

BOGGABRI COAL MINE

Response to Submissions

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VOLUME 1/2

CONTINUATION OF BOGGABRI COAL MINE ENVIRONMENTAL ASSESSMENT

RESPONSE TO SUBMISSIONS

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CONTINUATION OF BOGGABRI COAL MINE ENVIRONMENTAL ASSESSMENT RESPONSE TO SUBMISSIONS

for **Boggabri Coal Pty Limited**

1 INTRODUCTION

Boggabri Coal Pty Limited (Boggabri Coal) is a wholly owned subsidiary of Idemitsu Australia Resources Pty Limited which operates the Boggabri Coal Mine. Boggabri Coal currently operates under DA 36/88 which expires on 14 November 2011. To continue mining operations in 2011 a new Planning Approval will be required. Boggabri Coal submitted an Application (PA 09_0182) for Project Approval under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act) for the Continuation of Boggabri Coal Mine Project (the Project) on 12 October 2009.

Additionally, a Referral under the *Environmental Protection and Biodiversity Act 1999* (EPBC Act) was submitted to the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) on 15 December 2009. The Project was identified by SEWPaC as having a potential to have a significant impact on Matters of National Environmental Significance and was subsequently determined to be a “*Controlled Action*” under the EPBC Act on 5 February 2010. SEWPaC confirmed that the Project would need to be assessed through the “*accredited assessment*” process. The “*accredited assessment*” is a recognised process under a bilateral agreement between the State and Commonwealth Governments which means that a single assessment may be used by either authority during the approval process.

The Environmental Assessment Requirements for the Project were issued by the Director-General on the 17 December 2009. An Environmental Assessment (EA) in support of PA 09_0182 was placed on public exhibition between 15 December 2010 and 7 February 2011.

This report has been prepared in response to submissions received from interested stakeholders. Input into the report has been provided by the relevant specialists involved in the preparation of the EA, where required. A summary of all submissions received is included in **Appendix A** and a further summary of individual issues raised is included in **Appendix B**. Full copies of all submissions received are included in **Appendix C**.

The submission received from SEWPaC on 2 March 2011 is being responded to separately. A copy of this response will be provided to the Department of Planning (DoP) in the near future once it has been finalised.

2 SUBMISSIONS

DoP received 214 submissions to the EA including regulators, Non-Government Organisations (NGOs) and individuals. Submissions were received from seven regulators including Industry & Investment NSW (I&I NSW), Department of Environment, Climate Change and Water (DECCW), NSW Office of Water (NOW), Roads and Traffic Authority (RTA), Namoi Catchment Management Authority (Namoi CMA), Gunnedah Shire Council (GSC) and Narrabri Shire Council (NSC). A further submission was received from SEWPaC. A copy of a report being prepared for them will be provided separately.

Submissions were received from seven NGO's, including: Colong Foundation for Wilderness, Northern Inland Council for the Environment, the Wilderness Society – Newcastle, Maules Creek Community Council (MCCC), Northern Forest Alliance, and the Environmental Defenders Office (EDO). One submission in support of the Project was received from the United Mine Workers Federation of Australia (UMWFA).

A large number of the submissions were received from 199 individuals via the online submission register located on the DoP website. These included submissions from 168 individuals with Australian postal addresses, 26 individuals with international postal addresses and five submissions from individuals with an unknown place of origin.

Of the 168 submissions from within Australia, two came from residents living in the Narrabri Local Government Area (LGA). The remaining individual submissions from Australia were received outside of the LGA and included from other states such as Western Australia and Queensland. International online submissions from individuals were received from the United States of America, Canada, United Kingdom, Ireland and others.

3 SUMMARY OF ISSUES

Stakeholders who provided a submission in relation to the Project are listed in **Table 1**. Each has been provided a unique 'submission ID'. **Table 1** presents the various environmental impact categories under which each of the issues can be broadly classified and a dot represents where a stakeholder has raised that issue.

To ensure that the specific issues identified within the submissions were appropriately investigated and responded to, a consolidated list of issues was developed and is presented in **Appendix B**. This consolidated list of issues in **Appendix B** is categorised according to the environmental categories provided in **Table 1** allowing the various issues identified by individual stakeholders to be tracked, a complete table of submissions received is included in **Appendix A**. The consolidated list of issues in **Appendix B** notes where each of the issues raised is addressed within this report.

Table 1
Summary of Submissions

Submission Received	Submission ID	Air Quality	Greenhouse Gas	Acoustics	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Health	General Project Statement
Regulator																		
Roads and Traffic Authority - Western Region	R1														•			
Department of Environment Climate Change and Water	R2	•		•		•	•	•	•					•		•		
Namoi Catchment Management Authority	R3						•		•					•				
Gunnedah Shire Council	R4			•											•			
Narrabri Shire Council	R5														•			
NSW Office of Water	R6									•								
Industry & Investment NSW	R7													•				•
Non-Government Organisation																		
The United Mine Workers Federation of Australia	NGO1																	
The Colong Foundation for Wilderness Limited	NGO2					•	•							•				
Northern Inland Council for the Environment	NGO3		•			•	•		•	•		•	•	•			•	
The Wilderness Society - Newcastle	NGO4		•			•	•			•		•	•	•				
Maules Creek Community Council	NGO5	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•
Community Stakeholders	CS		•		•	•	•			•	•	•	•	•	•		•	•

4 RESPONSE TO ISSUES

This section provides a response to each issue raised in the submissions as summarised in **Table 1** above and indicates by whom each issue was raised.

4.1 AIR QUALITY

4.1.1 Greenhouse Gas Emissions

Submission: NGO3, NGO4, NGO5 and CS

A number of submissions were received in regards to the Greenhouse Gas emissions from the Project. The submissions indicated that *“Boggabri Coal mine alone will produce 16.9 million tonnes of greenhouse gases each year. This is equivalent to 10% of all greenhouse gases emitted annually throughout the whole of NSW”*.

The greenhouse gas assessment for the Boggabri Coal mine presented in Section 10.4 of the Air Quality Impact Assessment (AQIA), (PAEHolmes 2010) was completed in accordance with the methodologies established by the relevant policies and guidelines, and using the National Greenhouse Accounts (NGA) Factors published by the (then) Department of Climate Change (DCC 2009a).

As shown in Table 10-9 of PAEHolmes (2010), approximately 97% of the CO₂-equivalent (CO₂-e) emissions generated by the Project are defined as Scope 3 emissions, and approximately 92% of the CO₂-e emissions are due to the usage of the product coal. As defined by the NGA, Scope 3 emissions *“are a consequence of the organisation’s activities but are not from sources owned or controlled by the organisations”*.

The product coal from Boggabri will be exported overseas, and as such CO₂-e emissions from the burning of this coal are not included in the calculation of CO₂-e emissions from NSW. Whilst it is accepted that no matter where the coal is burnt, the CO₂-e emissions will add to the global CO₂ load, it is not accurate to compare the total Scope 1, 2 and 3 annual CO₂-e emissions from the Boggabri Coal Mine with NSW annual CO₂-e emissions.

The reason for this is that only the Scope 1 and Scope 2 CO₂-e emissions from Boggabri Coal would be included in NSW CO₂-e emission calculations. The Scope 3 CO₂-e emissions that occur within NSW (e.g. rail transport) would be accounted for in the NSW totals as emissions released by the company that operates the railway.

However, a like for like comparison can be made as follows:

- The total CO₂-e emissions for the State of NSW in 2007 were 162.7 Mt CO₂-e (DCC 2009b). The average annual emissions estimated for the lifetime of the Project (Scopes 1 and 2) are 0.45 Mt CO₂-e. This is equivalent to approximately 0.28% of the total emissions for NSW in 2007.

The total (i.e. Scope 1, 2 and 3) emissions from the various activities at Boggabri Coal Mine would need to be compared with the total global emissions of CO₂ to provide a meaningful like for like comparison. This can be done as follows:

- Approximately 3,000 Gt of CO₂-e are currently estimated to be stored in the atmosphere. On this basis, average annual emissions over the life of the Project from the mining and burning of coal (including mining, transporting the coal to the Port of Newcastle and usage of the coal) are estimated to be 0.012% of the current global CO₂-e atmospheric load.

4.1.2 Air Quality Monitoring Network

Submissions: NGO5

A concern was raised over the potential impacts to air quality from the Project and the implementation of a real-time environmental monitoring system was recommended.

Boggabri Coal Mine will prepare a cumulative Air Quality Management Plan (AQMP) in consultation with Maules Creek and Tarrawonga coal mines, to ensure the ambient air quality monitoring in the region is sufficient to enable the mines to minimise the potential for adverse impacts.

The AQMP will 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 AQMP and associated monitoring program will include methods to provide information to the public.

It should be noted that there are currently no approved methods for the measurement of PM₁₀ in ambient air.

4.1.3 The Maules Creek Coal Project is not included in the AQIA

Submission: R2

It was recommended that the Maules Creek Coal Project should be included in the AQIA for the Project.

There are a number of reasons why emissions from the currently approved or now proposed Maules Creek Coal Project were not included in the AQIA for the Project.

The study has applied the principle of including approved developments in cumulative assessments and in some limited cases, developments where sufficient and reliable information is available. This is done to assist in cumulative modelling as it minimises confusion, and prevents double counting and misrepresentation of likely emissions in any subsequent cumulative assessments in the area that would be based on other previous studies.

It is noted that a conservative Total Suspended Particulates (TSP) / Run of Mine (ROM) ratio of 1.0 kg/t was applied to estimate total TSP emissions from mining operations at the Tarrawonga Coal Mine (formerly East Boggabri) as this information was not provided in the Heggies (2005) assessment for that mine.

However this was not done for the approved or proposed Maules Creek Coal Project for a number of reasons:

- Although there is an existing approval for the Maules Creek Coal Project to the north of the Project Boundary, no extraction activity has ever taken place at the site. It was understood during the preparation of the AQIA that the development of the mine would need to be undertaken in accordance with a new Project Approval rather than utilising the original approval granted in 1990. The 1990 Maules Creek Coal Project assessment (Nigel Holmes & Associates 1990) is dated and given the existing assessment requirements, would not provide appropriate information to assist in incorporating this into the cumulative impact assessment. As such, the approved mine was excluded from further consideration;
- The AQIA modelling and impact assessment for Boggabri Coal was conducted in January 2010, and put on public exhibition in December 2010;
- The information that was publically available on the Maules Creek Coal Project at the time of the Boggabri Coal Mine AQIA being undertaken did not contain sufficient detail to prepare a reliable cumulative assessment;
- A cumulative impact assessment including the proposed Maules Creek Coal Project based on publically available information would not provide accurate or reliable information and would potentially be misleading; and
- The cumulative assessment for the Maules Creek Coal Project AQIA will accurately consider the potential impacts of both the Project and the proposed Maules Creek Coal Project.

Notwithstanding the above, it should be noted that the Tarrawonga, Boggabri Coal and Maules Creek Coal Mines have commenced to work cooperatively to minimise potential cumulative air quality impacts in the area.

4.1.4 Background of 12 µg/m³ Used for the Cumulative Average Annual PM₁₀ Assessment Not Explained

Submission: R2

It was suggested that there was no explanation for the use of 12 µg/m³ as the background annual PM₁₀ concentration in the AQIA for the Project.

Accounting for non-modelled dust levels in an air dispersion modelling assessment of cumulative impacts is challenging over large scale areas due to the spatial variance of these sources. This is further compounded when mine operations are currently active and ambient monitoring already accounts for these activities.

However, there may be some confusion with the terminology used, which is explained as follows.

The DECCW Approved Methods contain the following definitions:

- Background levels: *"Existing concentrations of pollutants in the ambient air"*; and
- Incremental impact: *"The impact due to an emission source (or group of sources) in isolation, i.e. without including background levels"*.

Thus background levels in the area around an existing mine include dust from the existing mine activities and other sources. However, when an existing mine is expanded, the old mine ceases to exist when the new Project Approval is issued, and any incremental change in the background dust level is assumed to arise due to the new expanded mine as a whole.

It is inappropriate (contrary to DECCW definitions) to double count any measured existing mine dust and modelled future mine dust in a cumulative assessment.

Because of this, PAEHolmes apply a *"non-modelled"* dust level to the predicted dust levels from the expanded (or new) mine. It should be noted that this is not the background level, but part of it.

The contribution to background levels from non-modelled sources was determined by calculating the difference between the actual monitoring results and the modelled sources from existing operations. For example 2008 monitoring data is compared to mine-alone predictions made for 2008 operations using 2008 weather and 2008 mine activity data.

At the time the background contribution was determined, monitoring data was only available to July 2009 and showed a rolling annual average PM₁₀ concentration of 16 µg/m³. The predicted impacts for the current Boggabri Coal Mine was determined to be approximately 4 µg/m³, resulting in a contribution from non-modelled sources of approximately 12 µg/m³.

It is noted that another reason that this approach is applied to reduce the inherent modelling error or bias by accounting for this in both the existing and future case. That is if the mine alone contributions are overestimated, this is compensated for by underestimated contributions from non-modelled sources, and vis-a-vis. In this way only the error or bias commensurate with the (relatively smaller) incremental change arises in the final predictions.

4.1.5 Air Quality Monitoring Network

Submission: R2

"Further information outlining the detail of mine's air quality management program" was requested.

Boggabri Coal Mine will update the existing AQMP in consultation with the other adjacent coal mines. This will ensure that the ambient air quality monitoring in the region is sufficient to minimise any potential adverse impacts at sensitive receptors. A coordinated monitoring network will ensure any potential cumulative impacts are identified and relevant corrective actions implemented.

The AQMP will combine a network of real-time monitors and meteorological data to enable regular assessment of air quality in the area and if necessary re-location, modification or cessation of operations to ensure compliance with any relevant conditions of Project Approval.

As discussed in the EA, Boggabri Coal will consult with DECCW in the development of the relevant management plans and monitoring programs as part of the likely Project Approval conditions.

4.1.6 Health impacts

Submission: CS

A concern was raised over the potential adverse health impacts from air borne dust generated from mining activities. A comprehensive AQIA was undertaken for the Project and is included in Appendix G of the EA. The AQIA was completed in accordance with the relevant guidelines as detailed in Section 8.1.1 of the EA. The cumulative impacts of the existing and approved mining operations that would coincide with the Project were considered in the assessment. The air quality modelling criteria was based on those specified in DECCWs modelling guidelines.

The AQIA indicated that the Project would exceed the recommended amenity criterion at two properties located to the south of the Project Boundary. The AQIA found that the Project will not have adverse health impacts on nearby receivers, live stock or agricultural production. Further to this Boggabri Coal will implement additional air quality monitoring systems which are described in Section 8.1.3 of the EA.

4.2 ACOUSTICS

4.2.1 Noise and Vibration Effects of increased train movements on Gunnedah, Curlew and Breeza residents

Submission: R4

Ultimately the Australian Rail Track Corporation (ARTC) is responsible for achieving the objectives and conditions of its Environmental Protection Licence (EPL). Boggabri Coal is willing to work with the ARTC if it identifies and wishes to adopt further noise management initiatives on its rail system. Boggabri Coal has consulted with the ARTC for the Project. Evidence of this consultation is included in Appendix E of the EA. To date, ARTC has not raised any regulatory non compliance issues against its EPL that would be required to be considered for the Project.

Despite this issue being the responsibility of ARTC as the relevant rail authority, Section 4.11 of the Noise Impact Assessment (NIA) (Appendix H of the EA) provides the relevant level of assessment to confirm any potential noise related impacts associated with the rail movements proposed by the Project.

It makes use of publically available information on the current rail movements that has been published by ARTC and confirms that the proposed increase in rail movements by the Project are likely to result in a very minor noise impact and is therefore considered acceptable.

4.2.2 Predicted Exceedances of the Noise Criteria and whether all Feasible and Reasonable Noise Mitigation Measures have been adopted

Submission: R2

Boggabri Coal has committed to the noise mitigation and management measures listed in Section 4.3 of the NIA (Appendix H of the EA) and Section 8.2.4 of the EA. Boggabri Coal has adopted all reasonable and feasible management measures that are appropriate for this type of operation in consideration of it being a brown field mine site with an existing mining fleet and infrastructure and its isolated location within the Leard State Forest. It should be noted that Boggabri Coal will continue to operate towards the north away, from the majority of private receptors located to the south of the Project Boundary.

The NSW Industrial Noise Policy (INP), which is the primary policy document referred to in the NIA as specified under the Environmental Assessment Requirements (EARs), recognises that extractive industries cannot, by their nature, be relocated to more remote areas away from sensitive receptors. The mine or quarry must be established where the resource is found for that resource to be developed. Mines and quarries therefore have limited potential for various options in alternative locations to achieve noise mitigation compared to other industrial developments and, in particular, cannot benefit from sensible land use planning decisions that can avoid or minimise noise impacts from other industries.

For this reason, it is not always feasible and reasonable to achieve the Project Specific Noise Levels (PSNL) recommended in the INP.

Boggabri Coal considers the proposed noise mitigation measures applied to the noise modelling represent all feasible and reasonable measures that are available for the Project.

4.2.3 Temperature Inversions

Submission: R2

DECCW has questioned a comment in the NIA regarding F and G class inversions being combined in the available weather data. This limitation in the data was recognised and therefore the assessment included stronger temperature inversions in the form of a combined inversion and source to receiver wind. Boggabri Coal believes the assessment is therefore appropriate for the area and considers the potential worst case scenario for noise enhancing weather conditions.

The issues raised by DECCW in their submission have been appropriately taken into account for the Project. Boggabri Coal is committed to establishing a Real Time Environmental Monitoring System (RTEMS) and will be obliged to operate its mining activities to the noise criteria set for the Project. Boggabri Coal will proactively manage its operations to meet the noise criteria set for the Project.

DECCW has further requested direct monitoring of temperature inversions via a minimum 60 m high tower. Boggabri Coal is currently in consultation with adjacent mining operations in relation to developing a regional real-time monitoring network. The proposed regional monitoring system will be developed in consultation with all relevant stakeholders and community. Boggabri Coal will review its existing Noise Management Plan in consultation with relevant stakeholders and to the satisfaction of the Director-General.

4.2.4 Sleep Disturbance

Submission: R2

Further information has been requested in relation to the sleep disturbance assessment method in the NIA. As stated in the Section 4.9 of the NIA (Appendix H of the EA), dozer track noise and train movements on the rail spur are the loudest potential sources of sleep disturbance and these sources were therefore the focus of this part of the assessment.

The 45 $L_{A1,1min}$ sleep disturbance contour was generated using the following method:

- For each assessed year, noise sources with a sound power level of 127 L_{Amax} , representing reasonable worst case dozer track noise were modelled at various locations within the mining area and on the existing coal stockpiles at the rail loadout facility. The sources were placed at the same locations in both the $L_{Aeq,15min}$ and L_{Amax} noise models. Figures B2, B4, B6 and B8 in the NIA show the source locations, for dozers and other sources, for the evening and night for years 1, 5, 10 and 21 respectively;

- Sources with a sound power level of $126 L_{Amax}$, representing an entire coal train travelling at 50 km/h, as shown in Table 6 in the NIA, were also placed at 100 m intervals along the rail spur;
- Noise contours representing the maximum (rather than sum) of all dozer track sources for each year were calculated, on the basis that track noise could possibly be produced at any one of the locations but is unlikely to be produced at two locations simultaneously;
- Noise contours representing the maximum (rather than sum) of all train sources on the rail spur were calculated, on the basis that only one train would be on the rail spur at any time; and
- Overall contours representing the maximum noise level from either dozer tracks or a train movement on the rail spur were then produced and the 45 L_{Amax} contour, for all years, was prepared and is presented in Figure 4 of the NIA.

4.2.5 Regulatory Noise Limits

Submission: R2

DECCW has requested the existing consent noise limits of 35 $L_{Aeq,15min}$ during all time periods and 45 $L_{A1,1min}$ at night be retained.

The background noise level adopted for the Project was 30 dBA and is described in Section 8.2.2 of the EA. This takes into consideration that there are already two existing coal mines operating in the area. This demonstrates the ability of the existing operations to manage their noise emissions.

Boggabri Coal believes it has considered all reasonable and feasible noise mitigation measures appropriate for the Project and in consideration of the nature and sensitivity of the existing environment in which the Project is located. The noise mitigation measures are summarised in Section 8.2.4 of the EA. Any noise criteria applied to the Project should be considered in context with the NIA in Appendix H of the EA.

Boggabri Coal has undertaken high level assessments to assess the practicality and feasibility to further reduce noise levels than what is described in the EA. These preliminary assessments have indicated that there would be a disproportionately lack of certainty of material benefits against costs. It is considered that any benefits, in the context of noise effects on the limited number of noise affected properties and the acoustic environment generally, would not be material which is weighed against the costs and lack of certainty of achieving such intangible benefits.

In addition Boggabri Coal is committed to and accepts that there will be a revised Noise Management Plan that will include real time noise monitoring enabling prognosticative conclusions as to the acoustic environment and mining effects.

This will provide the ability for anticipatory and early response to noise sensitive circumstances enabling proactive and early management responses.

It is noted that DECCW has acknowledged the high level of noise compliance by Boggabri Coal at its existing operation. This is the result of the 'high ground' position taken by Boggabri Coal to proactively and effectively manage its operations in the context of the noise effects and the acoustic environment. Boggabri Coal is committed to continue to apply this same level of proactive management.

Boggabri Coal has invested significant resources and will continue to adopt management practices to ensure noise emissions are minimised. These measures are summarised in Section 8.2.4 of the EA.

Consultation with near neighbours including all landowners within the identified Zone of Affection (ZOA) for the Project has occurred as described in Section 6.3.1 of the EA. Boggabri Coal has negotiated and reached agreements with a number of landowners and has since purchased several properties identified within the Project ZOA. Boggabri Coal will continue to consult with sensitive receivers and seek to establish relevant agreements following Project Approval.

Following the grant of any new Project Approval, Boggabri Coal will consult with adjacent landowners potentially affected by noise levels over 35 $L_{Aeq,15min}$ or 45 $L_{A1,1min}$ and establish relevant Agreements where possible.

4.3 VISUAL AND LIGHTING

4.3.1 Visibility from Mt Kaputar National Park

Submission: CS

It was raised that the Boggabri Coal Mine is already visible from the Mt Kaputar National Park and the additional disturbance from the Project would result in further visual impacts. A visual impact assessment was undertaken for the Project and is discussed in Section 8.3 of the EA and explained in further detail in Appendix I of the EA. Residences and roads to the North, East and West sectors are screened by the Willow Tree Range so they will not experience any adverse visual impacts from the Project. The Mt Kaputar National Park is located to the north of the Project Boundary and therefore it is not anticipated that adverse visual impacts will be experienced from any of the key viewing locations in this sector. The Mt Kaputar National Park will not be mined as part of the Project.

4.4 ECOLOGY

4.4.1 The Value of Leard State Forest within a Degraded Landscape

Submission: NGO2, NGO3, NGO5 and CS

The EA and supporting documentation including the Biodiversity Impact Assessment (BIA) (Parsons Brinckerhoff 2010a) and Biodiversity Offset Strategy (Parsons Brinckerhoff 2010b) identified the values of Leard State Forest within the surrounding degraded landscape.

The ecological value of the Leard State Forest has been considered and a provision has been made to retain forest habitat that will be added to, through a robust Biodiversity Offset Strategy so that at no time in the future, will the Leard State Forest be completely cleared. Rather, in the long term there will be a substantial net increase in forest and woodland habitat in the area.

Section 3 of the BIA notes that the Leard State Forest has been intensively logged for its timber resources on a regular basis up until the late 1970's / early 1980's. These activities have affected the quality and diversity of habitats for locally occurring Threatened species and it is likely that in the absence of the Project, these activities would continue throughout the Leard State Forest as productive timber develops. Forestry NSW has advised that the Leard State Forest is a low productivity forest, largely due to the low rainfall and poor growth conditions.

The Project will result in the loss of native vegetation and habitats on a local scale. Management measures proposed for the Project have followed the DECCW's policy for assessing the ecological impacts of proposed developments, with the primary aim to avoid, mitigate and compensate all identified impacts.

A number of mitigation measures and management strategies are proposed to limit the Project's impact on biodiversity. The proposed mitigation measures to reduce impacts on Leard State Forest are discussed in Section 8.4.3 and Section 8.5 of the EA.

Boggabri Coal has developed a robust Biodiversity Offset Strategy as presented in Section 8.5 of the EA commensurate with the impacts of the Project. The provision of offsets will place large areas of land under conservation management strategies, affording a greater level of protection to the area proposed to be cleared. The Biodiversity Offset Strategy has been developed in order to maintain and improve biodiversity values of the region within the medium to long term.

4.4.2 Leard State Forest is the largest vegetation remnant in the Liverpool Plains

Submission: NGO3 and NGO5

The EA in Section 8.5 and further in Section 3.2.3 of Appendix J of the EA acknowledge the value of the Leard State Forest as one of the largest remaining remnants within the Liverpool Plains. The Biodiversity Offset Strategy provides for the retention of part of this large remnant, through the expansion of the Leard State Conservation Area, and the creation of an east-west regional corridor to link existing remnant patches of vegetation within the Liverpool Plains region, as described in Section 8.5 of the EA. The Biodiversity Offset Strategy and post mine landscape will create a large patch of forest, consisting of woodland and rehabilitated land that will be larger than the original extent of the Leard State Forest. If these areas are complimented by additional offset lands from adjacent projects then the potential increase in biodiversity offset lands in the region would be substantial.

4.4.3 Impact on high levels of fauna diversity in Leard State Forest

Submission: NGO2, NGO3, NGO5 and CS

Very few terrestrial and arboreal mammal species were recorded. There was no strong evidence to suggest that the Leard State Forest supports a high level of fauna diversity in all cases. All impacts to the Leard State Forest will be offset through the creation of a robust Biodiversity Offset Strategy and in the longer term through the rehabilitation of the mining area. The proposed rehabilitation of Box Gum Woodland will maintain and improve faunal diversity in the long term. The Biodiversity Offset Strategy will provide a substantially larger area of vegetation and forested area under conservation than what currently exists. It should also be noted that other mine operators adjacent to the Project are likely to require further biodiversity offsets similar in nature to that proposed. This will compliment the Boggabri Coal Biodiversity Offset Strategy and will provide for even greater fauna habitat area and better vegetation linkages.

Only three arboreal mammal species, the Koala (very low density), Common Brush-tailed Possum and Sugar Glider, and very low diversity of small native terrestrial mammals, have been recorded within Leard State Forest. This is considered to be very low considering there is moderately good habitat for both terrestrial and arboreal mammals. In contrast these surveys recorded high densities of the exotic pest species, including Rabbits, Fox, Goat, House Mouse and Pig, possibly accounting for the low native mammal species diversity.

There was however, a high diversity of more mobile bird and mammal species (such as microbats) recorded within the Leard State Forest. The majority of these species utilise the Leard State Forest and its adjoining vegetation as a larger part of their home range for both foraging and roosting habitat. The Boggabri Coal Biodiversity Offset Strategy will conserve large patches of remnant vegetation in the Project Boundary.

The fauna habitats that occur within Leard State Forest were also identified within the biodiversity offset sites, therefore conserving habitat for fauna species that will be affected by the Project.

The conservation of these remnant areas of native vegetation within the biodiversity offset sites provides upfront compensation for the Project's impacts on locally occurring fauna species. A critical component of the strategy would be the restoration and establishment of a Regional East-West Wildlife Corridor linking the Leard State Forest with the Namoi River and large vegetation remnants to the west. The inclusion of these lands as potential biodiversity offsets would provide corridor linkages for fauna species within the locality, which is currently highly fragmented.

4.4.4 The Impacts of forestry overstated within Leard State Forest

Submission: NGO3

The EA and ecological assessment has not overstated the historic impacts of forestry activity. Data has been presented to show that the majority of trees are regrowth and there is evidence in relation to some fauna groups that the fauna is not high diversity (e.g. ground dwelling fauna are low diversity).

Detailed field surveys throughout the Leard State Forest identified large stumps within the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland (Box Gum Woodland) communities. Commercial harvesting was not limited to Cypress Pine (*Callitris* spp.) with Ironbark also particularly targeted throughout the Leard State Forest. The largest and most desirable commercially viable Ironbark has been harvested from the Box Gum Woodlands associated with the more fertile soils. The impacts of previous forestry operations and grazing have clearly altered the structure of the canopy within these communities. Furthermore the logging of Ironbark and Cypress Pine species throughout the skeletal shrubby woodland communities has in some areas resulted in significant disturbance with logging coops and snick tracks relatively common.

4.4.5 Misrepresentation of the condition and habitat of the White Box communities within Leard State Forest

Submission: NGO3

The condition of the Box Gum Woodland communities within the Project Boundary were accurately recorded within the EA in Section 8.4.1 and the BIA in Section 3.1.3;

"The White Box – White Cypress Pine Woodland in the Project Boundary was in moderate to good condition, with high native species diversity and low weed density. While the majority of the community has been subjected to forestry operations in the past only minor changes in structure were observed, minor clearing associated with existing access tracks was also observed. The edge effects along the adjoining roads were the main source of current disturbance."

Section 3.1.4 of the Biodiversity Assessment (Parsons Brinckerhoff 2010a) clearly identified the habitat quality of the Grassy Woodlands within the forest as;

"Given the presence of numerous tree hollows and the role of remnant vegetation in providing connectivity amongst the surrounding cleared landscape, Grassy Woodlands on fertile soils in the Project Boundary was considered to have moderate to good value for fauna."

"As with the majority of vegetation in Leard State Forest, this habitat has been structurally simplified as a result of previous disturbance regimes, however, the paucity of such vegetation at a landscape scale suggests that it is likely to provide important resources for native fauna at a landscape scale."

And later;

“Grassy Woodlands habitat on fertile soils in the Project Boundary provided a variety of tree hollows (Table 3-6) and stages suitable as nesting opportunities for birds, nesting dens for arboreal mammals and roosting habitat for microchiropteran bats.”

As noted in Section 8.4 of the EA, while the Grassy Woodlands within the Project Boundary were generally considered to be of high quality, condition and diversity, the impacts of contemporary forestry operations and historic logging, grazing and firewood collection within the majority of Leard State Forest is evident.

4.4.6 Deficiencies of reserve system in the Brigalow Belt

Submission: NGO3

The Boggabri Coal Biodiversity Offset Strategy will be add to the existing reserve system in the Brigalow Belt by the inclusion of additional land that contains remnant vegetation and the opportunity to restore deforested areas. The *Brigalow and Nandewar Community Conservation Area Act 2005* (BNC Act) provided for the conservation of over 350,000 ha of woodlands within the Brigalow and Nandewar Bioregions to allow for improved conservation outcomes whilst allowing for the sustainable use of natural resources. The Leard State Forest was identified as 'Zone 4' and dedicated as State Forest under the *Forestry Act 1916* for the purposes of forestry, recreation and mineral extraction. Boggabri Coal considers that the proposed Biodiversity Offset Strategy is in keeping with the objectives of the BNC Act.

The Boggabri Coal Biodiversity Offset Strategy will provide for the conservation of up to 7,571 ha of land. This land consists of approximately 5,161 ha of similar condition existing vegetation / habitats to those proposed to be affected by the Project and provides for the restoration of over 1,385 ha of derived native grasslands within offsets over the medium to long term.

To ensure the conservation of lands in-perpetuity, the Boggabri Coal Biodiversity Offset Strategy will include the dedication of the identified offsets under a secure conservation arrangement. These conservation agreements will be developed in consultation with relevant stakeholders. The offset properties have been located outside of currently known mining tenements or lease areas to ensure long-term conservation of biodiversity

The Boggabri Coal Biodiversity Offset Strategy will provide approximately 787 ha of Box Gum Woodland communities that will also meet the requirements for conservation under the NSW National Parks Establishment Plan (see Section 8.5.5 of the EA).

4.4.7 Leard State Forest is a crucial stepping stone for connectivity

Submission: NGO3 and NGO5

Two submissions commented that the Leard State Forest is a crucial stepping stone for connectivity for locally occurring flora and fauna species.

Due to the staged nature of the Project, the progressive rehabilitation and the early commencement of conservation works in the Offset properties, a continuous corridor of vegetation will always remain in the mining area. In the long term the forest and woodland connectivity will be maintained and enhanced, improving stepping stone and corridor function within the landscape.

As discussed in Section 8.5.5 of the EA, Boggabri Coal agrees that any remnant vegetation is important for a number of ecological reasons including connectivity. This is why the proposed Boggabri Coal Biodiversity Offset Strategy contains large patches of remnant vegetation; including high quality habitats that adjoin existing vegetated lands and will create direct linkages or key stepping stones within a Regional East-West Wildlife Corridor. The Biodiversity Offset Strategy will form a critical component in the restoration and establishment of a regional ecosystem corridor, linking the Leard State Forest with the Nandewar Range, Namoi River and large vegetation remnants to the West. These lands will form part of a north-south corridor from the Mt Kaputar Range in the north to Kelvin State Forest in the south. The inclusion of these lands as biodiversity offsets provides additional conservation areas in the region for Threatened flora and fauna.

4.4.8 Leard State Forest is a critical corridor

Submission: NGO3 and NGO5

The Biodiversity Assessment (Parsons Brinckerhoff 2010a) and the Biodiversity Offset Strategy recognises that Leard State Forest is an important isolated patch of remnant vegetation and would have higher value if linked with adjacent patches of vegetation in the form of a Regional East-West Wildlife Corridor as shown in Figure 28 of the Biodiversity Offset Strategy. These combined offsets would facilitate linkages between these conservation reserves in the wider Brigalow Belt South Bioregion. Furthermore, they provide potential rehabilitation of important linkages between Leard State Forest and the Namoi River floodplain, and further to remnant vegetation of the Nandewar Range and the Pilliga Nature Reserve. Such corridors are likely to maintain and potentially increase the biodiversity values of the region for a greater diversity of vegetation community types and species.

4.4.9 Reduce the woody vegetation cover in the vicinity of Leard State Forest from 30.6% to 26.8% and thus cross a critical threshold leading to loss of species

Submission: NGO3

The Biodiversity Assessment has accurately addressed the landscape scale impacts of the Project and identified reductions in canopy cover and its relationship to species decline. This is discussed in detail in Section 3.2 of the BIA. Based on the threshold limits for woodland birds suggested by Bennet and Radford (2004), the Leard State Forest will be capable of maintaining viable populations of these species.

It should be noted that the Project together with other adjacent developments and their offsets, will create a significant cumulative net benefit that will have an even larger wooded area in the long term. Therefore it is very unlikely that the woody vegetation cover will dip below a threshold where such species disappear. It should also be noted that the Threatened species in the Leard State Forest are not unique and are widespread in many other forest and woodland patches in the locality, including the Nandewar Ranges. Even in a worst case scenario, which is not likely, the identified species in the EA will be able to recolonise the wooded area.

4.4.10 The only reason that Leard State Forest was not protected as a National Park during the Brigalow and Nandewar Western Regional Assessment was because of objections from the Department of Mineral Resources

Submission: NGO3

Boggabri Coal understands that careful considerations were taken into account regarding the relative conservation values of the Leard State Forest versus mining and other uses before the various zonings were applied under the BNC Act.

As discussed in Section 5.6 of the EA, the aims of the Brigalow and Nandewar Western Regional Assessments (WRA) were to deliver:

- Adequate and complete core data layers to inform regional land use planning, conservation and resource management;
- Enhanced partnerships between core agencies and interest groups concerned with natural resources and ecological sustainability, to increase sharing of information and to reduce duplication; and
- The identification of a comprehensive, adequate and representative network of protected and managed areas.

Based on the information collected during the WRAs, the NSW Government decided to conserve 350,000 ha of woodlands in the Brigalow and Nandewar bioregions through the establishment of the BNC Act. This provided a regional approach to the protection of important conservation values with an aim of long-term sustainability of the region's important timber, gas, mineral and apiary sectors.

The western portion of the Leard State Forest now known as the Leard State Conservation Area was identified as having high conservation value. The remaining areas of Leard State Forest were recognised as having valuable mineral reserves and therefore other areas were identified under the BNC Act as being more appropriate and having higher conservation value. The Leard State Forest was identified as Zone 4 which is the lowest conservation value rating under the BNC Act.

4.4.11 The Project will destroy 624 ha of one of the most significant and intact known remnants of the nationally-listed and critically endangered Box Gum Woodland.

Submission: NGO3, NGO4

The Box Gum Woodland within Leard State Forest has not previously been identified within any Recovery Plan or scientific committee's determinations or listing advice as a significant remnant (Department of the Environment and Heritage 2000, 2006b; Department of the Environment Water Heritage & Arts 2010; NSW Scientific Committee 2002; Planning NSW 2004; Prober & Thiele 1993, 1995; Threatened Species Scientific Committee 2006). Nor was this remnant identified by DECCW ecologists in the scientifically rigorous surveys and assessments completed as part of the NSW Western Regional Assessments for the Brigalow Belt South Bioregion (WRAs) for the Brigalow Nandewar Community Conservation Area Act 2005 (BNC Act) (Planning NSW 2004).

The Boggabri Coal Biodiversity Offset Strategy provides for the conservation of Box Gum Woodland. Box Gum Woodland species will also be replanted in the offset areas. Hence, the net impact will be to increase the occurrence of this community. This is consistent with the aims and objectives of the National Recovery plan.

The EA acknowledges the Project will impact on 624 ha of the Threatened Box Gum Woodland. The Project's impacts on this community were assessed in Appendix E of the BIA and deemed to be significant. However, these assessments also identified that the remaining 81% of the remnant within the Leard State Forest would not be impacted by the Project.

The EA identifies in Section 8.5 requirement for a Biodiversity Offset Strategy that meets the DECCW principles of no net loss and like for like to adequately compensate for the loss of Box Gum Woodland. The Biodiversity Offset Strategy meets these requirements through the provision of 786.9 ha of like for like remnant and 937.3 ha of derived grassland Box Gum Woodland with a total offset to impact ratio of 4.5:1.

4.4.12 Revegetation of Box Gum remnants will be difficult to achieve

Submission: NGO2, NGO3 and NGO5

During the design and development of the Boggabri Coal Biodiversity Offset Strategy, consideration was given to the areas identified for rehabilitation to maximise biodiversity outcomes.

The majority of potential rehabilitation areas occur adjacent to remnant vegetation as this will provide connectivity and maximise the likely success of rehabilitation of native species. All of the proposed revegetation areas have been located within derived native grassland with high natural regeneration potential.

As outlined within Section 8.16 of the EA the restoration of the remnant stands of Box Gum Woodland within the biodiversity offset lands will involve bushland regeneration. Revegetation techniques will include supplementary planting of tube stock from province seed collections, fencing to exclude stock, feral animal control, weed control, fire control and sediment and erosion control. This type of assisted natural regeneration will improve the diversity of native plant species that may be present within the soil seedbank and over time will increase the biodiversity of the Box Gum Woodland remnants.

The results of recent field surveys within the offset sites have identified that the derived native grasslands are in moderate condition, containing high numbers of native species, only moderate infestations of exotic species and some evidence of natural canopy regeneration. The good condition of these grasslands is further demonstrated by the recent discovery of three separate populations of the endangered *Digitaria porrecta* located within derived grassland areas of the 'Therandra' and 'Merriendi' properties which are included in the Boggabri Coal Biodiversity Offset Strategy (refer to Appendix D of this report). This species is known to be sensitive to significant disturbances and grazing (Department of Environment Conservation and Climate Change 2008). The values of these derived grasslands should not be understated and the restorative works required in many instances of this community will simply include the need to foster natural regeneration through fencing and some supplementary canopy planting.

As described in Section 8.16 of the EA for the rehabilitation of the mining area the existing Rehabilitation Management Plan will be revised to determine the best practice rehabilitation techniques, including soil amelioration, final landform, habitat features and planting techniques of native species in consultation with the relevant regulators and to the satisfaction of DoP. The clearing of Leard State Forest will be staggered over the 21 year life of the mine, with progressive rehabilitation occurring close behind the mining activities. Seed collection of native occurring flora species and retention of the topsoil are an integral part of the rehabilitation process. Different vegetation structure types will be targeted to recreate the pre-mining landscape and vegetation communities. The Rehabilitation Management Plan will include monitoring of rehabilitation success, management of weeds, and exclusion of stock and feral pests.

4.4.13 More active tree planting in Offset Areas

Submission: R3

The Biodiversity Offset Strategy as described in Section 8.5.5 identified the need for supplementary planting of canopy trees in association with natural regeneration of the derived grassland areas.

It is likely that a range of rehabilitation techniques will be investigated as part of the ongoing revegetation of the derived grassland areas within the biodiversity offsets. Ongoing monitoring will provide the opportunity to continually improve and refine successful revegetation techniques.

4.4.14 Potential impacts on groundwater dependent ecosystems including Stygofauna

Submission: NGO4, NGO5, CS

The potential for stygofauna to be impacted by the Project via declining water levels and changes in water chemistry was raised, and that a detailed survey for its presence and other groundwater dependent ecosystems should be undertaken.

It is acknowledged that stygofauna have been detected by researchers working in the alluvial aquifers in the Maules Creek catchment to the north of the Project Boundary. However, it is considered unlikely they are present in the Permian coal seams where the depressurisation is predicted to occur. This is because stygofauna can tolerate low concentrations of dissolved oxygen but cannot survive concentrations below 0.01 mg/L (Hancock et al 2005). The groundwater from the coal seams is considered likely to contain less than 0.01 mg/L dissolved oxygen and therefore will not support the existence of stygofauna. This is in contrast to the alluvial aquifers which contain higher concentrations of dissolved oxygen due to higher recharge rates and are therefore known to support stygofauna communities.

The Groundwater impact assessment included in Appendix O of the EA identified that any potential impacts on the surrounding groundwater alluvial aquifer would be less than one metre and would be undetectable from naturally occurring seasonal variations.

4.4.15 A number of Threatened species whose distribution matches the Project area have been excluded from assessment based on a lack of suitable habitat present within the "Study Area"

Submission: NGO5

The BIA (Appendix J, Section 2.8) outlines the assessment methodology used in determining the likelihood of occurrence of Threatened species recorded or predicted to occur in the locality of the Project. This assessment adequately considered a range of environmental and species specific characteristics, including population distributions, specific habitat requirements, density of records and species detectability. The results of this assessment are provided in appendix J of the EA.

4.4.16 The Project will result in the loss of important habitat for migratory and / or nomadic species

Submission: NGO5

The Projects potential impacts on important habitat for migratory and / or nomadic species was adequately assessed within Section 4.1.3 of the BIA.

This assessment determined the Project would potentially impact on important habitat for one migratory species, Regent Honeyeater and as such was assessed accordingly within the EA (Appendix J of the BIA).

The Boggabri Coal Biodiversity Offset Strategy will include substantial areas of existing and regenerated vegetation communities that will provide additional habitat for migratory and / or nomadic species. The staged nature of disturbance, progressive rehabilitation and upfront offsets will ensure that the habitat for these species will be increased.

Migratory species are governed and legislated under the EPBC Act and as such an assessment of the Regent Honeyeater and other migratory species was also provided and assessed within the EPBC referral submitted to SEWPaC.

4.4.17 Insufficient Biodiversity Cumulative Impact Assessment

Submission: R2, NGO3 and NGO5

Section 11 of the EA considered the cumulative impacts on biodiversity of the Project and adjacent future and proposed new developments in the locality. A Simultaneous Worst Case Cumulative Impact Scenario (SWCCIS) was developed to specifically address the potential cumulative biodiversity impacts. The assessment was based on the assumptions described in Section 11 of the EA and any publically available information that described the relevant developments that were considered in the assessment. This assessment provides a representative indication of the cumulative impacts in the unlikely event that all mining operations are operating at maximum capacity at the same time. The Boggabri Coal Biodiversity Offset Strategy will provide a long term quantitative gain of forest land and habitat area.

4.4.18 Inadequate landscape assessment for assessing cumulative impacts

Submission: R2 and NGO3

The Cumulative Project Boundary for the Biodiversity Impact Assessment includes the Project, Tarrawonga expansion, Maules Creek Coal Project and Goonbri Coal. The analysis of remnant patch size within the locality of the Cumulative Project Boundary was determined using the broad scale 1:100,000 remnant vegetation and derived native grassland cover mapping for NSW (Keith, D. S., C., 2006). A number of studies have shown that woodland species of animal require a certain level of vegetation cover within the landscape in order to maintain viable populations. For example, woodland birds have been identified as reducing in the landscape when native cover falls below 30% (Reid 2000). Similarly, within agricultural landscapes and grazing properties, a 30% woodland cover is required to maintain ecological sustainability (McIntyre et al. 2000; Wilson & Lindenmayer 1995). Generally, it is accepted that there is a sharp decline in the biodiversity and particularly species richness of woodland birds in landscapes with a habitat cover less than 10% (Radford & Bennett 2007; Wilson & Lindenmayer 1995).

While large areas of the landscape within the locality of the Cumulative Project Boundary has been significantly affected by agricultural land uses, the significant size of the remnant vegetation patch associated with the Leard State Forest provides for approximately 50% of the landscape being vegetated. Based on the threshold limits for woodland birds suggested by Bennett and Radford (2004), the locality is capable of maintaining viable populations of woodland birds.

The landscape assessments provided within the Biodiversity Assessment (Parsons Brinckerhoff 2010a) reference the scientific literature to discuss the theoretical potential cumulative development impacts. The assessment provides general trends and absolute worst case scenarios for the cumulative impacts within the Project and adjacent future and proposed new developments and it should be acknowledged that this assessment includes assumptions that the potential Goonbri Project and Tarrawonga Expansion will completely clear all land associated with their various Exploration Licence (EL) areas.

The detailed identification and description of specific vegetation types present within the Cumulative Project Boundary was limited to the available information contained within the Boggabri Coal Mine (Parsons Brinckerhoff 2010c), Tarrawonga Modification (Eco-Logical 2010) and Maules Creek Coal Project Preliminary Environmental Assessment (Hansen Bailey 2010).

The SWCCIS provides a detailed description of the indicated vegetation types and provides a thorough assessment of each individual vegetation type proposed to be impacted along with its percentage removal within the study areas mapped using information available.

The cumulative impacts would affect up to 5,067 ha of remnant vegetation and as such, would further fragment habitat and increase the isolation of remnant vegetation. However, within the areas of Leard State Forest to be affected by open cut mining, the cumulative impacts are unlikely to completely fragment or lead to barriers to wildlife movement. Despite the cumulative impacts it is likely at least two separate east-west corridors will be retained within the Leard State Forest (refer to Figure 28 of the EA).

The first link would be located between the northern boundary of the proposed Boggabri Coal Project and the potential southern boundary of the Maules Creek Coal Project. This corridor will currently retain a remnant undisturbed continuous corridor of between 150 and 1,000 m in width.

The second link would be located along the southern boundary of Leard State Forest between the Tarrawonga Expansion and Boggabri Coal Projects. This link will provide an additional predominantly undisturbed remnant corridor of between 250 and 350 m in width. Furthermore, the southern corridor of retained remnant vegetation is likely to be progressively widened as the Boggabri Project rehabilitation progresses, ensuring a substantial east-west vegetated link will be retained within the Leard State Forest.

The effects of habitat fragmentation resulting from the cumulative impacts will to some degree be mitigated by the extent of retained habitats within the locality, including approximately 64% of the remaining remnant vegetation within Leard State Forest, the existing linkages to the Leard State Conservation Area and the proposed 5,161 ha of remnant vegetation within the Boggabri Coal Biodiversity Offset Strategy.

Boggabri Coal has developed a Biodiversity Offset Strategy as described in Section 8.5 of the EA to further mitigate and offset the impacts arising from the Boggabri Coal Project. This offset strategy identifies large patches of remnant vegetation in the locality of Leard State Forest. A critical component of the Boggabri Coal Biodiversity Offsets Strategy would be the restoration and establishment of a Regional East-West Wildlife Corridor linking the Leard State Forest with the Namoi River and large vegetation remnants to the west and the Nandewar Range to the east. The inclusion of these lands as potential biodiversity offsets would provide additional conservation areas in the region for Threatened flora and fauna, which has previously been highly fragmented.

The additional contribution of similar areas to offset future potential projects including the proposed Tarrawonga Modification, Tarrawonga Extension, Maules Creek Coal Project and Goonbri Project is likely to provide critical habitat and in the medium to long term improve the biodiversity and habitat value within the region.

It is likely that if the combination of existing and potential future proposed offset strategies were to complement each other, that the long term biodiversity of the region could be improved. This would also provide the opportunity for larger contiguous parcels of land to be placed under long term conservation management strategies in perpetuity for the future.

4.4.19 Consistency with the principles of Ecologically Sustainable Development

Submission: NGO5

This has been discussed in Section 5.2 and Section 10.4 of the EA and includes:

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the following principles of ESD:

“Integration Principle - the decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.”

The Project has continually evolved with a balanced consideration of all potential environmental, social and economic impacts. The continuation of the existing mining operation is consistent with the original development consent granted in 1990, with the importance of future coal mining and the Project noted in the draft Narrabri Shire Growth Management Strategy (Narrabri Shire Council 2009) and considerations provided for in the revised Local Environmental Plan (Narrabri Shire Council 2010).

Due to the substantive positive economic and social impacts associated with the Project and the nature of environmental impacts resulting from the Project (in consideration of the mitigation measures proposed) it can be concluded that the Project is well justified on environmental, social and economic grounds.

“Precautionary Principle - if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.”

The impacts of the Project have been identified with certainty and measures to address them incorporated into the Project, thus addressing the Precautionary Principle.

“Intergenerational Principle - the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.”

The maximised recovery of the insitu coal resource and the optimisation of final rehabilitation and landform of the proposed mining area and Biodiversity Offset Strategy address the Intergenerational Principle.

“Biodiversity Principle - the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.”

The biodiversity impacts of the project have been comprehensively addressed within the Biodiversity Impact Assessment. This assessment has identified the requirement for compensatory impacts and the implementation of a Biodiversity Offset Strategy specifically designed to protect and conserve native biodiversity.

“Valuation Principle - improved valuation, pricing and incentive mechanisms should be promoted.”

Detailed mine planning, engineering investigations and conceptual studies have developed a coal recovery strategy that will:

- Enable the most efficient utilisation of resources to extract the coal;
- Maximise coal recovery so as to promote the social and economic welfare of the community;
- Minimise the need for washing all coal, thus reducing water use; and
- Where possible, involve the upgrade of existing infrastructure, reducing land disturbance.

4.4.20 Clarification of vegetation clearing requirements

Submission: NGO3

The Project will gradually clear up to 1,385 ha of Leard State Forest over the 21 year approval period sought. The 1,385 ha of Leard State Forest will not be cleared in one event and will be staged throughout the Project to minimise surface disturbance.

Section 8.16.2 of the EA notes the following strategies to be implemented prior to any clearing of native vegetation:

- Undertake pre clearing wildlife surveys and fauna management, incorporating a two stage clearing protocol for all hollow-bearing trees;
- Relocate and store transportable habitat features such as large logs and boulders, for reuse as future potential fauna refuge sites;
- Minimise disturbance of vegetation for each stage of clearing;
- Collect native seed prior to clearing, for use in the revegetation of disturbed areas; and
- Remove and store topsoil.

4.4.21 Inadequate Hollow-bearing tree and Koala Assessment

Submission: NGO5

Standard and appropriate methodologies were deployed for this work. In regards to the hollow-bearing tree assessment, the survey approach has been adopted from the field methodology provided within the Biometric Decision Support Tool (Gibbons et al. 2008). Hollow sizes have been categorised into seven ranges based on known fauna preference and utilisation. In order to simplify the assessment of habitat values provided by each size class, the following additional categorisations have been used:

- Small – <5 – 10 cm;
- Medium – 10 – 20 cm; and
- Large – 20 - >30 cm.

There is no widely accepted criteria for the categorisation of hollow sizes. Whilst the adopted ranges may vary from those provided in other assessments or literature, the EA Section 8.4.2 notes the species likely to utilise each class, thereby providing a reference for assessing habitat value.

The size class system used within the BIA specifically related to the range of hollow sizes used by the targeted Threatened Fauna with potential to occur within the Study area.

Irrespective of the size classes or densities discussed within the report, the significant finding of the study was the confirmation of similar densities of hollow classes and vegetation types within the remaining areas of Leard State Forest, ensuring the Project will only impact on a proportion of the available resources within the Leard State Forest.

Overall the hollow-bearing tree assessment surveyed a total of 146 sites within the Project Boundary, with a total survey effort of 109.5 hours. This is well above the minimum survey effort required.

The systematic grid based sampling protocol was adopted from methods developed by Biolink Ecological Consultants and recognised best practice in a Koala habitat utilisation pilot study (Biolink Ecological Consultants 2009). The selection of food tree species within the western slopes and plains Koala management area was undertaken using the Approved Recovery Plan for the Koala (Department of Environment and Climate Change 2008a).

This survey was exhaustive and provided a comprehensive understanding of the Koala utilisation within the study area and wider Leard State Forest. SPOT survey assessments are suitably recognised for recording presence, distribution and abundance of Koalas and as such were appropriate to form the core of the Koala surveys.

The Koala breeds from September to March. During this period, activity and vocalisation is increased (Van Dyck 2008). Through this seasonal period there is an increased opportunity of Koala observations, due to the more likely encountering of mobile individuals and the detecting of vocalisations by population members. In addition to the systematic grid based sampling of the habitat study targeted nocturnal call playback for the Koala was completed in December 2008, January 2009, March / April 2009 and September 2009 without a response or record from within the Leard State Forest.

In regards to the assessment of vegetation condition, coverage and landscape values, the survey methodology has been adopted from the following sources:

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities; and
- Biometric Decision Support Tool (Gibbons et al. 2008).

In general the surveys completed have been significantly greater than the requirements of these guidelines. A summary of the quadrats sampled per vegetation stratification unit is provided in Table 2-7 of the BIA (Appendix J of the EA).

4.4.22 Lack of Significance Assessment for the Barking owl and South-eastern Greater Long-eared Bat

Submission: NGO3

The EA includes significance assessments for each species, undertaken in accordance with the draft Guidelines for Threatened Species Assessment.

Based on the results of extensive ecological survey and literature reviews, the assessment determined that the Project is not likely to significantly affect the Barking Owl. The outcome is based on the highly mobile nature of the species and the retention of a large (6,750 ha) continuous patch of remnant woodland adjoining the north, east and west of the Project Boundary. The assessment considered Barking Owl is likely to be affected by the Project, through loss of habitat, however within the locality (10 km) the species is unlikely to result in a significant decline in the population.

The assessment identified that the Greater Long-eared Bat would be significantly affected by the Project. It is acknowledged that the Project would reduce the area of occupancy and add incrementally to processes that threaten the species. The Boggabri Coal Biodiversity Offset Strategy meets the requirements of the EPBC Act by targeting offsets for all EPBC Act listed species affected, including the Greater Long-eared Bat.

It should also be noted that both the Masked and Barking Owls have been recorded within the Biodiversity Offset, indicating the quality and range of habitats required by these species will be retained.

4.4.23 Contradicting areas of mapped vegetation remnants and condition

Submission: NGO3

The MCCC has desktop reviewed the Project Boundary and the Proposed Offsets in relation to extent of vegetation remnants and condition to assess the magnitude of impacts and adequacy of the Offsets. This assessment relies heavily on the woody vegetation crown cover mapped by the Native Vegetation Mapping Program (NVMP).

The Biodiversity Offset Strategy outlined in Section 8.5.2 of the EA, notes that the identification of the remnant vegetation within the potential offset properties was based on a combination of the desktop investigations and subsequent detailed field investigations. Desktop investigations included aerial photography interpretation and review of the relevant regional vegetation mapping projects and land use maps (Duggin & Allison 1984).

The desktop analysis was subsequently verified by extensive field surveys to identify areas of remnant native vegetation and derived grassland. Detailed ground truthing of vegetation communities, sampling of condition mapping and Threatened species surveys have further verified the presence of vegetation communities and condition throughout the Study area.

Boggabri Coal is confident in the accuracy of its vegetation surveys as it is based upon extensive ground truthing to confirm the presence and extent of vegetation communities within the Project Boundary. No previous assessment has had the opportunity to undertake such a comprehensive ground based assessment as has been completed for the Project. This has provided the opportunity to record and accurately map the area within the Project Boundary. Boggabri Coal acknowledges that the Project will have significant impacts on biodiversity on a local scale and has developed a robust Biodiversity Offset Strategy commensurate with the impacts of the Project.

4.4.24 Exclusion of Threatened species

Submission: NGO5

The assessment of impacts on Threatened species present, or potentially occurring within the Project Boundary, has been based on extensive desktop and field based studies. Where habitat on site has been assessed as being unsuitable for locally occurring Threatened species, a low likelihood of occurrence has been designated.

The EA notes that four species of plant and 33 species of animal listed under the *Threatened Species Conservation Act 1995* (TSC ACT) and EPBC Act have been recorded, or are considered likely to occur in the Project Boundary. All Threatened species likely to occur within the Project Boundary regardless of whether they were recorded during the survey periods have been considered within the BIA.

4.4.25 Inadequate Assessment of Threatened species of fish

Submission: NGO5

Detailed desktop and field assessments have been undertaken to assess the likelihood of Threatened fish occurring within the Project Boundary and potential impacts associated with the Project.

Surveys conducted in the Namoi River recorded three species of fish, none of which are listed as Threatened. The desktop assessment identified the following six Threatened species / populations as having the potential to occur within the Project Boundary including:

- Olive Perchlet;
- Silver Perch;
- Murray Cod;
- Purple Spotted Gudgeon;
- Eel-tailed Catfish; and
- River Snail.

Based on known habitat requirements of these species and the lack of suitable habitat identified during the survey, a low likelihood of occurrence was assigned to each species, thereby negating the requirement to complete significance assessments under the *draft Guidelines for Threatened Species Assessment EPBC Act Significant Impact Guidelines*.

Given that suitable habitat exists upstream and downstream of the Project, no long-term impacts from the proposed waterway crossings would be expected for fish assemblages within the Project Boundary.

4.4.26 Further Clarification of the Aquatic Ecological Community

Submission: NGO5

The Project would require the removal of approximately 0.6 ha of Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Darling River as listed under the *Fisheries Management Act 1994* (FM Act).

Vegetation mapping within the Project Boundary was developed from extensive survey effort, including both desktop and field based assessments. The extensive survey effort and description of the existing aquatic environment as recorded in Section 3.7 of the EA is adequate in completing a comprehensive assessment for the Project.

Boggabri Coal has completed substantial river improvement works in consultation with NOW including tree plantings in the riparian zone on the Namoi River, removal of noxious weeds and the establishment of habitat structures for fish and other aquatic wildlife.

4.4.27 Importance of Superb Parrot populations

Submission: NGO5

It was suggested that Boggabri Coal did not consider the potentially occurring Superb Parrot within the Project Boundary as being important or significant.

Whilst the species has not been recorded within the Project Boundary, a significance assessment was undertaken which recognised that the Superb Parrot is important. However no breeding habitat would be affected by the Project and the species northern limit extends to Narrabri and Wee Waa, which occur north / north-west of the Project Boundary.

4.4.28 Impact on foraging habitat for cave-dependent microchiropteran bats

Submission: NGO5

The BIA includes a significance assessment for cave-dwelling microchiropteran bats (Appendix J of the EA).

The Project would remove approximately 1,385 ha of potential foraging habitat for these species. As these species are likely to access suitable foraging resources in the locality and that no roosting / breeding habitat would be affected by the Project, it is considered that no critical habitat for the survival of these species will be affected.

Moreover, Leard State Forest and the Leard State Conservation Area would continue to exist post-mining as a large continuous patch of remnant woodland of approximately 6,750 ha. This will provide necessary habitat resources for important roosting and breeding.

4.4.29 Impacts on the habitat for the Feathertail Glider

Submission: NGO2

Section 8.4.2 of the EA reviewed the potential impacts of all species including the Feathertail Gliders from the Project. Feathertail Gliders occur along eastern Australia from far north Queensland to Victoria and into South Australia. In NSW they occur from the coast to the western slopes and plains. Feathertail Gliders are thought to be abundant (Van Dyck & Strahan 2008), however, on the Liverpool Plains, this species is thought to be rare.

Feathertail Gliders are more frequently located in tall, mature and moist forests than dry or regenerating ones (Van Dyck & Strahan 2008, Menkhorst & Knight 2004), and requires a high diversity of trees and shrubs to provide year-round nectar (Menkhorst & Knight 2004). This species requires access to complex forests to meet all their food and nesting requirements (Van Dyck & Strahan 2008).

The Project Boundary is dominated by dry sclerophyll forest. While this vegetation provides potential habitat for this species, it is not considered optimal in terms of habitat complexity for foraging and nesting requirements. Although Feathertail Gliders are difficult to find in their habitat, this species has not been recorded in the Project Boundary during seasonal surveys, or during tree clearing operations.

As described in Section 8.4.2 of the EA, it is likely that habitat occurring in the Project Boundary lacks the necessary complexity that would potentially sustain a significant population of this species. It is further noted that this species is not listed as Threatened in NSW and therefore impacts on this species are not captured in the legislated assessment process.

4.4.30 The EA ignores climate change impacts on biodiversity and provides no assessment in relation to climate change adaption.

Submission: NGO3

The EA has assessed the impacts of the Project on biodiversity in accordance with DECCW impacts assessment guidelines. The Biodiversity Offset Strategy however, has developed a significant Regional East West Wildlife Corridor which is likely to facilitate in the medium to long term the movement of biodiversity through the surrounding landscape and increase the potential for species to adapt to the long term impacts associated with climate change.

Some of the proposed offset areas are located in lower lying areas in the landscape that are wetter and have better potential to resist the impacts of any drying that may occur due to climate change.

4.4.31 Inadequate Avoidance and Mitigation measures

Submission: R2

DECCW has requested that a greater level of detail regarding the area of individual vegetation communities to be avoided. The EA in Section 8.4.3 provides a description of the alterations made to the Project, resulting in the avoidance of 384 ha of Endangered Ecological Communities (EEC) in the following areas:

- Drainage line – 6 ha Box Gum Woodland EEC;
- Transport corridor – 25 ha Derived Grassland and Grassy Woodlands;
- Mine Infrastructure – 24 ha Derived Grassland, Riverine Woodland and Grassy Woodlands;
- Avoidance within A355 – 265 ha Box Gum Woodland EEC, Derived Grassland and Grassy Woodlands; and
- Avoidance within A339 – 890 ha Box Gum Woodland EEC, Riverine Woodlands and Shrubby Woodland / Open Forest.

This description identified the key habitats and EECs to be avoided. A breakdown of these habitats into their individual vegetation types is provided below in **Table 2**.

4.4.32 Insufficient information on offsets

Submission: NGO3

In order to ensure compliance with regulatory requirements and produce a robust and comprehensive offsets strategy, the DoP, in consultation with Boggabri Coal, established a joint working party as described in Section 8.5 of the EA. This integrated approach ensured extensive consultation and input from key regulatory stakeholders including the SEWPaC, NSW Department of Industry and Investment - Forestry (Forestry NSW), Department of Industry and Investment – Mineral Resources (I&I NSW Mineral Resources) and DECCW.

From the initial consultation with the joint working party, Boggabri Coal presented a proposal to deliver a local biodiversity offset strategy that specifically mitigates the impacts of the Project on local biodiversity within the Leard State Forest. Central to this proposal was the development of a Regional East-West Wildlife Corridor, considered essential to the mitigation of the impact of mining on Leard State Forest. It was generally agreed and supported by all agencies involved that the proposed offset strategy targeting a local offset solution and development of the corridor strategy rather than provision of a removed offset elsewhere in the bioregion was appropriate.

Furthermore, DECCW, along with other agencies, was specifically consulted on the availability of preferred or previously identified potential offset sites to supplement the offset strategy; however no such sites were provided at the time.

Boggabri Coal subsequently investigated numerous sites throughout the North West Region. The Biodiversity Offset Strategy presented in Section 8.5 of the EA has been developed through desk-top assessments and site inspections on 17 potential offset properties within close proximity to the Project Boundary and 22 potential other Regional East-West Wildlife Corridor sites.

The suitability of each of the potential properties was assessed for biodiversity values, landscape context and existing land uses. All of the offsets assessed are located within the Namoi CMA area, Liverpool Plains and Peel subregions consistent with both the EPBC draft offsets policy and the NSW Biobanking scheme for locating in the locality of the Project.

The Biodiversity Offset Strategy as described in Section 8.5 of the EA provides a well designed and robust offsets package to compensate for identified impacts and in the medium to long term improve ecological outcomes. The Boggabri Coal Biodiversity Offset Strategy identifies large patches of remnant vegetation in the locality of the Project Boundary. Field assessments confirmed that these vegetation remnants contain high quality habitat and will create a valuable corridor for Threatened species in the region. Importantly, these areas will provide upfront mitigation of the Project's impacts on locally occurring biodiversity.

Table 2
Summary of Vegetation Communities Avoided

Vegetation community name	Corresponding Threatened ecological community	Corresponding community within Vegetation Type Database (DECC 2009)	Area of modification and avoidance (ha)					Total Vegetation (ha)
			Drainage line	Transport corridor	Mine Infrastructure	Avoidance within ML355	Avoidance within ML339	
Derived native grassland			0	25	19.3	0	0	44.3
Yellow Box - Blakely's Red Gum grassy woodland	Box-Gum Woodlands ¹	Yellow Box – Blakely's Red Gum grassy woodland of the Nandewar Bioregion.	0	0	1.4	0	19	23.4
White Box – White Cypress Pine grassy woodland	Box-Gum Woodlands ¹	White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions.	0	0	0	0	3	3
White Box – Narrow-leaved Ironbark – White Cypress Pine grassy open forest	Box-Gum Woodlands ¹	White Box – White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt South Bioregions.	6	0	0	45.8	315.2	370.3
Pilliga Box - Poplar Box- White Cypress Pine grassy open woodland		Pilliga Box – Poplar Box – White Cypress Pine grassy open woodland on alluvial loams mainly of the temperate (hot summer) climate zone (Benson 88).	0	0	3.3	0	0	3.3
White Cypress Pine– Narrow-leaved Ironbark shrub/grass open forest		White Cypress Pine – Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion.	0	0	0	219.2	552.8	736.8
Total Avoidance (ha)			6	25	24	265	890	1210
Total EEC Avoidance (ha)			0	0	1.4	45.8	337.2	384.4

1 = Box-Gum Woodland (TSC Act and EPBC Act)

Further, the Biodiversity Offset Strategy proposed considers the possibility of additional mining in and adjacent to the Leard State Forest. None of the proposed offset areas will be required for future mining and the Biodiversity Offset Strategy proposed will not only remain viable in the event of additional mining but will become more critical in ensuring the maintenance of biodiversity in the region.

It is considered the Biodiversity Offset Strategy and Biobanking Assessment adequately presents all aspects of the offsets strategy, allowing an accurate comparison between the impacts of the Project and compensatory measures proposed.

4.4.33 Inadequate selection of appropriate Biodiversity Offset Areas

Submission: R3, NGO4 and NGO5

Biodiversity Offset Areas were selected based on their potential for revegetation and contribution to existing wildlife linkages across the Namoi floodplain, through the Leard State Forest and east to the Nandewar Range. The selection criteria are described in Section 8.5.2 of the EA and further detailed in Section 2 of Appendix J of the EA.

Consultation with DECCW and SEWPaC occurred during the development of the proposed Biodiversity Offset Strategy as described in Section 8.5.1 of the EA. DECCW was requested to provide information on any properties known to be of “*high conservation significance*” for potential inclusion in the Boggabri Coal Biodiversity Offset Strategy. No properties were identified by DECCW at the time for inclusion in the proposed Biodiversity Offset Strategy.

4.4.34 Biobanking

Submission: R2

DECCW has raised several issues in regards to the application of the Biobanking Tool to the Project, including a potential overestimation of BioBanking Credits and the inclusion of the 186 ha forestry area in the credit calculations.

Boggabri Coal has consulted with DECCW in regards to the application of the Biobanking tool to the Project and has through the assessment process provided two Reports outlining the assumptions applied to the Biobanking calculations for their review prior to the submission of the EA.

Boggabri Coal understands that the Biobanking credit calculator is under review and there are modifications proposed to address various perceived problems with the Biobanking calculator. It is understood that when the changes are made to the credit calculator, the numbers of credits attributable to a development site will change. Moreover some of the rules for the application of the Biobanking tool to a Biobanking site will change and there will likely no longer be such requirement to match ‘*like for like*’. On this basis there is likely to be a significant change to the Biobanking credit calculator and the uncertainties associated with the final outcome it is considered inappropriate to estimate offset areas using the current version of the Biobanking credit calculator.

For the above reasons Boggabri Coal has not elected to make this a Biobanking Project. However, the Biobanking tool has been used as a guide to develop an appropriate offset package. The currently proposed offset strategy is commensurate with the ecological impacts of the Project.

Despite the above, in light of DECCW most recent comments, a further revision and refinement of the Biobanking assessment has been undertaken for this Project. This revision has confirmed that previous assessments have been conservative and that in fact the Biobanking credits related to the offset strategy are greater than that originally suggested. The revised calculations are presented in detail in **Appendix E**.

4.4.35 Insufficient 'Like for like' vegetation in Offset Strategy

There will be a total of 5,161 ha of upfront 'like for like' native vegetation communities included in the Boggabri Coal Biodiversity Offset Strategy. This will include 922 ha of Threatened ecological communities.

Submission: R2, NGO2, NGO3 and NGO4

The Boggabri Coal Biodiversity Offsets Strategy is described in detail in Section 8.5 of the EA. Furthermore, the results of recent field surveys within the offset sites have identified the derived native grasslands are in fact of moderate condition, as they contain high levels of native diversity, only moderate infestations of exotic species and some evidence of natural canopy regeneration. These grasslands are likely to meet the DECCW Box Gum Woodland condition class 3 and 4 (NSW National Parks and Wildlife Service 2002a).

The good condition of these grasslands is further demonstrated by the recent discovery of three separate populations of the endangered *Digitaria porrecta* located within derived grassland areas of the 'Merriendi' and 'Therandra' offset properties. This species is known to be sensitive to significant disturbances and grazing (Department of Environment 2010). The value of these derived grasslands should not be understated and the restorative works may simply require the need to foster natural regeneration through fencing and some supplementary canopy planting.

The suggestion to substantially increase the proportion of remnant vegetation within the offset strategy is not founded on any specific reasoning. Biobanking broadly encourages the incorporation and management of low to moderate condition vegetation within an offset, leading to the greatest potential of improved state and therefore credits generated. The proposed Biodiversity Offset Strategy will significantly improve a large portion of degraded forest landscape.

4.4.36 Demonstrate how the proposal will meet the no net loss of biodiversity values and meet the 'like for like or better' requirements

Submission: R2, NGO2, NGO3 and NGO4

The Biobanking Assessment Methodology and Credit Calculator was recommended by the DECCW and the DoP as a mechanism for quantifying the appropriate level of ecological offset for any residual impacts from the Project.

The proposed Boggabri Coal Biodiversity Offset Strategy has been developed and guided by this Biobanking Assessment Methodology (Department of Environment Climate Change 2009a). Furthermore, the Biobanking Assessment Methodology and Credit Calculator have been used to provide a quantitative assessment of the biodiversity offset requirements of the Project and values of the Biodiversity Offset Strategy. This assessment (Parsons Brinckerhoff 2010d) demonstrated that the Boggabri Coal Biodiversity Offset Strategy will meet the estimated total quantum of ecosystem credits required by the Biobanking Assessment Methodology to offset the Projects impacts as such it is considered to meet the 'no net loss' of biodiversity values. The Boggabri Coal Biodiversity Offset Strategy has been specifically targeted to meet the '*like for like or better*' principle, with 12 of the 13 vegetation types to be impacted by the Project included within the Boggabri Coal Biodiversity Offset Strategy as described in Section 8.5.4 of the EA and Appendix J. The offsets have also been specifically targeted to include the seven high conservation value '*Red flag*' vegetation types to be impacted by the Project.

Where individual '*Red flag*' vegetation types were not available for incorporation within the Biodiversity Offset Strategy, additional areas and credits have been generated for other '*Red flag*' vegetation types and Threatened species, further demonstrating the '*like for like or better*' principle.

The specific ecosystem credit requirements for all but one of the '*Red flag*' vegetation types have been met by the Boggabri Coal Biodiversity Offset Strategy. It is recognised that if the specific ecosystem credit requirements for a '*Red flag*' vegetation type could not be met locally, an equal, or high conservation value vegetation type or Threatened species should be used to demonstrate the '*better*' conservation outcome.

4.4.37 Vegetated offset has a higher perimeter to area ratio

Submission: NGO3

It is noted that compared to the area impacted by the Project the offset properties have a higher perimeter to area ratio, however this is largely due to the offsets being spread over a distance of 30 km. Central to the offset strategy was the development of a Regional East-West Wildlife Corridor, considered essential to the mitigation of the impact of mining on Leard State Forest. The fundamental design of a linear corridor results in a larger edge to area ratio, however provides significant benefits in the form of linking isolated remnants and establishing a Regional East-West Wildlife Corridor.

The rehabilitation area will re-establish a large patch of forest and woodland communities including Box Gum Woodland. This will be complimented by the Boggabri Coal Biodiversity Offset Strategy which will link with adjacent patches of remnant vegetation.

4.4.38 Project and offset site locations

Submission: NGO3

The development site and all offsets occur within:

- Brigalow Belt South Bioregion;
- Namoi Catchment Management Area, Liverpool Plains Bioregion and Peel Sub regions; and
- Bugaldie Uplands and Liverpool Plains Mitchell Landscapes.

This is consistent with the landscapes and area criteria identified in the DECCW guidelines of offsets (Department of Environment and Climate Change 2008b) and Biobanking Assessment methodology requirements for the Project (Department of Environment Climate Change 2009).

4.4.39 Overstated value of Derived grasslands and vegetation canopy cover <10% within offsets

Submission: NGO3

Section 3.2 of the BIA (Parsons Brinckerhoff 2005, 2010c) provides an analysis of remnant patch size within the Project Boundary determined using the broad scale 1:100,000 remnant vegetation and derived native grassland cover mapping for NSW (Keith, D. S., C., 2006). This study recognises many grassy woodlands with <10% vegetation cover, native grasslands and derived grasslands still contain valuable biodiversity values and habitats for Threatened species.

This is demonstrated by the presence within the offsets of a number of Threatened ecological communities that naturally occur with canopies containing <10% cover, including; critically endangered ecological communities (CEEC) Plains Grassland and Box Gum Woodland, and Weeping Myall Woodland, all of which occur naturally with canopy covers <10%.

The results of recent field surveys within the biodiversity offsets (refer to Appendix D) have identified the derived native grasslands are in fact of moderate condition, as they contain high levels of native diversity, only moderate infestations of exotic species and some evidence of natural canopy regeneration. These grasslands are likely to meet the DECCW Box Gum Woodland condition class 3 and 4 (NSW National Parks and Wildlife Service 2002a).

The good condition of these grasslands is further demonstrated by the recent discovery of three separate populations of the endangered *Digitaria porrecta* located within derived grassland areas of the 'Merriendi' and 'Therandra' offset properties. This species is known to be sensitive to significant disturbances and grazing. The value of these derived grasslands should not be understated and the restorative works required in many instances of this community will simply be the need to foster natural regeneration through fencing and some supplementary canopy planting.

4.4.40 Why the Inclusion of areas of existing Remnant Vegetation in Offset areas and not degraded landscapes

Submission: NGO5

The Biodiversity Offset Strategy includes both the protection of existing vegetation remnants and the restoration of suitable rehabilitation sites. The sole use of 'greenfield habitat areas' would not satisfy the 'like for like' principle required by the relevant guidelines, as the offset sites would lack important habitat features, such as tree hollows.

Whilst habitat creation will be limited to the selected rehabilitation areas, vegetation clearing for the Project will not occur all at once and a large continuous patch of remnant woodland will remain adjoining the north, east and west of the Project Boundary. The proposed rehabilitation works and Biodiversity Offset Strategy will connect remnant vegetation patches, significantly contributing to wildlife linkages.

4.4.41 Of the 34 Threatened species, only 7 vertebrate fauna species appear to have been recorded in the offset areas

Submission: NGO3

The Biodiversity Offset Strategy includes habitats for all 34 Threatened species to be impacted by the proposal. As detailed in Section 8.5 of the EA the results of the surveys completed within the offsets identified 7 of these species.

Further to the surveys completed as part of the EA, additional recent surveys completed within the offsets (as summarised in Appendix D) have identified an additional, 16 Threatened species within these areas and a further 15 species are considered to have potential habitat. Vertebrate fauna recorded included Yellow-bellied Sheath-tail Bat, Eastern Cave Bat, Little Pied Bat, Brown Treecreeper, Hooded Robin, Painted Honeyeater, Grey-crowned Babbler, Speckled Warbler, Diamond Firetail, Varied Sittella, Turquoise Parrot, Barking Owl, Masked Owl, Little Eagle, Little Lorikeet and the Koala. Threatened vertebrate fauna with potential habitat but not recorded include, Granite Thick-tailed Gecko, Spotted-tailed Quoll, Pale-headed Snake, Spotted Harrier, Pied Honeyeater, Black-necked Stork, Swift Parrot, Square-tailed Kite, Black-chinned Honeyeater, Regent Honeyeater, Large-eared Pied Bat, Eastern Falsistrelle, South-eastern Long-eared Bat, Eastern Bent-wing Bat and Squirrel Glider (see Appendix D of this Report).

Significantly these records include a breeding roost site for the Eastern Cave Bat, and populations of *Digitaria porrecta* not recorded within the Project Boundary.

4.4.42 The offset aims to compensate for the destruction of intact vegetation on gentle terrain with highly fragmented vegetation in steep and rugged terrain with different soil characteristics

Submission: NGO3

The majority (52%) of the Project's impacts are associated with geologically steep skeletal soils and shrubby woodland vegetation associations. The biodiversity offsets have been developed through consultation with the Boggabri Coal Biodiversity Offset Working Group and have been guided by the Biobanking Assessment Methodology (Department of Environment Climate Change 2009). This assessment identified vegetation types to target and determined the adequacy of offsets.

The specific ecosystem credit requirements for all but one of the 'Red flag' vegetation types have been met by the Boggabri Coal Biodiversity Offset Strategy. It is recognised that if the specific ecosystem credit requirements for a 'Red flag' vegetation type could not be met locally, an equal, or high conservation value vegetation type or Threatened species should be used to demonstrate the 'better' conservation outcome.

These offsets include approximately 4,238 ha of remnant vegetation and native grasslands on gentle terrain and fertile soils.

4.4.43 Justification of the minimum width of the corridor to be maintained within the Leard State Forest in terms of maintenance and connectivity of biodiversity

Submission: R2 and NGO3

The Project will retain vegetation within the Project Boundary of between approximately 150 and 1,000 m along its northern limit, with extensive areas of the remnant vegetation further to the north of the Project Boundary.

The Maules Creek Coal Project Preliminary Environmental Assessment (2010) shows that the limit of mining will extend to their southern boundary, however it should be noted that the final void for the Project and the Maules Creek mining area do not meet.

The worst case cumulative impact scenario for Biodiversity assessed the potential cumulative impacts to the Leard State Forest by open cut mining and is included in Section 11 of the EA. This assessment identified the cumulative impacts are unlikely to completely fragment or lead to barriers to wildlife movement. Despite the cumulative impacts it is likely at least two separate east-west corridors will be retained within the Leard State Forest.

In assessing the potential minimal corridor width required for maintaining biodiversity within the Leard State Forest the Project along with the potential impacts of adjoining mining operations need to be assessed over the life of their respective operations.

In the case of the Project, the clearing of the Leard State Forest will be over a 21 year period. Disturbed areas will be progressively rehabilitated over the life of the Project. It is likely that this will be the case with adjacent operations. Given this staged progression, it is anticipated that a single vegetated wildlife corridor of greater than 500 m will be maintained at all times through the life of the Project. Boggabri Coal will coordinate land management and rehabilitation works with adjacent mining operations to ensure this wildlife corridor is maintained.

How species use a corridor network depends largely on the home and activity ranges of the species, their habitat requirements and the ecological characteristics of the corridor. For example, some large or mobile species may make direct movements through a corridor network, moving from one patch of habitat to another. These direct movements may be on the scale of a foraging expedition or a migration (Bennett 1990). Other species may have movements by single individuals punctuated by pauses in the corridor, which can last anything from a small foraging or resting bout to weeks and even months. If the corridor contains sufficient resources to maintain a population, then continuity through the corridor may be through gene flow through the resident population (Bennett 1990; Wilson & Lindenmayer 1995).

The minimum width of a wildlife corridor is also relative to the species it is trying to accommodate (Appendix J of the EA). Within the Leard State Forest, the majority of the fauna biodiversity is associated with the more mobile species of birds and bats. While the potential impacts of clearing, isolation and fragmentation on woodland birds and bat populations are well documented (Bennett 1990; Wilson & Lindenmayer 1995), the mobility of these species will provide a natural resilience to extinction from the Leard State Forest given the extensive areas of undisturbed remnant vegetation adjacent the Project. Very few native terrestrial or arboreal mammals have been recorded within the Leard State Forest, despite targeted extensive surveys as detailed in the EA.

Arboreal fauna species recorded within the forest including, Koala, Brushtail Possum and Sugar Glider were all recorded with close proximity (<50 m) to the existing open cut mining operation and / or the Leard State Forest, demonstrating a relative resilience to the edge effects potentially associated with the Project.

Additionally, there were no discernable changes observed in the density or diversity of woodland birds recorded with increased distance from the current mining area. In fact, a number of species, including the Plum-headed Finch and Hooded Robin were only recorded from areas in close proximity to the current mining area. The affects of habitat fragmentation resulting from the cumulative impacts of Projects on the biodiversity within the Leard State Forest is likely to some degree be mitigated by the extent of retained habitats within the locality, including approximately 64% of the remaining remnant vegetation within Leard State Forest, the existing linkages to the Leard State Conservation Area and the proposed 5,161 ha of remnant vegetation within the Boggabri Coal Biodiversity Offset Strategy.

While impacts to the local populations of some species may be reduced, the loss of species from the Leard State Forest is highly unlikely.

The Projects' disturbance will be staged. The potential long term benefits of the Boggabri Coal Biodiversity Offset Strategy will provide a >1,000 m wildlife corridor linking the remaining undisturbed areas of the Leard State Forest with the Nandewar Ranges in the East and Namoi River floodplain West. The minimum corridor widths provided are likely to maintain connectivity and the existing biodiversity. Further to this the proposed Biodiversity Offset Strategy will potentially provide a significant medium to long term regional biodiversity benefit currently not provided for.

4.4.44 No scientific evidence that the species richness or ecological integrity will be retained or enhanced either through rehabilitation or by reservation of offset areas

Submission: NGO2

The Biodiversity Offset Strategy as described in Section 8.5 of the EA provides a detailed description of the scientifically robust and rigorous desktop, field surveys and assessment methodologies used in the identification and description of the biodiversity offsets. The size and ratio of the biodiversity offsets and the ecological features they contain have been developed with reference to the Biobanking assessment methodology (Department of Environment Climate Change 2009) and DECCW offsets policy (Department of Environment and Climate Change 2008b) and adequately meet the "like for like" and no "net loss" principles.

Furthermore, the Biodiversity Offset Strategy has been quantifiably assessed against the Project impacts with the Biobanking assessment calculator which is underpinned by rigorous scientific literature and best practice methodologies to ensure the ecological integrity is maintained and improved.

4.4.45 The native wildlife safety must be taken into consideration

Submission: R2

The potential impacts of the proposed rail corridor on wildlife in regards to noise and threat of injury was adequately considered and discussed within Section 5 of the BIA (Appendix J of the EA).

The proposed Regional East West Wildlife Corridor presented within Figure 28 of the EA clearly identifies the proposed rail spur and its location within the Namoi River Offset component of the corridor. Where the proposed rail line passes through biodiversity offsets associated with the Regional East West Wildlife Corridor a minimum width of >1 km has been provided, ensuring the corridors capacity to facilitate fauna movement is maintained. Boggabri Coal will revise its existing Fauna Management Plan to ensure threats to native wildlife are minimised.

4.4.46 Rehabilitation of the mine site is a standard requirement and should be considered separate to the upfront offset strategy

Submission: R2

The Biodiversity Offset Strategy identifies the rehabilitation of the mine site separate to the upfront biodiversity offsets, however this rehabilitation and its interaction with the biodiversity offsets is considered important in the context of the proposed Regional East West Wildlife Corridor. Furthermore, rehabilitation of the mine site is provided for in the Biobanking Assessment Methodology (Department of Environment Climate Change 2009). The Biobanking Assessment Methodology is clear that it recognises that:

“Mining is a temporary land use and that rehabilitation of the site based on Mining, Rehabilitation and Environmental Management Process (MREMP) or the equivalent can re-establish biodiversity values.”

And importantly that:

“The number of credits created on a rehabilitated mine site may be used to reduce the up-front number of credits required for the initial clearing of the mining area”

Therefore the inclusion of the rehabilitation of the mine site and its Biobanking credits generated, are considered valid and appropriately considered within the overall Development of the Biodiversity Offset Strategy.

4.4.47 EPBC Referral

Boggabri Coal submitted a referral to SEWPaC under the EPBC Act as described in Section 5.4.10 of the EA. Boggabri Coal will ensure it complies with all relevant State and Federal legislation throughout the assessment process of the Project.

4.5 ABORIGINAL ARCHAEOLOGY

4.5.1 Care, Control and long term Protection of Aboriginal sites

Submission: R2 and NGO5

DECCW indicated that they had not yet completed a detailed review of the Aboriginal Archaeological and Cultural Heritage Assessment (AACHA) however, provided several general comments in this regard.

Boggabri Coal is committed to the protection of Aboriginal Archaeology and Cultural Heritage values and will update its existing Cultural Heritage Management Plan in consultation with the relevant local Aboriginal groups and DECCW. A summary of the AACHA is presented in Section 8.6 of the EA.

Any newly discovered sites will be managed in accordance with the relevant requirements and managed in accordance with the Cultural Heritage Management Plan as agreed with DECCW.

4.6 SURFACE WATER

4.6.1 Licensing

Submission: R6

Boggabri Coal has had a water licence application made under Part 5 of the *Water Act 1912* (Water Act) pending with NOW since April 2009. It is understood by Boggabri Coal that the determination of that application is awaiting the finalisation of the manner in which the exemptions to the existing groundwater embargo under the Water Act will be applied.

Boggabri Coal has responded to all requests for information in relation to this application and has been in regular contact with NOW since the submission of the application. Boggabri Coal is presently awaiting determination of that application.

Boggabri Coal does not believe that outstanding licence applications under the Water Act need necessarily delay granting of the Project Approval. The granting of the Project Approval will not eliminate the need for the water licence to be held under the Water Act (we note that sections 75U and 75V of the EP&A Act do not refer to the Water Act).

Boggabri Coal notes that the draft NSW Murray-Darling Basin Porous Rock Groundwater Sources Water Sharing Plan (Porous Rock WSP) has been on public exhibition and submissions received in respect of it.

The Project will be in the area of the Porous Rock WSP and therefore when / if the Porous Rock WSP commences and the relevant proclamations commencing the Parts 2 and 3 of Chapter 3 of the *Water Management Act 2000* (WM Act) NSW are made, Boggabri Coal will seek a Water Access Licence (WAL) in respect of the water sources in the Porous Rock WSP.

The need to hold this WAL (when or if it arises) will not be affected by the grant of a Project Approval for the Project because the requirement to hold a WAL (under Part 2 Divisions 1A and 2 of the WM Act).

4.6.2 EA Lacks Reference to Namoi River Styles Report

Submission: NGO5

The SoilFuture Report (SoilFuture, 2011) suggested the *"Need to include information published in the Namoi River Styles Report in the EA."*

The Surface Water Assessment (PB 2010) presented in Appendix M of the EA included an overview of local and regional hydrology. The Namoi River Styles Report (Lampert and Short 2004) provides information on the geomorphology of major 2nd order and above streams, including the Namoi River and Goonbri and Bollo Creek. However, it does not provide information on Nagero Creek, which is a minor tributary that drains the majority of the Project Boundary.

The published information is very useful for describing existing stream geomorphology in the wider Namoi catchment, however it should be recognised that it has limited application to the more relevant local Nagero Creek catchment.

4.6.3 Water reductions from the catchment are not included in the EA

Submission: NGO3 and NGO5

The SoilFuture Report (2011) suggested the “*need to include estimates of runoff volume reductions in the EA.*”

The Surface Water Assessment (PB 2010) included estimates of the potential impact to annual runoff volumes over the life of the Project in Section 7.3.3, Table 7.5. A summary of the change in catchment hydrology is presented in Section 8.8.3 of the EA. Runoff estimates were provided for ‘dry’, ‘median’ and ‘wet’ rainfall years for the Year 1, 5, 10 and 21 landforms, and were based on the results of daily water balance modelling using GoldSim.

The GoldSim model was run based on 109 years of data including daily rainfall and evaporation parameters. The model was used to calculate the volume of water in storages at the end of each day accounting for daily inflow, evaporation from the storage, water usage, pumping between storages in the form of a pumping policy and storage overflow, if it occurred. The model was also used to calculate the volume of water discharged at the study catchment outlet, accounting for the containment of water in storages, discharges from sediment dams, and diversion of clean runoff around mining areas.

The Australian Water Balance Model (AWBM) was incorporated into the GoldSim model, and was used to generate a daily times series of runoff from the various landuse types (undisturbed, rehabilitated spoil, industrial, mining void, active spoil and pre-strip).

Estimated annual runoff volumes at the study catchment outlet are summarised in **Table 3**. The study catchment outlet is the point where Nagero Creek meets the Namoi River floodplain, approximately 1 km downstream of the Mining Area. A 351 ML/yr reduction in median annual runoff volumes was predicted between Years 1 and 10 of the Project. For Year 21, runoff from a portion of the rehabilitated spoil dump is released directly to Nagero Creek, which is the reason for the increase in runoff volumes compared to Years 5 and 10.

Table 3
Summary of Estimated Annual Runoff Volumes at Study Catchment Outlet

Landform	Annual runoff volume (ML/yr)		
	Dry year (1940)	Median year (1905)	Wet year (1977)
Year 1	631	1,812	4,644
Year 5	520 (-18%)	1,517 (-16%)	4,222 (-9%)
Year 10	467 (-26%)	1,461 (-19%)	4,309 (-7%)
Year 21	561 (-11%)	1,690 (-7%)	4,441 (-4%)

Note. ^ Percentage change from Year 1 is given in brackets
Source: Boggabri Coal Mine EA, 2010

The SoilFuture Report (2011) estimated runoff losses to the wider Namoi Catchment of 721 ML as a result of the Project. However, it appears that this estimate assumed that all runoff from the Project Disturbance Boundary would be fully contained, and did not consider the diversion of clean water in advance of the mining area or from rehabilitated areas as assessed in Section 8.82 and Table 44 of the EA. The report also assumed that the baseline catchment was largely undisturbed and did not include the existing Boggabri Coal Mine.

4.6.4 Impacts on the downstream water users

Submission: NGO5

The MCCC response noted that there will be *“Impacts to downstream water users as a result of reduced runoff volumes”* and further suggest that *“that alienation of surface water runoff to the Namoi River catchment is compensated for via the purchase of surface water diversion licences.”*

The estimated annual runoff volumes at the study catchment outlet are summarised above in **Table 3**. Of the landforms modelled, it is predicted that the maximum reduction will occur during Year 10 of the Project, when median stream flows can be expected to reduce by 351 ML/yr (or 19%) at the point where Nagero Creek meets the Namoi River floodplain.

The maximum annual median runoff volume reduction of 351 ML/yr for Nagero Creek at the study catchment outlet is approximately 0.039% of the mean annual stream flow measured at the Boggabri gauging station (No. 419012) on the Namoi River which has an annual flow volume of 906,470 ML/yr. As such the reduction in runoff volumes associated with the Project will not have a significant impact on flows in the Namoi River or downstream users.

Any extractions from the Namoi River, Namoi Groundwater Source or Gunnedah Basin to supply the Project will be in accordance with the relevant Water Access Licences, the Water Sharing Plan (WSP) for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003 and the WSP for the Upper and Lower Namoi Groundwater Sources 2003.

The WSPs establish rules for sharing water between the environmental needs of the river or aquifer and water users, and also between different types of water users such as town supply, rural domestic supply, stock watering, industry and irrigation. Any impacts associated with water use will be assessed, identified and managed under the WSPs.

4.6.5 Acquisition of additional High Security Water Licences

Submission: R2

A Water Purchase Availability Assessment has been undertaken for the Project, and is included as Appendix E of the Surface Water Assessment (PB October 2010). The assessment concluded that it is possible for Boggabri Coal to secure an additional 750 ML/yr of water via the open water market to meet the estimated shortfall for a 10th percentile (dry) rainfall year in the Gunnedah Basin.

Boggabri Coal has been actively pursuing the acquisition of additional water entitlements on the open market over the past 12 months. This has already resulted in the purchase of an additional 567 ML of groundwater entitlement as of February 2011. These recent purchases of water by Boggabri Coal further demonstrate that access to regulated off-site water sources is available on the open market.

Further to this, Boggabri Coal has submitted an application for an additional groundwater licence with NOW for access to an additional 400 ML of hard rock aquifer water. Boggabri Coal's total groundwater allocation is expected to achieve approximately 1,100 ML within the first few years of the Project. This will provide adequate water to enable Boggabri Coal to operate.

4.7 GROUNDWATER

4.7.1 Groundwater Monitoring Network

Submission: R6

The existing groundwater monitoring network will provide useful data on the impacts of water levels and quality in the coal seam aquifers during, and post mining and will continue to be monitored. Some of these existing monitoring bores will be removed by mining and replacement bores will be necessary). The EA recognised this issue and recommended a number of sites for installation of new monitoring bores to ensure the impact of the Project is properly monitored and managed (refer Appendix O, Section 12.1).

All new monitoring sites will be nested bores and consideration will be given to the installation of vibrating wire piezometers in the Permian bedrock underlying the alluvial aquifer to assist in monitoring aquifer interconnectivity.

In addition to monitoring of groundwater levels and quality, the volumes of water pumped from the open cut pits will be measured by an approved method and the quality of this water tested to ensure adequate data is being collected for future groundwater modelling efforts. A clear method for identifying mining related loss of well yields from background yield losses will also be defined.

The existing Groundwater Management Plan will be updated in consultation with NOW to include the new monitoring sites and ensure the above requirements are incorporated.

4.7.2 Monitoring Bores

Submission: R6

Concern was raised that some of the Boggabri Coal monitoring bores do not have well screens or construction or water level details presented on the drill logs.

The majority of the monitoring bores utilised by Boggabri Coal were installed in 2005, prior to the commencement of mining.

A full report on the monitoring bore installation, including borehole logs with construction details was prepared at that time and will be provided to NOW. This report includes detailed borehole logs that show the monitoring bore construction, screen details and water levels. The new monitoring bores installed for the Project in 2009 have construction details (refer Appendix O, Appendix B). As stated in the EA, the development of the groundwater monitoring network will be undertaken in consultation with NOW.

4.7.3 Seepage Monitoring

Submission: R6

It has been asserted that all extractions from the Boggabri Coal mining operations should be metered and a detailed accounting be made of water taken from alluvial, coal seam and surface flows.

Boggabri Coal has committed to continue investigations to identify the best method to measure the volume of in pit mine water flows. Estimates of the proportion of groundwater seepage and incident rainfall on the pit will be made by examination of pumping records, rainfall records, pit water quality, groundwater levels and raw coal moisture.

This methodology will be outlined in the updated Groundwater Monitoring and Management Plan and will ensure the volume of water extraction from the alluvium and coal seams is quantified.

4.7.4 Mining in relation to alluvial aquifer

Submission: R6

It was suggested some long sections showing the depth of the monitoring bores, lithology, screen interval, groundwater level and depth and extent of the pit should be presented so that a better understanding of the interaction of the pit and the aquifers could be presented. It was noted that the base of the proposed open cut at RL 176 m will be lower in elevation than the base of the alluvial aquifer immediately to the south of the Project Boundary and needs to be clearly shown on cross sections.

The EA included two sections through the mining area (refer to Figure 13 and Figure 14 in Appendix O of the EA, Section 8.2). These show the relationship between the floor of the mining area and the alluvial aquifer. Cross sections of the existing monitoring bore network have been provided to NOW. During the preparation of the Groundwater Management Plan further long sections and cross sections will be prepared to illustrate the proposed construction of the groundwater monitoring network (both bores and vibrating wire piezometers) in relation to the floor of the open cut void and key aquifers to be monitored.

4.7.5 Groundwater Recharge

Submission: NGO5

It is suggested that recharge and discharge rates have not been assessed as part of this study and recharge rates were assumed based upon previous modelling in the area and then allowed to change in the bedrock areas for calibration. As such no response to rainfall events were presented.

Boggabri Coal has a program of measuring groundwater levels in monitoring bores constructed in the coal seams and the Boggabri Volcanics. The monitoring of coal seam water levels has not detected any significant rise in groundwater levels in the coal seams which indicates the recharge to the Permian bedrock is relatively low. The groundwater modelling for the Project therefore adopted a relatively low recharge rate of 1 mm/year for the Permian outcrop areas. If the recharge rate to the Permian aquifer is actually higher than that estimated for the model, this would only serve to reduce the extent of the modelled zone of depressurisation. Therefore the adopted rate is considered to be conservative for the EA process.

The ongoing groundwater monitoring program including electronic water level recording will assist in gathering additional information that can be utilised to validate this conservative assumption and be incorporated into the groundwater model.

4.7.6 Groundwater Recharge Post Mining

Submission: NGO5, CS

The potential for the Project to reduce the rate of groundwater recharge to aquifers in the disturbed areas post mining was raised.

The nature and treatment of the spoil material post mining will determine the rate of groundwater recharge. The rate of deep drainage is controlled by the land surface slope characteristics and vegetative cover. Modelling work undertaken for recharge to rehabilitated spoils on other mine sites suggests that *'deep percolation rates ranging from 1.0% to 5.5% of long term rainfall, can prevail'* (Mackie 2009).

These seepage rates are higher than was estimated for the undisturbed Permian bedrock in the EA modelling of 0.2% of annual rainfall and indicate that recharge to the spoil material may actually increase post mining.

The existing Groundwater Management Plan will be revised to ensure all medium to long term impacts are monitored and minimised.

4.7.7 Alluvium / bedrock Interconnection

Submission: NGO5

Previous groundwater models reviewed for the Project assumed that the basement Boggabri volcanics were impermeable and were therefore set as inactive in the modelling, not allowing any transfer of water from the alluvium through the basement volcanics. The modelling undertaken for the Project took a more conservative approach and assumed a perfect hydraulic interconnection between the alluvium and the Permian bedrock formations (refer Appendix O, Section 8.3.3). The effect of this assumption in the model was to allow groundwater to pass from the alluvium into the Permian bedrock due to mining and the rate of transfer was estimated. Despite the assumption of a perfect interconnection between the alluvium and the bedrock, the model indicated the majority of the predicted seepage to the pits was from water storage in the coal seams, with alluvial water being only a small portion of the inflows which peaked at 73 ML/year at the end of mining (refer Appendix O, Section 9.5).

A number of groundwater monitoring bores are proposed to be constructed in the alluvial aquifer and these bores will provide an opportunity to undertake short term pumping tests to examine the interconnection between the alluvium and the bedrock (refer Appendix O Section 12.0). The potential for this testing to be undertaken will be further investigated during development of the groundwater management plan, and the data will be utilised in future modelling efforts.

4.7.8 Groundwater Model Setup

Submission: R6

It was suggested that the upstream and downstream constant heads of 234 m AHD and 224 m AHD respectively were low when considering historical records.

As part of the groundwater assessment a review of water levels recorded in NOW monitoring bores in close proximity to the Project Boundary were used to determine appropriate levels for the constant heads representing inflow and outflow from the alluvium. A value within the range of the average / median water levels recorded in the NOW monitoring bores was adopted as the model was calibrated as steady state and therefore represented a long term average condition (refer Appendix O Section 8.3.2). The closest NOW monitoring bore to the upstream constant head boundary was GW036598 which recorded average / median water levels between 232 m and 234 m AHD (depending on aquifer).

A value of 234 m AHD was adopted for the upstream constant head boundary. Three NOW monitoring bores GW036093, GW036003 and GW036164 were located in proximity to the downstream constant head boundary. These bores recorded average / median water levels between 224 m and 226 m AHD again depending on the aquifer. The downstream constant head boundary was set in the model at 224 m AHD based on this data.

During the modelling it was important that the zone of depressurisation created by the Project did not extend to or interact with the constant head boundaries. This did not occur with the zone of depressurisation largely confined to the bedrock outcrop area and therefore the adopted levels are considered appropriate for a steady state model calibration that represents a long term average level.

4.7.9 Groundwater Model Calibration

Submission: R6

It was suggested by NOW that a transient phase calibration should be undertaken.

The groundwater model was developed as an Impact Assessment Model as defined by the Murray Darling Basin Commission (MDBC) 2000. Using this approach, where understanding or data were lacking the model parameters were conservative with respect to their intended use. This required homogenous aquifer parameters to be adopted to represent a heterogeneous system. As neither the aquifer heterogeneity, nor the groundwater extractions were represented in the model, calibration of the model in transient phase was not considered to be beneficial given the level of model complexity.

The primary objective of the modelling exercise was to quantify the impact of the mining operation on the alluvial aquifer, which was achieved, and it is considered that the changes to aquifer parameters that would occur through a transient calibration are unlikely to significantly impact on the magnitude of the impacts identified through the modelling exercise. Changes in aquifer parameters were investigated via the sensitivity analysis in Section 10.2 of the EA. This exercise did not report a significant increase in the zone of depressurisation for lower rates of groundwater recharge or a higher transmissivity in the Permian bedrock, indicating the modelling predictions have defined the range of impact with a high level of certainty.

The EA commits to a revision of the groundwater model at five yearly intervals by which time there will be further data available to verify the modelled predictions.

4.7.10 Groundwater Model Cumulative Impacts

Submission: R6

It was suggested that a cumulative groundwater model should be run that includes Boggabri Coal Mine, Maules Creek Coal Project, Tarrawonga Modification, Tarrawonga Extension and Goonbri Project.

The cumulative impact modelling was undertaken based on information in the public domain and included the Tarrawonga Modification (refer Appendix O). It should be noted that the Maules Creek Development Consent was due to expire in 2012 and therefore would not interact with the Project. No further detailed mine plans of an approved development were publically available for the Maules Creek Coal Project at the time of the assessment.

Further to this there were no mine plans in the public domain for the Tarrawonga Extension and Goonbri Project at the time the modelling work was undertaken and therefore assessment of the cumulative impact of these developments could not be undertaken. As at March 2011 there is still no further information on these two projects. The cumulative impacts of existing and approved mining operations were considered in the groundwater assessment for the Project. The inclusion of '*hypothetical*' mining operations within any assessment would lead to unreliable results that misrepresented the actual situation and would be potential misleading information.

Boggabri Coal appreciates there are cumulative impacts as a consequence of its activities and is supportive of the notion that any further developments should consider approved operations in its assessment.

4.7.11 Groundwater Model Impact of Drought

Submission: NGO5

The impact on the Maules Creek area during periods of drought was also raised.

The sensitivity analyses undertaken during the numerical modelling included a 10% reduction in the recharge rate to the alluvial aquifer which would simulate the impact of an extended drought over the 21 year approval period. This is obviously a highly unlikely and conservative scenario given that most droughts are typically less than a decade in duration.

This simulation showed that the zone of depressurisation remained largely within the Permian bedrock area and did not extend significantly into the alluvial aquifer. The zone of depressurisation under this lower recharge scenario remained a significant distance from the Maules Creek alluvium and therefore no impacts on groundwater users in this area were predicted. A monitoring network designed to confirm this conclusion has been proposed, and further refinement of the monitoring network will be undertaken during development of the Groundwater Management Plan.

4.7.12 Groundwater Model Revision

Submission: NGO5

The MCCC noted that the groundwater report for the existing operations recommends reviewing the model every 5 years. It is suggested that 2011 is the fifth year of operations and should therefore be revised. Should Project Approval be granted in 2011, this would be undertaken following this in consideration of the findings of the EA.

The groundwater model for the current operations was reviewed and the relevant parameters incorporated into the development of a revised model which is presented in the EA.

The EA commits to a revision of the groundwater model at five yearly intervals (refer Appendix O Section 12.5), however it is considered that further modelling at this early stage will be of little benefit as there is little new data to improve the model.

The initial priority is to develop an appropriate Groundwater Management Plan so that appropriate data is gathered to improve the knowledge of the hydrogeological system and the reaction of the aquifers to mining. Ongoing monitoring that will assist in confirming the findings of the groundwater assessment include:

- The installation of vibrating wires piezometers constructed in the bedrock underlying the alluvium and standard monitoring bores in the alluvials;
- Ongoing metering of water volumes pumped from the mining area; and
- The sharing of geological data between adjacent mining operations.

The detailed groundwater Assessment undertaken for the EA provides a reliable and accurate assessment of the potential impacts of the Project on local groundwater aquifers. The Namoi Catchment Water Study will rely on these detailed assessments and will provide the same detailed level of assessment for the immediate area surrounding the Project as included in Appendix O of the EA. Any future Project Approval should not be delayed because of the Namoi Catchment Water Study.

4.8 ECONOMICS

4.8.1 No Benefit Cost Analysis of Alternatives

Submission: NG05

The Benefit Cost Analysis (BCA) undertaken for the EA compared the Project to cessation of current mining activity in 2011. As identified in the Economic Assessment (p.6) presented in Appendix Q of the EA, Boggabri Coal's feasible alternatives for the mining of coal *"are essentially limited to different scales, designs, technologies, processes, modes of transport, timing, impact mitigation measures etc. However, these alternatives could be considered to be variants of the preferred proposal rather than distinct alternatives"*.

Boggabri Coal completed a detailed underground concept study which is included in Appendix C of the EA. This underground concept study concluded that alternative mining methods did not maximise the utilisation of the in-situ coal resource and was not a practical or feasible option due to the geological structure of the coal seams. Section 4.12 of the EA outlines the specific limitations of underground mining.

4.8.2 Mixing of Private Financial Values and Public Economic Values

Submission: NG05

Economists at Large identified that *"financial analysis should focus on dollar values and the profitability of a project to those operating it, while economic analysis should look at the costs and benefits to the society the project will impact upon, in this case primarily the state of NSW and local communities."*

The author of the Economics Assessment (Gillespie 2010) does not agree with the approach taken by Economists at Large as they undertake what they refer to as a financial assessment of the Project and a separate economic assessment of the Project that ignores any financial costs and benefits associated with mining.

Economic analysis is concerned with changes in community welfare resulting from a development proposal. These comprise *“the sum of any changes in consumers’ surplus and producers’ surplus. Consumers’ surplus is the difference between what a person would be willing to pay for a good or service and what they have to pay. It is measured as the area between a demand curve and the price line. Producers’ surplus is the difference between the costs of the inputs used in the production process and the price received for the finished product. It is measured as the area between a supply curve and a given price for a specified quantity supplied. In practical terms it is the net revenue that is earned by producers. These concepts are explained in standard texts in micro-economics and benefit-cost analysis”* (James and Gillespie 2002).

Where changes in welfare relate to private goods (such as coal), and markets are competitive, financial values are reflective of economic values. As identified in the NSW Treasury Guidelines on Economic Appraisal (2007) *“the general principle is that where market prices are available, they should provide the basis for the measurement of the opportunity cost of inputs or the willingness to pay for outputs.”* Where goods and services impacted by the Project occur outside markets, consumers surplus values may need to be imputed using non-market valuation methods.

Consequently, the author of the Economic Assessment believes the total economic benefit of the Project estimated by Economists at Large is conceptually incorrect in that it ignores the majority of the producer surplus value of the coal.

The Economic Assessment for the Project is accurate and is a suitable assessment for inclusion within the EA.

4.8.3 Royalties Referred to in the Economic Assessment are not discounted

Submission: NG05

All costs and benefits identified in the text in Chapter 2.4 of the Economic Assessment are expressed in an undiscounted manner.

This is for consistency in the text and as it is not appropriate to refer to average operating cost or average revenue in anything but an undiscounted manner.

However, all identified costs and benefits are discounted in the spreadsheet analysis and the results presented in Table 2.2 of Appendix Q are the results of the spreadsheet analysis in a discounted form.

4.8.4 The Analysis Overstates the Case of the Mine as it is Based on Peak Production and Employment Levels – Production Levels were not included in the Sensitivity Testing

Submission: NG05

The BCA is based on the proposed production rate profile of up to 7 Mtpa. Sensitivity testing on production levels is the same as the sensitivity testing for revenue, as revenue is simply production levels multiplied by price. Sensitivity testing for revenue (i.e. production levels or price levels) is provided in Appendix 2 of the Economic Assessment.

4.8.5 The Discount Rate of 7% Used in the Economic Assessment Could Be Considered Low

Submission: NG05

The analysis uses the NSW Treasury recommended discount rate of 7%, with sensitivity testing using 4% and 10%. These are also the discount rates referred to in DoP's draft Guideline for *"Economic Effects and Evaluation in Environmental Impact Assessment"* (James and Gillespie 2002).

4.8.6 The Economic Analysis Avoids Discussion of the Distribution of Benefits between Stakeholders

Submission: NG05

Page 12 and 13 of the Economic Assessment (Appendix Q of the EA) states that *"the net production benefit (which is the main benefit of the Project) is distributed amongst a range of stakeholders including:*

- *The local community in the form of donations and community support programs;*
- *Boggabri Coal and its shareholders;*
- *The NSW Government via royalties; and*
- *The Commonwealth Government in the form of Company tax."*

4.8.7 Omission of Foregone Recreation in Leard State Forest

Submission: NG05

To the extent that there is currently recreational activity in the part of Leard State Forest impacted by the Project, the opportunity cost of the use of forest land may be understated.

However, as stated by Economists at Large *"there is little information available on the number of recreational users"* and hence an estimate of any foregone recreation values is problematic.

Nevertheless, even reasonably significant levels of use would have little impact on the outcome of the analysis. For instance, if it were assumed that there were 10,000 visitors per annum at a consumer surplus value of \$30 per visit, this would be equivalent to a present value of foregone recreational activity of \$4 Million (M), compared to the estimated net benefits of the Project of \$1.4 Billion (B).

4.8.8 Impact on Agriculture in the Project Area is Hardly Considered

Submission: NG05

The value of agricultural production is reflected in the market price of agricultural land. Where the Project utilises agricultural land, the value of this land has been included as a cost of the Project. As the Project is largely situated within a State Forest it is not anticipated to greatly impact on agricultural production activities in the region.

4.8.9 Loss of Watershed and Aquifer Recharge is not considered

Submission: NG05

The Surface Water and Groundwater Assessments presented in Appendix M and Appendix O respectively have indicated that the impact of the Project in terms of loss of watershed and aquifer recharge is negligible and hence no effects were included in the economic analysis.

4.8.10 Value of State Forest as Carbon Sink is Omitted

Submission: NG05

This was omitted from the analysis but is likely to be no more than \$10 M, present value. Its inclusion in the analysis would have no discernable effect on a Project with an estimated net benefit of \$1.4 B.

Further the forest is to be offset by the creation of extensive forest lands as described in the Biodiversity Offset Strategy described in Section 8.5 of the EA.

4.8.11 The Analysis Omits the Environmental Costs from Burning of the Coal

Submission: NG05

The Project as described in Section 4 of the EA includes the mining and extraction of coal. Hence, the economic assessment is of the mining of coal. It is not concerned with the costs and benefits of other projects / activities, such as electricity generation via coal burning that would themselves be the subject of a separate development approval process.

Coal from the Boggabri Coal Mine is intended to be exported to electricity generator(s) in Asia and other global geographical areas. The electricity generator will burn coal whether sourced from the Project or from some other mine. Hence, globally, electricity generation and greenhouse gas emissions 'with' and 'without' Boggabri Coal's coal would be the same. The environmental costs, greenhouse or otherwise, of the generator should not be attributed to the Project.

Any consideration of the costs of the overseas burning of coal would also need to consider the benefits of electricity generation. Theoretically, electricity generated by the burning of coal has a direct economic value equal to the producer surplus and consumer surplus associated with electricity generation. Producer surplus is the net revenue associated with electricity production while consumer surplus is the consumers' willingness to pay for the electricity over and above the actual price paid. Consumer surplus is a particularly important component of direct electricity benefits since with price regulation the producer surplus generated by retailers is likely to be modest with the majority of the benefit accruing to consumers of electricity. In addition to these direct use benefits of electricity there are also public good and external benefits of electricity associated with electric street lighting, education, health, entertainment and communication, comfort and protection, convenience and productivity. The benefits of electricity in developing countries, particularly rural electrification is seen by the World Bank as significant for the alleviation of poverty.

Consideration of the net benefits of coal fired electricity compared to the environmental damage costs of the emissions is considered a broader policy issue for Governments that includes consideration of the relative merits of a range of alternative energy sources including nuclear, solar and wind.

The major overseas destinations of Australian coal exports have the sovereignty to address greenhouse gas emissions from their coal fired generators as they see fit within any requirements of conventions and protocols to which they are signatories.

4.8.12 Inclusion of the Social Value of Employment is inappropriate

Submission: NG05

Three Choice Modelling (CM) studies have been undertaken that have elicited the Willingness to Pay (WTP) of the general community for the preservation of mining jobs (Gillespie 2008, Gillespie 2009, Gillespie 2009b).

The study whose results applied were used in the Boggabri Coal benefit cost analysis (Gillespie 2009) was peer reviewed by Dr John Rolfe, Professor in Regional Development Economics at Central Queensland University. Dr Rolfe is a leading Australian academic in the area of choice modelling. While that particular study was in relation to underground mining (Bulli Seam Operations), Gillespie (2009b) was concerned with open cut mining (Proposed Warkworth Extension) in the Hunter Valley, an agricultural area. That study found an even higher WTP for the social value of employment.

However, to be conservative the lower value from the Bulli Seam Operations Study was used in the economic analysis. Sensitivity analyses were undertaken in relation to the social value of employment with 20% changes in the estimated value having little impact on the net benefits of the Project. Even with omission of the value, the Project is estimated to have a net benefit to the community of \$1.4 B.

4.8.13 Existence Value of Habitat that will be cleared has not been included in the BCA

Submission: NG05

The BCA recognises that there will be lost non-use values associated with the clearing of approximately 1,503 ha of forest and woodland (including 624 ha of Box Gum Woodland as listed under the EPBC Act and TSC Act). However, the community will also gain values associated with the creation of the proposed Biodiversity Offset Strategy (Offset Strategy). The aim of the Offset Strategy is essentially to ensure that the community values gained are at least equal to or greater than the values lost.

With the implementation of the proposed Offset Strategy, it is considered that the potential impacts of the Project on terrestrial fauna and flora would largely be compensated and hence no significant economic cost would arise that would warrant inclusion in the BCA apart from the capital and operating cost of this offset.

4.8.14 Why were the social values of employment transferred from the Illawarra Study and not the values of Aboriginal Heritage

Submission: NG05

Gillespie Economics (2009) estimated economic values for highly significant Aboriginal heritage sites. As identified in Section 8.6.2 of the EA and the Economic Assessment, no sites of 'high' archaeological significance are impacted and so these values were not transferred to the economic assessment for the Project.

4.8.15 Alternative Cost Benefit Assessment of Economic Values

Submission: NG05

The cost benefit assessment in the submission does not fully consider the costs and benefits that accrue from production. Refer to NSW Treasury (2007) NSW Government Guidelines for Economic Appraisal, page 43 and James and Gillespie (2009) Guideline for Economic Effects and Evaluation in EIA, page 15. The approach taken in the submission is therefore incorrect.

4.8.16 Overstatement of Benefits and Understatement of Costs

Submission: NG05

The BCA is based on a long run thermal coal price of AUS\$94/t. This is considered to be highly conservative with current spot prices being in the order of \$140/t.

As identified in the sensitivity analysis the BCA results are most sensitive to the assumed price of coal. If future coal prices were to be in the order of \$140/t the net benefits of the Project would be in the order of \$4 B.

4.9 SOCIAL

4.9.1 Effects of noise and other impacts on land values in the area

Submission: NGO5

Noise and other identified adverse impacts on land values in the area have been incorporated into the economic analysis by including the full cost of acquiring the affected properties (rather than the partial property value impact). At a broader regional level, the Project will increase employment and economic activity in the region which will increase the demand for housing and hence increase market values.

The EA has acknowledged the Maules Creek community, which includes the Fairfax Public School, the Maules Creek Recreational Reserve Trust Hall and surrounding amenities, Commercial Agricultural Businesses and private residences. The potential impacts of the Project on the community have been described in Section 8 of the EA.

Further to this any noise and air quality impacts considered to be unreasonable from an amenity perspective as identified in the EA, Boggabri Coal will underpin the market value by accepting a requirement to acquire such land upon request.

4.10 SOIL AND LAND USE

4.10.1 Existing published Information has largely been ignored

Submission: NGO5

As discussed in Section 8.15 of the EA, existing information relating to geology, soils, topography and vegetation was reviewed prior to undertaking the soil survey assessment for the Project. Specific soil information was reviewed from the following sources:

- The 1983 EIS in which 32 soil probe sites and 16 excavated backhoe sites were used to assess soil profiles within the immediate project boundary. Laboratory analysis was undertaken on 6 of these profiles;
- The Soil and Land Information System (SALIS) database which includes approximately 28 profile sites from a variety of studies including: The Boggabri Coal Consultancy (John Wood – 1993); Boggabri Native Vegetation Program (Mark Young – 2001); and Soil Landscapes of the Boggabri 1:100,000 Sheet Survey (Robert Banks – 2001); and
- The Namoi CMA's Land Management Units in the Namoi Catchment – Map & Legend 2009.

The Soil Survey and Land Resource Assessment sourced background information in June and July 2009 (Appendix S, Section 2.2) and conducted the soil survey in August 2009. During this time, GSSE made inquiries as to the availability of the Boggabri Soil Landscape Map Sheet.

Both DECCW and the Namoi CMA indicated that it was not yet available as it was being reviewed. It is noted that the document remains 'In Press', as per the reference list in the submission.

As described in Section 8.15.2 of the EA, the available information was overlaid with the mine plan which indicated proposed disturbance areas and aerial photos which assist in planning 4WD and backhoe access. The resources were used to assist in designing the field survey program and methodology for the Project Boundary. While the suggested additional reference material is relevant, the background information used for the soil assessment was sufficient for the objective of the soils assessment. In order to design the soil survey and assessment for the specific purpose of mining and planning rehabilitation, the author of the Soil Survey and Land Resource Assessment believes it is vital to undertake targeted field surveys to develop soil profile descriptions for the Project. This ensures the Director General's Requirements for the Project are achieved to a satisfactory standard.

4.10.2 The methodology and interpretations of soil information were not to Australian Standards

Submission: NGO5

The Boggabri Coal Soil and Land Capability Assessment was conducted in accordance with the DGRs for the Project and in accordance with relevant and appropriate standards. The methodology is described in detail in Section 8.15.2 of the EA and Appendix S of the EA.

4.10.3 The soil sections of the EA have not attempted to use the Australian Soil Classification (ASC) (Isbell 2002)

Submission: NGO5

The Australian Soil Classification (ASC) system has been the generally accepted method for naming soils for soil practitioners and scientists within Australia since 1996. However, GSSE chooses to use a more descriptive system which is based on the Factual Key system (Northcote 1979), which continues to be widely used within Australian soil taxonomy and was the accepted standard prior to the ASC. The Factual Key system has four distinct and descriptive groups, as opposed to the ASC which has 14 groups. The author uses this descriptive system for its simplicity in describing soil types to people who are inexperienced in soil taxonomy. This aspect of the system of choice allows the final report to be read and understood more readily by the target audience, that is people within the mining industry, surrounding stakeholders and general public, as well as soil practitioners.

4.10.4 Results Interpretation and lack of data

Submission: NGO5

The report by SoilFuture notes that the *“soils section of the EA have errors in the interpretation of soil laboratory data and fail to provide soil laboratory data for Cation Exchange Capacity and Exchangeable Sodium Percentage.”*

The laboratory data from the study has been summarised within each soil type description and is included in Section 3 of the Soil Survey and Land Resource Impact Assessment Report. It is noted that an error has occurred in appending an incorrect soil test report to the technical report submitted. This administrative error has no material impact on the findings.

The correct soil test report is attached in **Appendix D** of this report. The suite of soil laboratory data for Boggabri Coal does include results for Cation Exchange Capacity and Exchangeable Sodium Percentage for all 33 samples (Appendix C).

4.10.5 Land Capability and Land Zoning

Submission: NGO5

The SoilFuture Report comments that *“The soil section of the report confuses Land Capability with Land Zoning and states that State Forest is a Land Capability. The result of this is that a correct Land Capability assessment of the area to be mined has not been carried out, resulting in poor outcomes for rehabilitation.”*

The EA does not claim that State Forest is a Land Capability, this is confirmed in Appendix S, Table 1 in Section 2.6 of the Soil Survey and Land Resource Assessment, which shows State Forests as a *“Special Zoning”*. This *“Special Zoning”* was included in the Land Capability map to show the extent of State Forest. It should be noted that the post mining land use will remain as State Forest. The highest standard of mine rehabilitation is proposed for the Project.

4.11 REHABILITATION AND FINAL LANDFORM

4.11.1 Final Void

Submission: R3 and R2

The Rehabilitation and Landscape Plan is discussed in Section 8.16 of the EA. Boggabri Coal will continue to review its final landform and rehabilitation strategy to incorporate new technologies where appropriate. Should a further Project Approval be granted in the future, as described in Section 8.16.3 of the EA, the continuation of mining for a further seven years to the north of the Project Disturbance Boundary would significantly reduce the area of the remaining final void as shown in Figure 36 of the EA.

Boggabri Coal will continue to consult with the relevant authorities to ensure the continual improvement in its rehabilitation and landform strategy to ensure an enhanced environmental outcome is achieved.

4.11.2 Linkages with other Mines

Submission: R2

Boggabri Coal will continue to work with adjoining mine operators to minimise potential adverse landscape and biodiversity impacts. Boggabri Coal will consult with adjacent mining operations to enhance noise, air quality, water management and biodiversity outcomes.

4.11.3 Post Mining Land Capability

Submission: R3, NGO2 and NGO5

The SoilFuture report suggests that the *“Post mining lands should be restored to the previous land capability which is derived from slope, terrain and soil attributes.”*

The objective of mine rehabilitation at Boggabri Coal Mine will be to achieve a similar land capability post-mining as pre-mining within the Project Disturbance Boundary. The final landform and rehabilitation is discussed in detail in Section 8.16 of the EA.

Boggabri Coal will develop rehabilitation completion criteria for mine closure in consultation with the relevant government agencies and the community. Furthermore the Leard State Forest will continue to be used and recognised as State Forest post-mining. Therefore, the focus will be on achieving a successful rehabilitation outcome which fulfils the aims of establishing vegetation suited to a State Forest final landuse.

4.11.4 Mine spoil is inadequate to restore native vegetation

Submission: NGO3, NGO4 and NGO5

The general aim of the rehabilitation program at Boggabri Coal Mine will be to continue to establish forest vegetation dominated by selected tree and shrub species as described in Section 8.16 of the EA.

SoilFuture (2011) modelling suggests that vegetation will not be able to be established and sustained on the post-mining site due to a reduced capacity of the sub-strate to hold water or reduced available water holding capacity (AWC).

Boggabri Coal Mine does not agree with this modelling outcome and refers to evidence from extensive research undertaken by the Soil Conservation Service through the National Energy Research Development and Demonstration Council (NERDDC) grant scheme, titled Coal Mine Rehabilitation, Dyson, JR. (1988). The research program focused on a detailed assessment of coal mine rehabilitation areas in comparison with the stability and vegetative performance of an undisturbed control site. In particular the vegetation establishment was assessed on rehabilitated spoil with no topsoil and spoil with a 100 mm cover of topsoil.

Some of the key findings for the seven sub-projects within the overall research program are listed below:

- It was established that although differences were measured, the three sites possessed similar low infiltration rates, soil moisture storage potential and evapo-transpiration patterns and volumes;
- There was no evidence that there would be an increased accession of rainfall to groundwater as a result of mining; and
- It was concluded that a satisfactory degree of surface stability had been achieved on rehabilitated sites with limited or no topsoil.

Further to this, there is extensive evidence in successfully establishing vegetation on mine sites in NSW, QLD and other States, including direct tree seeding onto reshaped overburden with no topsoil.

4.11.5 Rehabilitation Management Plan

Submission: R7

The final landform and domain specific rehabilitation is discussed in Section 8.16.3 of the EA. Boggabri Coal will update its existing Rehabilitation Management Plan that outlines the domain specific objectives and completion criteria. Boggabri Coal will consult with I&I NSW in the development of the Rehabilitation Management Plan and completion criteria.

4.12 TRAFFIC AND TRANSPORT

4.12.1 Effect of increased train movements on Gunnedah, Curlewis and Breeza residents

Submission: R4

The assessment of the impact of increased train movements in Boggabri, Gunnedah and Curlewis was completed for the Project and is included in Appendix T of the EA. The relevant level of assessment was undertaken in accordance with the EARs. It showed that the Project would not have a significant impact on traffic movements at grade crossings in the above mentioned towns.

Boggabri Coal would be supportive of a Regional study that takes into account all train users to assess any long term potential cumulative impacts on residents in Gunnedah, Curlewis and Breeza by the relevant authority.

4.12.2 Closure of Leard Forest Road

Submissions: R5, NGO5 and CS

Mining activities will intersect Leard Forest Road in approximately Year 5 as shown on Figure 10 of the EA and consequently a section of the road will be closed.

The NSC and MCCC have raised concern over the closure of a section of Leard Forest Road, restricting access to landowners in the Maules Creek Community Area between Harparary Road and the Manilla Road.

This is discussed in Section 8.19.3 of the EA and assessed further in Section 4.9 and 5.3.2 of the Traffic Impact Assessment presented in Appendix T of the EA. The Assessment found that the public travel time from Maules Creek to the Leard Forest Road / Manilla Road intersection would increase by approximately 6 minutes and add an additional 6.7 km of travel.

The assessment further concluded that the public travel time from the Leard Forest Road / Harparary Road intersection to the Leard Forest Road / Manilla Road intersection would increase by approximately 22 minutes and add an additional 24.7 km of travel.

It should be noted that the Traffic Impact Assessment found that closure of a section of Leard Forest Road would not adversely affect the vehicle capacity or safety of the road network.

Boggabri Coal has consulted on several occasions with the NSC and MCCC in regard to the closure of a section of Leard Forest Road and the identification of suitable alternative road access for landowners. Boggabri Coal will continue ongoing investigations to identify a suitable alternative road access that meets the reasonable requirements of stakeholders.

4.12.3 Construction Traffic Assessment

Submissions: R1

The RTA has suggested there was no information provided regarding the *“volume and nature”* of construction traffic for the Project. This information is provided in Section 8.19.1 of the EA and in detail in Appendix T of the EA in the Traffic Impact Assessment Report on page 26. Construction related traffic is further discussed and assessed on pages 30, 33, 39, 40 and 42 and Table 5-2 of the Traffic Impact Assessment. Section 8.19.4 of the EA states *“the study has not identified any significant traffic impact that would result from the projected increase in mine operations or the number of construction staff”*.

4.12.4 Harparary Road Traffic Assessment

Submissions: R1 and NGO5

The RTA states that *“neither the Traffic Impact Assessment nor the Environmental Assessment includes an assessment of the proposed usage of Harparary Road by project-related Traffic”*.

Harparary Road and associated intersections including Leard Forest Road and Therribri Road have been considered within Section 8.19.3 of the EA and the Traffic Impact Assessment as described in Sections 4.6, 4.7 and 4.8 and discussed further in Section 8.19.3 and Table 55 and Table 56 of the EA.

The Traffic Impact Assessment found that *"Results from the "SIDRA" modelling clearly indicate that there would be no significant impact on the intersections and the road network adjacent to the Project site as a result of any increase in employment levels and coal production."*

The Manilla Road and southern section of Leard Forest Road will be the principal access roads used by construction staff and full time employees consistent with the existing Boggabri Coal Mine. The Leard Forest Road will be closed which will restrict any access to Project related traffic entering the site from the northern section of Leard Forest Road via Harparary Road.

Boggabri Coal has negotiated a Voluntary Planning Agreement (VPA) with the NSC which includes the upgrade of Harparary Road for the benefit of the Maules Creek Community residents. This will further improve the existing ample capacity of the intersections and traffic capacity of Harparary Road. Boggabri Coal will consult with the NSC and local community in regards to any upgrades to Harparary Road and provide further detailed design information as required.

The Project as described in Section 4 of the EA does not identify Harparary Road as a principal access route that will be utilised for the construction or ongoing operational requirements for the Project. Therefore, further assessment of Harparary Road is not required to assess the impacts of the Project on this road.

4.12.5 Therribri Road Overpass

Submission: R1

The RTA states that *"Therribri Road grade separated overpass over the private haul road is to be constructed prior to any increase in the transport of product coal from 1.5 Mtpa on the private haul road."*

The EA states in Section 4.1, 9.19.3, and 9.19.4 that *"Boggabri Coal will build an overpass on Therribri Road across the private coal haul road when coal haulage by trucks exceeds 5.5 Mtpa."*

Boggabri Coal currently has approval to haul coal over Therribri Road at grade at a rate of up to 5.0 Mtpa. Boggabri Coal cannot accept a limit of 1.5 Mtpa as proposed by the RTA for the following reasons:

- Boggabri Coal produced 2.1 Mtpa in 2010 and therefore is already exceeding the proposed suggested limit of 1.5 Mtpa by the RTA;
- The proposed production schedule will achieve 3.2 Mtpa in 2011;
- Traffic assessments indicate there is sufficient capacity at the intersection with the Private coal haul road and Therribri Road to accommodate the truck haulage of Product coal in excess of 5.5 Mtpa;

- There has been no incidents or near misses with the current traffic arrangements at the intersection in question;
- Boggabri Coal has commenced the detailed preliminary design works for the construction of the proposed rail spur;
- The adjacent Maules Creek Coal Project is progressing quickly and Boggabri Coal have been in discussions with Aston Resources over a shared arrangement for the construction and operation of the joint rail spur;
- It is likely that the construction of the rail spur will commence in late 2011;
- The Therribri Road overpass would potentially interfere with the construction of the rail spur as they are within the same easement of the Project Boundary; and
- NSC is the relevant roads authority for Therribri Road and has not made the request for the crossing to occur.

Imposing a limit of 1.5 Mtpa is not practical as the existing coal haulage as discussed above exceeds that level and will need to continue to exceed it until the rail spur is constructed which, as discussed above, is anticipated to be by 2012 to 2013.

4.12.6 Detailed Design Works and Concurrence with RTA

Submission: R1

Following the grant of Project Approval, Boggabri Coal will develop relevant traffic management plans and provide detailed designs in consultation with the RTA and the NSC as the relevant road's authorities as discussed in Section 8.19.4 of the EA.

Boggabri Coal will develop a Code of Conduct for drivers in consultation with the RTA and NSC as the relevant road's authority.

Boggabri Coal will seek concurrence with RTA pursuant to section 138 of the *Roads Act 1993* prior to the construction of any works on the Kamilaroi Highway.

4.12.7 Private Coal Haul Road

Submission: NGO5

The MCCC has suggested that "At the completion of the proposed rail loop Boggabri Coal's existing private haul road will become the only heavy vehicle access route to the mine and controls at the intersections of the Leard Forest Road and Therribri Road will be changed to give priority to the public roads, with mining traffic not having the right of way. Access to the private haul road will be provided by Boggabri Coal at the Kamilaroi Highway to the satisfaction of the RTA."

The Project is described in detail in Section 4 of the EA. It is not proposed that the Private Coal Haul Road will be a heavy vehicle access route to the site.

The rail spur alignment truncates the existing private haul road between the Kamilaroi Highway and the Mine Infrastructure Area. The private haul road will therefore not be available as an access route. Following the construction of the rail spur, the private coal haul road will continue to be used by maintenance staff and other light vehicles for mining related purposes only.

Boggabri Coal does not have concurrence from the RTA nor is it seeking approval to construct an intersection for heavy vehicles to enter or exit from the private coal haul road onto the Kamilaroi Highway.

Boggabri Coal will continue to use the Manilla Road and Leard Forest Roads as the principal mine access. The Traffic Impact Assessment, included in Appendix T of the EA, found that there is sufficient capacity on the Kamilaroi Highway, Manilla Road and Leard Forest Road intersections to accommodate existing and Project related traffic.

Boggabri Coal will continue to support the maintenance of the relevant sections of these roads commensurate with the impacts of the Project and in consultation with the NSC.

4.13 GENERAL PROJECT STATEMENT

4.13.1 Consideration of Underground Mining Option

Submission: NGO5

Boggabri Coal completed an underground concept study which is discussed in Section 4.12 of the EA and included in Appendix C of the EA. The geological structure and proximity of the coal to the surface makes the resource ideally suited to open cut mining methods. A number of disadvantages were identified from the underground concept study which included technical and economic limitations at the present time. The study identified that:

- Only three seams of the proposed eight target seams would be viable for longwall extraction;
- Less efficient deployment of resources in developing the mine;
- The sterilisation of more than 100 Mt of coal resource due to the multi seam nature of the deposit;
- Lower production levels with an average of 5.3 Mtpa ROM coal would provide less social and economic benefit to the community than the Project;
- All ROM coal would need to be washed which would result in a poorer environmental outcome than open cut mining; and
- The construction of a large tailings dam to manage coal fines and rejects would result in a poorer environmental outcome.

The MCCC has indicated that *“an EA should be undertaken as to the impacts of the Underground Mining on the Forest environment and the community.”* Boggabri Coal is not seeking approval for an underground operation.

It is sufficiently evident from the underground concept study that the technical and economic constraints of an underground mining operation would not be viable under current market conditions. An underground mining operation would have a much lower production capacity and therefore would have less social and economic benefits to the community.

Boggabri Coal has committed to exploring alternative coal extraction methods, such as auger mining at the boundary with adjacent operations to minimise unnecessary surface disturbance. Boggabri Coal will continue to review its mining activities and introduce available technologies where practicable to produce favourable or improved environmental outcomes.

As noted in the EA there is a potential further seven years of open cut mining in Boggabri Coals existing mining authorities. If viable this remaining coal may be targeted under a new planning approval in the future. Beyond this Boggabri Coal does not have any further intentions at this time to extend mining into A339. If mining was to occur in A339 it would likely be underground as the coal seams are much lower than in the open cut area for the Project.

Boggabri Coal acknowledges that there are other potentially viable coal resources in the region which will need to be assessed at the appropriate time under prevailing market conditions. Boggabri Coal will continue to work with regulators and community to balance the costs and benefits of its activities.

4.13.2 Cumulative impacts not adequately addressed

Submission: NGO5

The EA considered the potential cumulative environmental impacts of air quality, noise, ecology, surface and groundwater and traffic. The studies undertaken for the EA include the background levels of existing landuses including all agricultural activities and mining operations. Future proposed mining operations that had an approval or publically available mine plan were also considered in the EA.

Further to this Boggabri Coal completed a WCCIS Assessment that is described in detail in Section 11 of the EA. The other mining related projects considered in this assessment did not have a valid planning approval or sufficient information that was publically available at the time that could be used or was suitable to be used in a detailed environmental impact assessment.

Boggabri Coal believes it has adequately assessed the cumulative impacts with existing land uses and approved mining operations. Boggabri Coal is supportive of any new or proposed developments in the area considering existing developments and proposed activities that have a valid and approved mining or other commercial activities.

Boggabri Coal will continue to liaise with the community, NSC, GSC, industry, regulators and other relevant stakeholders to ensure any potential cumulative impacts are managed in a coordinated fashion for the Project and future mining developments in the area.

4.13.3 Consideration of the NCMA Policy and Catchment Action Plan

Submission: R3

The Namoi CMA noted that the Namoi Catchment Action Plan (Namoi CAP) and the Namoi Catchment Management Authorities Extractive Industries Policy should be considered in the EA.

The NSC initiated the development of the Narrabri Shire Growth Management Strategy (NSCGM Strategy) which was prepared by Edge Planning (2009). The NSCGM Strategy was considered the first stage in the review of the current Local Environmental Plan (LEP) being prepared for the Narrabri Shire. The Growth Management Strategy provided the strategic direction for the draft LEP as well as providing guidance for the future development pattern of the Shire.

It should be noted that the NSCGM Strategy identified “*Coal Mining as an important emerging industry for the Shire*”. The NSCGM Strategy considers a number of Regional Authorities policy and guidelines including the Namoi CAP in its development. It should be noted that the NSCGM Strategy and the Narrabri Shire LEP were considered in the EA. Therefore the principles of the Namoi CAP have been addressed through meeting the objectives of the Narrabri Shire LEP. The EA refers to the consideration of the Namoi CAP in Section 8.13.2.

Boggabri Coal acknowledges the importance of supporting all Regional environmental and social objectives and has striven to ensure consistency with the Narrabri Shire LEP in consultation with the NSC. Boggabri Coal has further reviewed the Namoi CAP and NCMA Extractive Industries Policy and believes the Project and proposed mitigation measures, including the Biodiversity Offset Strategy, does not contradict the objectives of the NCMA.

4.13.4 Mining Titles and Plans

Submission: R7

It has been identified that a proposed mine water dam and irrigation areas are located within an Exploration Licence held by another mining company. Boggabri Coal will consult with I&I NSW to ensure the Project including mine related infrastructure is constructed in accordance with the *Mining Act 1992*. Boggabri Coal will revise and update its existing Mine Operations Plan in this regard to the satisfaction of I&I NSW. As indicated in Figure 1 of the EA Boggabri Coal intend to apply for a Mining Lease over the affected area in Authorisation 355.

5 STATEMENT OF COMMITMENTS

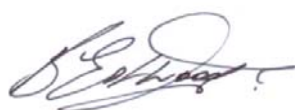
Following the consideration of the above submissions received from stakeholders and the community Boggabri Coal has revised the Statement of Commitments to incorporate, where practicable, additional management and control measures to further mitigate any potential adverse environmental impacts. In this regard, Boggabri Coal proposes to operate in accordance with the Statement of Commitments as described in Section 9 of the EA and Ref 26 in **Table 4** below and the proposed amendment to commitment 1 and 2 described in **Table 4**.

Table 4
Supplementary Statement of Commitments

Ref	Commitment
Mining Operations	
1 & 2	Upon the Receipt of Project Approval, Boggabri Coal will relinquish DA 36/88 at the appropriate time as agreed between Boggabri Coal and DoP.
26.	Boggabri Coal will continue to investigate alternative road access options to the Maules Creek Community to mitigate the closure of a section of Leard Forest Road in consultation with the NSC and MCCC.

* * *

for
HANSEN BAILEY



Ben Eastwood
Senior Environmental Scientist



James Bailey
Director

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APPENDIX A

Summary of Submissions

Submission Received	Submission ID	State	Country	Air Quality	Greenhouse Gas	Acoustics	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Health	General Statement
Regulator																				
Roads and Traffic Authority - Western Region	R1	NSW	Australia														•			
Department of Environment Climate Change and Water	R2	NSW	Australia	•		•		•	•	•	•					•		•		
Namoi Catchment Management Authority	R3	NSW	Australia						•		•					•				
Gunnedah Shire Council	R4	NSW	Australia			•											•			
Narrabri Shire Council	R5	NSW	Australia														•			
NSW Office of Water	R6	NSW	Australia									•								
NSW Industry & Investment	R7	NSW	Australia													•				•
Non-Government Organisation																				
The United Mine Workers Federation of Australia	NGO1	NSW	Australia																	
The Colong Foundation for Wilderness Limited	NGO2	NSW	Australia					•	•							•				
Northern Inland Council for the Environment	NGO3	NSW	Australia		•			•	•		•	•		•	•	•			•	
The Wilderness Society - Newcastle	NGO4	NSW	Australia		•			•	•					•	•	•				
Maules Creek Community Council	NGO5	NSW	Australia	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•
Community Stakeholder																				
Gregory Olsen	CS	NSW	Australia		•			•				•		•		•				
Michael Daley	CS	NSW	Australia					•												•
Conor Brian Scott	CS	n/a	Ireland		•			•				•		•		•				
Jack Whiddon	CS	NSW	Australia		•			•				•		•		•				
Carol Collins	CS	Delaware	USA		•			•				•		•		•				
Glen Winters	CS	NSW	Australia		•			•				•		•		•				
Rebecca Hockley	CS	TAS	Australia		•			•				•		•		•				
Frances Lynch	CS	Massachusetts	USA		•			•				•		•		•				
Chris Michaelides	CS	VIC	Australia		•			•				•		•		•				
Jodie Cox	CS	VIC	Australia		•			•				•		•		•				
Jeff Meares	CS	NSW	Australia		•			•				•				•				
MaryJo Matheny	CS	Indiana	USA																•	
Grace Neff	CS	N/A	USA					•												
Daniel Katz	CS	NSW	Australia																	•
Milton Moor	CS	SA	Australia																	•
Martin Male	CS	ACT	Australia		•			•				•		•		•				
Tristan Mules	CS	QLD	Australia																	•
Vivienne Ortega	CS	VIC	Australia					•	•											
Robert Rutkowski	CS	N/A	N/A		•			•				•		•		•				
Xavier Mayes	CS	NSW	Australia		•			•				•		•		•				

Submission Received	Submission ID	State	Country	Air Quality	Greenhouse Gas	Acoustics	Visual and Lighting	Ecology	Biodiversity Offset Strategy	Aboriginal Archaeology	Surface Water	Groundwater	Economics	Social	Soil & Land Use	Rehabilitation and Final Landform	Traffic and Transport	Environmental Monitoring	Health	General Statement
Don & Prue Mantack	CS	WA	Australia																	•
Ron Silver	CS	Florida	USA		•			•				•		•		•				
Frances Pike	CS	NSW	Australia		•			•												
Nathan Tremain	CS	QLD	Australia		•			•				•		•		•				
Sharon Miller	CS	NSW	Australia		•							•				•				
Nicholas Robertsor	CS	NSW	Australia		•			•				•		•		•				
Elizabeth Coleman	CS	NSW	Australia		•			•												
Marita Macrae	CS	NSW	Australia					•	•											
Dick Clarke	CS	NSW	Australia		•			•				•		•		•				
Serena Lucrez	CS	QLD	Australia		•			•				•		•		•				
Julie Norbury	CS	NSW	Australia		•			•				•		•		•				
Hope Nguyen	CS	VIC	Australia		•			•	•			•		•		•				
Louise Fowler-Smith	CS	NSW	Australia		•			•				•		•		•				
Jean Harrison	CS	TAS	Australia																	•
Vicki Perizzolo	CS	California	USA		•															
Tegan Redinbaugh	CS	NSW	Australia																	•
Jodi Ford	CS	WA	Australia					•												
Nick Westley	CS	NSW	Australia		•			•				•	•	•		•	•			
Deborah Brown	CS	QLD	Australia		•			•				•		•		•				•
Laylee Purchase	CS	QLD	Australia		•			•												•
Gerald Millington	CS	NSW	Australia																	•
Nora Jones	CS	NSW	Australia		•			•				•		•		•				
Brenda Hixenbaugh	CS	Montana	USA					•												•
Dan Healy	CS	QLD	Australia		•			•				•		•		•				
Margit Alm	CS	VIC	Australia		•			•				•		•		•				
Kevin Orr	CS	NSW	Australia		•															
Michael Evans	CS	California	USA		•			•				•		•		•				
Evan Ahern	CS	NSW	Australia		•			•				•		•		•				
Celine Dunn	CS	NSW	Australia		•			•				•		•		•				
Bobbie Flowers	CS	New York	USA		•			•				•		•		•				
Victoria Bail	CS	NSW	Australia		•			•	•			•		•		•				
Jane Brownrigg	CS	VIC	Australia		•			•				•		•		•				
Simon Cook	CS	NSW	Australia		•			•				•		•		•				
Thomas Colley	CS	N/A	N/A		•				•			•								
Vicki Sullivan	CS	VIC	Australia					•												•
Georgia Lowe	CS	NSW	Australia		•			•	•			•			•	•				
Reussell Weisz	CS	California	USA		•			•				•		•		•				
Alan Hayward	CS	NSW	Australia		•			•				•		•		•				

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Elisabeth Vis	CS	WA	Australia		•															•
Winnie Luu	CS	NSW	Australia		•			•				•		•		•				
Robert Jeffrey Goulc	CS	QLD	Australia		•			•				•		•		•				
Erin O'Donnell	CS	VIC	Australia		•			•				•		•		•				
Sue Cleveland	CS	VIC	Australia		•			•				•		•		•				
Jill Thio	CS	VIC	Australia		•			•				•		•		•				
Robert Jenkins	CS	QLD	Australia		•			•				•		•		•				
Cheryl Billing Smith	CS	VIC	Australia		•			•				•		•		•				
Duncan Reilly	CS	SA	Australia		•			•				•		•		•				
Richard Elliot	CS	N/A	UK		•			•				•		•		•				
Shane Pyemont	CS	NSW	Australia																	•
Simon Hill	CS	NSW	Australia		•			•				•								
Kate Meares	CS	NSW	Australia		•			•				•		•		•				
Dr Marty Branagar	CS	NSW	Australia		•			•				•		•						
Heidi Wollum	CS	N/A	Sweedden		•			•				•		•		•				
Jake Savona	CS	VIC	Australia		•			•				•		•		•				
Peter Cejchan	CS	Czechia	European Union		•			•	•			•		•		•				
Anna Rodriguez	CS	N/A	Spain																	•
Liz Thornton	CS	NSW	Australia																	•
Gerg Marks	CS	ACT	Australia		•			•				•		•		•				
Karinda Stone	CS	NSW	Australia		•			•				•		•		•				
Pont Luis-Marie	CS	N/A	Fance																	•
Ingrid Rossemann	CS	QLD	Australia		•			•				•		•		•				
Nikala Sim	CS	NSW	Australia					•										•	•	
Vivian Parish	CS	VIC	Australia		•			•	•			•		•		•				
Kathryn Lai	CS	NSW	Australia																	•
Kay Lane	CS	NSW	Australia																	•
DeDe O'Donnel	CS	Pennsylvania	USA		•			•				•		•		•				
Emily Gardner	CS	VIC	Australia		•			•				•		•		•				
Judy Gehrig	CS	North Carolina	USA		•										•					
Mike Mizzi	CS	NSW	Australia		•			•	•			•		•		•			•	
John Hervatch	CS	VIC	Australia																	•
Francis Matri	CS	Connecticut	USA		•			•				•		•		•				
Sonia Geerlings	CS	NSW	Australia		•			•				•		•		•				
Jimmy Malecki	CS	NSW	Australia		•			•	•			•		•		•				
Kim Bauer	CS	N/A	N/A		•			•				•		•		•				
Nancy Gathing	CS	Wisconsin	USA																	•
Kenneth Lapointe	CS	Ontario	Canada		•			•				•		•		•				

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Paul Spyris	CS	NSW	Australia					•												•
Catherine Scott	CS	VIC	Australia		•			•						•		•				
Pete Eckford	CS	NSW	Australia		•			•				•		•		•				
Noelene Lucas	CS	NSW	Australia		•			•				•		•		•				
Jenny Rose	CS	NSW	Australia		•			•						•						
Anne Collins	CS	QLD	Australia		•			•				•		•		•				
Laura Herndor	CS	California	USA					•	•			•		•						
Charlotte Rogers	CS	NSW	Australia																	•
Mark Merritt	CS	NSW	Australia					•	•											•
Nikole Hynarc	CS	QLD	Australia		•			•				•		•		•				
Kris Gesling	CS	NSW	Australia		•			•				•								
Brendan Crotty	CS	NSW	Australia					•												•
Miriam Robinson	CS	VIC	Australia		•															•
Angela Fazzar	CS	Florida	USA		•			•				•		•		•				
Sinead Lenaghan	CS	VIC	Australia		•			•				•		•		•				
David Stewart	CS	NSW	Australia		•			•				•		•		•				•
Maryanne Watters	CS	NSW	Australia																	•
Ross Rapmund	CS	NSW	Australia		•			•				•		•		•				
Mary Katz	CS	NSW	Australia		•			•				•		•		•				
Jennifer Brown	CS	NSW	Australia																	•
Ivette Mendoza	CS	NSW	Australia		•			•				•		•		•				
Robert Dvorak	CS	VIC	Australia		•			•				•		•		•				
Kay Wilson	CS	NSW	Australia																	•
Ilona Renwick	CS	NSW	Australia				•	•	•			•		•						
Keren Parnel	CS	NSW	Australia		•			•				•		•		•				
Greg Armfield	CS	NSW	Australia					•				•								•
Geraldine and Robert Johnson	CS	QLD	Australia		•			•				•		•		•				
Janenne Kornfield	CS	QLD	Australia		•			•				•		•	•	•				
Paul May	CS	QLD	Australia		•			•	•			•		•	•	•				
Carmel Brown	CS	NSW	Australia		•			•				•		•		•				
Susie Russell	CS	NSW	Australia		•			•				•		•		•				
Julian Brown	CS	VIC	Australia		•			•				•		•		•				
Gary Brooke	CS	NSW	Australia		•			•				•		•		•				
Marla de Vries	CS	N/A	Netherlands																	•
Rachel Bardsley	CS	NSW	Australia					•				•		•						
Norman Hanel	CS	SA	Australia		•			•				•		•		•				
Steve Denshire	CS	NSW	Australia		•			•	•			•		•		•				
Kelly-Ann Horne	CS	VIC	Australia		•			•				•		•		•				

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Daniel Murany	CS	QLD	Australia					•												•
Denise Dempsey	CS	VIC	Australia		•			•	•							•				
George Mair	CS	ACT	Australia					•						•	•					
Margaret Lund	CS	NSW	Australia		•			•				•							•	
Wendy White	CS	NSW	Australia		•			•				•			•					
Joan Lowe	CS	NSW	Australia		•			•	•			•		•		•			•	
Michael Stone	CS	NSW	Australia		•			•	•			•		•		•			•	
Margaret Urer	CS	NSW	Australia					•						•						•
Frances Bell	CS	WA	Australia		•			•				•		•		•				
Alan Carpenter	CS	NSW	Australia		•			•				•		•						
Robyn Mitchinson	CS	NSW	Australia		•			•				•		•		•				
Cecile van der Burgh	CS	VIC	Australia		•			•	•			•		•		•				
Myles Surname	CS	TAS	Australia																	•
Elizabeth Bulley	CS	NSW	Australia					•								•				
Anne Bentley	CS	NSW	Australia		•			•	•			•		•		•			•	
Marilyn Hind	CS	NSW	Australia		•			•				•		•		•			•	
Ifeanna Tooth	CS	NSW	Australia		•			•				•		•		•				
Elisabeth McInnes	CS	NSW	Australia		•			•	•			•		•		•			•	
Yola Metti	CS	NSW	Australia		•			•				•		•		•				
Robert Lollbach	CS	NSW	Australia		•			•	•			•		•		•			•	
Paul Rymer	CS	NSW	Australia		•			•				•		•		•				
Daniel Endicott	CS	NSW	Australia		•			•				•		•		•				
N/A	CS	N/A	N/A		•															•
James Tedder	CS	NSW	Australia					•												•
Paul Sutton	CS	N/A	Wales		•			•				•		•		•				
Lisa Domagala	CS	QLD	Australia		•			•				•		•		•				
Lynne Rymer	CS	NSW	Australia		•			•				•		•		•				
Tony Hill	CS	NSW	Australia					•												
Ed Valk	CS	NSW	Australia		•			•				•		•		•				
Vanessa Howe	CS	NSW	Australia					•				•								
Patrick Norman	CS	QLD	Australia					•								•				
Yvonne Lollback	CS	NSW	Australia		•			•				•		•		•			•	
Adrian Pottow	CS	QLD	Australia		•			•				•		•		•				
Erica Rink	CS	NSW	Australia		•															•
John Talary	CS	NSW	Australia		•			•				•		•		•				•
Jane Judd	CS	NSW	Australia		•			•				•				•				
Boudicca Ceresse	CS	NSW	Australia					•	•						•	•				
Katherine Downs	CS	NSW	Australia		•			•	•			•		•		•				

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Alice Graham	CS	TAS	Australia		•			•				•		•		•				
Liesel Rickarby	CS	NSW	Australia		•			•	•			•		•		•			•	
Beverley Symons	CS	NSW	Australia		•			•				•		•		•				
Susanne Skates	CS	NSW	Australia		•			•	•			•		•		•			•	
Warrick Jordan	CS	NSW	Australia		•			•	•			•	•	•		•				
Carrie Rieden	CS	WA	Australia		•			•	•			•		•	•	•				
Sean Corrigan	CS	QLD	Australia		•			•				•		•		•				
Carl Gosper	CS	WA	Australia		•			•				•		•		•				
Lisa Newling	CS	NSW	Australia		•			•				•		•		•				
Barrie Griffiths	CS	NSW	Australia		•			•				•		•		•				
Marg McLear	CS	NSW	Australia		•			•				•		•		•				
Steve Phillips	CS	NSW	Australia		•			•	•							•				
Lynton Auld	CS	NSW	Australia					•	•											
Deanne O'Donnel	CS	Pennsylvania	USA		•			•				•		•		•				
Ian Brown	CS	NSW	Australia					•												
Colin Morse	CS	NSW	Australia														•			
N/A	CS	NSW	Australia		•			•				•		•		•				
N/A	CS	NSW	Australia					•	•											
N/A	CS	N/A	N/A		•			•				•		•		•				
N/A	CS	NSW	Australia		•			•				•		•		•				
N/A	CS	NSW	Australia					•						•						
N/A	CS	NSW	Australia		•			•	•			•			•	•				
N/A	CS	NSW	Australia												•					•
N/A	CS	VIC	Australia		•			•				•		•		•				
N/A	CS	NSW	Australia				•	•	•						•					
N/A	CS	QLD	Australia		•			•				•		•		•				
N/A	CS	NSW	Australia		•			•				•		•		•				

APPENDIX B

Summary of Issues

Category	Submission ID	Issue	Section
Air Quality	R2	The emission inventory used in modelling assumes emissions from Tarrawonga Mine to be ~20% of the total emissions from the Project. However consideration of the approved Maules Creek Coal Mine has not been included.	4.1.3
	R2	Appendix F Air Quality Worst Case Cumulative Impact Assessment provided information on the possible future mining in the area but did not provide any meaningful assessment on cumulative impacts.	
	R2	With the exception of Tarrawonga Mine no additional air quality modelling was undertaken to provide an assessment from all three mines (Boggabri, Tarrawonga and Maules Creek mines).	
	R2	The Air Quality Impact Assessment shows PM10 annual rolling averages of 19-25 ug/m3 the assessment uses 12 ug/m3 as the background annual PM 10 concentration however provides no explanation for using the lower background concentration.	4.1.4
	R2, NGO5	The EA does not clearly state where the proposed TEOM air quality monitoring unit(s) or the real time meteorological monitoring unit will be located.	4.1.2
Greenhouse Gas	CS, NGO4	The Project will destroy an existing carbon sink and produce 16.9 million tonnes of greenhouse gases equivalent to 10% of all greenhouse gases emitted annually in NSW.	4.1.1
	NGO3	The greenhouse gas emissions from the Project are estimated at 16.4 million tonnes of carbon dioxide equivalent per annum and represent 10% of all greenhouse gases emitted annually in NSW and will destroy an existing carbon sink.	
	NGO3	With consideration of other mining operations and Projects an estimated 50 million tonnes of carbon dioxide equivalent per annum, which over a 21 year period would be over 1 billion tonnes.	
	NGO5	The Project is expected to make a significant contribution to the NSW GHG emissions impacting on the NSW Kyoto targets.	
	NGO5	The Project will make a significant contribution of an additional 1% of all NSW greenhouse gas emissions. If greenhouse gas emissions from the burning of coal produced at the Boggabri Coal Mine were accounted for in the NSW emissions, these emissions would be the equivalent of 25% of the NSW Kyoto target. Increased GHG emissions have been shown to directly contribute to extreme weather events and changes in climate. The mining of coal in the Maules Creek area will directly contribute to the climate change problem that we are leaving to our children. As farmers our environment and our livelihood is directly impacted by severe weather and climate change. Our future generations will continue to pay the price long after mine closure and Idemitsu has moved on.	
Acoustics	R2	No clear demonstration that all reasonable and feasible noise mitigation measures have been applied and no evidence is provided that consultation with affected receptors has / is being undertaken. This must include a comparative analysis of all available operation equipment, mitigation technologies, management strategies and provision of a justification for the measures selected for application at the site.	4.2.2
	R2	The rail assessment only assumes a 0.3dBA increase with additional average 3 train movements per day rather than the maximum number of trains during the day / night.	4.2.1
	R4	The cumulative impacts of rail haulage (noise and vibration) on Gunnedah require greater examination	

Category	Submission ID	Issue	Section
	R2	The EA states that only stability class A to F with no occurrence of G class inversions, indicating strong inversions do not occur in this area however the Air Quality Impact Assessment for modelling proposes Class F and G inversions are aggregated into the F class.	4.2.3
	R2	The statement that strong inversions do not occur in the area is not accepted based on the data provided.	
	R2	The EA fails to provide an economic or social benefit justification of the need for any noise limits to be set above the PSNL.	4.2.5
	R2	The existing noise limits (i.e. PSNL of 35 LA eq, 15 min day and 45 LA1, 1min night) be retained for the Project as a means of demonstrating all reasonable and feasible mitigation measures have been implemented.	
	R2	The EA provides no information on the extent of any attempts to negotiate agreements with affected receptors when noise impacts above the Project Specific Noise Levels (PSNL) are predicted.	
	R2	Noise sources and locations considered in the assessment of potential sleep disturbance need to be identified.	4.2.4
	R2	No significant mitigation measures to minimise impacts on sleep disturbance are identified to address exceedances predicted at a number of residences. Where INP criteria can not be achieved at any receptor a suitable agreement should be developed.	
	NGO5	It is expected there will be significant impacts on forest fauna and birdlife, and neighbouring properties due to noise resulting from blasting and heavy equipment.	4.4.38
Visual and Lighting	CS	Boggabri Coal mine is already visible from Coryah Lookout in Mt Kaputar National Park and the further 1,300 ha of disturbance will represent an alarming scar of immense proportions.	4.3.1
Ecology	CS, NGO4	The Project will result in the clearance of 1385 ha of critical habitat.	4.4.11
	CS, NGO3, NGO4, NGO5	Endangered groundwater dependant ecosystems including Stygofauna in the vicinity of the Project will be damaged as a result of changes to water chemistry and a reduction in the water table of up to 2 m as shown in the Environmental Assessment (Drawing A5 in Appendix O of the Environmental Assessment). Due to aquifer connectivity, there could be serious impacts on the Stygofauna due to changes in water chemistry.	4.4.15
	NGO5	No assessment has been undertaken of the potential impact of the proposal on a unique suite of Stygofauna known to be associated with the groundwater in the Maules Creek catchment and potentially Leard State Forest.	
	CS	There are inadequate mitigation and management measures proposed to account for the impact on 194 fauna species, including 33 species listed under the <i>Threatened Species Conservation Act 1995</i> and seven listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .	4.4.33
	CS	The Leard State Forest is the largest single stand of remnant vegetation left on the Liverpool Plains and is home to 22 Threatened plant and animal species including the nationally endangered Grassy White Box ecosystem.	4.4.1, 4.4.3, 4.4.7, 4.4.8
	CS	The Project will result in the reduction of the Leard State Forest by about 30%.	4.4.9
	NGO3	The Project will reduce the woody vegetation cover in the vicinity of the Leard State Forest from 30.6% to 26.8% and thus cross a critical threshold leading to loss of species.	

Category	Submission ID	Issue	Section
	CS	The Project will result in 28% of the existing White box-Narrow Leaved Ironbark-White Cyprus Pine grassy open forest being cleared. In total, 623.6 ha of a total 3,214 ha of Critically Endangered Ecological Communities (CEEC) in the Leard State Forest will be disturbed as a result of the Project.	4.4.12
	CS	Do not mine Mt Kaputar National Park.	4.3.1
	CS	There is no mention in the EA of any research being completed to determine if hollow dependent species will use nesting boxes or if Threatened species would be suitable for relocation.	4.4.3, 4.4.22
	CS	The EA fails to note the significant effect on Threatened ecological communities and Threatened avifauna by the temporary loss of habitat between extraction and revegetation works.	
	CS	The EA portrays the Leard State Forest as being extensively logged landscape which fails to note that large areas of high quality forest remain.	4.4.4
	NGO2	This Project along with other mining proposals would destroy the majority of the Leard State Forest.	4.4.18, 4.4.19
	NGO2	The Leard State Forest at 7,464 ha in extent is very diverse with two endangered ecosystems and also contains suitable habitat for the Feather-Tailed Glider.	4.4.3, 4.4.30
	NGO2	The EA contains no scientific evidence that the species richness or ecological integrity will be retained or enhanced either through rehabilitation or by reservation of offset areas.	4.4.44
	NGO3	The EA misrepresents and underestimates the condition of the vegetation within the Boggabri Coal open cut.	4.4.4, 4.4.5, 4.4.24
	NGO3	The EA severely misrepresents the impact of the proposal on the scale and configuration of native vegetation.	
	NGO3	The EA ignores climate change impacts on biodiversity and provides no assessment in relation to climate change adaption.	4.4.31
	NGO3	The EA largely ignores the cumulative impacts of background rates of clearing and clearing planned in adjoining mines or proposed mines.	4.4.18, 4.4.19
	NGO3	The EA underestimates the significance of the impacts on Threatened species and communities.	4.4.23, 4.4.29, 4.4.12
	NGO3	The Project aims to avoid regulatory requirements by not referring the Boggabri Existing to the Federal Minister for the Environment under the EPBC Act 1999.	4.4.47
	NGO5	The existing Boggabri mining operations was exempt from the provisions of the Commonwealth EPBC Act and only the extension was referred. This was considered inappropriate as the entire Project would impact on "Matters of National Significance".	
	NGO3	The Project will clear 1,900 ha of native vegetation, amounting to 1/3 of the Leard State Forest and in conjunction with adjoining mines will clear an estimated 3,500 ha of the Leard State Forest and 5,500 ha of native vegetation in total.	4.4.18, 4.4.19, 4.4.21
	NGO3, NGO4	The Project will destroy 624 ha of one of the most significant and intact known remnants of the nationally-listed and critically endangered Box Gum Woodland.	4.8.12
	NGO3	The Project will cause unacceptable negative impacts on up to 34 Threatened species and their habitats, particularly hollow-dependant species and declining woodland birds.	4.4.23, 4.4.29
	NGO3	The Project will increase the fragmentation of the landscape leading to edge effects and increased impacts from invasive	4.4.38

Category	Submission ID	Issue	Section
		species.	
	NGO5	The expected impacts on critically endangered White Box Grassy Woodland communities would seriously affect the endangered and threaten species that live in the Forest. It is expected there would be forced migration of displaced native animals to other land.	4.4.7
	NGO5	Threats to the importance of the Leard State Forest as a large area of remnant vegetation in the Brigalow Bioregion.	4.4.2, 4.4.6, 4.4.7, 4.4.8
	NGO5	The EA provides a simplistic and misleading analysis of existing remnant vegetative cover in the region.	4.4.18, 4.4.44
	NGO5	The Project will have significant impacts for a number of Threatened species and ecological communities including: Box – Gum Woodland – TSC and EPBC Act; Eight species of woodland bird – for which the area forms “core habitat” – TSC Act; Regent Honeyeater – TSC Act and EPBC Act; Three species of hollow-dependent micro chiropteran bat – for which the area forms ‘core habitat’ - 3xTSC Act and 1x EPBC Act.	4.4.12, 4.4.23
	NGO5	A number of Threatened species whose distribution matches the Project area have been excluded from assessment based on a lack of suitable habitat present within the “Study Area”.	4.4.16
	NGO5	The EA excludes all Threatened species of fish on the basis of a lack of records and no preferred habitat within the study area is not consistent with DECCW Threatened Species Assessment Guidelines.	4.4.26
	NGO5	An underestimation of the area of the aquatic Ecological Community of the Natural Drainage System of the Lower Darling.	4.4.27
	NGO5	The Project will result in the loss of a significant area of habitat for hollow-nesting birds and of foraging habitat for cave dependent bats.	4.4.12, 4.4.23, 4.4.29
	NGO5	The Project will impact an important population of the Superb Parrot.	4.4.28
	NGO5	The Project will result in the loss of important habitat for migratory and/or nomadic species.	4.4.16
	NGO5	The EA fails to address most objectives of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act) by providing misleading documentation, outdated ecological assessments, misleading and contradictory statements and omission of current research.	4.4.18
	NGO5	The EA fails to consider the Pre-cautionary Principle.	4.4.20
Biodiversity Offset Strategy	CS	Collectively the mining projects in the vicinity of the Leard State Forest will mine two-thirds of this invaluable forest and will replace it with dubious offsets.	4.4.34
	CS	The 1,385 ha of critical habitat planned to be disturbed will not be adequately replaced with species poor plantings.	4.4.33, 4.4.34, 4.4.36, 4.4.43
	CS	Offsets will not preserve the Threatened species or the water table.	4.4.36, 4.4.37
	CS	It is unrealistic to think that a functioning natural ecosystem with high biodiversity values can be recreated on agricultural and rehabilitated mining land.	4.10.4
	CS	There is no detail on how the rehabilitated land will be implemented or how the offset and mitigation programs will	4.4.45, 4.4.47

Category	Submission ID	Issue	Section
		function.	
	R3	More active tree planting in the first five years for the derived native grassland areas as against natural regeneration with passive management. Further, it is recommended that tree and shrub plantings be undertaken to enable the achievement of the ecological benchmarks as specified in the <i>Guide to Vegetation in the Namoi Catchment - Regional Vegetation Communities</i> .	4.4.14
	R2	The EA has not adequately addressed the outcomes of the cumulative impact assessment (the Simultaneous Worst Case Cumulative Impact Scenario) into proposed avoidance, mitigation and offset measures associated with the Leard State Forest and adjoining native vegetation.	4.4.18, 4.4.19
	R2	The Simultaneous Worst Case Cumulative Impact Scenario focuses on woodland birds and individual vegetation communities are generally not examined.	
	R2	The proposed avoidance measures are inadequately identified and the Statement of Commitments does not contain a clear unambiguous commitment to the proposed mitigation measures.	4.4.32
	R2	The area of each vegetation type that the Project has modified its design to avoid is not adequately defined with two or more vegetation types grouped together.	
	R2	The EA should include the investigation of the Regional East-West Wildlife Corridor with neighbouring mining operations to ensure all avoidance measures are fully considered. In addition it is unclear from the EA whether it is the intent of the proponents to develop a robust biodiversity offset package from all other projects (combined offset strategy) to compensate from identified impacts.	4.4.33
	R2	The EA states that a undisturbed continuous corridor varying from 150m to 1000m in width (forming part of the East-West Wildlife Corridor) will be retained between Boggabri Coal Mine and the proposed Maules Creek Coal Mine however provides no argument as to why a maximum width of 150 m would be suitable for use as a effective wildlife corridor. Current research indicates a minimum 500 m wide wildlife corridor would be more effective.	4.4.44
	R2	The EA states that harvesting activities will not occur in the biodiversity offset areas instead will be limited to the NSW Forestry owned land however the 186 ha of Eucalyptus plantation and mine rehabilitation are still being included in the BioBanking offset calculations.	
	R2	An over estimation of credits generated from the offset lands as a result of a claimed large landscape scale improvement.	4.4.35
	R2	As a result of the above comment the proposed Offset Strategy does not appear to be adequate as it does not provide the quantum of credits required according to the BioBanking assessment, demonstrate how the proposal will ensure no net loss of biodiversity values and meet 'like for like or better' requirement and substantially increase the proportion of the offset that involves protection, management and enhancement of existing remnant vegetation.	
	R2	The BioBanking assessment for the offset strategy only achieves the required quantum of credits for the required for the Project with the inclusion of mine rehabilitation.	4.4.35, 4.4.47
	R2	Rehabilitation of the mine site is a standard requirement and should be considered separate to the upfront offset strategy.	4.4.47

Category	Submission ID	Issue	Section
	R2	The Project offset areas are fragmented and have high edge to area ratio with a number falling short of the minimum patch size. These factors together with the high proportion of rehabilitation works compromise the value of the offset and its long term viability.	4.4.38, 4.4.40, 4.4.45
	R2	If exact 'like for like' in the surrounding area is not achievable, the proponent must demonstrate that an adequate offset will be obtained that meets 'better' conservation outcome requirement. The information presented in the BioBanking Assessment does not demonstrate that the proponent has adequately addressed this requirement.	4.4.37
	NGO3	The rehabilitation proposals are not deliverable and the offsets do not meet the principles set down by DECCW.	
	NGO5	The Boggabri Coal offset strategy clearly fails sound environmental scrutiny in regard to providing genuine ecological community replacement for the areas of Project disturbance.	
	NGO2	The 1,385 ha of forest including Grassy White Box that is proposed to be disturbed by the Project can never be replaced through offsets or by rehabilitation.	4.4.34, 4.4.35, 4.4.36, 4.4.37
	NGO2	The loss of native woodlands in the Leard State Forest would be almost impossible to substitute as there are so few native woodlands left in the Liverpool Plains Bioregion.	
	NGO3	The EA fails to provide adequate or accurate information on the proposed offset to enable a genuine assessment of their values to be made.	4.4.33
	NGO3	The EA proposes inadequate offsets that will not mitigate the impacts of the proposed clearing. The offsets do not provide like for like habitat with regard to bioregion, soil type or depth, productivity or geomorphology. Nor do they provide like for like habitat with regard to vegetation patch size, condition or integrity.	4.4.35, 4.4.36, 4.4.37, 4.4.43
	NGO4	The proposed offset areas for the Project appear to be inadequate. The destruction of a significant stand of forest containing EECs and replacing it with ecologically speculative rehabilitation of dubious environmental value, when strong identified values exist in standing forest is nonsensical from an ecological perspective.	
	NGO5	It is expected the purchase of offset land by Boggabri Coal could not establish "like for like" with regard to the ecosystem currently contained within the Forest. The main impact of the offset plan appears to permanently remove farmers from the landscape, decreasing the agricultural viability of the district and destroying the fabric of the local community.	
	NGO5	Offset strategy of linking highly fragmented small remnants in an extensively developed agricultural landscape is not an effective offset for clearing 1,384 ha of a large contiguous remnant block.	
	NGO5	The offset strategy has not yet been completed and there is a reference to 'potential offsets' in the zone of affectation (ZOA) which have not been fully researched. If the property remains privately owned it may leave a gap in the Wildlife Corridor, which may cause an increase of wildlife activity across this property causing undue influx of animals, both native and feral, which could cost the landowner both in terms of time and money to control due to increased feral and native damage to cropping and grazing destruction.	4.4.46

Category	Submission ID	Issue	Section
	NGO5	It is to be noted that part of the ZOA includes the proposed rail line and the proposed East-West Wildlife Corridor. If this is to be a genuine Wildlife Corridor then the real threat of injury as well as the noise aspect must be given consideration. The native wildlife safety must be taken into consideration.	
Aboriginal Archaeology	NGO5	Cultural sites that are within the Forest and sites not yet discovered will be lost.	4.5.1
	R2	Care, control and long term protection of Aboriginal sites	
Surface Water	R2	The water balance notes that during dry years the peak water demand would exceed available water for dust suppression and use in the CHPP and the proposed procedures that would be implemented for dust suppression during these dry years.	4.6.5
	R3	<i>The Namoi Catchment Action Plan (CAP) and the Namoi Catchment Management Authorities (CMA) Extractive Industries Policy</i> should be considered and addressed by the proponent.	4.13.3
	R3	The proponent has not indicated how the proposed development will help to meet National (caring for our Country), State (State Plan) nor Catchment (Namoi CMA CAP) environmental or social targets.	
	NGO3	Surface water will be impacted by the Project through on-site contamination of flows over a large area, and will thus lead to reductions in flow in the Namoi River.	4.6.4, 4.7.5, 4.7.6
	NGO5	The Project will result in the containment of onsite water within the 1,343 ha mine site would have serious impacts on recharge and surface flows, and a potentially permanent reduction in water flows in the Namoi River reducing the water available for environmental and food production purposes. Zone 5 irrigators depend on inflows from the Maules Creek aquifer for the majority of irrigation water supplies.	
	NGO5	The Namoi Catchment Water Study is designed to model all cumulative impacts to water within the catchment. Individual projects should not be considered in isolation and the EA should be subject to the Namoi Catchment Water Study model before a decision by the Minister is made.	4.7.12
Groundwater	CS	The Project will result in a permanent reduction in the water table of up to one meter.	4.7.7
	CS	Cumulative permanent reductions in the water table of up to two meters will result from the Project and others in the vicinity including Tarrawonga Coal Mine along with the proposed Maules Creek Coal Project and the Goonbri Project.	
	R6	Although the figure presented in the Groundwater Impact Assessment is schematic it would be better if the base of the alluvium at the location of the section is at ~180 m AHD. Over the model domain the base of the alluvial aquifer gets down to an RL of 120 m AHD. A north-south section through the mine over the model domain is required so that a better understanding of the inter-relationship between the aquifers can be understood.	
	CS	The Project will entail a very significant water deficit that will result in 400 ML of groundwater required to be obtained from the deep hard rock aquifer. By year 5 the Project will require 1,114 ML of groundwater (half the storage capacity of Warragamba Dam).	4.6.5
	R6	Boggabri Coal Mine does not have the current water licences to account for all take of water associated with the mine workings, in particular incidental water seeping into the mine pit.	4.6.1

Category	Submission ID	Issue	Section
	R6	If a bore field is proposed near the NSW Office of Water (NOW) monitoring bores Boggabri Coal Mine will have to purchase entitlement as the bore field will be located in the Upper Namoi Zone 5, Namoi Valley Groundwater Source and would have to abide for the mandatory distance condition of 400 m of a NOW monitoring bore.	4.7.1
	R6	Licence 90BL253854 is 142 ML for the Gunnedah Basin not the 'Namoi Groundwater Source'.	
	R6	The stratigraphy and colours on the Geology Map presented in the Groundwater Impact Assessment (Appendix O) do not match the stratigraphy and colours of the cross section. In addition the cross section does not show the Namoi River or the Quaternary Sediments (alluvials).	
	R6	All groundwater monitoring bores should be nested piezometers sites that penetrate to the full depth of the Merriown Seam. It may be possible to expand the monitoring network to include a vibrating wire piezometers installed in the grout on the outside of the casing of a screen type of wire piezometer.	
	R6	The groundwater model could be improved as the calibration phase conducted was steady state and could be improved by conducting a transient state with the current extraction from the mine included in the model.	4.7.8, 4.7.9
	R6	The prediction phase of the groundwater model is transient however it is not clear just how well the model predicts what has actually happened given that the existing usage was not used during the calibration phase.	
	R6	Many of the Boggabri Coal Mine monitoring bores do not have well screens or construction or water level details presented on the drill logs and needs to be corrected. Future correspondence with NOW should occur in relation to the locations of future monitoring bores.	4.7.2
	R6	Some long sections showing the depth of the monitoring bores, lithology, screen interval, groundwater level and depth and extent of the pit should be presented so that a better understanding of the interaction of the pit and the aquifers could be presented.	
	R6	It is noted that the base of the proposed open cut at RL 176 m will be lower in elevation than the base of the alluvial aquifer immediately to the south of the Project area and needs to be clearly shown on cross sections.	4.7.4
	R6	In relation to the model grid the upstream constant head of 234 m AHD is a bit low, when considering that in the 1970's the shallow aquifer was at 239.6 m AHD and is now about 236.6 m AHD. In addition the downstream constant head of 224 is also a bit low, when considering that in the 1970's the shallow aquifer was at 231.1 m AHD and is now about 226.3 m AHD.	4.7.8
	R6	A cumulative groundwater model should be run that includes Boggabri Coal Mine, Maules Creek Coal Project, Tarrawonga Modification, Tarrawonga Extension and Goonbri Project.	4.7.10
	NGO3	The impacts on the proposal on groundwater and groundwater dependent ecosystems are likely to be severe and permanent.	4.4.14
	NGO5	Due to dust suppression and coal washing requirements over the 21 year period of the open cut mining lease, it is expected significant quantities of groundwater would be diverted from environmental and food production purposes. Other losses of ground water associated with mining due to diversions of runoff and reductions in recharge are a major concern.	4.6.3, 4.6.4, 4.6.5

Category	Submission ID	Issue	Section
	NGO5	Water supply in the Maules Creek area is highly dependent on seasonal rainfall and the increased demand on the aquifer by the mining operations will have significant impacts on the local community in periods of drought.	
Social & Economic	CS	The economic gain is not justified considering the cost to the environment.	4.8.6
	CS	There will be additional economic costs to NSW in the form of transport infrastructure.	
	CS	Money will not flow into the community as a result of the Project	
	NGO5	The Economic Impact Assessment analysis avoids discussion of the distribution of benefits between stakeholders.	
	NGO5	No benefit cost analysis of alternatives has been included in the Economic Impact Assessment.	4.8.1
	NGO5	The Economic Impact Assessment indicates a mixing of private financial values and public economic values.	4.8.2
	NGO5	Royalties referred to in the Economic Impact Assessment are not discounted	4.8.3
	NGO5	The Economic Impact Assessment analysis overstates the case of the Project as it is based on peak production and employment levels – production levels were not Included in the sensitivity testing.	4.8.4
	NGO5	The discount rate of 7% used in the Economic Impact Assessment is considered low.	4.8.5
	NGO5	The Economic Impact Assessment omits foregone recreation in Leard State Forest.	4.8.7
	CS	Approval of the Project will result in the imposition of large scale mining. The proposed Maules Creek Mine and the Project will produce up to 20 Mtpa of coal. This is larger than any existing Hunter Valley mine and will induce significant social impacts	
	NGO5	The Economic Impact Assessment on agriculture in the Project area is hardly considered.	4.8.8
	NGO5	The Economic Impact Assessment does not consider the loss of watershed and aquifer recharge.	4.8.9
	NGO5	The Economic Impact Assessment does not include the value of the Leard State Forest as a carbon sink.	4.8.10
	NGO5	The Economic Impact Assessment analysis omits the environmental costs from burning of the coal.	4.8.11
	NGO5	Inclusion of the social value of employment within the Economic Impact Assessment is inappropriate as there is no appropriate peer reviewed WTP study, the Project is open cut and the study drawn on is underground and is not in relation to mining in an agricultural area.	4.8.12
	NGO5	The existence value of habitat that will be cleared has not been included in the benefit cost analysis within the Economic Impact Assessment.	4.8.13
	NGO3	The cost to the community of the loss of the ecosystem services and non-use values the forest provides is severe.	
	NGO5	Why were the social values of employment transferred from the Illawarra Study and not the values of Aboriginal heritage within the Economic Impact Assessment.	4.8.14
	NGO5	The Economic Impact Assessment should include an alternative cost benefit assessment of economic values.	4.8.15
	NGO5	The Economic Impact Assessment provides an overstatement of benefits and understatement of costs.	4.8.16

Category	Submission ID	Issue	Section
	NGO3, NGO4	The Project should be rejected due to the potential social impacts on the Maules Creek community. Due to the number of mining projects and proposals in the area the Maules Creek Community face encroachment of mining onto their farms, loss of community networks as farmers sell up and leave, constant machinery noise, incessant train and truck movements, reduced air quality and associated health impacts, reductions in their water table and the closure of their main flood proof access road.	4.9.1
	NGO5	Due to the noise, dust and water impacts there is expected to be an impact on property valuations in areas immediately adjacent to the zone of acquisition/affectation. The number of potential buyers is expected to reduce significantly and a bargaining power imbalance exists between the mine and landholders. The timing of land disposal is out of the control of the existing land owner causing uncertainty and stress for those nearing retirement and those wishing to expand their operations.	
	NGO5	The Environmental Assessment fails to fully consider community expectations and outcomes of a project of this size. The commercial obligations of a multinational corporation should not be used as justification for the project. The Environmental Assessment should be considered in isolation of any commercial agreements, both current and projected.	4.8
Soil and Land Use	CS	The Leard State Forest is an irreplaceable forest ecosystem in an already degraded landscape.	4.4.18, 4.4.19, 4.4.21
	NGO5	Existing published Information has largely been ignored	4.10.1
	NGO5	The methodology and interpretations of soil information were not to Australian Standards	4.10.2
	NGO5	The soil sections of the EA have not attempted to use the Australian Soil Classification (ASC) (Isbell 2002)	4.10.3
	NGO5	Results Interpretation and lack of data	4.10.4
	NGO5	Land Capability and Land Zoning	4.10.5
	CS	The cumulative effect of the four open cut proposals will destroy remnant forest and surrounding farmland.	4.13.2
	NGO2, NGO3, NGO4	The Leard State Forest was set aside in perpetuity for conservation and sustainable use under the NSW Forestry Act 1916 and is supposed to be managed for public good, the preservation of soil, the provision of timber and the protection of flora and fauna. A major extractive use is not compatible with such conservation purposes.	4.4.6
	NGO3	The EA ignores the requirements of the Forestry Act 1916 in relation to the management of public forests.	
	NGO5	The EA fails to mention the close proximity of the Maules Creek community, which includes Fairfax Public School, the Maules Creek Recreational Reserve Trust Hall and surrounding amenities, and surrounding Commercial Agricultural Businesses and associated occupied residential dwellings.	4.9.1
Rehabilitation and Final Landform	R2	No justification is provided that describes why it is uneconomical to provide a final rehabilitated landform that negates the need for a final void.	4.11.1
	R2	The extent of the final void should be minimised as much as possible to reduce the long term impacts on the landscape.	
	R2	The proponent should continue their work with adjoining mine operations/proposals to work towards minimising final landscape/biodiversity impacts and enhanced noise/air/water management and biodiversity outcomes.	4.11.2

Category	Submission ID	Issue	Section
	R3, NGO2, NGO5	Post Mining Land Capability	4.11.3
	R3	Rehabilitation work conducted on mine sites in the Hunter Valley has established poor or failed imitations of previous vegetation communities and nothing would suggest that this Project could achieve otherwise.	4.11.4
	NGO3, NGO4, NGO5	Mine spoil is inadequate to restore native vegetation	
	NGO4	The ability to rehabilitate the Forest to its pre-mining condition is doubtful. Furthermore, it is expected the 10 cm of topsoil spread over large heaps of "spoil" will have insufficient water holding capability, which will prevent permanent rehabilitation. The current ecosystem could not be re-instated if the rehabilitation were unsuccessful.	
	R7	Rehabilitation Management Plan	4.11.5
Traffic and Transport	R1	Boggabri Coal should construct an overpass on Therribri Road when the transport of product coal by trucks on the private haul road exceeds 1.5 Mtpa.	4.12.5
	NGO5	The Traffic Impact Assessment contains no information regarding the volume or nature of construction traffic.	4.12.3
	R1	The Environmental Assessment does not include an assessment of the proposed usage of Harparary Road by Project related traffic.	4.12.4
	R1	Closure of the Leard Forest Road results in access to Manilla / Boggabri Road is denied and would result in an additional 45 km to make this same trip possible. The alternative road is subject to flooding from Horse Arm and Maules Creeks along with the Namoi River.	4.12.2
	R4	The closure of Leard Forest Road needs to be an ongoing consideration. The upgrade of Harparary Road as part of the Voluntary Planning Agreement is acknowledged however as mining progresses a reasonable level of access to the road is maintained and that alternative routes are considered more closely in consultation with the local community.	
	R5	The Leard Forest Road is a vital emergency and trade route which should not be closed. The Maules Creek community has communicated many times to Boggabri Coal and the Narrabri Shire Council that access through the Forest is essential. An alternative route through the Forest should be provided during mining operations to maintain this crucial link between Maules Creek and the towns to the south and east.	
	CS	The cumulative impacts of additional train movements on Gunnedah, Curlewis and Breeza require greater examination.	4.12.1
	R1	Detailed Design Works and Concurrence with RTA	4.12.6
	NGO5	Private Coal Haul Road	4.12.7
	NGO5	Further detail on how the Real Time Noise Monitoring System will operate and types of management actions to be implemented.	4.2.3
Health	NGO3	Open cut mining has well documented health, agricultural productivity and social impacts due to a general reduction in air quality. The introduction of a drag line will exacerbate these concerns. It is essential for the establishment of an ongoing sophisticated real time air quality monitoring in the Boggabri Coal Mine / Maules Creek area to reduce long term company - community conflict.	4.1.6
	NGO5	Coal mining will affect people's health who live and work in the area including animals and vegetation.	

Category	Submission ID	Issue	Section
	CS	Open cut mining has well-documented health, agricultural productivity and social impacts due to a general reduction in air quality. The MCCC has submitted a list of "principles" to guide the development of an extensive Air Quality Monitoring Network for the area if the EA is approved.	
	NGO5	The Boggabri Coal Project will result in reduced air quality associated with serious health impacts.	
General Project Statement	CS	Underground mining would better protect biodiversity in the Leard State Forest.	4.13.1
	NGO5	Consideration should be given to the other options mentioned in the EA. These other options have not been fully investigated in the EA.	
	R7	Mine Titles and Plans	4.13.4
	NGO2	The cumulative environmental and social impacts of the Project along with other mining project and future proposals in the area be considered.	4.13.2
	NGO3	Highly magnified cumulative effects due to other planned large scale open cut projects in the Leard State Forest will have unforeseen impacts on the Forest environment and on the local community. Detailed quantitative modelling of the cumulative projects has not been undertaken despite the same consultant being used for the two main projects.	