (informally referred to as Box Gum Woodland). The discussion is intended to accompany the response made in Section 4.3 of Chapter 4.

The discussion firstly revisits the descriptions of Box Gum Woodland provided by the EPBC Act Conservation Listing and the TSC Act Final Determination. Low diversity derived native grasslands, such as those recorded for the Project and the Project Offsets are then evaluated in relation to the TSC Act guidelines for identifying Box Gum Woodland.

A.2 Legal Definitions of Box Gum Woodland

The EPBC Act very explicitly defines what is included in the Conservation Listing for Box Gum Woodland. It states that forms of Box Gum Woodland, where the canopy stratum has been removed, must be at least 0.1 hectares in size and contain a diversity of understorey species (i.e. 12 herb species) to be included in the listing. An excerpt from the listing is reproduced below:

The Committee considers that areas in which an overstorey exists without a substantially native understorey are degraded and are no longer a viable part of the ecological community. Although some native species may remain, in most of these areas the native understorey is effectively irretrievable.

In order for an area to be included in the listed ecological community, a patch must have a predominantly native understorey.

The size and life-form of understorey species are such that viable populations can exist in very small areas (Prober & Thiele 1993). Therefore, in order to be the listed ecological community, an understorey patch, in the absence of overstorey trees, must have a high level of native floral species diversity, but only needs to be 0.1 hectares or greater in size. A patch in which the perennial vegetation of the ground layer is dominated by native species, and which contains at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns, grasses and sedges) is considered to have a sufficiently high level of native diversity to be the listed ecological community. At least one of the understorey species should be an important species (e.g. grazing-sensitive, regionally significant or uncommon species; such as Kangaroo Grass or orchids) in order to indicate a reasonable condition.

The EPBC Act clearly states that low diversity grasslands, where there was once a canopy comprising Yellow Box, White Box or Blakely's Red Gum but where the diversity of native non-grass species numbers less than 12, cannot be included in the listing. The EPBC Act requires that representatives of Box Gum Woodland must be in reasonable, viable condition to be considered a part of the ecological community. The low diversity grasslands of the

Project Boundary and within parts of the proposed offsets clearly do not conform to the EPBC Act listing.

In contrast, no such criteria or specific cut-off is provided by the TSC Act. The TSC Act Final Determination of the Box Gum Woodland EEC does not provide a definitive description of the grassland form of Box Gum Woodland:

2. White Box Yellow Box Blakely's Red Gum Woodland includes those woodlands where the characteristic tree species include one or more of the following species in varying proportions and combinations - Eucalyptus albens (White Box), Eucalyptus melliodora (Yellow Box) or Eucalyptus blakelyi (Blakely's Red Gum). Grass and herbaceous species generally characterise the ground layer. In some locations, the tree overstorey may be absent as a result of past clearing or thinning and at these locations only an understorey may be present. Shrubs are generally sparse or absent, though they may be locally common.

11. Disturbed remnants are still considered to form part of the community including remnants where the vegetation, either understorey, overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank are still at least partially intact.

Notwithstanding this, paragraph 11 of the Final Determination does provide a more qualitative descriptor for grassland units that are considered to be Box Gum Woodland. Like the EPBC Act, the TSC Act Final Determination makes a comment about *the viability* of grassland areas that are to be included in the TSC Act listing. Grassland forms of the TSC Act listed Box Gum Woodland are required to exhibit a “*natural regenerative ability*” (assisted or unassisted) that would indicate a mostly intact soil bed and associated seed bank.

A.3 Natural Regeneration as a Key Consideration

From all of the above, it is strongly suggested that to determine whether native grasslands (derived from the clearing of Box Gum Woodland) conform to the TSC Act listing relies on understanding the regeneration potential of the grassland.

The identification guidelines for TSC Act Box Gum Woodland published firstly by NSW NPWS (2005) and then NSW DECC (2007) ask the following key questions:

1. Is the site on the tablelands or western slopes of NSW?
2. Does the site contain, or would be likely to contain, White Box, Yellow Box or Blakely's Red Gum?
3. Is the ground layer mainly grassy? [assuming mainly native grasses]
4. If the site has been degraded, is there potential for assisted natural regeneration of the tree layer or the understorey (e.g. by removing grazing, weeds, etc)?

For a grassland site to be considered Box Gum Woodland under the TSC Act it must answer “yes” to points 1-3 and have potential for assisted natural regeneration of the tree or the understorey layer. Moreover, to be considered to meet the TSC Act definition of Box Gum Woodland, the site should be capable of assisted natural regeneration and not require active planting of trees and understorey.

A.3.1 What is Natural Regeneration?

Natural regeneration differs from revegetation. Regeneration relies on native seed stored in the soil or in the canopy, or seed transported to the site by water, wind or animals; revegetation is the introduction of seed or seedlings (Rawlings et al. 2010) to a site that would otherwise remain predominantly exotic or poorly diverse.

For natural regeneration of trees, a grassland must have either healthy trees to produce seed or suppressed seedlings or saplings (McIntyre, McIvor et al. 2002). Eucalypts do not have reserves of seed buried in the soil [unlike many understorey species] (McIntyre, McIvor et al. 2002). Their seeds are very small and do not survive for long periods in the soil (McIntyre, McIvor et al. 2002; DECCW (NSW) 2010). Furthermore, their seeds do not compete well in dense litter or with most grasses for light and moisture (DECCW (NSW) 2010).

For natural regeneration of the understorey (n.b. this also applies to overstorey species), the seed bed must be favourable for seed establishment or ecosystem is allowed to cycle or proposer i.e., regular recruitment of native species. Factors that prevent seed establishment applicable to grasslands include dense litter, high seed predation and dense exotic grass and exotic forb cover. Fire is considered to be a process that assists natural regeneration by Rawlings *et al.* (2010) and could provide a more favourable seed bed; however the seed bank (in either the canopy or soil) must still be viable. Prevention of seed germination is indirectly proportional to natural regeneration potential.

So for disturbed sites (e.g. grasslands) the following conditions are needed to allow natural regeneration to occur:

1. There must be canopy trees or suppressed saplings present and be healthy enough to produce seed crop and;
2. The seed bed must support natural seed germination from the seed bank of trees or soil, if present.

A.4 Evaluation of the Low Diversity Derived Native Grassland in the Project and Offset Areas against TSC Act Criteria

This vegetation community comprises an amalgam of those areas currently being cultivated or that have lain fallow in recent years.

A combination of highly intense land use and variable resting periods has resulted in paddocks that range between being dominated by crop or pasture-improvement exotic species to being dominated by a few species of native grasses and a low diversity of herbs.

Due to these paddocks having been cropped, ploughed and fertilised over many decades, the soil profile and native seed bank have been disturbed to the extent that natural regeneration of the grassland to woodland is unlikely.

The areas of low diversity native grassland do not form part of the TSC Act listing using this interpretation due to a lack of potential natural regeneration. The soil has been extensively disturbed by regular ploughing, cropping and fertilisation over decades such that the original native soil seed bank is no longer viable; it is likely to be highly compromised (partial or total physical damage) by the passing of considerable periods of time and extensive mechanical disturbance.

Generally low diversity derived native grasslands have the following attributes:

- Highly simplified structure:
 - Absence of trees or if present sparse or standing paddock trees and mostly unhealthy;
 - No mature shrubs; and
 - Dense ground layer or sparse depending on transition;
- Low habitat values (based on comparisons with biometric benchmarks):
 - No fallen logs;
 - No hollows or very few exposed;
 - Not much litter; and
 - Not much rock;
- Disturbed ground layer:
 - Dense cover of native grasses or exotic species;
 - Poor native species diversity;
 - Depleted native seed bank;

- No moss; and
 - No lichens.
- Restoration
- Requires a combination of active revegetation or very long periods of assisted regeneration due to high levels of soil disturbance.

These attributes, particularly the highly disturbed ground layer and soil profile and need for active restoration, preclude this community as endangered ecological community Box Gum Woodland and Derived Native Grassland under the TSC Act.

A.5 Project Example

A species list, representative of the diversity and composition of flora found in the community “Low Diversity Native/Exotic Grassland and Cultivation”, is provided in **Table A.1** below. This table summarises the native and exotic species recorded in quadrats conducted at Louenville (Q4 & 5). **Photograph A.1** and **Photograph A.2** show these quadrats.

Within this community, no upper or midstorey vegetation layers are present except for the occasional tree. Regeneration of canopy trees is not evident; regeneration is likely to have been suppressed due to the extensive weed cover. The ground layer is comprised of a very high percentage of crop species or weeds (100% in Q4 and 99% in Q5), dominated by exotic species in the families Asteraceae and Poaceae, the composition of which varies as result of differing stages of land use. Pasture-improvement herbs and grasses and various thistles are also common.

No native species were recorded at Q4, which is currently a cultivated field of *Triticum aestivum* (Common Wheat). Q5 is a fallow field which has had some time for native species to regenerate; however although 14 native species (including 8 herbs) were recorded at Q5, they were recorded in such low abundances that weed cover was still assessed to be 99%. A single White Box was recorded in the quadrat; however it is isolated within the regularly cropped paddock.



Photograph A.1 **Louenville Q4**



Photograph A.2 **Louenville Q5**

Table A.1 Examples of data collected from low diversity grassland within 20 x 50 metre quadrats

Family	Scientific Name	Common Name	Q4	Q5
WEEDS				
Asteraceae	* <i>Buglossoides arvensis</i>	Sheepweed	+	
Asteraceae	* <i>Centaurea calcitrapa</i>	Star Thistle		+
Asteraceae	* <i>Cirsium vulgare</i>	Spear Thistle		+
Asteraceae	* <i>Euchiton japonicus spp. complex</i>	Father-and-Child Plant		+
Asteraceae	* <i>Hypochaeris glabra</i>	Smooth Catsear		+
Asteraceae	* <i>Silybum marianum</i>	Variigated Thistle	+	+
Asteraceae	* <i>Sonchus asper</i>	Prickly Sowthistle	1	1
Brassicaceae	* <i>Brassica sp.</i>	-	+	
Brassicaceae	* <i>Lepidium africanum</i>	-		+
Brassicaceae	* <i>Rapistrum rugosum</i>	Turnip Weed	+	2
Fabaceae (Faboideae)	* <i>Medicago laciniata</i>	Cut-leaved Medic		1
Fabaceae (Faboideae)	* <i>Medicago minima</i>	Woolly Burr Medic		1
Lamiaceae	* <i>Stachys arvensis</i>	Stagger Weed	+	
Malvaceae	* <i>Sida spinosa</i>	-		+
Poaceae	* <i>Avena fatua</i>	Wild Oats		1
Poaceae	* <i>Hordeum leporinum</i>	Barley Grass		1
Poaceae	* <i>Lolium perenne</i>	Perennial Ryegrass	+	1
Poaceae	* <i>Triticum aestivum</i>	Common Wheat, Bread Wheat	2	
Polygonaceae	* <i>Fallopia convolvulus</i>	Black Bindweed	1	1
Polygonaceae	* <i>Polygonum aviculare</i>	Wireweed		1
Polygonaceae	* <i>Polygonum patulum</i>	Bellard's smartweed		+
NATIVES				
Asteraceae	<i>Calotis lappulacea</i>	Yellow Burr-daisy		+
Asteraceae	<i>Vittadinia cuneata</i>	Fuzzweed		1
Campanulaceae	<i>Wahlenbergia sp.</i>	Bluebell		1
Chenopodiaceae	<i>Einadia nutans ssp. linifolia</i>	Climbing Saltbush		+
Chenopodiaceae	<i>Sclerolaena birchii</i> (syn. <i>Bassia birchii</i>)	Galvanized Burr		+
Geraniaceae	<i>Erodium crinitum</i>	Blue Storksbill		+
Myrtaceae	<i>Eucalyptus albens</i>	White Box		1
Oxalidaceae	<i>Oxalis sp.</i>	-		+

Table A.1 Examples of data collected from low diversity grassland within 20 x 50 metre quadrats

Family	Scientific Name	Common Name	Q4	Q5
Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass		1
Poaceae	<i>Austrostipa verticillata</i>	Slender Bamboo Grass		+
Poaceae	<i>Bothriochloa sp.</i>	-		+
Poaceae	<i>Chloris truncata</i>	Windmill Grass		1
Rutaceae	<i>Geijera parviflora</i>	Wilga		+
Solanaceae	<i>Solanum ferocissimum</i>	Spiny Potato-bush		+
		species richness	0	14
		no. of non grassy understorey species	0	11
		ground cover %	25	55
		weed cover %	100	99
		canopy regen %	0	0

A.6 Conclusion

Derived native grassland that is listed under the EPBC Act overlaps with some of the higher condition TSC Act derived native grasslands. The EPBC Act criteria provide a very clear prescription and cover relatively high condition grasslands with a considerable diversity of native herbaceous plants other than grasses.

The TSC Act includes a wider range of grassland condition than that of the EPBC Act, but does not have a precise threshold. However, it is reliant on making a judgement as to whether or not the grassland could return to woodland via natural regeneration.

The low diversity grasslands of the Project Boundary and within some proposed offsets do not fit either the EPBC Act or TSC Act definitions.

A.7 References

DECC (NSW) (2007). **Guidelines for Identifying Endangered Ecological Communities: White Box – Yellow Box – Blakely’s Red Gum Woodland.**

DECCW (NSW) (2010). **Draft National Recovery Plan for White Box - Yellow Box - Blakely’s Red Gum Grassy Woodland and Derived Native Grassland.** Sydney, NSW DECCW.

McIntyre, S., J. G. McIvor, et al. (2002). **Managing and Conserving Grassy Woodlands.** Collingwood, CSIRO Publishing.



NSW NPWS (2005). **Identification Guidelines for Endangered Ecological Communities: White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)**. Hurstville NSW, National Parks and Wildlife Service.

Rawlings, K., D. Freudenberger, et al. (2010). **A Guide to Managing Box Gum Grassy Woodlands**, Caring for our Country Environmental Stewardship.

Appendix B

Offset Survey Methodology

B.1 Introduction

B.1.1 Background

At the time of submission of the Environmental Assessment (EA) for the Maules Creek Coal Project (the Project), preliminary on-site investigations of the Eastern, Western and Northern Offset properties had been conducted with the expectation that further surveys would be completed.

Additional flora and fauna field surveys were subsequently undertaken in September 2011 of the Eastern, Western and Northern Offset properties. This Appendix provides a description of the methodologies used and figures of the sampling locations within these properties.

B.1.2 Aim of Field Surveys

The purpose of the additional field studies was primarily to collect further baseline flora and fauna data from the offset properties and to develop a more detailed vegetation map. Of particular focus were fauna groups of relevance to the Project Boundary (i.e. birds, bats) and vegetation conforming to Box Gum Woodland and Derived Native Grassland listed as threatened under both the State and Commonwealth legislation.

Another objective of the additional field studies included collecting data on site specific management issues (e.g. major problem weeds, access, track establishment where required, fencing requirements etc) that would assist in the preparation of the draft Biodiversity Offset Management Plan (draft BOMP).

B.2 Literature Review

The existing body of information regarding potential and actual threatened species occurrences in and around the offset properties form a valid component of the baseline information. As such, a review of past surveys of the offset properties (where available) and surrounding land were completed. Threatened species records available from government databases were also examined.

B.2.1 Literature Review

The Leard State Forest and its surrounds have been subject to detailed flora and fauna studies since the late 1970s and are relevant to the Eastern and Western Offset properties. Earlier studies by James B. Croft & Associates (1979) and Dames and Moore (1983, 1984) were considered when assessing the potential occurrence of threatened species in the Eastern and Western Offset properties.

There has also been considerable ecological survey effort within the locality of Leard State Forest in recent times for baseline data by Government and Industry. The contemporary studies completed within Leard State Forest and within the Leard State Conservation Area

include those completed by Hunter (2007), ELA (2010), Parsons Brinckerhoff Pty Ltd (2010), Cumberland Ecology (2011) and OEH (2011).

For the Northern Offset properties, we reviewed information regarding the flora and fauna of the Barraba area and Mount Kaputar National Park (DEC (NSW), 2006).

B.2.2 Database Analysis

Threatened species records obtained from the Atlas of NSW Wildlife database (OEH, 2011a) were examined for an area within a 10 km radius of the offset properties to gain an understanding of the known distribution for species relevant to the Project.

Protected Matters predicted for the offset areas were obtained using the EPBC Protected Matters Search Tool (SEWPaC, 2011). The Protected Matters Search Tool provides a list of MNES that are predicted to occur based on the presence of suitable habitat, which was useful for informing threatened species searches during field survey.

B.3 Survey Properties and Field Dates

The proposed offset properties that were subject to additional survey include some of those listed in **Table C.1** below. The surveys were conducted over two sessions:

- Eastern and Western offset properties (12-16 September 2011, five days/four nights); and
- Northern Offset properties (26-30 September 2011, five days/five nights).

The Shared Property and Wallandilly were not surveyed at the time as access was not available for these properties.

Table B.1 Properties Subject to Further Field Investigation

Offset Area	Property	Area_ha
Eastern	Kelso	507.82
	Louenville	458.89
	Olivedeen	193.37
	Blue Range	748.07
	Teston (north)	292.26
	Tralee	342.14
	Cattle Plain	284.08
Shared	Wallandilly	1889.62
	Shared Offset	884.29
	Teston (south)	1272.50

Table B.1 Properties Subject to Further Field Investigation

Offset Area	Property	Area_ha
Northern	Velyama	919.50
	Warriahdool	1010.53
	Mt Lindesay	2429.81
	Wirradale	4321.22

B.4 Weather Conditions

The following tables (**Table B.2** and **Table B.3**) provide weather data for the survey period. Weather observations for the Eastern and Western Offset surveys were drawn from the Narrabri Airport station. Weather observations for the Northern Offset surveys were drawn from the Barraba Post Office station (Bureau of Meteorology (BOM) 2011).

B.5 Flora Surveys

B.5.1 Quadrat Sampling

A total of 43 quadrats were sampled in 20 x 50 metre plots to maintain consistency with the dataset collected from the Project Boundary. The locations of these quadrats were chosen so that sampling was conducted in areas most representative of the condition and composition of the vegetation patch (where access permitted). These quadrat locations are shown in **Figure B.1** and **Figure B.2**. In each quadrat, the following information was recorded as a minimum:

- All vascular flora species present within the plot or directly adjacent to the plot;
- The stratum in which each species occurred;
- The relative frequency of occurrence of each plant species;
- Vegetation structural data (i.e. height and percentage cover of each stratum);
- The proportion of weeds in each stratum as a percentage cover;
- A waypoint to mark the location of the quadrat, using a handheld GPS; and
- Photographs of the quadrat.

The relative abundance and cover of each species within the quadrat was approximated using a scoring system based on the Braun-Blanquet scoring system (Braun-Blanquet, 1927). The scores used are provided in **Table B.4**.

Table B.2 Weather Conditions during the Eastern and Western Offset Surveys (Narrabri Airport AWS station 054038)

Date	Minimum temperature		Rainfall (mm)	9am		9am wind		3pm		3pm wind	
	(°C)	Maximum (°C)		Temperature (°C)	humidity (%)	speed (km/h)	direction	Temperature (°C)	humidity (%)	speed (km/h)	direction
12/09/2011	1.5	18.2	0.6	11.6	69	SSE	13	17.6	40	SE	20
13/09/2011	2.2	20.6	0.2	13.5	56	W	4	20.5	33	WNW	11
14/09/2011	2.8	22.9	0	17.5	43	NNW	9	22.4	23	W	13
15/09/2011	3.6	25.7	0	19.1	35	NNW	22	25.3	22	W	19
16/09/2011	4.6	27.8	0	19.9	35	N	17	27.6	21	W	17

Table B.3 Weather Conditions during the Northern Offset Surveys (Barraba Post Office station 054003)

Date	Minimum temperature (°C)		Rainfall (mm)	9am		9am wind		3pm		3pm wind	
	temperature (°C)	Maximum (°C)		Temperature (°C)	humidity (%)	speed (km/h)	direction	Temperature (°C)	humidity (%)	speed (km/h)	direction
26/09/2011	3.8	22	0	15.1	59	Calm		21.1	37	SSE	4
27/09/2011	2.7	24.5	0	12.4	63	Calm		23.1	32	SE	6
28/09/2011	6.7	17.5	0	15.1	68		N	13.9	91	NNW	4
29/09/2011	12	18.9	42	13.4	96		N	17.7	38	W	15
30/09/2011	5.3	19.6	8	14.4	53	Calm		17.8	34	SW	11
1/10/2011	3	15	0	8.5	87	Calm		8.5	80		Calm

Table B.4 Modified Braun-Blanquet Scores

Class	Cover-abundance	Notes
+	Rare (less than 1 % cover)	Herbs, sedges and grasses: within 4 m ² Shrubs and small trees: less than 5 individuals.
1	Few Individuals (less than 5 % cover)	Herbs, sedges and grasses: within 20 m ² Shrubs and small trees: 5 or more individuals Medium - large overhanging tree.
2	5 - less than 25 % cover	-
3	25 - less than 50 % cover	-
4	50 - less than 75 % cover	-
5	75 - 100 % cover	-

B.5.2 Rapid Grassland Plots

A total of sixteen rapid grassland plots were collected to supplement the quadrat dataset. The purpose of collecting rapid plots was to maximise the sampling coverage of large areas of grassland as much as possible in a limited survey timeframe.

Rapid grassland plots were sampled within 20 x 50 m quadrats exclusively in grassland units dominated by grass species (i.e. shrublands and herbfields would be excluded from rapid sampling if they were present). As a minimum, the following were recorded:

- All vascular species in the ground stratum;
- Percentage ground cover;
- Percentage cover of litter, moss and bare ground;
- The proportion of weeds in the ground stratum as a percentage cover; and
- A waypoint to mark the location of the quadrat, using a handheld Geographical Positioning System (GPS).

Although the data collected from rapid plots cannot be analytically compared to the remaining dataset, they provide enough information to determine the condition and composition of grassland areas at their respective locations.

B.5.3 Groundtruthing Transects

The following methods of ground-truthing were undertaken as part of the vegetation mapping exercise:

- Meander transect surveys to obtain information on community distribution in the Project Boundary and surrounds; and
- Detailed walks of vegetation units and recording boundaries using a handheld GPS unit.

The resultant information was synthesised using Geographical Information Systems (GIS) to create a spatial database that was used to interpret and interpolate the data to produce a vegetation map of the offset properties. Aerial, topographical and geological data were also used to interpret the survey data. Mapping was completed using MapInfo Version 10.5 (Pitney Bowes Software Inc., 2010) on a Windows XP platform.

B.5.4 Assessing Condition of Box Gum Woodland

The condition classes described in the EPBC Act Listing Advice (Threatened Species Scientific Committee 2006) was used to map the condition of Box Gum Woodland and Derived Native Grasslands occurring in the offset areas:

- 'A' – An overstorey of eucalypt trees exists, but there is no substantial native understorey;
- 'B' – A native understorey exists, but the trees have been cleared; and
- 'C' – Both a native understorey and an overstorey of eucalypts exists in conjunction.

Reference to the identification guidelines published by the NSW National Parks and Wildlife Service was also made (NSW NPWS 2005) (**Table B.5**). Condition class 1 and 2 shown in the table below is considered to be equivalent to the EPBC Act condition class C; condition classes 3 and 4 are considered to be equivalent to the EPBC Act condition class B; and condition class 5 is equivalent to EPBC Act condition class A.

Table B.5 Identification Guidelines for Box Gum Woodland based on Condition (published by NSW NPWS)

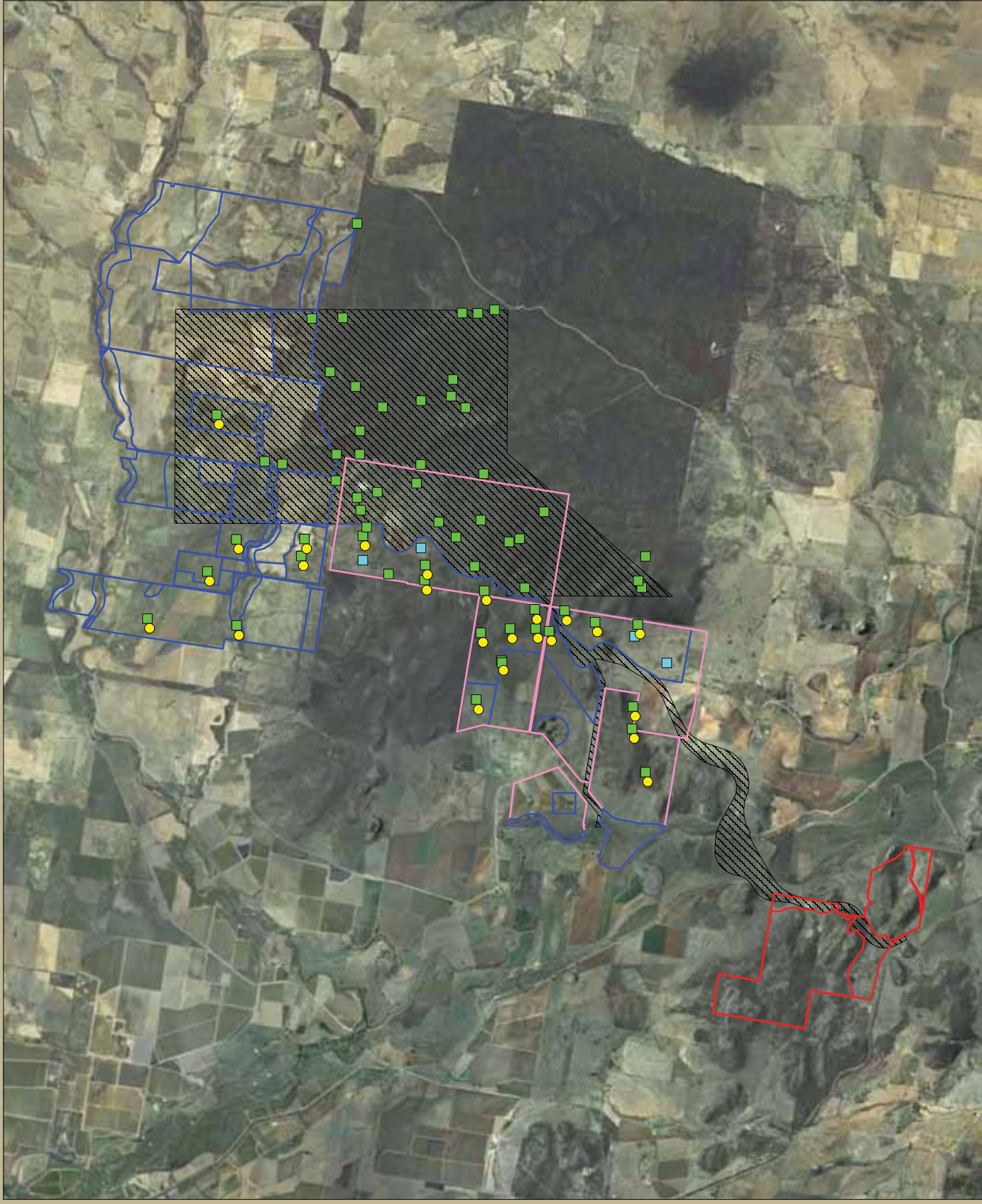
Condition Class	Description
1. Multi-aged overstorey with a Remnants in this condition are very scarce and are generally confined grassy herb-rich understorey	to travelling stock reserves, roadside vegetation, cemeteries, some national parks and the occasional private property
2. Partially cleared/thinned stands with a mixture of native and exotic understorey species	This condition is far more common than the above; however its long-term future is often insecure due to inadequate regeneration of overstorey species. Often current management (e.g. set-stocking) is inconsistent with tree regeneration.
3. Stands where White Box,	This condition occurs where the characteristic trees occur in

Table B.5 Identification Guidelines for Box Gum Woodland based on Condition (published by NSW NPWS)

Condition Class	Description
Yellow Box or Blakely's Red Gum have been killed and other species dominate the canopy	in conjunction with White Cypress Pine. The understorey is often in reasonable to very good condition.
4. Grasslands (secondary or derived grasslands), where the tree overstorey has been removed and only the Box-Gum Woodland understorey is present	This condition is likely to be reasonably common in some areas and is likely to be relatively easy to rehabilitate if appropriate management strategies are implemented.
5. Degraded remnants that have few, if any, native species in the understorey	This condition is typical of Box-Gum Woodland where agricultural practices have been more intensive (e.g. pasture improvement over long periods).

The Commonwealth considers condition class B vegetation to be of low to moderate condition representatives of the ecological community and class C to be a good condition representative of the ecological community. Condition class 5 and condition class C vegetation do not meet the EPBC Act definition for Box Gum Woodland and Derived Native Grasslands, which require a predominantly native understorey.

The quantitative assessments requested by OEHL and CMA and which have been prepared by Cumberland Ecology to respond to the supplementary submissions are considered to be a metric assessment that is independent of this condition assessment for Box Gum Woodland.

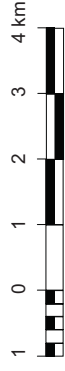


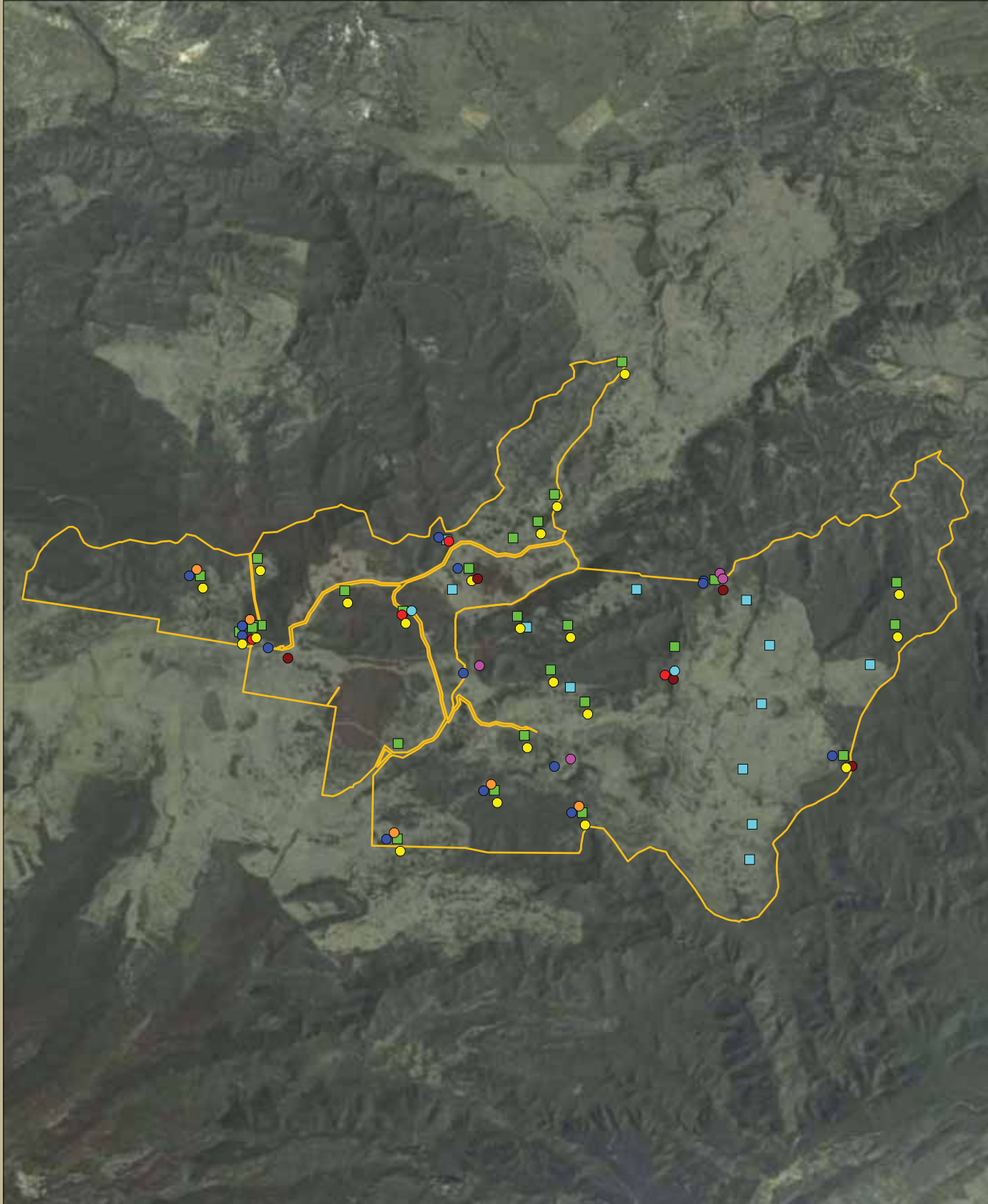
- Legend**
- Flora Survey Locations**
- Green square: Quadrat
 - Blue square: Rapid Assessment
- Fauna Surveys Locations**
- Red circle: Anabat (4)
 - Orange circle: Arboreal Camera (5)
 - Purple circle: Diurnal Area Search (14)
 - Yellow circle: Harp Trap (4)
 - Cyan circle: Hollow Count (45)
 - Dark red circle: Nocturnal bird survey (2)
 - Red circle: Terrestrial Camera (5)
- Property Boundaries**
- Hatched pattern: Project Boundary
 - Blue outline: Eastern Offset
 - Pink outline: Western Offset
 - Red outline: Shared Offset



Figure C.1 Field Survey Locations within the Project Boundary, Eastern and Western Offset Properties

* Note: Vegetation Communities are listed for the Impact Area and all Offset Areas



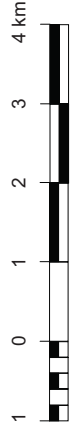


- Legend**
- Flora Survey Locations**
- Quadrat
 - Rapid Assessment
- Fauna Surveys Locations**
- Anabat (4)
 - Arboreal Camera (5)
 - Diurnal Area Search (14)
 - Harp Trap (4)
 - Hellow Count (45)
 - Nocturnal bird survey (2)
 - Terrestrial Camera (5)
- Northern Offset



Figure C.2 Field Survey Locations within the Northern Offset Properties

* Note: Vegetation Communities are listed for the Impact Area and all Offset Areas



B.6 Fauna Surveys

The focus of survey in the Eastern and Western Offset Areas was to confirm the occurrence of habitat that could support the fauna species known to occur in the Leard State Forest. In the Northern Offset Area, fauna survey aimed to detect the presence of species recorded in the Leard State Forest. The main target fauna groups were woodland bird species and microchiropteran bat species, which were the most prevalent fauna groups in the Leard State Forest.

Specialist ornithologists were engaged to assess the condition of the habitat in the Eastern, Western and Northern offset properties for threatened bird species known to occur in the Project Boundary. Anabat and harp trapping were conducted to detect bat species in the Northern properties where there is little baseline data available. Camera traps were deployed to collect further baseline information of resident species. Habitat data was collected including systematic hollow counts and field notes at each flora and fauna sampling site. These methods are described in further detail below. The locations of survey are shown in **Figure B.1** and **Figure B.2**.

B.6.1 Avian Surveys

i. Eastern and Western Properties

The aim of bird surveys of the Eastern and Western properties was to assess the quality of bird habitat. Each property was examined on foot over one to five hours. The duration of each visit was determined by the size of patches of remnant vegetation and habitat complexity. Hence, the method for collected bird data was not standardised.

All species detected by either sight or call, were recorded. The current state of the vegetation cover was noted as well as the current land-use affecting habitat areas on each property. Surveys were also conducted opportunistically within the Leard State Forest so that the types of habitat and the habitat quality on the offsets could be compared with those of the State Forest.

ii. Northern Offsets

Diurnal birds:

An area search by visual and aural cues was conducted at ten sites on Wirradale (26–28 September, sunrise–sunset, 1–2 hours per site for a total of 12 hours) and four sites on Mt Lindesay (26, 29–30 September, mid morning and afternoon, 1–3 hours per sites for a total of 8 hours), coinciding with vegetation survey plots, Anabat, harp trap or camera sites.

The vegetation on each offset property was also assessed subjectively for the presence of potential habitat for threatened birds (NSW TSC Act, EPBC Act) that have been recorded in and around Leard State Forest during surveys completed of the Project Boundary.

Nocturnal birds:

Call-playback of all local owl species' calls at two sites (upper Maules Creek at the waterfall on Wirradale, 26 September; Manna Gum gully on Mt Lindsay Road, 27 September), both at approximately 2030 h, followed by 10 minutes of listening for responses and spotlighting at each site. Each site was surveyed for two nights.

B.6.2 Microchiropteran Bat Surveys

i. Harp Trapping

Harp traps were established at four sites on the Northern Offset properties. Harp trapping was carried out at each site for no less than two consecutive evenings.

ii. Anabat Echolocation Detection

Anabat units were established at four sites on the Northern Offset properties. Anabat units were left out at each site for no less than two consecutive evenings.

B.6.3 Infra-red Camera Traps

Paired arboreal and terrestrial infra-red camera traps were established at five sites in the Northern Offsets

B.6.4 Hollow Counts

A regularised hollow assessment was conducted at 45 sites. At each sampling point, searches for hollow-bearing trees were made within a 20m x 50m quadrat. For each hollow-bearing tree identified the (1) species; (2) height and diameter at breast height (DBH); (3) number of hollows; and (4) size class of hollows were recorded. Hollow size classes are defined in **Table B.6** below. Data obtained was used to determine densities of tree hollows per ha of habitat proposed to be cleared.

Table B.6 Tree Hollow Size Classes

Class	Diameter (cm)
1	<5
2	5-10
3	11-15
4	16-20
5	21-25
6	26-30
7	>30

B.6.5 Other

i. Incidental Fauna Observations

Any incidental vertebrate fauna species that were heard calling, observed or otherwise detected on the basis of tracks or signs were recorded.

ii. Habitat Assessment

Notes relating to the presence of key habitat features were taken at each fauna survey site as well as at all flora quadrat locations. Notes were made about the following features as a minimum:

- Dominant overstorey species;
- Presence of flowering eucalypts;
- Presence of She-oak species;
- Recovery potential (signs of regeneration and general diversity of understorey);
- Proximity to wetland/ephemeral or permanent streams/soaks;
- Evidence of disturbance, clearance or fire; and
- Connectivity of the vegetation patch.

B.7 Summary of Survey Effort

The survey effort in the offset properties are summarised in **Table B.7** below.

Table B.7 Summary of Survey Effort for the Eastern, Western and Northern Properties

Survey Method	Survey Effort
Preliminary survey	
Site inspection and vegetation mapping	5 days (24-25 Nov, 2010; 29 Apr-1 May, 2011)
Flora Sampling	
Quadrats	43 quadrats
Rapid Assessments	16 plots
Diurnal Birds	
Day habitat search (east/west)	approximately 40-50 hours
Area search (northern)	W: 10 hours (12 sites); Mt L: 8 hours (4 sites)

Table B.7 Summary of Survey Effort for the Eastern, Western and Northern Properties

Survey Method	Survey Effort
Habitat assessment (northern)	throughout the week.
Nocturnal Birds	
Call playback and Spotlighting	two sites (each surveyed for two nights)
Non-flying Mammals	
Terrestrial Infrared cameras	25 survey nights
Arboreal Infrared cameras	25 survey nights
Microbats	
Harp trapping	15 trap nights
Ultrasonic call recording	15 survey nights
Hollow Counts	45 sites

B.8 Survey Limitations

The surveys are considered to be a brief “snap-shot” of the bird assemblage in the area and were not expected to detect spring-summer visitors. Surveys were slightly too early in the season to record most of the spring–summer migrants that are anticipated to arrive (e.g. some cuckoos, Rainbow Bee-eater, Dollarbird). Of these, many are likely to be common species, for instance, the Pallid Cuckoo (*Cacomantis pallidus*) and the Sacred Kingfisher (*Todiramphus sanctus*). However, it is possible that the Painted Honeyeater (*Grantiella picta*) and the Rainbow Bee-eater (*Merops ornatus*) would have been among these arrivals.

The opportunity to survey over an extended period of time and over many seasons would be also more conducive to detecting species that would occur in low densities and/or are rare in the tableland country like at Mt Lindesay and Wirradale, such as Square-tailed Kite (*Lophoictinia isura*) and Spotted Harrier (*Circus assimilis*).

Rain, wind and access-track condition also precluded call-playback at potentially the most conducive site for threatened owls, namely Maules Creek on Wirradale.

The overall length of survey of the offset properties (when considering that the surveys of the Leard State Forest has been surveyed many times over many seasons and years) is relatively short but the bird diversity recorded during the offset surveys is still comparable to the diversity recorded in the Leard State Forest. Many of the threatened species recorded in the Project Boundary were also recorded on one or more of the offset properties.

This indicates that the survey effort was more than adequate to gain information about the resident bird species in the offset properties and to ascertain the likelihood of occurrence of threatened species not detected. The existing bird assemblages and habitat characteristics

could be used to suggest which of the possible local threatened bird species could be expected to occur on each of the offset properties.

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Appendix C

Superb Parrot (*Polytelis swainsonii*)

C.1 Habitat and Distribution

The Superb Parrot is a medium-sized nomadic parrot endemic to inland south-eastern Australia. It has suffered a contraction in its historic range over the last century, mostly as a result of clearing for agricultural purposes and timber production; habitat degradation of breeding, nesting and forage sites; and the loss of wooded movement corridors on the inland slopes (Higgins 1999). Its current known distribution in NSW is widespread west of the Great Dividing Range, mostly in the inland slopes and central plains, in the Darling Riverina Plains, Brigalow Belt South, Cobar Penneplain, Riverina and NSW South Western Slopes bioregions (DSEWPaC 2012, Baker-Gabb 2011). The breeding range of the species is restricted to three main geographically separate areas in the southern Riverina, slopes and tablelands of NSW.

The species is known to undertake seasonal movements from the Riverina and is considered a non-breeding winter migrant to northern NSW (Namoi and Gwydir regions) where its range extends north to Narrabri and Wee Waa. Flocks of birds are dispersive and travel large distances in response to food supply and drought conditions (Higgins 1999). In the north-central regions, Superb Parrots typically forage in River Red Gum (*Eucalyptus camaldulensis*) forest and Box eucalypt (Yellow, Black and Western Grey Box), or *Callitris* pine woodland between April and August (DSEWPaC 2012). The species prefers grass seeds and herbaceous plants; but will also forage on fruits, berries, nectar, flowers and occasionally insects in a range of habitats including remnant woodland, grazing land and crop land (Barrett et al 2003).

The Project Boundary contains vegetation communities that offer ostensibly suitable forage habitat for the species, including preferred Box eucalypt woodland, Cypress pines forest and grazing land (**Table D.1**).

C.2 Likelihood of Occurrence

C.2.1 Data Analysis and Literature Review

Interrogation of the OEH Atlas of NSW Wildlife database (DECCW, 2010a) indicates that 18 records exist for the Superb Parrot within the Narrabri LGA. The closest and most recent record, in 2009, is located near the town of Narrabri, approximately 40km north-west of the Project Boundary (see **Figure D.1** below). Previous records (2001 and 2004) exist further away from the Project Boundary, to the north of the Pilliga East State Forest.

Table C.1 Vegetation communities in the Project Boundary that offer forage habitat for the Superb Parrot

Associations	Vegetation Communities
Red Gum/Ironbark forests	Dwyer's Red Gum woodland
	Dwyer's Red Gum - Ironbark woodland
	Narrow-leaved Ironbark - White Cypress Pine shrubby open forest
	Silver-leaved Ironbark heathy woodland
RF elements	Cliff and scree Thickets (Rainforest Species)
Riparian forests	Melaleuca riparian forest
	River Red Gum riparian woodlands and forests
	White Box - Blakely's Red Gum - Melaleuca riparian forest
White Box, Yellow Box, Blakely's Red Gum woodlands	White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest
	White Box - Narrow-leaved Ironbark - White Cypress Pine shrubby open forest
	White Box - White Cypress Pine grassy woodland
	Yellow Box - Blakely's Red Gum grassy woodland
Belah associations	Belah woodland
	Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland
	White Box - Wilga - Belah woodland
Grasslands	Plains Grassland
	Derived Native Grassland
	Derived Native Grassland (Low Diversity - Ironbark Woodland)
	Derived Native Grassland (Low Diversity - White Box Woodland)
	Derived Native Grassland (Low Diversity - with scattered Poplar Box trees)
	Exotic grassland
Cultivated areas	Wheat Field (with scattered Ironbark trees)
	Wheat Field (with scattered Poplar Box trees)
	Wheat Field (with scattered White Box trees)
	Crop land on basalt soil (with scattered White Box)

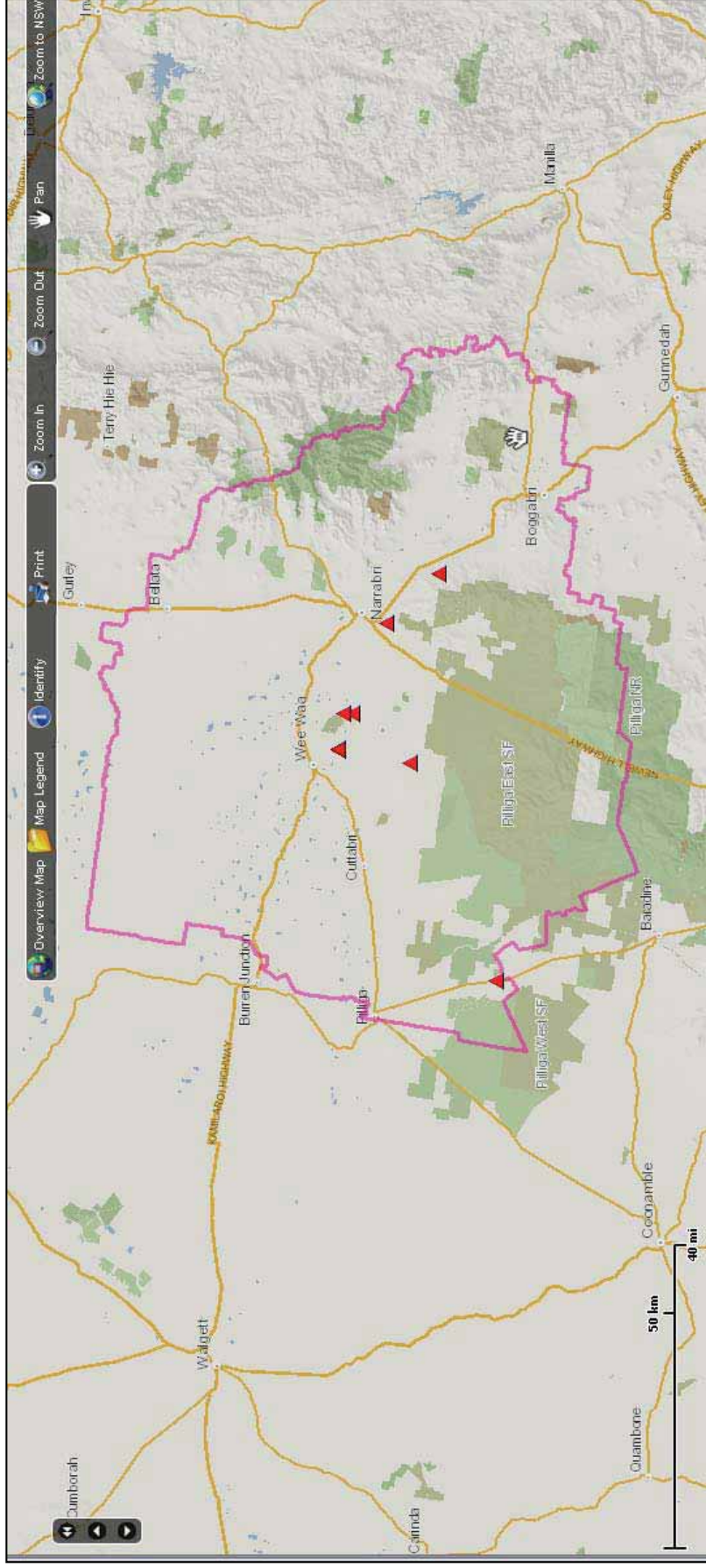


Figure C.1 Known occurrences of Superb Parrot in the Narrabri Local Government Area (source: OEH Atlas Records)

Bird surveys have been conducted within the Project Boundary and in many nearby areas of forest and woodland and collectively these provide a substantial database of bird records. The following studies were utilised to assess the likelihood of occurrence of the Superb Parrot within the Project Boundary:

- Narrabri LGA Count and locality records from the Wildlife Atlas;
- Croft and Associates bird survey results (1979);
- Dames and Moore bird survey results (1983-1984);
- Cumberland Ecology bird survey results (2008 & 2010)
- Parsons Brinckerhoff bird survey results (2010); and
- Eco Logical bird survey results (2010).

The Western Regional Assessments of the Brigalow and Nandewar bioregions was reviewed (DECC (NSW), 2009), as were studies undertaken within the locality of Leard State Forest and nearby national parks and state conservation areas for baseline data by Government and Industry (DEC (NSW), 2006b, Hunter, 2007, Harden, 2008, Butler, 2009, ELA, 2010, Parsons Brinckerhoff Australia Pty Ltd, 2010, OEH (NSW), 2011).

None of these studies recorded Superb Parrot within the Project Boundary, Leard State Forest or locality (defined here as being within 20 km of the Project Boundary).

C.2.2 Field Survey

As discussed in the EA, numerous fauna surveys, including targeted threatened bird surveys, have been undertaken in the locality since the late 1970s. Cumulatively, this information provides a comprehensive overview of the likelihood of occurrence of the Superb Parrot in the Project Boundary. Despite surveys over many years and seasons, there are no records for the Superb Parrot in the locality of the Project Boundary.

C.2.3 Conclusion

The National Recovery Plan for the Superb Parrot (Baker-Gabb 2011) indicates that breeding habitat for the species does not occur in the Project Boundary. Breeding only occurs at the southern extent of the species' distribution, largely confined to south of 33 degrees, at three distinct areas around the Riverina and south-west slopes regions.

The Recovery Plan indicates the species may occur in the Namoi region (see **Figure D.2** below); however based on the biology and ecology of the species, this only represents potential winter forage distribution.

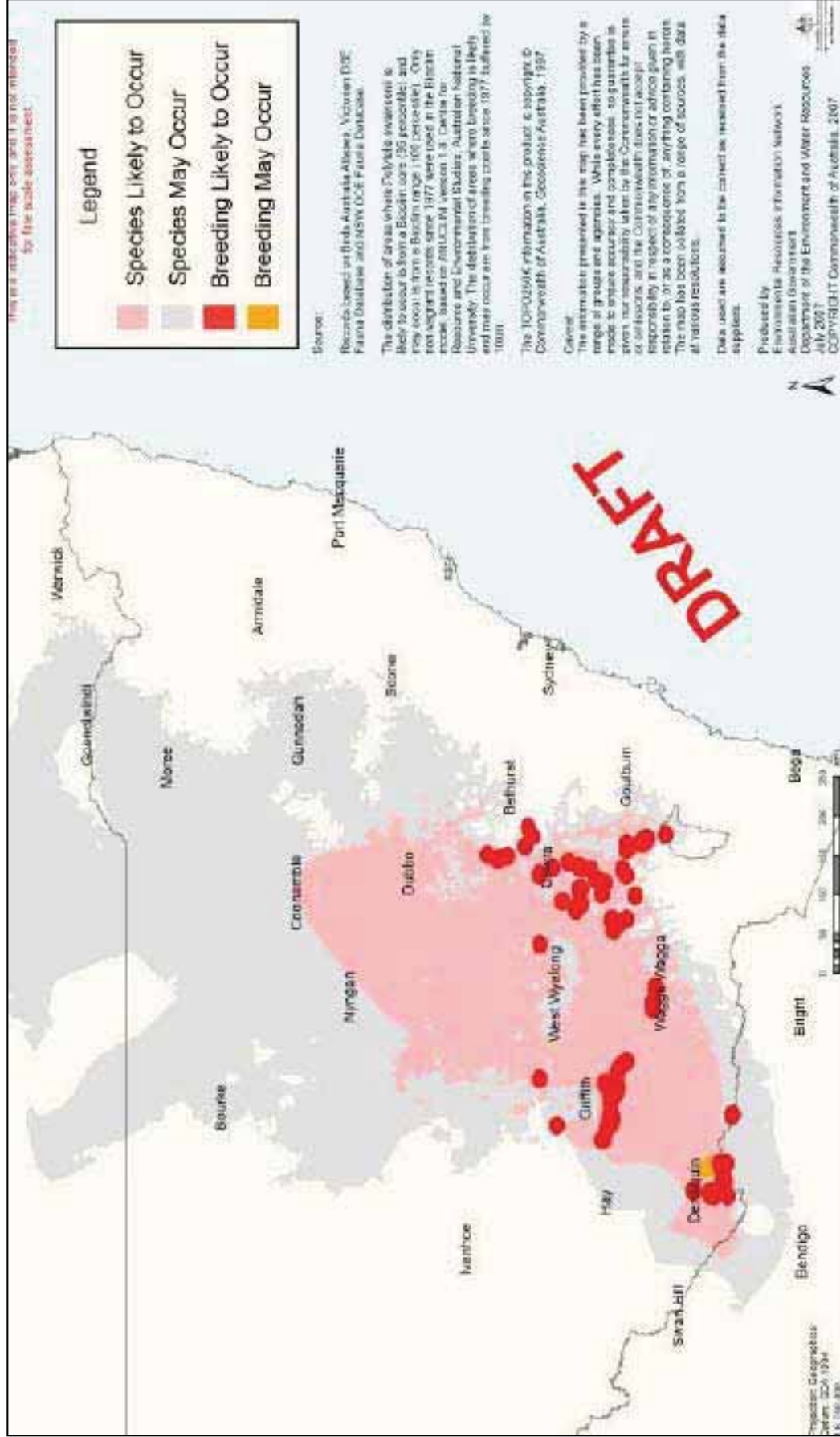


Figure C.2 Distribution of Superb Parrot *Polytelis swainsonii* (source: Baker-Gabb 2011; National Recovery Plan)

Despite the availability of suitable forage habitat in the Project Boundary, the Superb Parrot is not a confirmed or frequent visitor to the locality and is therefore not considered dependent on habitat within the Project Boundary. The clearing of potential forage habitat will not impact the species as the Superb Parrot is dispersive in response to the availability of suitable food resources and would still be able to utilise forest and woodland elsewhere in the region.

Due to the lack of records of the species in the locality (both Atlas and field survey results) over the past 20 years, the Superb Parrot is not considered likely to be impacted by the loss of habitat associated with the Project.

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