BENGALLA Mining Company

Continuation of Bengalla Mine

Response to Submissions

March 2014

Volume 1 Main Report

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ENVIRONMENTAL CONSULTANTS

BENGALLA

CONTINUATION OF BENGALLA MINE

RESPONSE TO SUBMISSIONS

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19 March 2014

For:

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RESPONSE TO SUBMISSIONS

for

Bengalla Mining Company Pty Limited

1 INTRODUCTION

This section outlines the status of the Project in the approvals process and explains the purpose of this Response to Submissions (RTS) document.

1.1 BACKGROUND

Bengalla Mining Company Pty Limited (BMC) seeks a contemporary Project Approval from the Minister for Planning and Infrastructure under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Continuation of Bengalla Mine (the Project). The Project would enable mining to continue to the west of the currently approved limit of mining for a further 24 years at a rate of up to 15 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal. The conceptual layout of the Project is shown in **Figure 1**.

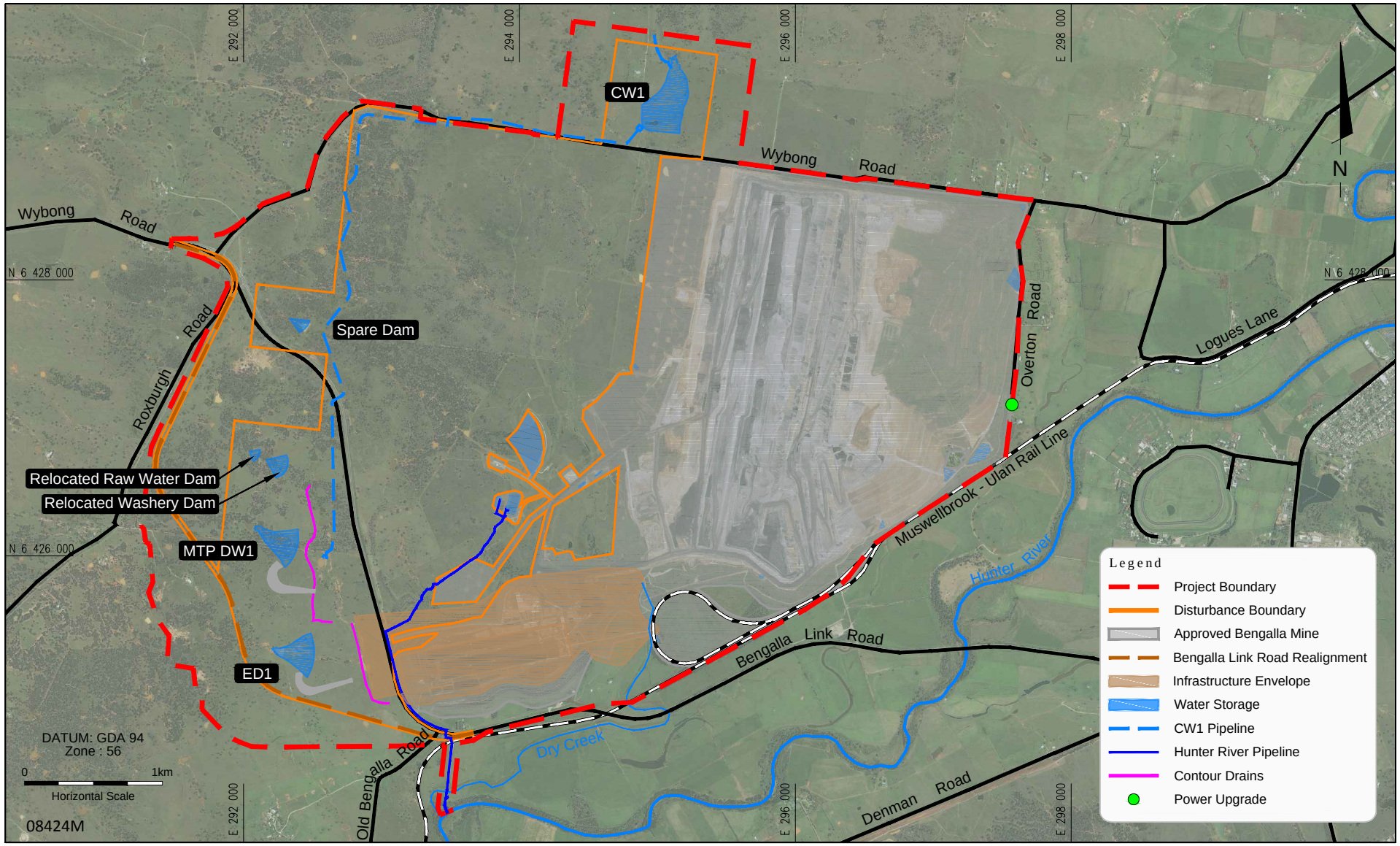
In accordance with Clause 3 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, BMC made a request for Director-General's Requirements (DGRs) on 17 February 2012. Following consultation with the relevant government agencies, the Director-General of the Department of Planning & Infrastructure (DP&I) issued DGRs for the Project on 13 March 2012.

The Project was referred to the then Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (now Department of the Environment (DoE)) on 31 March 2012. The Minister for DoE declared the Project to be a *'controlled action'* on 7 June 2012 due to its potential impact on threatened species and communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). As such, the Project will require assessment under the EPBC Act.

SEWPaC accredited the assessment process under the EP&A Act. The department's assessment requirements were provided to the Director-General of the DP&I who included them in the DGRs for the Project which were subsequently received on 12 July 2012.

Following the issuance of DGRs, the Continuation of Bengalla Mine Environmental Impact Statement (EIS) (Hansen Bailey, 2013) was prepared and ultimately placed on public exhibition from 4 September 2013 to 11 October 2013.

A total of 119 submissions were received by DP&I during the public exhibition of the EIS.



BENGALLA MINE

Conceptual Project Layout

FIGURE 1

1.2 DOCUMENT PURPOSE

This RTS has been prepared by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of BMC to support SSD-5170 under section 78A(8A) of the EP&A Act. The document responds to the submissions raised by stakeholders during the public exhibition period.

1.3 DOCUMENT STRUCTURE

This RTS is structured as follows:

- **Section 2** outlines of the submissions received from stakeholders;
- **Section 3** provides a summary of the supporting submissions received from the public;
- **Section 4** provides a summary of the revised Project Biodiversity Offset Strategy and subsequently updated Agricultural Impact Assessment (Offset AIA);
- **Section 5** provides comprehensive responses to the issues raised by regulatory agencies;
- **Section 6** provides comprehensive responses to the issues raised by special interest groups;
- **Section 7** provides comprehensive responses to the issues raised by the public;
- **Section 8** provides a consolidated list of all primary commitments made in the Bengalla EIS and this RTS;
- **Section 9** lists the abbreviations used in within this RTS; and
- **Section 10** outlines all materials referenced within this RTS.

Appendix A provides a summary of the stakeholders who made submissions in relation to the Project EIS and identifies the relevant environmental or socio-economic aspect raised. Responses to stakeholder submission issues (see **Section 5** to **Section 7**) have been prepared in response to submissions received. A copy of each original submission has been included in **Appendix B**.

Technical specialists involved in the preparation of the EIS have provided expert advice for this RTS. Where applicable and as referenced, this RTS should be read in conjunction with **Appendix A** to **Appendix D**, which provides additional detailed technical information.

2 STAKEHOLDERS AND SUBMISSIONS RECEIVED

This section provides a summary of the stakeholders that made submissions pertaining to the Project and the content in the EIS.

Following public exhibition of the EIS, DP&I provided to Hansen Bailey a total of 119 submissions from various stakeholders, including 11 regulatory agencies, three special interest groups and 8 individual stakeholders (including two confidential submissions).

The remaining 97 private submissions were all in support of BMC's existing contribution to the local community and ongoing commitment demonstrated by the Project. Private submission were received from a range of stakeholders including local business, residents, organisations and employees all of which provided unique reasons as to how BMC contributes to their existence. A summary of the supporting Public Submissions is provided in **Section 3** with original submissions included in **Appendix B**.

A list of the submissions that are addressed within this report are provided below.

2.1 REGULATORY AGENCIES

The following regulatory agencies provided a submission in relation to the Project EIS:

- Department of the Environment (formerly SEWPaC);
- NSW Office of Water (NOW);
- NSW Environment Protection Authority (EPA);
- Office of Environment and Heritage (OEH) – Heritage Branch;
- Division of Resources and Energy (DRE), Trade and Investment NSW;
- Muswellbrook Shire Council (MSC);
- NSW Rural Fire Service;
- NSW Health;
- Department of Primary Industries – Office of Agricultural Sustainability & Food Security (DPI – Agriculture);
- Dams Safety Committee; and
- Roads and Maritime Services (RMS).

2.2 SPECIAL INTEREST GROUPS

The following special interest groups provided a submission in relation to the Project EIS:

- The Australian Institute;
- Muswellbrook Chamber of Commerce; and
- Construction, Forestry, Mining and Energy Union (CFMEU).

2.3 PRIVATE STAKEHOLDERS

The following private stakeholders provided a submission in relation to the Project EIS:

- Confidential Submission - 17;
- Confidential Submission - 26;
- BL & ML Bates;
- H&J Brown;
- P&J Brown;
- PG & CM Lane;
- JB Moore; and
- E & WJ Rankin.

Further information regarding the response to submissions and the broader approvals process for the Project can be found on the DP&I website: (http://majorprojects.planning.nsw.gov.au/page/project-sectors/mining--petroleum---extractive-industries/mining/?action=view_job&job_id=5170).

3 SUPPORTING PUBLIC SUBMISSIONS

This section provides a summary of the supporting Public Submissions received following the exhibition of the Bengalla EIS.

As noted in **Section 2** a total of 97 supporting Public Submissions were received following the Public Exhibition of the Bengalla EIS. Supporting Public Submissions were received from a number of different community members and contained a variety of messages which described the Project and BMC as:

- Providing for an source of current (existing approval) and future employment (the Project);
- Having an active involvement in the community and supporting a number of local organisations and events;
- Maintaining a high level of health, safety and environmental performance and compliance;
- Providing certainty around future mining proposals and economic growth in the region and NSW; and
- Providing other benefits including provision of taxes and royalties to the NSW Government, minimal impacts, use of coal, management of agricultural land and general land use.

In addition to the above several submissions described general support of the Project and BMC. A breakdown of all submissions messages are depicted in **Figure 2**. It should be noted that in general each submission contained one or more messages.

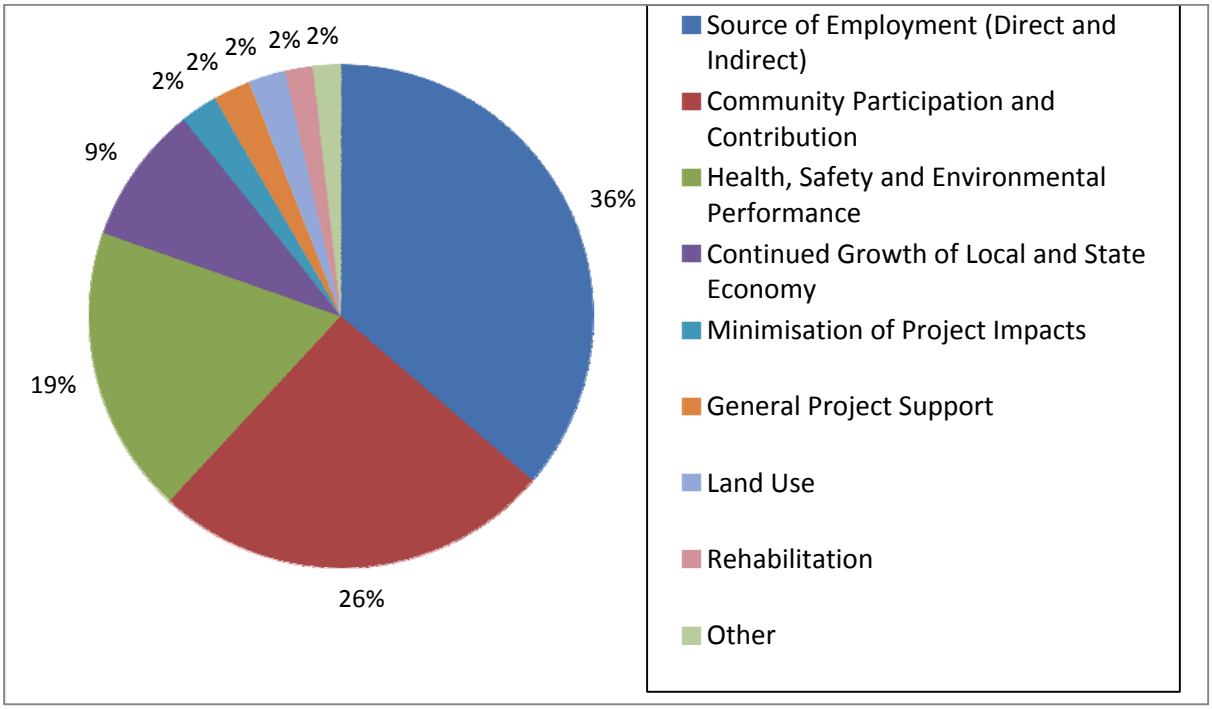
From **Figure 2** it can be seen that employment (36%) along with BMC's existing contribution to the local community (26%) and existing health, safety and environmental record (19%) represent over 80% of the messages within the total supporting submissions.

Supporting Public Submissions were received from all facets of the community including employees (both operational and administrative), local individual contractors and companies and members of the general community including primary and secondary aged children. All submissions provided overwhelming support for the Project and looked forward to BMC's continued presence for the duration of the Project.

Additional supporting submissions have been received from the Muswellbrook Chamber of Commerce and the CFMEU as described in **Section 6.1** and **Section 6.2** respectively.

Each of the original submissions is included in **Appendix B** and should be read in conjunction with the remainder of this RTS.

Figure 2
Summary of Messages from Supporting Public Submissions



4 BIODIVERSITY OFFSET STRATEGY

This section describes the comprehensive Biodiversity Offset Strategy (BOS) developed for the Project in response to the delayed implementation of the Upper Hunter Strategic Assessment (UHSA). Following to the development of the BOS, an Agricultural Impact Assessment has been completed of the offset properties in conjunction with Project impacts within the Project Boundary.

4.1 BIODIVERSITY OFFSET STRATEGY

4.1.1 Upper Hunter Strategic Assessment Development

As noted in Section 8.11.4 of the EIS it was originally intended that the impacts to flora and fauna as a result of the Project would be compensated for by contributing funds to the UHSA based upon calculations using the Biodiversity Certification Assessment Methodology (BCAM) developed by OEH. In this regard, BMC (through Coal & Allied) was one of the first mining companies to complete the necessary reporting for inclusion within the UHSA (see EIS Appendix O). At the time of preparation of this RTS, the UHSA remains under development and has yet to be implemented.

In response to DoE's comment following the exhibition of the Project EIS '*If an Upper Hunter Offset Fund is unavailable, an alternative offset strategy must be developed, and must be consistent with the Department of the Environment's Environmental Offsets Policy*" (see **Section 5.1**), BMC is engaging its commitment as described in Section 8.11.4 of the EIS which stated:

> *"In the event that the Upper Hunter Strategic Assessment process is not implemented or is not acceptable to BMC, it will consult with the relevant regulators to determine an alternative offset strategy for the Project".*

Given that the UHSA is yet to be implemented within an appropriate time frame to account for the Projects impacts to biodiversity values, BMC has subsequently developed a comprehensive BOS for the Project. BMC will continue to work with OEH regarding the development of the UHSA which may be utilised in some future arrangement following its eventual implementation.

BMC has maintained commitment towards the development of an alternative offset strategy in parallel to the UHSA process as a risk management measure. As a result, BMC has completed flora and fauna verification surveys (including both desktop and field assessments) on over 33 properties since 2010 which aimed at identifying the most suitable offsets should they be required.

A summary of the final Project BOS is provided below with a detailed report prepared by Cumberland Ecology in **Appendix C**.

4.1.2 NSW State and Federal Offsetting Requirements

The BOS focuses on offsetting predicted Project impacts upon threatened species and ecological communities. These include threatened species and communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

NSW and Commonwealth offsetting guidelines were used to inform the development of the BOS, including:

- TSC Act *Principles for the use of biodiversity offsets in NSW* (13 Principles) (OEH, 2013) (see **Section 4.1.5**); and
- EPBC Act *Environmental Offsets Policy* (SEWPaC 2012) (see **Section 4.1.8**).

4.1.3 Project Impacts

As identified in Section 8.11.3 of the EIS the Project will impact approximately 881 hectares (ha) of native forest, woodland and grassland on previous farmland in the upper Hunter Valley on land owned by BMC or another mining company. Most of the Disturbance Boundary contains highly modified grassland areas with lesser areas of forest and woodland.

Despite the modified current condition of the vegetation in the Disturbance Boundary, it still supports some threatened flora and fauna. This includes White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DNG) (referred to hereafter as "Box Gum Woodland and Derived Native Grassland"). This is listed as a Critically / Endangered Ecological Community (C/EEC) under both TSC and EPBC Acts.

During the life of the mine, the Project will impact on 73 ha of Box Gum Woodland and 462 ha Box Gum Woodland Derived Native Grassland. The Project will also remove 9.7 ha of other State-listed EECs and 168 ha of non-endangered Narrow-leaved Ironbark Woodland. Section 8.11.3 (Table 67 and Figure 58) of the EIS presents the areas of vegetation to be directly impacted due to the Project which are reproduced in **Table 1** and on **Figure 3**.

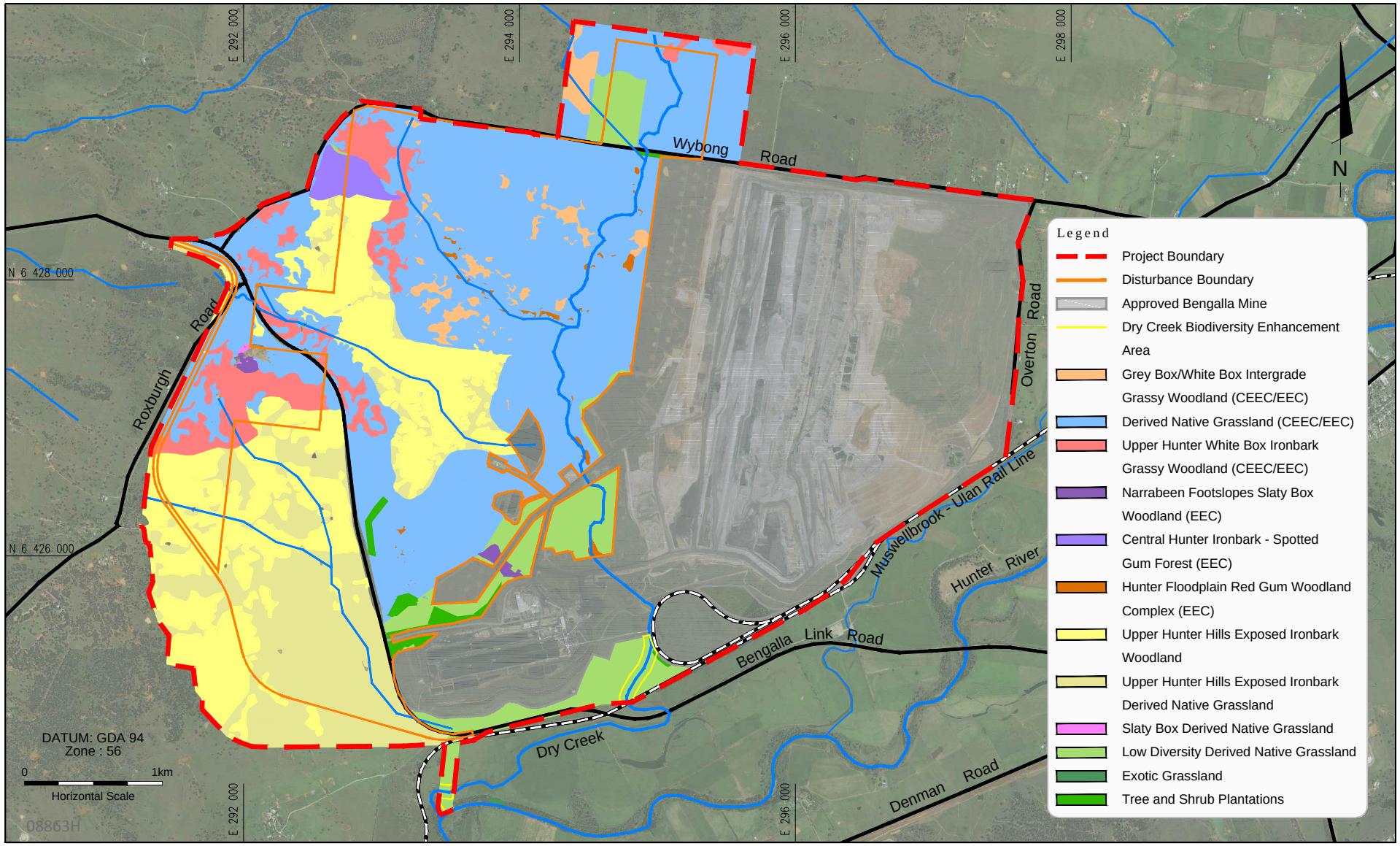
The forest and woodland habitat to be impacted by the Project is known habitat for State-listed threatened species including the following ‘vulnerable’ species that are known to occur:

- Tiger Orchid (*Cymbidium canaliculatum*);
- Woodland birds: Brown Treecreeper; Speckled Warbler; Grey-crowned Babbler; Black-chinned Honeyeater;
- Squirrel Glider; and
- Woodland bats: Yellow-bellied Sheathtail-bat; Eastern Bent-wing Bat; Large-footed Myotis; Eastern Cave Bat.

Table 1
Direct Vegetation Project Disturbance Boundary

Vegetation Communities	Status	Disturbance Boundary (ha)
Grey Box/White Box Intergrade Grassy Woodland (Box Gum Woodland)	C/EEC	27.9
Upper Hunter White Box - Ironbark Grassy Woodland (Box Gum Woodland)	C/EEC	45.3
Derived Native Grassland (Box Gum Woodland)	C/EEC	462.1
Central Hunter Ironbark - Spotted Gum Forest	EEC	6.7
Narrabeen Footslopes Slaty Box Woodland	Vulnerable	2.9
Hunter Floodplain Red Gum Woodland	EEC	9.4
Upper Hunter Hills Exposed Ironbark Woodland	Not Listed	167.9
Derived Native Grassland (Slaty Box)	Not Listed	0.0
Derived Native Grassland (Upper Hunter Hills Exposed Ironbark)	Not Listed	159.2
Low Diversity Derived Native Grassland/ Exotic Pasture	Not Listed	57.5
Tree and Shrub Plantation	Not Listed	11.4
Total Area*		**950.3**
Total C/EEC (EPBC Act and TSC Act)		**554.3**

**The total area contains approximately 19 ha of cleared areas associated with the Bengalla Link Road, farm dams and infrastructure that have been excluded from vegetation calculations.*



BENGALLA MINE

Project Vegetation Communities

FIGURE 3

4.1.4 Biodiversity Offset Properties

A comprehensive BOS has been developed which comprises 6,215 ha of land (see **Figure 4**) including broad areas of native forest and woodland, and semi-natural grassland that are suitable for use as a compensatory measure to offset the Project impacts (see **Section 4.1.3**).

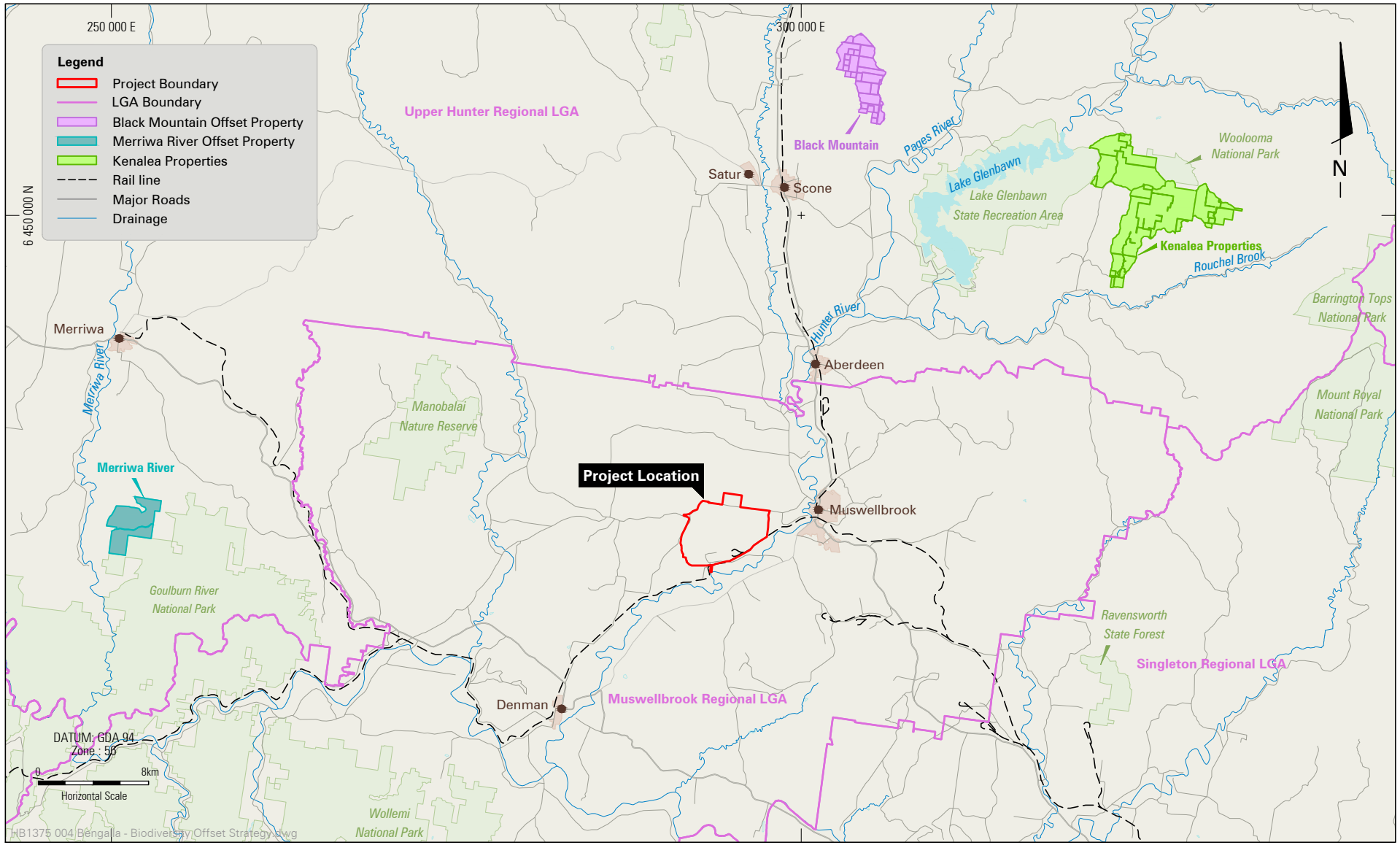
The constituent offset areas that form the BOS are presented on **Table 2** and are described broadly as follows:

- **Kenalea Properties (4,097 ha)**: contains extensive areas of Box Gum Woodland and other forest, woodland and grassland. Direct links to Mount Woolooma National Park and Lake Glenbawn State Recreational Area. Contains broad areas of grassland and grassy woodland that can be regenerated in the long term to provide for a substantial net gain;
- **Black Mountain (1,222 ha)**: contains three variants of Box Gum Woodland C/EEC and broad areas of Narrow-leaved Ironbark Forest, all in moderate to good condition. Large enough to be a conservation reserve in its own right; and
- **Merriwa River (897 ha)**: contains broad areas of Ironbark forest and woodland, largely in moderate to good condition. Directly adjacent to the Goulburn River National Park.

Black Mountain and the nearby Kenalea Properties can build biodiversity links connecting the Liverpool Ranges to Barrington Tops. In addition, Merriwa River further expends the area of Goulburn River National Park and increases biodiversity connectivity within the Upper Hunter Valley.

The BOS includes broad areas of different types of Box Gum Woodland and Derived Native Grassland. The vegetation mapping, quadrat data and Box Gum Woodland Rapid Habitat Assessment combined found that the BOS contains 1,720 ha of Box Gum Woodland CEEC and 1,500 ha of Derived Native Grassland CEEC and a total of 6,215 ha of Native Remnant Vegetation (including 2,508 ha of non-EEC listed native woodland/open forest). A detailed list of the vegetation communities present on the BOS is provided in **Table 2**.

All threatened flora and fauna species that are predicted to be impacted by the Project are known or considered likely to occur in the lands of the BOS. The fauna investigations have illustrated that all offset areas contain excellent habitat for threatened species including the orchid *Cymbidium canaliculatum,* woodland birds, woodland bats and Squirrel Glider. *Cymbidium canaliculatum* and 11 of the threatened fauna species, known or likely to occur within the Disturbance Boundary have been recorded within the BOS along with an additional six threatened species not known within the Disturbance Boundary including Spotted-tailed Quoll, Greater Long-eared Bat and Large-eared Pied-bat. Based upon the context and condition of the habitats on the offsets, many more threatened species are considered likely to occur.



BENGALLA PROJECT

Biodiversity Offset Strategy

FIGURE 4

Table 2
BOS Vegetation Communities

Vegetation Community	Status	Kenalea Properties (ha)	Black Mountain (ha)	Merriwa River (ha)	Total (ha)
Upland Grassy Box Woodland	C/EEC	N/A	57	N/A	57
Midland Grassy Box Woodland	C/EEC	N/A	226	N/A	226
Lowland Grassy Box Woodland	C/EEC	N/A	438	N/A	438
Grey Box/White Box Intergrade - Blakely's Red Gum - Yellow Box Grassy Woodland	C/EEC	975	N/A	N/A	975
Box Woodland on Basalt	C/EEC	N/A	N/A	23	23
Subtotal (C/EEC Woodland)					**1,718**
Grey Box/White Box Intergrade - Blakely's Red Gum - Yellow Box Grassy Woodland Derived Native Grassland	(C/EEC)	1500	N/A	N/A	1,500
Subtotal (C/EEC Derived Grassland)					**1,500**
Total CEEC					**3,220**
Dry Rainforest	EEC	9	N/A	N/A	9
Total EEC					**9**
Ironbark Grassy Woodland	Not Listed	N/A	135	N/A	135
Narrow-leaved Ironbark Grassy Woodland	Not Listed	2	N/A	N/A	2
Narrow-leaved Ironbark Alluvial Open Forest	Not Listed	N/A	N/A	51	51
Ironbark Open Forest on Sandstone (Narrow-leaved Ironbark)	Not Listed	N/A	N/A	178	178
Subtotal (Narrow-leaved Ironbark Woodland)					**365**
Ribbon Gum - Pittosporum Forest	Not Listed	N/A	89	N/A	89
Socketwood Vine Thicket	Not Listed	N/A	2	N/A	2
Sydney Blue Gum Forest	Not Listed	N/A	8	N/A	8
Midland Shrubby Box Woodland	Not Listed	N/A	156	N/A	156
River Oak Forest	Not Listed	N/A	5	N/A	5
Callitris Open Forest	Not Listed	N/A	N/A	128	128
Ironbark Open Forest on Sandstone (Red Ironbark)	Not Listed	N/A	N/A	303	303
Low Open Forest - Scrub Complex on Sandstone Plateaus	Not Listed	N/A	N/A	113	113

Vegetation Community	Status	Kenalea Properties (ha)	Black Mountain (ha)	Merriwa River (ha)	Total (ha)
Mallee Open Forest on Narrabeen Conglomerate	Not Listed	N/A	N/A	9	9
Sheltered Open Forest Complex in Sandstone Gullies	Not Listed	N/A	N/A	57	57
Redgum Alluvial Open Forest	Not Listed	N/A	N/A	35	35
Blakely's Red Gum - White Box/Grey Box Intergrade Shrubby Woodland (non-C/EEC)	Not Listed	566	N/A	N/A	566
Silvertop Stringybark - Blakely's Red Gum Shrubby Woodland (non-C/EEC)	Not Listed	409	N/A	N/A	409
Silvertop Stringybark - Rough-barked Apple Shrubby Woodland (non-C/EEC)	Not Listed	526	N/A	N/A	526
Silvertop Stringybark/ Messmate/ Sydney Blue Gum moist shrub/grass tall open forest on ranges of the lower North Coast	Not Listed	10	N/A	N/A	10
Silvertop Stringybark/White Box Intergrade shrubby open forest	Not Listed	28	N/A	N/A	28
Silvertop Stringybark - Blakely's Red Gum Shrubland	Not Listed	16	N/A	N/A	16
Riparian River Oak Open Forest	Not Listed	55	N/A	N/A	55
Subtotal (Other Woodland)					**2,516**
Derived grass and herblands	Not Listed	N/A	105	N/A	105
Subtotal (Other Grassland)					**105**
Total					**6,215**

The BOS was assessed against NSW state and Federal offsetting requirements used to assist in evaluating the type and quantum of offsets required for a Project. These methods include assessment of the vegetation removal and offset ratios, assessment against OEH's *Principles for the Use of Biodiversity Offsets in NSW* and *NSW Offset Principles for Major Projects* (including BioBanking assessments) along with assessment against DoE's EPBC Act *Environmental Offsets Policy* (including assessment using the Offsets Assessment Guide).

The results of the assessments indicate that while there is some variation between each of the assessment methodologies utilised, the Project provides a substantial BOS which adequately offsets the residual impacts of the Project and addresses expectations associated with each of the offsetting mechanisms. Further details are provided below in relation to how each offsetting approach compares to the Project impacts.

4.1.5 NSW Principles for the use of Biodiversity Offsets

Following additional consultation with OEH regarding the development of the BOS on 4 March 2014, it was agreed that the BOS would be assessed against OEH's *Principles for the use of biodiversity offsets in NSW* (13 Principles). These 13 Principles have been developed by OEH to provide a useful framework when considering biodiversity impacts and appropriate offset requirements. A description as to how the BOS meets the requirements of OEH's 13 Principles for offsetting is provided in **Table 3**.

It should be noted that the BOS was also found to meet the requirements of the *NSW Offset Principles for Major Projects* (7 Principles) (see **Appendix C**).

Table 3
Principles for the use of Biodiversity Offsets in NSW

NSW Offset Principles	Justification
1. Impacts must be avoided first by using prevention and mitigation measures. Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.	The Project is bounded by the Approved Bengalla Mine to the east, Wybong Road in the north (and approved Mount Pleasant Mine) and existing infrastructure and the Main Northern Rail Line to the south. The valuable coal resource is directly below flora and fauna habitats, west of the current operation and changes to mine plans are highly impractical to attempt avoidance. Therefore, due to the nature of the Project it is not possible to completely avoid the identified impacts to flora and fauna. However, the Project will continue to use largely existing infrastructure (with upgrades) to minimise the disturbance to biodiversity as far as practicable. Any relocated or new infrastructure has been sited within areas proposed to be mined at a later date, where practical.
2. All regulatory requirements must be met. Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).	BMC will ensure that all regulatory requirements for the BOS will be met.
3. Offsets must never reward ongoing poor performance. Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.	The offset areas will be managed in accordance with the Biodiversity Offset Management Plan (BOMP) (to be developed in consultation with the relevant regulators) to increase their ecological values over time and will not be deliberately degraded or mismanaged.

NSW Offset Principles	Justification
4. Offsets will complement other government programs. A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.	The BOS will complement other government programs for conservation in that it will address the goals of recovery plans for threatened species and recommendations for management of weeds and feral animals.
5. Offsets must be underpinned by sound ecological principles. Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.	The BOS will: • Enhance and manage existing habitat and secure these habitats for biodiversity; • Regenerate new areas of habitat that will be strategically located near existing habitat to effectively provide larger intact areas of habitat in the longer term; and • Reconstruct and enhance new and existing woodland corridors to connect offset areas.
Offsets must: - Include the consideration of structure, function and compositional elements of biodiversity, including threatened species	The BOS will enhance, regenerate and protect woodland community types that will be lost, thus ensuring that ecological structure and function of representative communities in the locality will be maintained and improved. This includes replanting with local or endemic species, and protecting and enhancing habitat for a range of threatened species including threatened flora and fauna.
- Enhance biodiversity at a range of scales	The BOS will enhance biodiversity at a landform scale. The proposed BOS, in conjunction with areas of regenerated woodland, will form a large viable woodland area supporting habitat for a wide variety of species. The BOS will provide for links to existing conservation areas and to other habitat areas in the locality to enhance ecological function of habitats. The BOS will also enhance biodiversity at the local scale by protecting a diversity of habitat types across the Project Boundary, including riparian, forest and woodland vegetation. Under the BOS, understorey complexity and other habitat features such as logs, stags and tree hollows will be preserved and protected to encourage fauna and flora use of these habitats.

NSW Offset Principles	Justification
- Consider the conservation status of ecological communities	The BOMP (to be developed) will maintain and improve occurrences of endangered ecological communities and regionally significant plant communities and includes targeted preservation of remaining and regenerated Box Gum Woodland and Derived Native Grassland.
- Ensure the long-term viability and functionality of biodiversity.	Offsets will be conserved in perpetuity and will be appropriately managed during the life of the Project.
6. Offsets should aim to result in a net improvement in biodiversity over time. Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site. Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation. Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.	The BOS will result in a net improvement in woodland and open forest communities over time, with commensurate benefits to threatened species. The BOS will protect areas of intact vegetation via an appropriate land zoning or other alternative means for the life of the impact. The BOS will also enhance existing vegetation through management actions that include translocation of threatened species to protected areas, and reconstructing habitat corridors to link areas of habitat. The BOS makes provisions for the regeneration of ecological communities, strategically placed to add to the areas of existing habitat to be protected and enhanced. Under the BOS, revegetation and rehabilitation works will be implemented progressively over the life of the Project to minimise the impacts of progressive mining across the Disturbance Boundary.
7. Offsets must be enduring – they must offset the impact of the development for the period that the impact occurs. As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.	The BOS will be secured by an appropriate land zoning or other alternative means.

NSW Offset Principles	Justification
8. Offsets should be agreed prior to the impact occurring. Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval.	The nature and extent of the offsets will be agreed prior to commencement of the Project. The disturbance will be staged over the life of the Project. Thus, the BOS will be progressively implemented over the life of the Project to ensure that at every stage of disturbance, impacts are minimised.
9. Offsets must be quantifiable – the impacts and benefits must be reliably estimated.	The Project impacts and BOS have been assessed using Geographic Information Systems and ortho-rectified aerial photography. The methodology uses ground truthed data to allow for accurate and reliable quantification of the biodiversity losses and gains for the Project.
Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include: - The area of impact; - The types of ecological communities and habitat/species affected; - Connectivity with other areas of habitat/corridors; - The condition of habitat; - The conservation status and/or scarcity/rarity of ecological communities; - Management actions; and - Level of security afforded to the offset site.	The area of impact, types of communities and species to be impacted, extent of existing and future connectivity, condition of habitat and conservation status of ecological communities have been documented within the BOS (see **Appendix C**). The BOS makes provisions for the management of the offset areas to ensure that there will be a net benefit in biodiversity values. The Offset Areas will be conserved in perpetuity and will be actively managed during the life of the Project, ensuring that there is a net gain in biodiversity in the wider locality in the long term.
The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where: - They protect land with high conservation significance	The proposed Offset Areas have high conservation significance in that they contain endangered ecological communities, habitat for threatened species, known occurrences of threatened species and significant riparian habitats.
- Management actions have greater benefits for biodiversity	The management actions that are proposed, such as cessation or reduction of cattle grazing, revegetation, weed control and feral animal control have a high probability of providing a significant conservation benefit.

NSW Offset Principles	Justification
- The offset areas are not isolated or fragmented	The habitat within the locality is largely fragmented in its current state. The BOS aims to reverse fragmentation effects by locating the Offset Areas strategically to effectively provide larger areas of habitat.
- The management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).	The proposed offsets will be secured by an appropriate land zoning or other alternative means for the life of the impact.
10. Offsets must be targeted. They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.	The offsets are targeted and will deliver a like-for-like or better conservation outcome for endangered ecological communities and threatened species. Under the BOS, Endangered Ecological Communities will be targeted, including Box Gum Woodland. Derived grassland will be offset by their woodland community types as woodland habitats have a higher conservation value. Habitat for threatened species identified within the Disturbance Boundary will also be targeted.
11. Offsets must be located appropriately. Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.	The proposed offsets are located appropriately within the landscape. The Offset Areas have been assessed and found they share the same general characteristics as the land within the Disturbance Boundary and support a similar suite of threatened species.
12. Offsets must be supplementary. They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.	The proposed offsets are supplementary in that they are proposed exclusively for the Project and are not already funded or being managed for biodiversity value for another development proposal.

NSW Offset Principles	Justification
13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract. Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.	The proposed offsets will be enforceable through development consent conditions and will be auditable to ensure that actions have been carried out.

4.1.6 BioBanking Assessment

To further to allow an objective assessment and demonstrate the suitability of the BOS, BioBanking surveys and BioBank Credit Calculator assessments have been undertaken for the Project. The process provided an understanding of the required offset area to development area ratio to act as a guide during negotiations with relevant governing bodies in the determination of the suitability of offset areas.

The results of the BioBanking assessments for the Disturbance Boundary and the BOS are provided in **Table 4** and the BioBanking Credit Reports are provided in **Appendix C**. Results indicate that the Project will require 29,080 ecosystem credits to offset the impacts of 881 ha of native vegetation within the Disturbance Boundary and that the BOS offers a total of 64,828 ecosystem credits.

The relatively small areas of EEC's present within the Disturbance Boundary are closely related to Box Gum Woodland and Derived Native Grassland CEEC as they are forms of grassy woodland and open forest. For this reason, the BOS is considered to effectively offset impacts on the other EEC's by the provision of excess ecosystem credits provided by the Box Gum Woodland and Derived Native Grassland CEEC.

In addition, the "Ironbark Woodland" within the Disturbance Boundary is predominantly cleared and so in the Derived Grassland form, whereas, within the BOS it is exclusively in woodland form. As such, the Ironbark provision within the BOS is considered to comprise much higher quality vegetation communities. Furthermore, the EEC's and Ironbark Woodland within the Disturbance Boundary will be actively rehabilitated back to pre-disturbance condition as will be detailed within the Biodiversity Management Plan and Rehabilitation Management Plan (see EIS Table 102).

Table 4
BioBanking Assessment

Vegetation Group	Disturbance Boundary (Ecosystem Credits)	BOS (Ecosystem Credits)			Total BOS Offset (Ecosystem Credits)
		Kenalea Properties	Merriwa River	Black Mountain	
Box Gum Woodland and Derived Native Grassland C/EEC	15,660	28,671	179	5,951	**34,801**
EECs	1,144	92	0	0	**92**
Narrow-leaved Ironbark	12,276	26	3,941	1,247	**5,214**
Other native vegetation	0	17,977	3,250	3,376	**24,603**
Total	**29,080**	**46,766**	**7,370**	**10,574**	**64,710**

4.1.7 Vegetation Removal and Offset Ratios

With consideration of the Project impacts associated with the Disturbance Boundary (see **Table 5**) a summary of the BOS offset vegetation community ratios in accordance with the *NSW OEH Interim Policy on Assessing and offsetting biodiversity impacts of Part 3A, State significant development (SSD) and State Significant Infrastructure (SSI) Projects* (Chief Executive Officer OEH, 2011) is provided in **Table 5**.

Table 5 indicates the BOS will provide woodland and grassland habitat for threatened species at over a 7:1 ratio for the life of the Project.

The BOS will also provide a total of 3,220 ha of Box Gum Woodland and Derived Native Grassland providing an overall C/EEC offset ratio of 6:1.

As the vegetation within the BOS contains vast areas of Box Gum Woodland C/EEC a significant net increase in this vegetation community has been provided at a ratio of 23.5:1

In addition, the BOS provides a further 365 ha of Narrow-leaved Ironbark Woodland (offset ratio of 2.2:1) and 2,620 ha (offset ratio of 14.5:1) of other native vegetation will be provided in the BOS.

Table 5
Summary of Offset Vegetation Communities and Ratios

Vegetation Group	Disturbance Boundary (ha)	BOS			Total (ha)	Ratio
		Kenalea Properties (ha)	Merriwa River (ha)	Black Mountain (ha)		
Box Gum Woodland C/EEC	73.2	975.2	23.1	721.4	1,719.7	**23.5:1**
Box Gum Woodland Derived Native Grassland C/EEC	462.1	1,500.1	0	0	1,500.1	**3.3:1**
Total C/EEC	535.3	2,475.3	23.1	721.4	3,219.8	**6.0:1**
Total EEC	9.7	8.9	0	0	8.9	**0.9:1**
Narrow-leaved Ironbark Woodland	167.9	1.9	228.2	135.0	365.0	**2.2:1**
Other Vegetation	168.7	1,610.1	645.5	365.2	2,620.7	**14.5:1**
Total Vegetation	881.6	4,096.3	896.7	1,221.5	6,214.5	**7.1:1**

4.1.8 EPBC MNES Assessment

The Offsets Assessment Guide has been utilised to allow an objective assessment of the suitability of the BOS. The process has been useful in gaining an understanding of the required offset area to development area ratio. The Matters of National Environmental Significance (MNES) Assessment was included in the Ecological Impact Assessment for the Project (as EIS Appendix O) has been relied upon for the development of the Project BOS. This is reproduced **Appendix C**.

The complete results of the EPBC Offsets Assessment Guide for the BOS is also provided in **Appendix C** with the final results of the offsets calculator are provided in **Table 6**.

For each MNES assessed, the BOS provides for a result significantly greater than the required 90% of the offset requirement through retention and management. In addition, the BOS provides significant habitat for each EPBC MNES species required to be offset for the Project as shown in **Table 7**.

Table 6
EPBC MNES Offset Results

MNES	Total Quantum of Impact (ha)	Total Offset	Condition Yr 0	Condition without offset	Condition Yr 20>	TOTAL (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland	29.28	1,719.67	6/10	5/10	7/10	**924.17%**
White Box – Yellow Box – Blakely's Red Gum Derived Native Grassland	184.84	1,500.08	5/10	4/10	6/10	**125.48%**
Regent Honeyeater (*Anthochaera phrygia*)	108.80	4,609	5/10	4/10	6/10	**915.40%**
Swift Parrot (*Lathamus discolor*)	108.80	4,609	5/10	4/10	6/10	**915.40%**
Grey-headed Flying-fox (*Pteropus poliocephalus*)	108.80	4,609	5/10	4/10	6/10	**915.40%**
Spotted-tailed Quoll (*Dasyurus maculatus*)	108.80	4,609	5/10	4/10	6/10	**915.40%**
Large-eared Pied Bat (*Chalinolobus dwyeri*)	136.00	1,778	5/10	4/10	6/10	**282.51%**
Greater Long-eared Bat (*Nyctophilus corbeni*)	136.00	1,778	5/10	4/10	6/10	**282.51%**

Table 7
Project MNES Offset Provisions

MNES	Description	Area Impacted (ha)	Area Provided in Offsets (ha)
Community			
White box – yellow box – Blakely's Red Gum Grassy Woodland	Critically endangered vegetation community that contains a dominant or co-dominant canopy cover of either White Box, Yellow Box or Blakely's Red Gum.	73 ha	1,720 ha
White box – yellow box – Blakely's Red Gum Derived Native Grassland	Critically endangered vegetation community that is the grassland derivative of the above. Required to contain 12 non-grass groundcover species including 'important' species in order to be classified as C/EEC. The vegetation community would likely regenerate to Box Gum Woodland.	462 ha	1,500 ha

MNES	Description	Area Impacted (ha)	Area Provided in Offsets (ha)
Species			
Regent Honeyeater (*Anthochaera phrygia*)	A winter migrant confined to Victoria and NSW and is strongly associated with the western slopes of the Great Dividing Range. The species is found in temperate eucalypt forests and woodlands, particularly in blossoming trees and mistletoe.	272 ha 'Likely' to be impacted	4,609 ha Suitable habitat present
Swift Parrot (*Lathamus discolor*)	This species breeds in Tasmania and migrates to the mainland in winter, where it is most commonly found in dry, open eucalypt forests and woodlands containing Grey Box, White Box and Yellow Gum, all of which occurs in the BOS.	272 ha 'Likely' to be impacted	4,609 ha Suitable habitat present
Grey-headed Flying-fox (*Pteropus poliocephalus*)	Grey-headed Flying-fox occurs in rainforests, open forest, woodlands, Melaleuca swamps and Banksia woodlands.	272 ha 'Likely' to be impacted	4,609 ha Suitable habitat present
Spotted-tailed Quoll (*Dasyurus maculatus*)	Has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest.	272 ha 'Likely' to be impacted	4,609 ha Known within Offsets
Large-eared Pied Bat (*Chalinolobus dwyeri*)	It is found in well-timbered areas containing gullies and roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Hirundo ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.	272 ha 'Likely' to be impacted	1,778 ha Known within offsets
Greater Long-eared Bat (*Nyctophilus corbeni*)	The species is most commonly found in inland woodland vegetation types including Box-Ironbark dominated communities and mallee. In the Hunter Valley the species is found in national parks, including Wollemi National Park, where it has primarily been recorded in moister woodland of various eucalypt species with a distinct shrub layer frequently adjacent to watercourses.	272 ha 'Likely' to be impacted	1,778 ha Known Within Offsets

4.1.9 Biodiversity Offset Management Plan

In order to provide a comprehensive framework for the implementation of the proposed biodiversity impact mitigation and offset measures, a Biodiversity Offset Management Plan (BOMP) will be developed for the Project. The BOMP will ensure that the Project's conservation objectives are met and that impacts to biodiversity are adequately managed for the life of the Project.

The BOMP will be developed in consultation with the relevant agencies following determination of the Project however will include (at least) the following:

- A description and plan of onsite conservation measures (long and short term);
- Measures to protect local biodiversity values;
- Provisions to address specific issues such as the occurrence of threatened species;
- Details of appropriate areas for management and conservation;
- Details of reference sites, monitoring methodology, and other contributions to conservation;
- Description of key performance indicators against which to measure progress; and
- Specification of appropriate review periods where progress is reviewed and the document updated as required.

The BOMP will contain comprehensive details of the proposed management measures that will be implemented in the offset properties to ensure that there is an improvement in the biodiversity values, including the possibility for strategic livestock management, reasonable endeavours in the control and management of weeds and feral animals, as well as shrub and tree planting and direct seeding of groundcover species in more modified areas.

4.1.10 Conclusion

A substantial BOS has been developed to offset the predicted residual impacts of the Project. Assessment of the BOS, using a number of methods, has indicated that the offsets proposed for the Project will adequately offset these impacts. BMC will ensure that all land sought for the BOS is subject to an appropriate legally binding conservation covenant (or equivalent) in consultation with relevant regulators. The BOS will protect 6,215 ha of high quality native vegetation across three properties to account for impacts to 881 ha of largely degraded native vegetation providing a direct offset ratio of 7:1.

The BOS provides a total of 1,720 ha of Box Gum Woodland (C/EEC) and 1,500 ha of Derived Native Grassland (C/EEC), 9 ha Dry Rainforest EEC, 365 ha Narrow-leaved Ironbark and 2,620 ha of other native vegetation. Overall the BOS provides for 6:1 for total C/EEC's listed under both State and Commonwealth legislation including 23:1 for the Box Gum Woodland component of the C/EEC. In addition, the BOS includes significant areas of known and potential habitat for the suite of species predicted to be impacted by the Project.

The Kenalea Properties will link to and significantly increase the conserved forest and woodland area of Mount Woolooma National Park and provide additional linkages with the surround State Forests and Lake Glenbawn. Black Mountain provides strategic position for increasing the biodiversity linkages across the Upper Hunter Valley increasing connectivity between the Liverpool Ranges and Barrington Tops (a renowned World Heritage Area). Merriwa River will build onto the Goulburn River National Park.

The Kenalea Properties also contain excellent habitat for a suite of threatened fauna including critically endangered bird species know to travel through the Upper Hunter Valley.

The long term objective of the BOS is to provide for a net benefit to flora and fauna within the locality and region, substantially increasing the proportions of native woodland in conservation tenure. When the avoidance, mitigation and BOS is considered, no significant impacts are predicted to occur to threatened communities and species as a result of the Project, and the Project will provide a major ecological benefit in the medium to long term.

The BOS readily complies with both the *NSW OEH principles for the use of biodiversity offsets in NSW* (OEH (NSW) 2013) and the *EPBC Act Environmental Offsets Policy*. In addition, the BOS conforms to the *NSW OEH interim policy on assessing and offsetting biodiversity impacts of Part 3A, State significant development (SSD) and State significant infrastructure (SSI) projects*.

4.2 AGRICULTURAL IMPACT ASSESSMENT

4.2.1 Requirement for Agricultural Impact Assessment

As noted in **Section 4.1.1** it was intended that the impacts to flora and fauna as a result of the Project would be compensated for by contributing funds to the UHSA based upon calculations using the BCAM developed by OEH. However, at the time of preparation of this RTS for the Project, the UHSA remains under development and has yet to be implemented. Given that the UHSA is yet to be implemented, BMC has developed a comprehensive BOS for the Project as described in **Section 4.1.1**.

An Agricultural Impact Assessment of the Ecological Offset Properties (AIA) has been completed to examine any potential loss of agricultural production associated with transferring the offset areas from an agricultural based land use to an ecological conservation outcome. The AIA builds on the results presented within the Agricultural Impact Statement (Appendix W of the EIS) which quantified the impacts associated with the Disturbance Boundary during the life of the Project.

The AIA has been prepared in accordance with the Project DGRs dated 13 March 2012 which stated:

> *"… the EIS is to contain a rigorous assessment of the agricultural impacts of the project."* and (the the associated covering letter)
>
> *"The Department's preliminary assessment of your project under the draft Upper Hunter Strategic Regional Land Use Plan shows the proposed mine extension is located within 2 kilometres of mapped Biophysical Strategic Agricultural Land and the Equine Critical Industry Cluster. The Department strongly recommends that you consider the draft Plan and in particular the draft gateway criteria in Chapter 11 of the Plan during preparation of your mine plan and EIS."*

A summary of the revised Offsets AIA is provided below with a detailed report prepared by Scott Barnett and Associates reproduced in **Appendix D**.

4.2.2 Strategic Agricultural Land

In September 2012, the Strategic Regional Land Use Plan – Upper Hunter (SRLUP) (DP&I, 2012) was finalised and released. The SRLUP defines areas of both Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CICs), including clusters for the equine and viticulture industries.

On 28 January 2014 amendments were made to the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (SEPP Mining) which included:

> Part 4, Clause 21: Savings and transitional — mining and petroleum development on strategic agricultural land:
>
> *(1) Part 4AA of this Policy does not apply to or with respect to an application for development consent under Part 4 of the Act if the relevant environmental assessment requirements under Part 2 of Schedule 2 to the* Environmental Planning and Assessment Regulation 2000 *for the development were notified by the Director-General on or before 10 September 2012."*

As BMC received DGRs for the Project on 13 March 2012, part 4AA(1) is not relevant to the Bengalla EIS application for Development Consent.

Nonetheless the revised Offset AIA considered the final BSAL and CIC mapping attached to the SEPP Mining enacted on the 28 January 2014. The relevant maps from SEPP Mining pertaining to this report includes 'Upper Hunter Region Strategic Agricultural Land Map – STA_003' and 'STA_004'. The indicative extent of SAL illustrated in the Mining SEPP in relation to the offset properties is presented in **Appendix D**.

There is no mapped BSAL on any of the offset properties. A discussion in relation to the Equine CIC mapping is provided in **Section 4.2.3** below and **Appendix D**.

4.2.3 Agricultural Assessment

In order to accurately calculate the various capabilities of the offset properties each was dissected into agricultural domains based on soil types present and relevant field observations. **Table 8** provides an overview of each of the agricultural domains and their quantitative distribution within each of the offset properties. **Appendix D** contains figures depicting each of the agricultural domains as described in **Table 8**.

Table 8 shows Agricultural Domain X is the highest quality grazing land and least abundant within the proposed offset properties, comprising an area of approximately 1,519 ha (24.4%). Though the highest quality grazing lands within the offset properties, this land is only suited to grazing of natural pastures and semi improved pastures at light stocking rates.

Table 8
Offset Properties Agricultural Domains

Domain	Description	Merriwa River (ha)	Black Mountain (ha)	Kenalea Properties (ha)	Total (ha)	Total %
X	Hilly to steep grazing land suited to aerial application of fertiliser, not suited to soil disturbance due to potential for erosion. Predominantly cleared with shade timber. Some naturalised species with mixed native pasture species.	0	143	1,376	1,519	24.4
Y	Steeper country with shelter timber or regrowth. Not suitable to soil disturbance.	0	571	1,719	2,290	36.8
Z	Predominantly land that has not cleared or heavily timbered steep slopes and/or land with rocky outcrops. Not suited to agriculture.	897	508	1,002	2,407	38.7
Total		**897**	**1,222**	**4,097**	**6,216**	**100.0**

Semi improved pastures have been achieved by the aerial application of fertiliser. The land is generally not suited to soil disturbance due to slope. There are limited areas of cleared but isolated plateaus.

Agricultural Domain Y covers an area of 2,407 ha (38.7%) and is suited light grazing. It is not suitable to aerial applications of fertiliser primarily due to tree cover. The slope limits its agricultural worth. This land is capable of supporting low levels of pasture production and such can be used for beef cattle grazing for weaner production.

The majority (2,407 ha or 38.7%) of the land within the offset properties is composed of land classed as Agricultural Domain Z. This land is not suited to grazing or any agricultural activity by cows for weaner production at low stocking pressure.

Interviews with the current land managers / owners confirmed that:

- The Merriwa River property is not used for agriculture;
- Black Mountain is used for beef cattle breeding with progeny being turned off as store weaners to be sold through Scone sale yards or grown out on other local Scone properties; and
- The Kenalea Properties are used for beef cattle breeding with progeny being turned off as store weaners to be sold through Scone sale yards or grown out on properties outside the Hunter Valley.

Although the Black Mountain property and a small 5 ha portion of Kenalea is mapped as Equine CIC, none of the properties are currently or have recently been used for any horse-related breeding activities and have no horse related infrastructure on them. This is further described in **Appendix D**. The production value of the three agricultural domains per hectare and total value is summarised in **Table 9**.

Table 9 shows that the gross value of agriculture (beef cattle) production from the potential offset properties, based on the current land use which is $330,895 per annum. The net value of agricultural production is $230,428. This is from the sale of 681 head of cattle per annum (weaner, cull cows and bulls). It is noted that this assumes all the potential offset properties will be removed from agricultural production.

The closest regional sale yard with weekly sales is at Scone. Scone also holds monthly store cattle sales. The National Livestock Reporting Service NSW Cattle Saleyard Survey for the financial year ended 30 June 2013 (MLA, 2013) shows that the Scone sale yard had throughputs of 59,571 head. The National Livestock Reporting Service NSW Cattle Saleyard Survey (MLA, 2013) reports a total of 1,665,581 cattle sold through NSW saleyards in 2013.

Land manager interviews revealed that of the expected 681 head turned off the proposed offset properties only 286 would be sold through Scone sale yards. The balance (394 head) would be expected to be sold direct from paddock to feed lotters or fatteners outside the Upper Hunter area. Based on 286 head been sold through the Scone sale yard, the expected number to be turned off represents 0.48% of Scone's throughput. Based on the Upper Hunter Shire Council's yard charges of $6.11 per head (financial year 2013/14), the 286 head sold from proposed offset properties through Scone yards would contribute $1,747 of income to the Scone sale yards.

Table 10 shows the value of the regional, State and National beef slaughtering illustrating the relatively small magnitude the agricultural output of Project Boundary compared to regional, State and National production.

Table 9
Value of Current Agricultural Production (2013) within Offset Properties

Agricultural Domain	Enterprise	Number Animals Sold*	Gross Value of Production	Net Value of Production
X	Inland weaners	557	$270,847	$188,613
Y	Inland weaners	124	$60,047	$41,816
Z	-	-	-	-
Total		**681**	**$330,895**	**$230,428**

** Includes culled breeding stock.*

Table 10
Value of Beef Slaughtering

Enterprise	Offsets Area (M)	Hunter Region (M)	NSW (M)	Australia (M)
Beef Slaughtering	$ 0.3	$ 95.5	$ 1,487.6	$ 6,550.5
Total Agricultural Production	$ 0.3	$ 311.7	$ 8,359.2	$ 39,645.1

4.2.4 Alternative Agricultural Land Use

Ares of the offset properties suited to cattle grazing is also suited to sheep and wool production, which historically, was the traditional land use for the more elevated and sloping country of the Upper Hunter. However over the years the increasing occurrence of wild dog attacks (based on discussions with landowners) has resulted in a changing of farm practices trending towards cattle which tend to be less susceptible to wild dog predation in the Upper Hunter.

The slope of these offset properties limits its agricultural use to grazing of breeding cattle and sheep on unimproved pasture with limited use of fertiliser.

There is limited opportunity to improve the productivity of the offset properties however consideration was provided into potential changes to management to represent superior management and or capital investment. The changes identified included aerial fertiliser application where appropriate to allow for a marginal increase in pasture production.

It was concluded that $50 p/ha per annum invested on areas of Domain X in the form of aerial fertiliser application the carrying capacity was predicted to improve to 8 DSE/ha. No other changes were proposed to the other domains due to due to steepness of land and general tree cover or the land not being suitable for agricultural production.

This change in management would result in an increase gross value of production from the proposed offset properties of $51,255 from the sale of an extra 105 head of cattle. The increase in net value of production would be $35,693.

4.2.5 Impact Assessment

As described above assuming all 6,216 ha of land from the proposed offset properties is removed from agriculture the gross value of beef production lost would be $330,895 per annum from the sale of 681 head of cattle. The net value of production lost would be $230,428 per annum.

Assuming the properties are removed from agriculture in perpetuity, calculated that present value of foregone gross value of production as $4.4 Million (M) (at 7% discount rate) and the present value of net value of agricultural production is $3.0 M (at the 7% discount rate (see EIS Appendix W).

The AIS prepared for the Project (see EIS Appendix W) identified that 964 ha of agricultural land within the Disturbance Boundary will be removed from production as a result of the Project. BMC would also be required to utilise existing (or to seek additional) water licences for the Project. Sustainable farming practices will, however, continue during the life of the Project in available areas outside the Disturbance Boundary. Prior to an area being disturbed it shall remain in agricultural production as long as practical having regard for relevant safety and mine operational considerations. This is the practice currently adopted by BMC during its period of operation of the Approved Bengalla Mine since 1998.

The combined gross value of agricultural production from the Disturbance Boundary, proposed offset properties and maximum water resource to be used by the Project is impacted properties is $1.5 M per annum. As shown in **Table 11** this value is 0.449% of the total agricultural production of the Hunter Region, 0.017% of NSW and 0.004% of Australia.

In total, gross value of foregone net agricultural production from agricultural land and water resources required for the Project is estimated to have $16.9 M present value (using 7% discount rate) and the net value to have $6.9 M present value (using 7% discount rate) (see EIS Appendix W).

As the overall agricultural contribution of the land within the Disturbance Boundary, proposed offset properties and the water resource earmarked for use by the Project is small when compared to the total agricultural production on a regional, state and national scale, the reduced availability and productivity of this land will have a minimal impact to the industry.

Table 11
Comparison of Annual Value of Agricultural Production Affected by Project

Resource	Value of Production (M)	Hunter Region (M)	NSW (M)	Australia (M)
Disturbance Boundary	$ 0.1			
Water	$ 1.0			
Offset Areas	$ 0.3			
Total agricultural production	$ 1.5	$ 311.7	$ 8,359.2	$ 39,645.1

Source: ABS, 2008; ABS 2011

5 REGULATORY SUBMISSIONS

This section responds to the submissions received from regulatory authorities. Submissions were received from:

- *Department of the Environment;*
- *Environment Protection Authority;*
- *Office of Environment and Heritage;*
- *NSW Heritage Office;*
- *Division of Resources and Energy;*
- *NSW Office of Water;*
- *Muswellbrook Shire Council;*
- *NSW Health;*
- *Roads and Maritime Service;*
- *Transport for NSW;*
- *NSW Rural Fire Service; and*
- *Department of Primary Industries.*

A response to each of the issues identified by the above mentioned submissions is provided below. The original submissions are presented in ***Appendix B****.*

5.1 DEPARTMENT OF THE ENVIRONMENT

5.1.1 Biodiversity Offset Strategy

Issue

The Department notes that the proponent is participating in the Upper Hunter Strategic Assessment, and that the project's offsets in relation biodiversity are proposed to be provided under the Upper Hunter Biodiversity Plan. While the details of the Plan, and in particular the Upper Hunter Offset Fund specifications are still being negotiated, the Department understands this approach will be capable of providing adequate offsets to compensate for impacts to threatened species and communities. Notwithstanding, the Department recommends that a contingency condition be incorporated into any approval, should offsets be unable to be provided under the Upper Hunter Offset Fund, or its equivalent. For example:

If an Upper Hunter Offset Fund is unavailable, an alternative offset strategy must be developed, and must be consistent with the Department of the Environment's Environmental Offsets Policy, available at www.environment.gov.au/epbc/publications/environmental-offsets-policy.

Response

A comprehensive BOS has been developed for the Project which is described in **Section** 4.

5.1.2 Box Gum Woodland

Issue

The Department considers the proposed clearing is likely to have a residual significant impact on Box Gum Woodland, for which offsets are required.

Response

A comprehensive BOS has been developed for the Project which is described in **Section** 4.

The BOS identifies the provision of extensive offsets for Box Gum Woodland. Approximately 1,720 ha of woodland and 1,500 ha of Derived Native Grassland will be provided in the BOS, which equates to an offset ratio overall C/EEC ratio of 6:1 and breaks down to approximately 23:1 for Box Gum Woodland and 3.2:1 for Derived Native Grassland. With the implementation of the BOS, it is not considered that any residual significant impact to Box Gum Woodland will occur as a result of the project.

5.1.3 Bothriochloa biloba

Issue

The proposed action will remove approximately 881 ha of known habitat for this species. While it is stated that the species has been recorded within the proposed action area, there is no clear information on how many individuals will be affected by the action. It is therefore not possible to determine whether or not the proposed action is likely to have a residual significant impact on the species. Further information is therefore required.

Response

Bothriochloa biloba was delisted from the EPBC Act in October 2013. As such it is not considered necessary to consider further in this assessment.

5.1.4 Swift Parrot

Issue

The Department considers the proposed clearing is likely to have a residual significant impact on the Swift Parrot, for which offsets are required.

Response

A comprehensive BOS has been developed for the Project which is described in **Section** 4.

The BOS identifies the provision of extensive areas of suitable habitat for the Swift Parrot. Approximately 4,609 ha of woodland will be provided in the BOS, which equates to an offset of 915.4% for the Swift Parrot. With the implementation of the BOS, it is not considered that any residual significant impact to the Swift Parrot will occur as a result of the Project.

5.1.5 Regent Honeyeater

Issue

The Department considers the proposed clearing is likely to have a residual significant impact on the Regent Honeyeater, for which offsets are required.

Response

A comprehensive BOS has been developed for the Project which is described in **Section** 4.

The BOS identifies the provision of extensive offsets for the Regent Honeyeater. Approximately 4,609 ha of woodland will be provided in the BOS, which equates to an offset of 915.4% for the Regent Honeyeater. With the implementation of the BOS, it is not considered that any residual significant impact to the Regent Honeyeater will occur as a result of the Project.

5.1.6 Spotted-tailed Quoll

Issue

The Department considers the proposed clearing is likely to have a residual significant impact on the Spotted-tailed Quoll.

Response

A comprehensive BOS has been developed for the Project which is described in **Section** 4.

Whilst not specifically requiring an offset as a result of the Project the BOS will provide extensive offsets for the Spotted-tailed Quoll. Approximately 4,609 ha of woodland will be provided in the BOS, which equates to an offset of 915.4% for the Spotted-tailed Quoll. With the implementation of the BOS, it is not considered that any residual significant impact to the Spotted-tailed Quoll will occur as a result of the Project.

5.1.7 Biodiversity Management Plan

Issue

The EIS notes that a Biodiversity Management Plan regarding the management, mitigation and monitoring will be developed prior to the commencement of the project. The EIS has not included specifications for actions and responsible persons or agencies. The EIS outlines monitoring activities along with the frequency of monitoring and relevant parameters but does not include an explicit timeline.

Further, the EIS has identified the need to find reference sites for establishing baseline data, which will occur before construction activities and mining commence. It is highly desirable for baseline data to be collected over a series of years prior to the commencement of the action, to allow adequate capture of temporal and spatial variation.

Response

A Biodiversity Management Plan (BMP) will be prepared for the Project and will contain specifications for appropriate reference sites, baseline data, actions, responsible persons/agencies and a timeline for monitoring. It will also contains details of which MNES will be targeted and monitored and contains detailed specifications on the data to be collected and the thresholds for corrective actions. The BMP will be developed in consultation with all relevant agencies and shall include DoE's requests above.

5.1.8 Water Resources Offsets

Issue

The Department notes that offsets do not appear to have been considered in relation to impacts to water resources. Should the proposed action, after all avoidance and mitigation measures are assessed, be considered likely to lead to a residual significant impact on a water resource, including environmental and human users then offsets relating to these impacts will be required.

Response

As described in Section 5.4.4 and Table 15 of the EIS, BMC will hold all relevant licences, share component and allocation required to comply with the Water Management Act (WM Act) and Water Act at all times water is taken, whether during or after the life of the Project.

5.1.9 Stability of the Overburden Emplacement Area

Issue

The EIS does not… provide information on the stability of the overburden emplacement area.

Response

Bengalla has operated since 1998 in accordance with DA 211/93 (as modified) and approved Mining Operations Plans (MOP) which are required to be regularly updated and approved by DRE. The MOP outlines the proposed operational and environmental activities planned for Bengalla during the MOP term including overburden design parameters. There have been no overburden stability issues at Bengalla since commencement of mining in 1998.

The Project will not result in any significant changes to the existing method of mining (i.e. continue dragline strip mining operation to the west) and as a result no overburden stability issues are predicted.

Pending the determination of the Project, BMC will submit a new MOP aligning with the new Development Consent which will be developed in consultation and to the approval of DRE.

5.1.10 Dry Creek Interaction with Acid-Forming and Sodic Materials

Issue

The EIS does not… address the interaction of the reinstated Dry Creek with contamination sources, including acid-forming and sodic materials.

Response

The Geochemical Impact Assessment (Appendix L of the EIS) has identified some overburden material which may be sodic and have structural stability problems related to potential dispersion and erosion. BMC will continue with its existing, successful site rehabilitation practices for potentially sodic overburden within the Project area by ensuring that a topsoil cover is utilised as part of final rehabilitation. All existing rehabilitation activities onsite is completed in accordance the approved MOP and Rehabilitation Management Plan both of which will be required to be updated following Development Consent for the Project.

The Geochemical Impact Assessment also indicates that all overburden material, apart from the Archerfield Sandstone (ASS) located above the Wynn seam, is classified as Non-Acid Forming (NAF), and has a high factor of safety with respect to potential acid generation.

Current and proposed management methods for ASS materials at Bengalla are sufficient to minimise the risk of any significant impact to the environment and in particular to Dry Creek, which include:

- Deep burial of Potentially Acid Forming (PAF) ASS overburden and coal reject under NAF overburden in the backfilled open cut pit as described in the Acid Rock Drainage Management Plan;
- No co-disposal of ASS or coal rejects within overburden emplacement area which overlie, or have potential connectivity with the alluvial soils and/or Dry Creek;
- No coarse reject materials will be emplaced in the Western Overburden Emplacement Area (OEA) to avoid any potential connectivity with the adjacent Dry Creek; and
- A 2 m thick select clay fill layer would be required for the length of the alignment to maintain drainage.

As noted in Section 8.21.9 of the EIS, BMC will develop a Dry Creek Reinstatement Management Plan within five years of the proposed construction in consultation with relevant regulators (to be determined by DP&I in any Development Consent) to ensure that effective management measures are employed during the construction and reinstatement and revegetation of Dry Creek.

Runoff collected in the pit and sediment dams will continue to be monitored to ensure that any potential runoff from sodic or acid-forming overburden is identified and managed accordingly. Using these techniques, the re-established Dry Creek should therefore have no interaction with sodic or acid-forming materials.

5.1.11 Dry Creek Water Quality

Issue

The EIS does not… provide information on the water quality in Dry Creek, pre and post realignment.

Response

BMC monitors Dry Creek at four locations as shown in Figure 12 of the EIS. Two of the locations (SW01 and SW03) are sampled only during periods of discharge from the Staged Discharge Dam. The other two sampling locations (SW04 and SW05) are located at the upstream and downstream boundaries respectively of the Project Boundary.

Over the 60 month period November 2008 to November 2013, sampling at Dry Creek has been attempted on at least 57 separate occasions. For all but three of these sampling efforts, Dry Creek at the upstream location has not had sufficient flow for sampling.

Table 12 shows a summary of the Dry Creek water quality monitoring results. Based on the limited information available from the three occasions when Dry Creek upstream did have enough water to sample, it appears that Dry Creek water quality is slightly alkaline, fresh, and has a mean Total Suspended Solids of 23 milligrams per litre (mg/L). The results for SW05 downstream show the impacts of controlled releases under the Hunter River Salinity Trading Scheme (HRSTS).

Table 12
Dry Creek Surface Water Quality Monitoring Results, 2008 to 2013

Parameter		SW04 Dry Creek Upstream	SW05 Dry Creek Downstream*
pH	Max	7.6	8.2
	Mean	7.5	7.9
	Min	7.3	7.4
	Count	3.0	13
EC (µS/cm)	Max	143	1,495
	Mean	122	816
	Min	86	176
	Count	3.0	13
TSS (mg/L)	Max	41	9,580
	Mean	23	1,122
	Min	7.0	15
	Count	3.0	14

** May include controlled discharges*

The reinstatement of Dry Creek is not scheduled until after Year 15 of the Project. As noted in Section 8.21.9 of the EIS, BMC will develop a Dry Creek Reinstatement Management Plan within five years of the proposed construction in consultation with relevant regulators to ensure that effective monitoring and management measures are employed during the construction and reinstatement and revegetation of Dry Creek.

In addition, BMC will update the existing Surface Water Management Plan for the Project to the approval of relevant regulators to include the commitments in this EIS.

5.1.12 Hunter River Heavy Metal Loading

Issue

The EIS does not…provide an assessment of the proposal's contribution to heavy metal loading in the Hunter River. The provided reference to existing water quality data from the Hunter River does not include heavy metals other than iron and zinc.

Response

Table 13 shows the water quality monitoring results for the Staged Discharge Dam (where licensed discharges occur in accordance with the HRSTS, see Section 3.12 of the EIS for a detailed discussion on the HRSTS) and Hunter River upstream and downstream of the Project (see Figure 12 of the EIS for locations). With reference to the minimum, average and maximum recorded values, results indicate:

- The Staged Discharge Dam has concentrations of Aluminium, Calcium, Cobalt, Copper, Manganese, Iron, Vanadium and Zinc that are equal to or lower than those recorded in the Hunter River (both upstream and downstream);
- The Staged Discharge Dam has higher concentrations of Arsenic, Boron, Magnesium, Lithium and Molybdenum than in the Hunter River (both upstream and downstream) however some context is provided below:
    - The lowest recommended ANZECC trigger value for Arsenic is 0.013 mg/L, based on 95% of species ecosystem protection. The recorded maximum value at the Staged Discharge Dam is equal to this value;
    - As detailed in Table 3.6 of the Surface Water Impact Assessment (Appendix J of the EIS), the lowest recommended ANZECC trigger value for Boron is 0.37 mg/L, based on 95% of species ecosystem protection. The recorded maximum value at the Staged Discharge Dam is less than half the ANZECC trigger value;
    - As detailed in Table 3.6 of the Surface Water Impact Assessment (Appendix J of the EIS), the lowest recommended ANZECC trigger value for Magnesium is 2,000 mg/L, based on livestock drinking for cattle. The maximum recorded value in the Staged Discharge Dam is less than 50 mg/L;

- The lowest recommended ANZECC trigger value for Lithium is 2.5 mg/L based on crop irrigation. The maximum recorded value in the Staged Discharge Dam is 0.126 mg/L; and
- The lowest recommended ANZECC trigger value for Molybdenum is 0.05 mg/L based on the short term (up to 20 years) value for irrigation water. The mean Molybdenum concentration in the Staged Discharge Dam is 0.091 mg/L (a value between irrigation and cattle drinking quality). The maximum discharge limit under the HRSTS at the Staged Discharge Dam is 200 ML/d. The minimum flow in the Hunter River for discharge is 1,000 ML/d at Denman. This results in a 'worst-case' (minimum) dilution ratio of 1:5 for controlled site discharges to the Hunter River at Denman. Under this dilution ratio, the maximum recorded value of Molybdenum of 0.134 mg/L would reduce to 0.02 mg/L at Denman, which is below the ANZECC guideline trigger value. Over the period 2006 to 2011, annual controlled discharges from the Project have ranged between 0 to 205 ML/a. Over the same period, Hunter River flows are estimated at between 100,000 ML/a to 350,000 ML/a at Denman.

- Beryllium, Cadmium, Lead, Mercury and Selenium do not exceed their Limits of Reporting (LOR) in either the Staged Discharge Dam or the Hunter River; and
- The Staged Discharge Dam has a higher minimum and mean value of Nickel than in the Hunter River (both upstream and downstream), but a lower maximum value. The lowest recommended ANZECC trigger value for Nickel is 0.011 mg/L, based on the 95% of species ecosystem protection. The maximum recorded value in the Staged Discharge Dam (0.006 mg/L) is lower than the ANZECC trigger value.

Table 13
Six Monthly Water Quality Monitoring Results

Analyte grouping / Analyte	Units	LOR	W01 – Hunter River Downstream of Kayuga Bridge (March 2010 to August 2013)				W04 – Hunter River Whites Creek Vineyard (March 2010 to August 2013)				W18 – Staged Discharge Dam (August 2011 to August 2013)			
			Count	Min	Mean	Max	Count	Min	Mean	Max	Count	Min	Mean	Max
Total Dissolved Solids @180°C	mg/L	1	8	232	311	474	8	220	328	462	5	720	1628	2310
Suspended Solids (SS)	mg/L	1	8	6	35	164	8	10	62	348	5	5	36	71
Sulfate as SO4 - Turbidimetric	mg/L	1	8	19	30	46	8	25	36	59	5	214	495	770
Calcium	mg/L	1	8	24	39	54	8	24	41	57	5	19	26	40
Magnesium	mg/L	1	8	15	25	32	8	15	25	33	5	22	34	48
Aluminium	mg/L	0.01	8	0.24	1.63	8.72	8	0.17	1.91	10.10	5	0.08	0.46	1.20
Arsenic	mg/L	0.001	8	0.001	0.001	0.002	8	0.001	0.001	0.002	5	0.006	0.010	0.013
Beryllium	mg/L	0.001	8	0.001	0.001	0.001	8	0.001	0.001	0.001	5	0.001	0.001	0.001
Cadmium	mg/L	0.0001	8	0.0001	0.0001	0.0001	8	0.0001	0.0001	0.0001	5	0.0001	0.0001	0.0001
Cobalt	mg/L	0.001	8	0.001	0.001	0.004	8	0.001	0.002	0.005	5	0.001	0.001	0.002
Copper	mg/L	0.001	8	0.001	0.003	0.010	8	0.001	0.003	0.011	5	0.001	0.001	0.002
Lead	mg/L	0.001	8	0.001	0.001	0.001	8	0.001	0.001	0.001	5	0.001	0.001	0.001
Lithium	mg/L	0.001	8	0.001	0.001	0.002	8	0.001	0.001	0.003	5	0.033	0.087	0.126
Manganese	mg/L	0.001	8	0.024	0.051	0.144	8	0.029	0.061	0.176	5	0.015	0.031	0.052
Molybdenum	mg/L	0.001	8	0.001	0.001	0.001	8	0.001	0.001	0.001	5	0.061	0.091	0.134
Nickel	mg/L	0.001	8	0.001	0.003	0.015	8	0.001	0.004	0.016	5	0.004	0.005	0.006
Selenium	mg/L	0.01	8	0.01	0.01	0.01	8	0.01	0.01	0.01	5	0.01	0.01	0.01
Vanadium	mg/L	0.01	8	0.01	0.01	0.02	8	0.01	0.01	0.03	5	0.01	0.01	0.01
Zinc	mg/L	0.005	8	0.005	0.009	0.028	8	0.005	0.007	0.020	5	0.005	0.007	0.009
Boron	mg/L	0.05	8	0.05	0.05	0.05	8	0.05	0.05	0.05	5	0.09	0.11	0.16
Iron	mg/L	0.05	8	0.23	1.62	8.28	8	0.24	1.93	9.52	5	0.07	0.34	0.87
Mercury	mg/L	0.0001	8	0.0001	0.0001	0.0001	8	0.0001	0.0001	0.0001	5	0.0001	0.0001	0.0001
Hexavalent Chromium	mg/L	0.01	8	0.01	0.01	0.01	8	0.01	0.01	0.01	5	0.01	0.01	0.01
Fluoride	mg/L	0.1	8	0.1	0.2	0.5	8	0.1	0.3	0.5	5	1.5	2.0	2.7
Chloride	mg/L	1	4	20	57	107	4	23	63	103	5	147	353	519

5.1.13 Flood Impact Assessment

Issue

The EIS does not…provide an assessment of the expected impact a flood would have if it should exceed the flood level that the project's mitigation measures have been designed to withstand.

Response

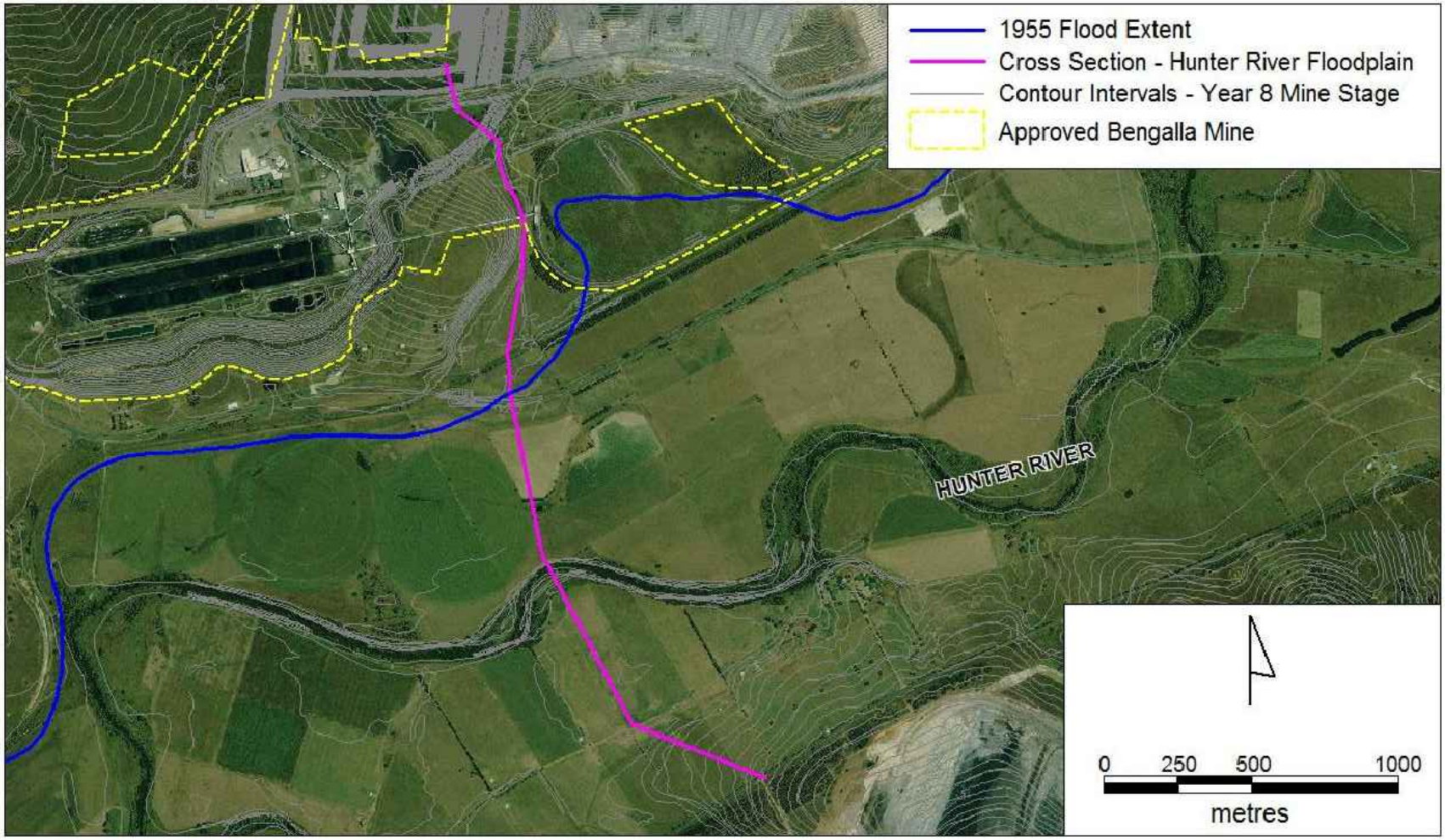
Flood impacts at Bengalla can potentially occur from the Hunter River or from Dry Creek, and are assessed in Section 5.8 of the Surface Water Impact Assessment (Appendix J of the EIS). Adjacent to Bengalla, the largest Hunter River flood event on record was the 1955 flood event, previously estimated as approximately equal to the 100 year Average Recurrence Interval (ARI) design flood event (Surface Water Impact Assessment for Bengalla Development Consent Modification, WRM, 2010) (see Figure 12 of the EIS). The estimated 1955 flood level in the vicinity of the re-established Dry Creek channel is between RL 134 m and RL 135.5 m.

Due to the effect of the Glenbawn Dam (constructed in 1957 and raised in 1987) in attenuating flood discharges, the 100 year ARI design flood is likely to be smaller than the historical 1955 event. Hence a level of about RL 135 m is considered a reasonable estimate of the 100 year ARI flood level in the vicinity of the re-established Dry Creek channel.

Floodwaters near the edge of the Hunter River Floodplain can only move into the Project Boundary via culverts under the railway embankment and parallel road embankment on the northern side of the railway embankment. The culverts are aligned perpendicular to the direction of flow in the Hunter River. Hence, any floodwaters within the Project Boundary would be backwater storage only and not active flow. Hence the risk of erosion impacts on the site due to Hunter River flooding is very low.

During Year 4 of the Project, mining will occur in the Dry Creek channel (Dry Creek is dammed upstream of the mining area and pump transferred to the downstream Dry Creek channel). During a large flood event in the Hunter River, it is theoretically possible that floodwater would back up the Dry Creek channel and enter that mining area. However, to flow into the Satellite Pit, Hunter River floodwater levels would need to exceed approximately RL 145 m in this area, which is approximately 10 m higher than the conservative estimate of the 100 year ARI flood event. Therefore, the risk of this occurring is extremely low.

During Year 8 of the Project, the mining area will progress into the Dry Creek channel as shown on see **Figure 5**. Hunter River flood levels would need to exceed approximately RL 140 m to enter the Main Pit (approximately 5 m higher than the conservative estimate of the 100 year ARI flood event) via the culverts underneath the road embankment. If the culverts were removed, the water level would need to reach approximately RL 147 m to enter the mining area. A cross section of the Hunter River floodplain is shown in **Figure 6**.



HB1375 005 Bengalla - Hunter River Floodplain Plan.dwg

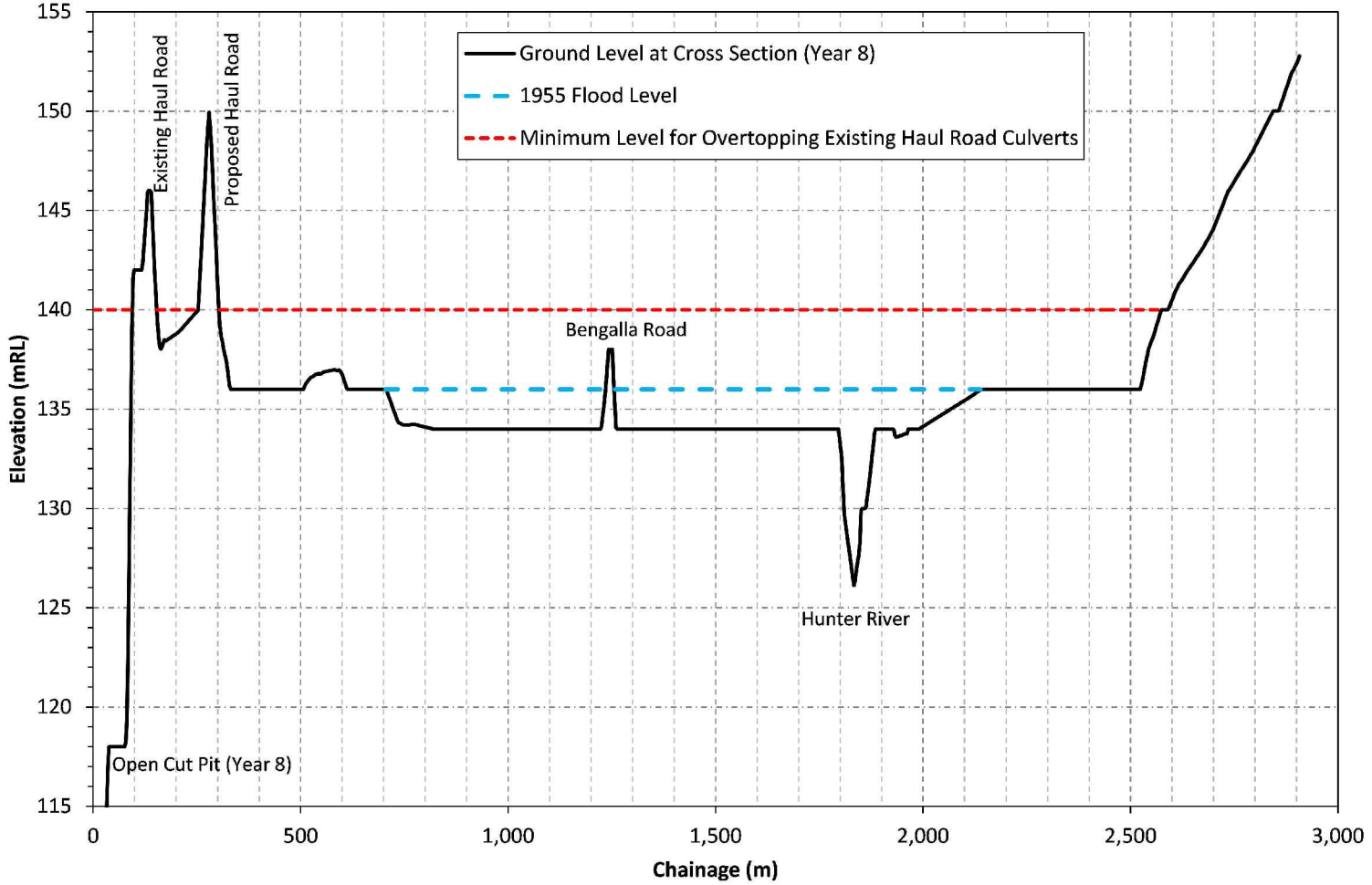
BENGALLA PROJECT

BENGALLA

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Hunter River Floodplain Cross Section - Plan View

FIGURE 5



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BENGALLA PROJECT

BENGALLA

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Hunter River Floodplain Cross Section - Year 8

FIGURE 6

A flood frequency analysis (FFA) of the Hunter River at Muswellbrook has been previously undertaken (Bengalla Development Consent Modification, WRM, 2010) for a period of 97 years of data. Note that for the purposes of the assessment, any potential effects of Glenbawn Dam (constructed in part to provide downstream flood mitigation) have been ignored in this analysis. Hence, actual design flood discharges are likely to be lower than indicated by the FFA of data which includes the pre-dam period.

The FFA results show that the 100 year ARI peak design discharge for the Hunter River at Muswellbrook Bridge is about 3,920 m^3/s. This is approximately the recorded maximum peak discharge of 3,964 m^3/s recorded during the February flood of 1955. On this basis, the 1955 flood is approximately equal to the 100 year ARI design flood event. The 1,000 year ARI flood event has estimated from an extrapolation of the flood frequency curve to be approximately 7,200 m^3/s (or 1.8 times greater than the 1955 flood event discharge). There are substantial uncertainties with this estimate due to the potential for errors in the extrapolation and therefore this value should be used with caution. Nevertheless, the estimate provides a reasonable indication of flood magnitude for an extreme event.

An analysis of the cross sectional area of the Hunter River floodplain (see **Figure 5**) indicates a total area of approximately 3,000 m^2 at the 1955 flood level (adopted level of RL 136 m). During the Year 8 mining stage of operations, at the minimum overflow level to the open cut pit (RL 140 m), the cross sectional area of the Hunter River floodplain is about 12,000 m^2, which is four times larger than the cross sectional area for the 1955 flood. Hence, at the same velocity the flow capacity of the Hunter River floodplain would be approximately four times larger than the 1955 flood discharge of about 4,000 m^3/s. This means that the flood discharge to enter the open cut pit would be about 16,000 m^3/s, which is much larger than the estimated 1,000 year ARI discharge of 7,200 m^3/s. On this basis, the minimum flood immunity of the open cut pit at any time during operations is estimated to be significantly larger than the 1,000 year ARI flood.

Post-mining, Hunter River flood levels would need to exceed approximately RL 160 m to enter the Main Pit, or more than 25 m higher than the 100 year ARI flood event.

As described in the Dry Creek Interim Management System and Conceptual Reestablishment Study (Appendix X of the EIS) the construction of a clean water dam (CW1) on Dry Creek upstream of the Project will occur in Year 1. CW1 has been designed to capture the runoff generated from the 1 in 200 year ARI, 72 hour storm prior to passing under Wybong Road. Noting that this dam is essentially all surcharge capacity, CW1 has a surcharge capacity of 900 ML to reduce the potential for runoff entering the Project's void. Should the Mount Pleasant Project proceed, the clean water catchment would decrease due to their infrastructure occupying part of the catchment.

5.1.14 Final Void Water Quality

Issue

The EIS does not…provide a "comprehensive assessment of final void water quality".

Response

The adopted methodology presented in the Groundwater Impact Assessment (see Appendix K of the EIS) and level of assessment of the final void are consistent with industry approaches for open cut coal mining projects in NSW.

The final void water quality assessment is based on consideration of salinity, which represents the primary issue of concern for the final void. Post mining the final void will behave as a sink in the groundwater system and will prevent flow of brackish to saline water in the final void lake from entering the Hunter River alluvium. The geochemical assessment indicates that water in the open cut pit will not be acidic and hence, the risk of elevated dissolved metals concentrating in the pit is very low.

5.2 NSW ENVIRONMENT PROTECTION AUTHORITY

5.2.1 Noise limits

Issue

The assessment predicts exceedances of the Project Specific Noise Levels ("PSNL") that must be addressed by the proponent in accordance with chapters 8 and 9 of the Industrial Noise Policy ("the INP"). The EPA will then be in a position to recommend noise limits for all residences predicted to receive noise levels up to and including the PSNL. For any other receivers predicted to receive noise levels above the PSNL, the Department of Planning & Infrastructure ("DPI") is best positioned to weigh the social and economic benefits of the proposal against potential adverse noise impacts and to determine if a higher noise limit is justified. If a higher noise limit is accepted by DPI following this assessment and consent is granted, the EPA will include these limits in the EPL.

Response

Chapter 8.2.1 and 9 of the Industrial Noise Policy (INP) recommends a number of issues be considered in cases where predicted noise levels may exceed the Project Specific Noise Levels (PSNLs) at one or more receivers. The consideration of each of these issues is presented below (with consideration of acoustics only).

1. Characteristics of the area and receivers likely to be affected

1a. The extent and number of receivers affected

The Project is located within a mixed mining/rural area approximately 4 km west of Muswellbrook within the Muswellbrook Local Government Area (LGA). All receivers that are potentially affected by the Project currently receive some noise from the existing Bengalla Mine and depending on the location of the receiver, may also receive mining noise from Hunter Valley Energy Coal's (HVEC) Mt Arthur Coal Mine or Glencore Xstrata's Mangoola Mine.

Receivers located generally north of the Project may potentially receive noise (once constructed) from the approved but not yet constructed Mount Pleasant Project.

The closest receivers to the Project are rural landholdings that are primarily used for cattle grazing, with many of the closest receivers owned by the proponent or other mining companies. Receivers located generally east and south of the Project currently receive some traffic noise from Denman Road and intermittent train noise from the Ulan Line, while receivers generally south and west of the Project currently receive some traffic noise from the Bengalla Link Road.

Privately owned rural receptors that are predicted to receive noise levels over the PSNLs are located generally to the east, south west and west of the Project, as receivers to the north and south are owned by mining companies. Noise modelling for the Project (Appendix H of the EIS) and as presented in Section 8.3.3 of the EIS predicts a total of 28 receptors (excluding those receptors located within the existing zone of affection from another mining company) will experience noise levels above the PSNL under reasonable worst case operating and weather conditions and after all feasible and reasonable noise control and mitigation measures are implemented, as shown in **Table 14**.

Table 14
Receptors Predicted to Exceed PSNL

PSNL Impact	Predicted Project Impact
More than 5 dBA over PSNL	7 private receptors
More than 2 dBA over PSNL	11 private receptors
Less than 2 dBA over PSNL	12 private receptors

1b. The daily activities of the community

The majority of receivers in the vicinity of the Project own or operate farming enterprises which includes intermittent and occasional use of tractors and other diesel powered machines to complete various tasks. According to the Social Impact Assessment (Appendix R of the EIS), the majority of receivers also derive income from other sources such as employment within the region. A portion of the community therefore travels to employment locations on a daily basis, similar to the wider NSW community.

1c. Property values

The property values of receivers adjacent to the Project are consistent with the rural nature of the area and the market values of such land.

1d. Zoning of receiver properties and the appropriateness of the zoning

Surrounding receivers are located on land zoned as E3 Environmental Management or RU1 Primary Production under the *Muswellbrook Local Environmental Plan 2009*. These zones permit industrial / noisy activities.

1e. Potential change in ambient levels as a result of the Project

The acoustic environment in the region is complex, with a mix of existing and approved mining and transportation sources in the area. Receivers located generally east of the Project would experience a gradual reduction in Project-related mining noise as mining activity progresses to the west away from these receptors; however noise levels from other existing and approved mines may not reduce over the same time period.

Receivers located generally west of the Project would experience a gradual increase in Project-related noise as the active mining area moves closer; however the majority of these properties also currently receive noise from other operating mines and may receive noise from other approved mines in the future. Any net changes in mining noise level over time depend on the location of each receiver compared to the Project and to other currently operating and approved mines.

Receivers located generally south of the Project are owned by HVEC and receive noise from Mt Arthur Coal Mine, in addition to noise from the existing Bengalla Mine (see EIS Figure 5). Receptors located generally north of the Project are owned by Rio Tinto and may receive future noise from the approved Mt Pleasant Project and perhaps the West Muswellbrook Project (exploration project only), in addition to existing noise from Bengalla Mine.

1f. The extent of impacts to birds and other animals

Birds and other animals quickly become accustomed to noise from various sources such as road traffic, as evidenced by the variety of wildlife that can be observed adjacent to highways and other roads. Traffic noise levels adjacent to roads can reach levels greater than predicted noise levels from the Project.

Mining companies regularly use land adjacent to active mining areas for cattle grazing, with no noticeable adverse impact on the animals, while birds can often be observed in the vicinity of mining areas. BMC currently raises cattle on rural land adjacent to Bengalla, with no apparent adverse effects to the animals.

1g. The likely variation between individuals in response to the noise

The PSNLs recommended in the INP implicitly consider a normal variation in an individual's response to industrial noise based on dose-response and other research in Australia and overseas. The PSNLs have been conservatively set by the EPA to protect 90% of the potentially affected population for 90% of the time.

1h. The amenity of areas used for outdoor recreation or conservation, heritage or wilderness areas

There are no outdoor recreation, conservation, heritage or wilderness areas with the potential to be affected by noise from the Project.

1i. Other industry in the area (including agriculture)

Cattle grazing currently occurs on properties in the vicinity of the Project, however this is a low-intensity agricultural activity with little need for mechanical assistance. Major coal mining developments including the existing Bengalla Mine, Mt Arthur Coal Mine and Mangoola Mine currently operate in the immediate vicinity of the Project, while the approved Mt Pleasant Project is located adjacent to the Project's northern boundary and the West Muswellbrook Project is located to the north west. The Hunter Valley Region, and the area encompassing the Project, has been influenced by the operation of large coal mining developments for some years.

Given that the Project is a natural extension of an existing mine rather than a new project on a greenfield site, potentially affected receptors are well aware of mining noise in the area and in many cases currently receive noise from more than one mining development.

2. Characteristics of the proposal and its noise or vibrations, such as:

2a. The noise characteristics of the activity:

The Project would generally continue to produce a semi-continuous low hum, with occasional small variations as specific machines move from place to place. Noise levels would vary from being inaudible or barely perceptible to being clearly audible depending on the time of day, the location and orientation of the receiver, background noise levels and prevalent weather conditions.

Predicted noise levels for the Project have been calculated considering reasonable worst case operating and weather conditions, with occasional periods of higher noise level due to stronger weather conditions to be actively managed and controlled.

Long term average noise levels would therefore be lower than the reasonable worst case predicted noise levels for much of the time, particularly during the day when potentially affected residents are more likely to be outdoors.

2b. The extent to which any remaining noise impacts exceed the PSNLs

Rural receptors that are predicted to receive noise levels over the PSNLs are located generally east and west of the Project. Predicted noise levels presented in the EIS indicate 7 privately owned receptors would receive noise levels more than 5 dBA over the PSNLs during the Project life, with an additional 11 private receptors expected to receive up to 5 dBA over the PSNLs and a further 12 private receptors to receive less than 2 dBA over the PSNLs. Predicted noise levels include all reasonable and feasible noise mitigation measures, as described in the EIS.

2c. The circumstances and times when the PSNLs are likely to be exceeded

Predicted noise levels represent reasonable worst case operating and weather conditions, with occasional periods of higher noise level due to stronger weather conditions to be actively managed and controlled. The weather assessment presented in the EIS indicates prevailing south-easterly and south-south westerly winds tend to occur during the day and evening, with a prevailing east-north-easterly wind associated with a temperature inversion during the night. The PSNLs are therefore predicted to be exceeded at times of mildly to strongly noise enhancing weather conditions, depending on the location of the receiver in relation to mining operations.

Receivers located generally east of the Project would receive highest noise levels during a SSW wind during the day and evening, with often lower noise levels during the night under the prevailing ENE winds. These would be lower than levels of noise previously experienced from the existing Bengalla Mine, when its previous operations were closer.

Receivers located generally south west of the Project would receive highest noise levels during the night under the influence of a combined temperature inversion and ENE drainage flow along the Hunter River valley.

Receivers located generally west and north west can receive highest noise levels at any time, with a south-east prevailing wind during the day and evening and a prevailing temperature inversion at night.

2d. The circumstances and times when noise levels are likely to be lower than the PSNLs:

Predicted noise levels in the EIS represent reasonable worst case operating and weather conditions. Noise levels would therefore be lower than the predicted levels for much of the time, either due to more favourable equipment operating locations or to more favourable weather conditions or both. Noise levels would generally be lower and mining noise would generally be less audible, during the day and evening compared to the night period.

2e. The accuracy with which impacts can be predicted, and the likelihood that the impacts will occur in the manner predicted

The predicted noise levels were calculated using industry best practice noise modelling methods which are generally acknowledged to provide an accuracy of 2 dBA in most cases. Periods of higher noise levels may occur in the absence of further mitigation due to relatively brief periods of strongly noise enhancing weather conditions, however such periods are expected to occur occasionally and are difficult to reliably predict.

In addition, BMC has committed to achieving the predicted noise levels by the following best practice mitigation and management measures:

- Selecting mining equipment that meets the modelled operating sound power levels;
- Adopting a number of noise control measures as described in the EIS;
- Adopting active noise management strategies to deal with periods of time in which atmospheric conditions are more strongly noise enhancing than considered in the EIS, including:
    - Mobile machines including trucks, dozers, graders and water carts will operate on elevated and exposed sections of the OEA during the day and early evening and on lower and more shielded sections of the OEA during the more sensitive night period;
    - In-pit haul roads will be located in acoustically shielded areas where possible;
    - Out of pit haul roads will be located as far from sensitive receivers and through low elevation and shielded areas where possible; and
    - During the sensitive night periods, mining machines (excavators and shovels) will work below the natural ground level. Vegetation clearing, topsoil stripping, stockpiling and rehabilitation will be completed during the day.
- Continuing use of the existing real-time noise monitors to monitor compliance with the approved noise levels and react to any potential or actual periods of higher noise level.

2f. The degree to which the character of the noise is new to an area and differs from existing noise sources

The Project is the continuation of an existing coal mine, using substantially the same mining methods and equipment as the existing operation. All potentially affected residents would currently receive some audible noise from one or more of the three existing mining developments in the area, although the received noise level from each mining development would gradually change over time as each mine progresses.

2g. The economic benefit and social worth of the proposal for the local area, the region or the nation

As described in Economics Impact Assessment (Appendix S of the EIS), the Project is estimated to have net production benefits to Australia of $1,790 M.

Further, the Project is estimated to make up to the following total annual contribution to the regional economy for 24 years:

- $1,486 M in annual direct and indirect regional output or business turnover;
- $789 M in annual direct and indirect regional value added;
- $155 M in annual indirect household income; and
- 1,745 direct and indirect jobs.

The Project is estimated to make up to the following total annual contribution to the NSW economy for 24 years:

- $2,408 M in annual direct and indirect regional output or business turnover;
- $1,223 M in annual direct and indirect regional value added;
- $441 M in annual indirect household income; and
- 4,868 direct and indirect jobs.

3. The feasibility of additional mitigation or management measures

3a. Alternative sites or routes for the development

BMC has undertaken exploration programs and detailed feasibility studies have been carried out in order to identify the extent and quality of the coal resource and to determine the most appropriate mine plan and mining method. This process has included the consideration and refinement of alternative mine plans and operational alternatives.

The final mine plan design for the Project as presented in the EIS incorporated a variety of benefits to the environment and society to minimise the impacts from the Project. A number of noise control and management measures have been incorporated into the mine plans, such as provision of better shielded OEA areas for use during the more sensitive night period and use of the quietest available mining equipment.

Further detail on the Project alternatives considered in presented in Section 4.13 of the EIS.

3b. The technical and economic feasibility of alternative noise controls or management procedures

The Project includes a number of noise control and management measures, many of which are a continuation of measures adopted at the existing Bengalla Mine. Additional noise control options beyond the recommended and proposed options were considered but ultimately have not been adopted due primarily to the technical limitations of each option, including:

- Extracting the coal using underground mining methods, which is an unsuitable option considering the nature of the resource and overlying strata;
- Operation of the Project only during the day and evening or only during the day, which requires additional mining equipment to maintain the proposed annual production rate and therefore would increase noise levels and exceedances of PSNLs during operating periods; and
- Additional noise barriers and other shielding strategies, which are not effective for the Project due to the nature of topography in the area and the strongly noise enhancing weather conditions that have been considered in the EIS which tend to curve the sound path over the top of a noise barrier. Noise barriers have the potential to be marginally effective for selected noise sources such as mining equipment on exposed upper benches, however any such barriers would quickly be removed by the advancing mine and would provide a limited benefit for the majority of receivers that are on higher ground overlooking the mining area. Any small benefits provided by these barriers would be outweighed by the additional noise required to construct the barriers.

4. Equity issues in relation to:

4a. The costs borne by a few for the benefit of others

The EIS clearly acknowledges all of the social, environmental and economic impacts of the Project, being negative, positive or neutral. Notwithstanding this, BMC has proposed a range of measures to mitigate, offset and compensate for relevant environmental, social and cultural impacts as described in the EIS (see EIS Table 102).

4b. The long term cumulative increase in noise levels

The EIS considered cumulative noise levels, with concurrent operation of the Project and other nearby mining developments, and concluded all receivers that remain unaffected by individual mining developments would also remain unaffected by cumulative noise levels.

4c. The opportunity to compensate effectively those affected

Research has repeatedly indicated an average noise level increase of less than 2 dBA, in a varying noise source such as traffic, is barely perceptible to the average person.

Mining noise is similar to semi-continuous traffic noise in that it varies over short and medium time scales from a few seconds to a few minutes. A mining noise level change of up to 2 dBA and by extension an exceedance of up to 2 dBA above the PSNLs, is therefore unlikely to be noticed by receivers.

Furthermore, contemporary conditions of Development Consent provide privately owned receivers predicted to experience a significant noise impact (i.e. 5 dBA above the PSNL) the opportunity for acquisition by landholders, should they request it.

Those privately owned properties predicted to experience moderate noise impacts (i.e. between 2 dBA and 5 dBA above the PSNL) are also granted the opportunity for 'at-receiver' noise mitigation, consistent with contemporary conditions of Development Consent.

Conclusion

The majority of receivers surrounding the Project Boundary currently experience some mining noise, ranging from occasionally audible for the more remote receivers to significantly and consistently audible for some receivers closer to existing mining developments.

Predicted noise levels in the EIS represent reasonable worst case operating and weather conditions. Noise levels would therefore be lower than the predicted levels for much of the time, either due to more favourable equipment operating locations or to more favourable weather conditions or both. Noise levels would generally be lower and mining noise would generally be less audible, during the day. The reasonable worst case predicted noise levels would also remain within the PSNLs for a number of operating years at each receiver, depending on the location of the receiver.

Residents located generally west of the Project would receive gradually increasing noise levels as the active mining area progresses to the west, which generally means noise levels in the earlier years would comply with the PSNLs under all except the strongest noise enhancing weather conditions.

The Project has implemented all reasonable and feasible noise mitigation measures for the Project, including mine plan design details to provide shielded OEA areas and haul roads where possible and careful selection of mining equipment to provide the lowest possible source noise levels.

The Project will continue to use real-time noise monitors to identify potential or actual periods of louder mining noise and to react appropriately to control noise levels.

Current NSW Government noise policy (as also reflected in the *Mining State Environmental Planning Policy (Resource Extraction)*) provides receivers predicted to experience a significant noise impact (i.e. 5 dBA above the PSNL) the opportunity for acquisition by the proponents. Those properties predicted to experience moderate noise impacts (i.e. between 2 dBA and 5 dBA above the PSNL) are also granted the opportunity for 'at-receiver' noise mitigation, consistent with contemporary conditions of Development Consent.

Therefore, considering the extent of predicted noise impacts, the noise mitigation and management measures to be implemented for the Project and the overall economic significance of the Project to the local, regional and state community, the proposed noise criteria above the PSNL for 21 privately owned receivers is considered justified in the context of Chapters 8.2.1 and 9 of the INP.

5.2.2 Background Noise Levels

Issue

The adopted background noise levels in Table 3 of the Acoustic Impact Assessment ("AIA") are generally lower than those in Table 4. It is unclear how the levels in Table 3 have been derived, and there appears to be little relationship with the Table 4 values except to support the ascertain that the Table 3 values are conservative and should be used in the assessment.

While the EPA is happy to accept a conservative assessment, further information should be provided on what noise sources are giving rise to the elevated measured background levels in Table 4, given that they are not audibly from Bengalla operations.

Response

The background noise levels in Table 3 of the Acoustic Impact Assessment (Appendix H of the EIS) are the levels that were measured in the receiver area during previous assessments of noise from the existing Bengalla Mine. They were derived from long term measurement periods of more than one week and exclude noise from Bengalla Mine and are therefore appropriate for use in an assessment.

The more recent measured levels in Table 4 have been compiled from regular noise compliance surveys and were generally measured over short (15 minute) time periods. These data are therefore appropriate to check the previously adopted background noise levels provided a conservative approach is taken consistent with the short term nature of the data.

A detailed inspection of the measured levels indicates:

- Receivers to the east, represented by the Racecourse Road monitoring location, occasionally receive background noise levels as low as 32 dBA during the day and night as shown in Table 4 of the Acoustic Impact Assessment (Appendix H of the EIS). Higher background levels do occur, however the occurrence of levels around 32 dBA in the short term measurements indicates a reasonable probability of similar levels occurring in a longer term measurement period. The previously adopted background levels in Table 3 of the Acoustic Impact Assessment (Appendix H of the EIS) therefore remain appropriate for these receivers;
- Receivers to the south, represented by the Edinglassie monitoring location, are now all owned by HVEC and are no longer the focus of an acoustic assessment;
- Receivers to the south west, represented by the previously Chudyk (now BMC owned) and Denman Road monitoring locations, previously received background noise levels on or below 30 dBA during all time periods. More recent short term data suggest background levels have increased during the day, however the data in Table 4 clearly indicate levels as low as 30 dBA continue to occur during the night. As the night period is the most sensitive for these receivers, the previous background level of 30 dBA remains relevant; and
- Receivers to the west and north-west, represented by the Hamilton and Moore monitoring locations, previously received a background noise level on or below 30 dBA during all time periods. The adopted 30 dBA background level follows the INP recommendation that a measured level below 30 dBA should be considered 30 dBA for the purposes of a noise assessment. More recent data in Table 4 indicate background levels continue to drop to 30 dBA or lower fairly regularly, therefore the previously adopted 30 dBA background noise level remains appropriate for these receivers.

Based on the review above, the adopted background noise levels are considered appropriate for the assessment.

5.2.3 Modifying Factors

Issue

Section 4.7 of the AIA states that modifying factors have been applied to the source sound power levels of individual plant and equipment items. This has been done to simplify the assessment of a large number of sources that do not require the same modifying factors. The EPA considers that this approach is contrary to the requirements of Section 4.3 of the INP. This clearly states that 'the modifying factors are to be applied to the noise from the source measured/predicted at the receiver and before comparison with the criteria.' Any modifying factors applied in the AIA should be amended accordingly and the results, outcomes and actions arising from this change should be revised in the AIA.

Response

The EPA is correct that the INP requires any modifying factors to be applied to the received noise levels before comparison with the criteria. Determining if modifying factors are applicable requires predicted noise levels to be reported in octave or third-octave frequency bands, which is problematic with currently available noise model software as further described below. The method adopted in the Acoustic Impact Assessment (Appendix H of the EIS) is considered a reasonable compromise between the requirements of the INP and the limitations of available software.

The Acoustic Impact Assessment (Appendix H of the EIS) presents calculated noise levels at receivers in two ways:

- As noise contours over the receiver area; and
- As a table of noise levels at receptors and over 25% of contiguous receiver properties.

Currently available noise model software, including Environmental Noise Model (ENM) software used during preparation of the Acoustic Impact Assessment, have the ability to present calculated noise levels in two ways:

- As contours representing the sum or maximum of all modelled noise sources, however only total dBA noise levels can be shown in the contours; or
- As a table of noise levels at selected receiver points, where the table can include separate noise levels per noise source and in each octave or third-octave frequency band.

The two methods produce similar but not identical results (i.e. total dBA noise levels) at each point. Differences between the noise levels indicated by the contours and the levels indicated by the tables have the potential to cause confusion, therefore the Acoustic Impact Assessment (Appendix H of the EIS) includes a table of noise levels at receptors that are, effectively, read from the noise contour figures (although this process actually reads intermediate results files rather than the contour files and has been automated to improve accuracy). Accordingly, as all results are effectively derived from the contours, results in the tables exactly match results presented in the noise contour figures and data regarding the frequency content of Project-related noise are not available.

If the results tables were calculated directly by ENM, any applicable modifying factors could be determined at receptors as required by the INP but could not be reflected in the noise contours and cannot be considered when calculating noise levels over 25% of property areas. Potentially large differences of approximately 5 dBA could occur between predicted noise levels at the same or nearby locations, which would not be appropriate in a publicly available and well scrutinised document.

Nevertheless, the following further work has been completed to address the EPA's submission:

- The EIS noise model has been modified to calculate noise levels at 18 representative receptors in the vicinity of the Project and to report noise levels per source and per octave band at each receiver; and
- The need for any modifying factors, with a focus on the low frequency penalty, has been determined from the total received noise level spectrum at each receiver location.

Assessed receptor locations are generally those shown as potentially affected by the Project, excluding receptors predicted to receive more than 5 dBA over the PSNLs and receptors owned by a mining company. Clusters of adjacent residences were in some cases represented by one receptor location.

Results are shown in **Table 15** in the absence of any modifying factors applied to the source noise levels, including a comparison with the predicted noise levels reported in the Acoustic Impact Assessment (Appendix H of the EIS) based on the noise contours.

Table 15
Modifying Factor Analysis at Receptors

Assessed Receptor	Predicted Noise Levels at Receptor Points			Predicted Noise Level from the AIA Contours Including Low Frequency Source Penalties, dBA	Difference Between AIA Contours and Receptor Point Noise Levels, dBA
	dBA	dBC	dBC - dBA		
25	34.2	49.9	**15.7**	34.0	-0.2
29	34.8	50.0	**15.2**	34.5	-0.3
102	34.2	49.2	**15.0**	36.4	2.2
105	35.4	49.9	14.5	37.9	2.5
106	37.5	51.8	14.2	39.4	1.9
108	36.6	50.6	14.0	39.0	2.4
126N	36.0	50.5	14.6	37.6	1.6
126C	34.6	49.6	14.9	36.6	2.0
126S	33.1	46.7	13.6	35.9	2.8
130	32.8	47.8	14.9	35.7	2.9
145	35.2	50.0	14.8	36.3	1.1
146	35.2	50.1	14.9	37.4	2.2
161	33.5	47.0	13.5	34.1	0.6
180	31.7	46.8	**15.1**	34.4	2.7
184	32.7	47.6	**15.0**	35.7	3.0
186N	32.5	47.6	**15.1**	35.2	2.7
186S	31.8	47.5	**15.6**	34.1	2.3
189	32.3	47.7	**15.5**	34.7	2.4

Calculated noise levels at receptor points indicate the dBC - dBA differences, which are used to identify the need for a 5 dBA low frequency penalty according to the INP, range from 13.5 to 15.7 dB. Ten of the 18 residences are predicted to receive a dBC - dBA difference of less than 15 dB and therefore do not require a low frequency penalty, while 8 of the 18 assessed locations have a dBC – dBA difference of 15 dB or more and therefore require a 5 dB penalty to be added to the predicted noise levels.

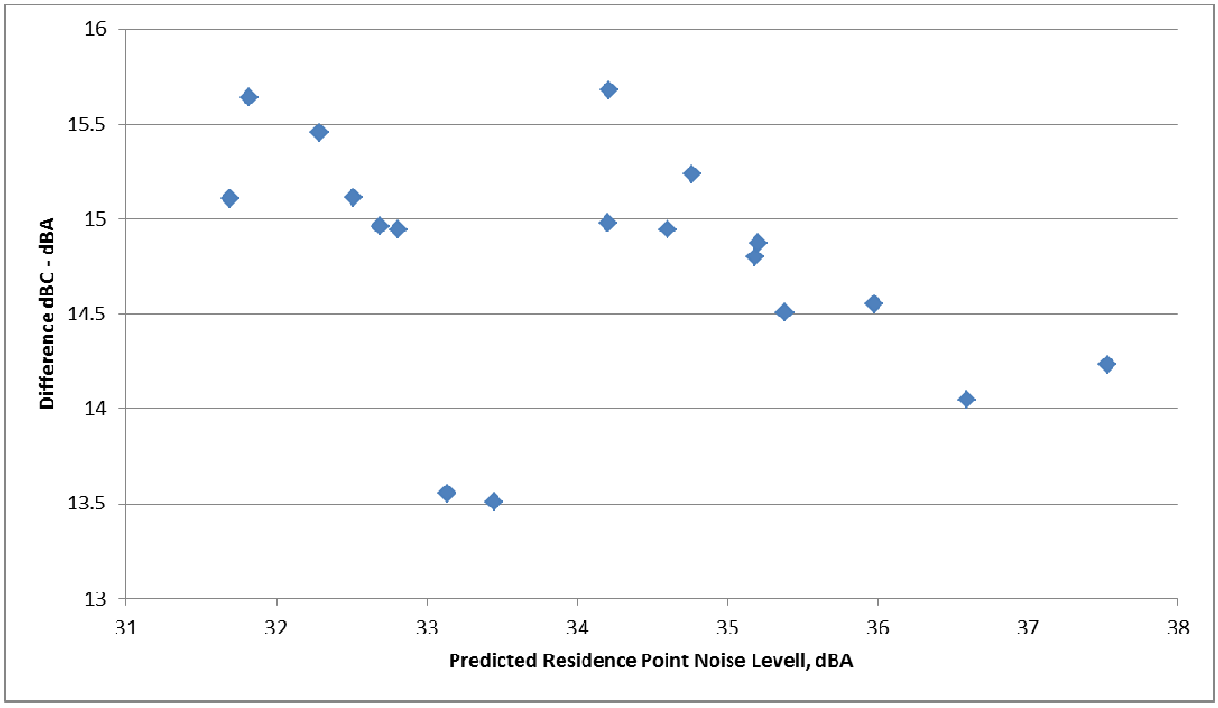
The table also shows the predicted noise levels based on the Acoustic Impact Assessment noise contours and differences between the Acoustic Impact Assessment contour noise levels and the calculated noise levels at receptor points (Appendix H of the EIS). In general the noise modelling method adopted for the Acoustic Impact Assessment, including source sound power penalties for known low frequency sources such as the Coal Preparation Plant (CPP), increases predicted noise levels by 2 to 3 dBA and 'overstates' noise levels at 16 of the 18 assessed receptor points. Smaller differences between the two methods were noted at Receptors 25 and 29 which are both located north east of the Project remote from the CPP and were therefore relatively unaffected by the penalties applied in the Acoustic Impact Assessment (Appendix H of the EIS).

This comparison has indicated all receptors with the potential to be mildly or moderately affected by the Project are expected to receive a dBC – dBA difference of close to 15 dB, with some just under and some just over the 15 dB threshold. Whether the INP low frequency penalty should practically apply to these receivers, and whether it should apply to some receivers and not other nearby receivers, is debatable given the very small 'exceedances' of the 15 dB threshold.

There is a fairly strong correlation between the predicted noise level and the dBC – dBA difference at each receiver, as shown in **Figure 7**. In general, receptors closer to the Project receive higher noise levels but are less likely to require a low frequency penalty according to the INP. This trend has the potential to create a 'quiet zone' at intermediate distances from an industrial development such as a coal mine, where receivers closer to the development are potentially affected by noise from the development and receivers at greater distances are considered potentially affected due primarily to the INP low frequency penalty.

Receptors in the 'quiet zone' would be just outside the area affected by noise from the development but would not require the low frequency penalty and would therefore remain on an island 'unaffected' by noise from the development. This hypothetical but possible situation is a natural consequence of a threshold-based rather than a progressive low frequency or other penalty.

Figure 7
Predicted Receiver Point Level vs dBC – dBA Difference



The Acoustic Impact Assessment (Appendix H of the EIS) method of applying the low frequency penalty has effectively raised the predicted noise levels at mildly and moderately affected receivers near the Project by typically 2 to 3 dBA, which is considered reasonably appropriate given the marginal nature of the 15 dB threshold exceedances. Accordingly, as the Acoustic Impact Assessment (Appendix H of the EIS) method complies with the INP and avoids the risk of 'quiet zones' and other difficult to justify anomalies as described above, no further adjustments to the predicted noise levels are considered necessary.

5.2.4 Blasting Frequency

Issue

The EPA notes that the proposed increase in frequency of blasting proposed for the project is significantly higher than the ANZECC blasting guidelines. Any increase in the frequency of blasting beyond that recommended in the guidelines may cause significant community concern.

Response

Bengalla Mine has historically used smaller blast holes and consequently smaller charge weights, than comparable large mining developments in order to minimise ground vibration and overpressure levels at receivers. A natural consequence of smaller blast events is the need for additional or more frequent events to maintain the desired production rate.

Effectively, the community would benefit from smaller blast impacts to balance the increased frequency of blasting.

Blast events can occur at various locations within the active mining area. For example, some blasts would occur in the southern end of the mining area and would be more noticeable to receivers generally south and south-west of the Project, while other blasts would occur towards the northern end of the mining area and would be more noticeable at receivers located generally north and north-west of the Project. While all blast events are potentially noticeable at a range of receiver locations, the different blast locations within the Project would minimise any 'cumulative' impacts from more than one blast event per day at any receiver.

As outlined in Section 8.4.4 of the EIS BMC's existing Blast Management Plan will be revised in consultation with the relevant regulators to include at least the following:

- Maximum of 12 blast events per week during the hours of 7:00 am to 5:00 pm, Monday to Saturday;
- Commitment for a maximum of one blast event per day during the hours of 11:00 am to 3:00 pm on Sundays only for blasts scheduled within 500 m of the Mine Infrastructure Area (MIA) as defined on Figure 17 of the EIS (or the approved but not yet constructed Mount Pleasant Project infrastructure area);
- MSC along with all privately owned residents located within the Project noise management zone; (see Table 40 and Table 41 of the EIS) will be offered to be notified of a Sunday blast (when required as per above);
- Blast design procedures to be undertaken by appropriately qualified personnel to minimise the potential for overpressure, ground vibration and blast fume impacts to residential receivers, surrounding infrastructure and BMC employees;
- Ongoing review of real-time meteorological monitoring information (wind speed, direction, inversion) before the firing of any blast;
- The existing blast monitoring system will be regularly reviewed and implemented to ensure it is representative of the nearest sensitive receptors in consultation with relevant regulators;
- Procedures for the notification of neighbours of upcoming blast events (timing and location) and maintenance of the BMC Blasting Hotline;
- Management measures to close public roads, rail infrastructure and evacuate MIAs within 500 m of a blast site during the blast event and until potentially impacted areas are clear of dust and fumes; and
- A summary of blast monitoring sites and procedures.

5.2.5 NO_2 Blast Fume Predictions

Issue

The EPA has significant concerns with the predictions of NO2 included in Appendix H "Isopleth Diagrams – Blast emissions" of Appendix G of the EIS.

Several of these predictions indicate impacts of blast fume at sensitive receptors above the appropriate standards. The EPA also No Response that modelled results are based on 1-hour averages and, as the inherent nature of blasts result in short term impacts, actual results may be higher.

Response

The isopleth diagrams presented in Appendix H of the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) are based on the maximum 1-hour results for each hour of blasting over the course of the modelled year. Todoroski Air Sciences notes that the isopleth diagrams do not represent a single blast event but the maximum impact in the hour of the day, assuming that worst case blasts occur in every single hour of the year in the daytime when blasting is permitted. The isopleth diagrams show a conservative prediction of the potential range of blasting impacts associated with and without the use of the current blast management strategy at Bengalla.

As noted in Section 8.1.3 of the EIS, the modelling predictions for Year 24 indicate that Receptor 168 (subject to acquisition by another mining company upon request) may experience Nitrogen Dioxide (NO_2) levels of up to 272 µg/m^3 in Year 24, which is slightly above the 1-hour average period criterion of 246 µg/m^3.

Total annual average impacts at this receptor are below the relevant criterion. It may be the case that no actual impact occurs at Receptor 168 in practice, given the total cumulative impact predicted is relatively close to the criterion and the modelling predictions are considered to be conservative. The results indicate that the current blast permissions may need to be revised for the operation of the proposed Project in order to minimise potential risk at receptors in the early morning and late afternoon periods, and would need to be revised (years into the future) in response to mine progression to the west.

It is important to note that the results presented include hypothetical base case impacts that would be the result of not employing any blast management practices whatsoever. This was done in order that the relative effect in reducing emissions due to the current blast management controls could be presented.

The conservatively predicted worst case event blast fume (NO_2) impact shows potential for elevated levels at some sensitive receivers for hypothetical blasts during early morning and late evening periods, however the figures also illustrate that with the current blast controls operating, these impacts can be averted (and are being averted by the mine's management practices).

In practice, blasting is not carried out at these risk times, as no blasting during specific temperature inversions conditions occurs. The results show that for the case of the early morning and late evening periods some risk may exist, and application of skilled operator judgment in pre-blast evaluation is important.

In regard to short term effects, by definition impacts over a shorter time average reference period will be higher than the impacts predicted over a longer averaging period where the source of the emissions is variable. The concern regarding higher impacts over shorter term averaging periods would by definition apply in any circumstance, anywhere, to any air quality criteria with a time averaging period.

The applicable NSW air quality criteria for NO_2 is based on hourly and annual exposure levels. The results in the assessment are provided over these time averaging periods so that a valid assessment of impacts can be made by comparison with the applicable criteria. The issue that EPA raises comes down to blast fume being present at a location for less than one hour in most cases, whereas it's criteria for NO_2 is applicable to an hour long period.

As described in Section 8.1.4 of the EIS, the current blast management system has proven to be adequate for mitigating the risk of blast impacts to date however, BMC will investigate and implement an appropriate blast forecasting system as part of an improved blast management system. Actual and predicted meteorological conditions for each blast will be utilised to minimise the risk of blast fume impacts. Blast procedures will be revised regularly as the Project progresses from east to west to minimise potential impacts on sensitive receivers. BMC's existing Blast Management Plan will be revised in consultation with the relevant regulators.

5.2.6 Development of Blast Fume Criteria

Issue

The EPA recommends that prior to the determination of this project that DPI consult with the Department of Health to determine appropriate standards for post blast gases including, but not limited to, NO2, NO, SO2 and CO. The proponent should then be required to prepare a Blast Management Plan that appropriately demonstrates how compliance with the identified standards will be achieved.

Response

In the event that DP&I develops any new air quality standards for post blast fumes prior to determination of the Project and imposes these standards on BMC, they would be included in the revised Blast Management Plan.

5.3 OFFICE OF ENVIRONMENT AND HERITAGE

5.3.1 Assessment of the Nature and Extent of B10

Issue

OEH considers that the assessment has not accurately quantified the known nature and historical assessments of the site complex B10 (37-2-0579), nor adequately identified its potential scientific significance.

Response

In assessing the boundary and potential archaeological record of B10 (37-2-0579) and its associated scientific significance as part of the EIS (AECOM, 2013), with particular emphasis on the northern exclusion zone, AECOM undertook a comprehensive review of the site which included:

- A desktop review of relevant archaeological assessment/salvage reports (ERM, 2007, 2008; Rich, 1993; White, 1998);
- A review of the site's AHIMS site card,
- Geo-referencing of relevant maps and figures from past assessment reports,
- Examination of available topographic data for the site and environs; and
- Site visits to determine the validity of existing site/landform mapping.

On the basis of this review, AECOM determined the following:

1. Rich's (1993) definition of the boundary of the B10 quarry site was based principally on her interpretation of the then limited available topographic data which she used to define a long 'ridgeline' landform that extended northward from the "Hunter flats" to what is now known as the northern exclusion area;
2. That the topography of the northern exclusion zone is not consistent with Rich's description of it forming part of a 'ridgeline' and that at present there is no evidence to suggest that Tertiary ridge gravels and associated quarrying activities have been identified in this area;
3. Field observations and historic aerial photographs indicate that land within the B10 northern exclusion zone has been subject to a range of ground surface disturbances relevant to any assessment of its archaeological significance; and
4. There is uncertainty as to the location of previously recorded surface artefacts within the northern exclusion zone and their current status.

<u>The Ridgeline Landform</u>

Examination of Rich's archaeological assessment report (Rich, 1993) for Bengalla Coal Mine suggests that the mapping of the B10 quarry/extraction site was based principally on Rich's interpretation of the 1:25,000 Muswellbrook topographic map sheet.

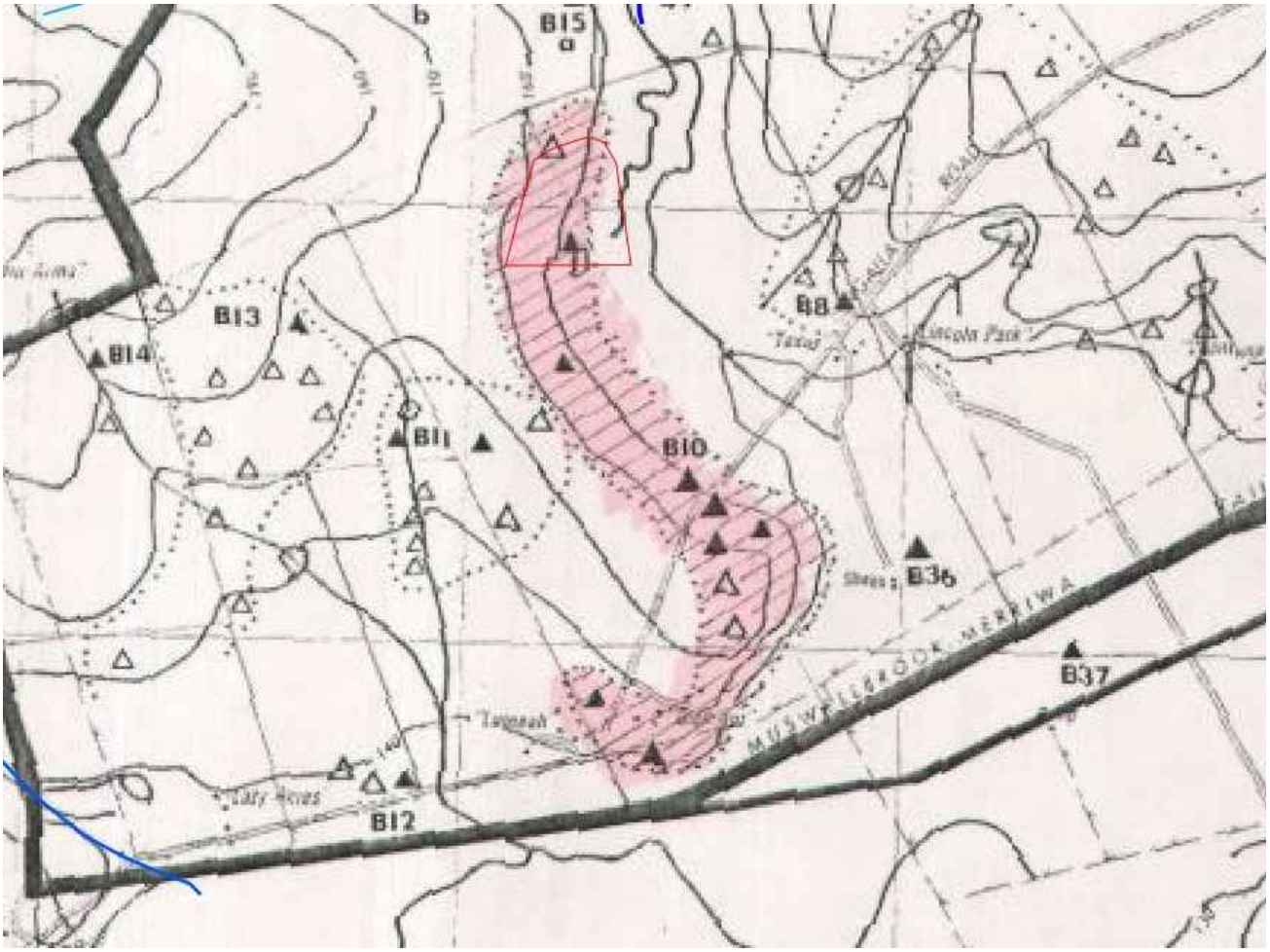
It was primarily intended to reflect both the extent of the 'ridgeline' that defines this site and the potential distribution of the Tertiary ridge gravels associated with it. The distribution of visible surface artefacts identified during Rich's survey was likely also considered. Test excavation was not undertaken by Rich in the northern extent of the B10 site to confirm its extent.

Accordingly, any discussion regarding the extent of this site must be predicated on the following three key points:

1. That interpretation of the type and extent of landform elements present within an area is an inherently subjective activity;
2. That the extent of the 'ridgeline' associated with B10 can be interpreted in a number of different ways; and
3. The original assessment completed by Rich (1993) did not conclusively map the extent of the tertiary ridge gravels associated with B10. Subsequent assessments, including AECOM's (AECOM, 2013), did not identify Tertiary ridge gravels in the northern exclusion zone consistent with those identified within the southern exclusion zone.

AECOM's (2013) review of available topographic data for the B10 northern exclusion zone and in-field observations indicate that this area incorporates two distinct landform elements: creek flat associated with Dry Creek and a gently inclined lower slope associated with a prominent hill 1 km to the west (see **Plate 1**). **Figure 8** shows Rich's (1993) original map of B10 - note, the hill to the west of the northern exclusion zone shown in red. On this basis, it is suggested that the B10 northern exclusion zone does not comprise part of what Rich (1993: 94) has referred to as a "long ridge".

Plate 1
Existing Landscape within Site B10



Source : Rich 1993

HB1375 008 Bengalla - Originial Layout Of Site B10.dwg

BENGALLA PROJECT

BENGALLA

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Original Layout of Site B10

FIGURE 8

Disturbance

Field observations (AECOM, 2013) and a review of historic aerial photographs indicate that land within the B10 northern exclusion zone has historically been subject to a range of ground surface disturbances (prior to being designated an exclusion zone as part of AHIP #2621), with native vegetation clearance, ploughing and the construction of the Bengalla haul road (during the construction of Bengalla Mine in 1998) of particular relevance to the assessment of archaeological significance for this area. AECOM's assessment of the archaeological significance of the northern exclusion zone was based, in part, on the character and extent of these disturbances, which are illustrated on **Plate 2**. Reference to the 1998 aerial (**Plate 3**) shows that the western-most portion of the exclusion zone (shown in red) was grossly modified as a result of the construction of the approved Bengalla haul road, with extensive heavy earth works evident. To the east, examination of the 1989 aerial (**Plate 4**) indicates that the eastern third of the exclusion zone formed part of a larger ploughed field extending to the northeast undertaken prior to ownership by BMC. As a result of this disturbance, subsurface archaeological materials are unlikely to remain in this area.

The remaining portion of the exclusion zone, meanwhile, has been subject to complete native vegetation clearance with dam and contour bank construction also evident. On the basis of these disturbances and the lack of an identifiable 'ridgeline' as described by Rich (1993), AECOM concluded that this area was of low archaeological significance.

Plate 2
Previous Disturbance of Site B10

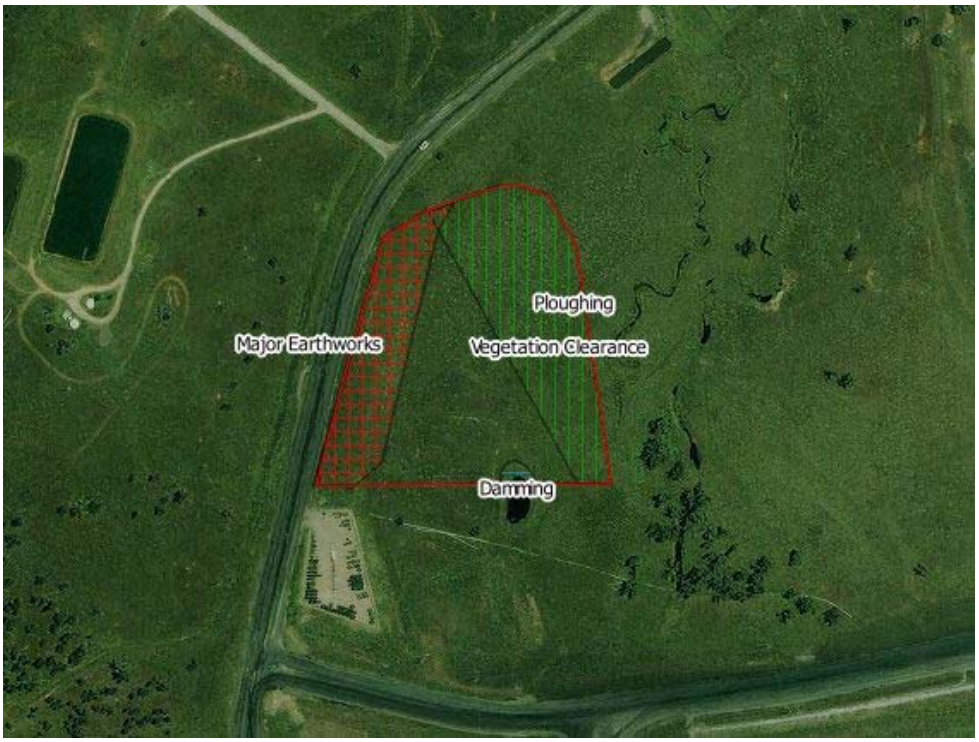


Plate 3
Approved Disturbance Associated with the Construction of Bengalla Mine

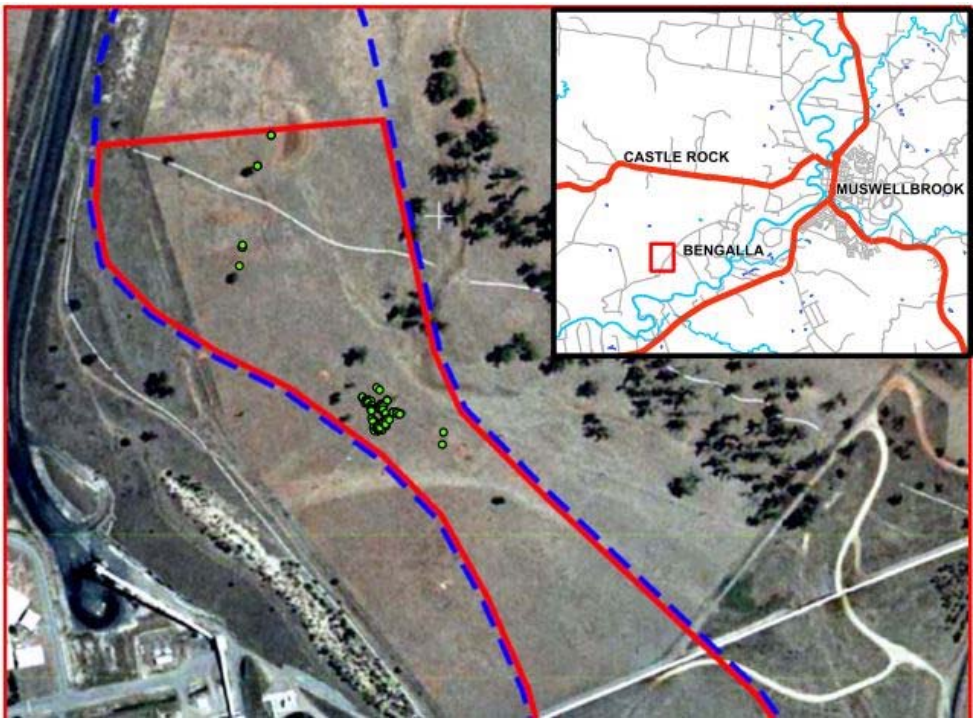
Plate 4
B10 Depicting Disturbance Associated with Ploughing

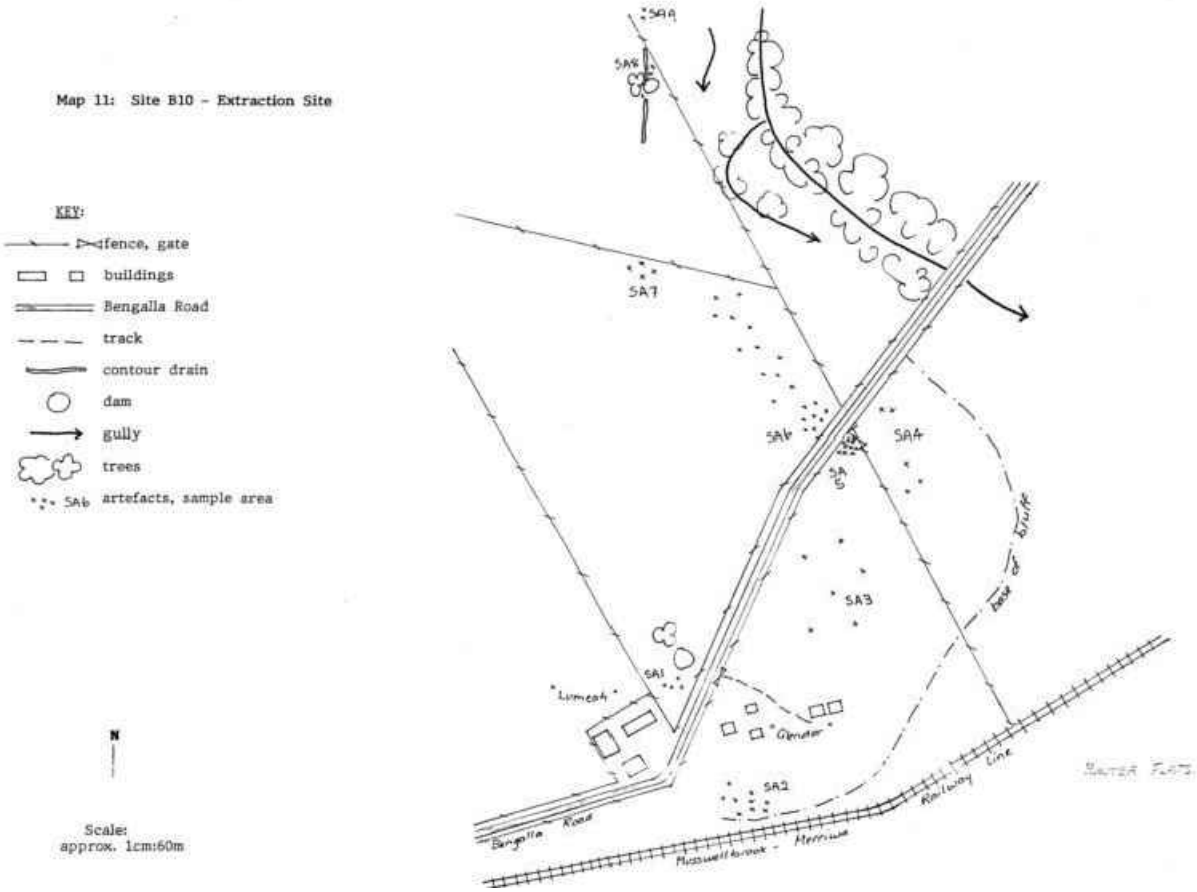
Surface Artefacts in Northern Exclusion Zone

During AECOM's (2013) review of whether surface artefacts were present within the northern exclusion area of B10 it was found that no surface artefacts had been previously recorded in the area. It is noted that two surface artefact loci - SA9 and SA8 - were, in fact, recorded in the vicinity of the southern boundary of the area by Rich (1993) (**Figure 9**) who noted that the northern extent of B10 was characterised by "declining artefact density and patchy occurrence of material" (Rich, 1993: 94). The exact location of these loci within the northern exclusion zone is difficult to determine given the hand-drawn nature of Rich's B10 site plan, provided as Map 11 in Rich (1993). However, SA8 appears to straddle the southern boundary of the exclusion zone, having been identified around the farm dam at its southern extent, while SA9 is located within it. Regarding the current status of SA8 and SA9, reference to ERM's 2008 salvage report for AHIP #2621 suggests that SA8 has been partially salvaged under this AHIP.

Plate 5 shows the location of surface artefacts salvaged by ERM in 2008. Attention is drawn, in particular, to the presence of salvaged artefacts in the vicnity of the farm dam straddling the southern boundary of the northern exlcusion zone. On the basis of available data, these artefacts may form part of SA8. SA9, originally recorded by Rich (1993) as consisting of one silcrete and one mudstone artefact, was not located during AECOM's archaeological survey (AECOM, 2013).

Plate 5
Locations of Artefacts Salvaged Within Site B10 (ERM 2008)





Source : ERM 2008

HB1375 009 Bengalla - Artefact Loci Within Site B10.dwg

BENGALLA PROJECT

Artefact Loci within Site B10

FIGURE 9

Summary

In summary, AECOM makes the following conclusions regarding the nature and extent of the B10 site:

- Tertiary ridge gravels associated with the B10 site have currently not been identified within the northern exclusion zone precluding any reliable statements about the site's true extent;
- That Rich's (1993) B10 site boundary was based principally on a interpretation of then limited available topographic data for the Bengalla area;
- A review of available topographic data for the B10 site and environs suggests that Rich's B10 site boundary extends outside what would be considered to comprise a 'ridgeline', based on the standardised Australian landform characterisation system of Speight (2009);
- That the topography of the northern exclusion zone is inconsistent with this area forming part of a 'ridgeline' and is be more appropriately described as consisting of a combination of creek flat associated with Dry Creek and a gently inclined lower slope associated with a prominent hill approximately 1km to the west;
- That land within the B10 northern exclusion zone has been subject to a range of ground surface disturbances (prior to being designated an exclusion zone as part of AHIP #2621), with native vegetation clearance, ploughing and the construction of the Bengalla haul road of particular relevance to any assessment of the archaeological significance of this area;
- That two surface artefact loci - SA8 and SA9 - have been recorded on the southern boundary of the B10 northern exclusion zone, one of which (SA8) may have been partially salvaged in 2008 under AHIP #2621; and
- No artefacts were recorded in the northern exclusion area during the 2013 archaeological survey (AECOM, 2013).

5.3.2 Significance Assessment of B10

Issue

- *OEH notes the arbitrary distinction between the northern and southern sections of this site are invalid.*
- *Page 84 of the EIS notes that none of the sites impacted have been attributed a high scientific significance. This is false as B10 (37-2-0579) was originally ascribed a high significance in 1993. All studies of the site since have confirmed the high scientific value of this location.*
- *The assessment has not adequately identified its potential scientific significance.*
- *There is a high potential for subsurface and surface material of high scientific value to remain throughout the entire area of the site (all sections).*

- *Table 34 - This table indicates that Site B10 has been split into north and south section and assessed independently. This is an inappropriate and invalid distinction. Site B10 constitutes a single site based on landform. The attribution of low significance to the northern section of the site is based on the results of a surface survey where ground surface visibility was rated as low. Subsurface investigation would be necessary in order to qualify this rating.*

Response

AECOM (2013) notes that the distinction between the northern and southern sections of the B10 site had its origins in the conditions of AHIP #2621, which arbitrarily divided the site on the basis of proposed impacts. The decision to assess the northern and southern parts of the B10 site complex as separate entities was based on the division of the site as part of AHIP #2621 and the findings of our review of the character and extent of the site, as described above. Further to this, the Project is not proposed to impact on the southern exclusion area and as a result the distinction was required to clearly outline impacts and associated mitigation measures.

It is not disputed that the evidence of quarrying behaviour identified within the B10 site complex justifies it being attributed with high archaeological significance. However based on our extensive background review and field assessment, the northern exclusion zone, does not exhibit the necessary evidence to confidently link it with the remainder of the site complex. Of particular relevance here is fact that the topography of this area is not consistent with it forming part of 'ridgeline' and that at no point have Tertiary ridge gravels been identified in this area.

However, in recognition of OEH's concerns and uncertainties regarding the extent of the Tertiary ridge gravels associated with B10, a scientific program of test excavation is proposed to be undertaken to determine the nature and extent of any subsurface archaeological materials present within this area. The results of this testing program can then be used to identify the significance of the area, its association with the destroyed and remaining portions of the B10 site complex, and inform appropriate management/mitigation measures should they be required. The proposed methodology for the text excavation will be developed in consultation with OEH.

5.3.3 Management Recommendations for B10

Issue

OEH has significant concerns regarding the assessment of, and management proposals for, Aboriginal Heritage Information Management System (AHIMS) quarry site complex B10 (AHIMS 37-2-0579).

Response

The management recommendations provided in the EIS were developed with respect to its findings regarding the nature and extent of the B10 site complex. Due to the issues identified above, no further archaeological works were recommended for the northern exclusion zone, which was assessed as being of low scientific significance. The recommendation for the southern exclusion zone was that it remains undisturbed.

However, in recognition of OEH's concern with respect to the northern exclusion zone, a program of test excavation is proposed to be undertaken to determine the nature and extent of any subsurface archaeological materials present within this area. The proposed methodology for the text excavation is currently being developed in consultation with OEH.

5.3.4 Archaeological Significance of Bengalla MLA

Issue

OEH notes that archaeological assessments by multiple consultants over the Bengalla Mine Lease Area (MLA) have identified the entire Bengalla MLA as being of moderate to high scientific and cultural significance. For instance the results of investigations conducted by ERM (2008) under Aboriginal Heritage Impact Permit (AHIP) #2621 confirm the significance of the archaeological signature of the Bengalla MLA as noted on Page 16 of that report most of the artefacts found at the site "are not commonly recorded in camp scatters along the creek" (ERM 2008). This study confirmed White's (nee Rich's) conclusions that quarry site complex B10 (AHIMS 37-2-0579) represents a major silcrete extraction locations and possible raw material source for the surrounding region (White 1998).

Response

A review of the previously completed archaeological assessments undertaken within the Bengalla MLA including Rich (1993), White (1998), and ERM (2007, 2008) both as part of the EIS and during preparation of this response. On the basis of these reviews, it is noted that that no significance assessment has been undertaken for the entire Bengalla MLA where it has been attributed 'high or moderate scientific' significance.

The original significance assessment undertaken by Rich (1993:6) states "destruction of Aboriginal sites and finds is not desirable, but most (within the MLA) are not of sufficient archaeological significance as to prevent the proposed development from proceeding. The partial loss of B10 is a significant loss, and every effort should be made to minimise impact". No significance assessment of the entire MLA was undertaken in either White (1998) or ERM (2007, 2008) in any other assessment. Reference by OEH to the ERM (2008) statement that most of the artefacts found at the site "are not commonly recorded in camp scatters along the creek" is a reference to the significance of B10 and B13 (now salvaged), not the entire MLA.

> *"At the B10 site a large silcrete "macro flake" was found (also found at the B13 site). "Macro flakes" are typical of a "stone extract site" or quarry. These types of large flakes are not commonly recorded in camp scatters along the creek." (ERM 2008:16)*

Investigations undertaken by ERM (2007, 2008) comprised salvage works associated with B11, B13 (2007) and B10 (2008). These reports do not provide formal significance assessments; rather they note the importance of these individual sites (which have now been salvaged and destroyed with the exception of portions of B10) as a result of their rarity.

AECOM disagrees that the entire Bengalla MLA has previously been assessed as being of moderate and high archaeological significance. Rather, it is suggested that particular sites within the MLA have been attributed varying degrees of significance (but not using a tiered contemporary rating scheme (i.e. low, moderate and high).

5.3.5 Impacts to B10 Northern Exclusion Zone

Issue

OEH notes that due to the significance of this site complex it has historically been identified as warranting full protection of all remaining areas and as such was specifically excluded from further impact under AHIP #2621. The exclusion zones identified in AHIP #2621 constituted both the extant northern and southern section of the site and were clearly identified to Bengalla in a letter by OEH, dated 11 October 2007, to Mr Jeff Torkington (Project Development Manager Bengalla Mine). That letter clearly identified those areas OEH had excluded from impact. The variation to AHIP #2621 that accompanied the letter contained text and maps (provided in Attachment 1 to that letter) identifying the areas that should not be impacted. The decision to vary the AHIP to allow partial impact was largely based on the fact that the section of the site applied for had been subject to previous impacts and therefore overall damage to the site was minimised. OEH considers that those sections of AHIMS 37-2-0579 identified as 'Exclusion Zones' in Attachment #1 to the varied AHIP #2621 should remain undisturbed for the life of the Bengalla mine project.

Response

It is suggested that the B10 northern exclusion zone, following reassessment as part of the EIS as being of low scientific significance on the basis of available evidence, does not exhibit the necessary evidence to confidently link it with the remainder of the site complex. As such, a program of archaeological test excavation is recommended within the northern exclusion zone.

BMC has not breached the conditions of AHIP #2621 with respect to impacting these areas and that impacts noted by AECOM (2013) for the northern exclusion zone occurred prior to this area being designated an exclusion zone in AHIP #2621.

5.3.6 Previous Archaeological Works in B10 Northern Exclusion Zone

Issue

- *The proposed impacts authorised by that AHIP were consistent with those originally identified by White (1993) as proposed for the mine. Various references within the EIS to the results of salvage and investigations in the northern section are questioned. No impact to any surface or subsurface object in the northern section of AHIMS 37-2-0579 has been authorised and OEH has no record of any salvage excavations in that area.*
- *Only small portions of the central section have been subject to subsurface investigation. Surface surveys have been hampered by low visibility. This is confirmed in comments raised by Registered Aboriginal Parties (RAP's) in response to this EIS. Both the Northern and Southern sections of the site were identified as 'no impact areas' for the life of the mine under the process for AHIP #2621 variation.*
- *A number of Aboriginal objects have been identified as present on the surface of the northern section of AHIMS 37-2-0579. OEH notes that these were identified during surveys when ground surface visibility was quite low and the actual density of surface objects is most likely heavily underrepresented in the survey results. Currently no understanding of the nature of subsurface deposits in this area exists.*
- *This section notes that " ... in the Hunter Valley such questions will revolve around stone tool manufacture; settlement patterning; how regional resources were used; how uses changed throughout the Holocene; and how these changes manifested in the archaeological record". AHIMS 37-2-0579 has been identified as likely to contain subsurface deposits. Likelihood exists that these deposits may provide information regarding the evolution of the use, and procurement, of boulder silcrete in the upper Hunter Valley. The limited subsurface excavation done to date at this site has indicated the potential for significant sub-surface deposits that may further inform our understanding of these aspects of traditional Wonaruah life.*

Response

OEH may have misunderstood AECOM's (2013) statement "A second excavation, which included a program of surface collection, was undertaken at the site by ERM in 2007 as part of a second AHIP #2621. The focus of the archaeological works was on the middle/northern portion of the site, although it excluded a small section at the very northern extent" to mean that excavations have been undertaken within the northern exclusion zone.

The EIS (AECOM, 2013) states that excavations were undertaken in the middle/northern portion of the site (i.e. north of the central area where White (1998) undertook salvage works).

A review of AHIP #2621 and its subsequent variation cannot find reference to 'no impacts for the life of the mine'.

The findings of White (1998) or ERM (2008) are not disputed however it is suggested that the original boundary of site B10 and associated northern exclusion zone may not accurately reflect the true extent of surface and subsurface archaeology associated with the quarry. A program of test excavation is proposed to be undertaken to determine the nature and extent of any subsurface archaeological materials present within this area.

5.3.7 Chance Finds and Previously Unidentified Archaeology Procedure

Issue

- *This section provides no discussion or proposal for the management of a number of site types that may be found in the area such as Quarry Sites and Grinding Grooves. A more comprehensive chance finds protocol is necessary to ensure that unforeseen Aboriginal objects are afforded the appropriate mechanisms for protection and management.*
- *OEH would expect the proposed 'chance finds procedure' to be finalised prior to project approval. This would ensure that this aspect of the final ACHMP meets industry standards and that inappropriate impacts to Aboriginal objects do not occur as a result of the project.*

Response

The existing approved Aboriginal Cultural Heritage Management Plan (ACHMP) contains a 'Chance Find Procedure' which would continue to be implemented for the existing Bengalla until the plan is revised for the Project. A more detailed Chance Finds Procedure which will include procedures for managing identified quarry sites and grinding grooves will be included in the revised ACHMP which will be prepared in consultation with Registered Aboriginal Parties (RAPs) and OEH.

5.3.8 Geomorphology

Issue

"Archaeologically, areas of erosion and exposure are of particular importance as they provide the greatest visibility and subsequently the greatest chance of identifying surface artefacts". This statement is misleading. Although the chances of locating surface finds is often increased in areas of visible erosion, as noted in this section, the subsurface integrity at these locations is invariably compromised and therefore the archaeological significance reduced. Areas of little to no erosion, that can be identified through contextual and landscape analysis as likely to contain in-situ deposits, are generally of much higher archaeological significance regardless of whether testing identifies deposits or not. A negative result from testing is of high value as it informs the predictive model dataset and a positive result (in the form of intact deposits) returns valuable information on traditional habitation and subsistence patterns.

Response

It is noted that the subsurface integrity in areas of erosion and exposure are invariably compromised. As stated in Section 4.6 of AECOM (2013:23), areas of erosion are important for identifying ***surface artefacts*** as they provide the greatest surface visibility. However, as AECOM notes in the sentence following this statement in the EIS, the potential for stratified deposit is reduced in these areas due to erosion.

5.3.9 Evaluation of Predictive Model

Issue

Table 32 identifies that the predictive model indicated that "Quarry sites may occur where exposed silcrete and mudstone outcrops occur"; the result provided is that "No new quarry sites were identified during the archaeological survey". It is unclear whether unquarried silcrete and/or mudstone outcrops were located or whether no such outcrops were located. This has direct bearing on the contextual local significance and representativeness of AHIMS 37-2-0579.

Response

The potential interpretive significance of the presence of unquarried outcrops of silcrete and mudstone within the study area is acknowledged. However, no such outcrops were identified during survey.

5.3.10 Precautionary Principal

Issue

Contrary to the statement on p. 85 of the EIS, OEH considers that AECOM has not adopted a precautionary approach for the purposes of this evaluation.

Response

It is acknowledged that existing uncertainty regarding the extent of the Tertiary ridge gravels associated with B10 warrant a program of archaeological test excavation within that portion of the site to be impacted by the Project (i.e., the northern exclusion zone of B10).

This program will assist in providing scientific certainty regarding both the archaeological significance of this area and the effectiveness/reliability of proposed mitigation and management measures.

5.3.11 Archaeological Salvage

Issue

- *OEH notes that no subsurface salvage program is proposed in this section for any site within the project area. As noted by AECOM in Appendix A, Section 4.7 (p. 109) "As demonstrated by numerous Aboriginal archaeological investigations in the Upper Hunter Valley, surface artefacts at most open artefact scatter sites represent only a portion of the total number of artefacts present." A subsurface salvage methodology should be developed in consultation with the RAP's, OEH and DP&I prior to any determination being made regarding this project.*
- *Part of the justification for the position of 'no salvage' is a reference to "Turvey" (in White 1998:28). Page 28 of White (1998) contains only tables do not contain any comments by any "Turvey". The justifications for 'no salvage' at Site B10 (37-2-0579) refer to excavations at this location. No excavations have ever occurred at this location and it forms part of a site complex/landform that has been clearly identified and confirmed as being of high scientific significance. This location was also specifically protected from any impact by Bengalla mine as part of the process for the issue of AHIP #2621.*

Response

Following its reassessment as part of the EIS (see EIS Appendix M) the B10 northern exclusion zone was determined to be of low scientific significance on the basis of available evidence, does not exhibit the necessary evidence to confidently link it with the remainder of the site complex. Nevertheless, a two part salvage program is proposed for the Project including:

1. A program of archaeological test excavation within the B10 northern exclusion area to identify the nature and extent of subsurface archaeological deposit. The results of the test excavation will be utilised to inform management recommendations within the ACHMP; and
2. An archaeological salvage program for the remainder of the land within the Disturbance Boundary.

Following additional consultation with OEH during the preparation of this RTS an acceptable draft survey methodology for the test excavation of site B10 north has been developed in order to address OEH's concerns surrounding the Project.

An archaeological salvage for the remainder of the land within the Disturbance Boundary will be developed in consultation with OEH and the RAPs and included with the survey methodology in the draft ACHMP for consultation.

5.3.12 AHIMS Search in AECOM's Methodology

Issue

Table 3.1 is not an accurate representation of the AHIMS results for the area as it does not include any reference to the Quarry Sites. This constitutes false information provided to the Aboriginal stakeholder groups for the project.

Response

OEH's assertion of providing false information to Aboriginal stakeholder groups is strongly refuted. Appendix A of AECOM (2013) provides a copy of the AECOM's project methodology sent to Aboriginal stakeholder groups at the start of the Project. Table 3.1 within the methodology shows the results of the AHIMS search for the study area. Aboriginal quarry site B10 (37-2-0579) is not listed within that table as the AHIMS coordinates for this site placed it *outside* the Study area. As such, it was inadvertently not included in the search results. This AHIMS database error was not determined until early on in the assessment process. The omission of the B10 site from the AHIMS search table was simply a product of the fact that the OEH's AHIMS database does not map polygons (i.e. site areas); instead only recognising single points as Aboriginal sites. Thus, the information provided by AECOM at the time represented known information from OEH's AHIMS database.

The location and extent of B10 was subsequently mapped correctly for the EIS. In addition to this, Aboriginal stakeholder groups for the Project were made aware of B10 both during fieldwork and during subsequent review of heritage assessment reports.

A comprehensive account of all consultation completed with the registered Aboriginal parties is included in Section 6.5 of the EIS.

5.3.13 Arborist Scarred Tree Assessment

Issue

OEH has reviewed the document. OEH notes the constant reference to an arbitrary date of 150 years for the latest possible traditional tree scarring. This is not scientifically or ethnographically valid.

Response

The arborist reference (see Appendix F of AECOM, 2013) to the cessation of Aboriginal tree scarring in the Hunter Valley 150 years ago (c.1862) was used in the assessment as a 'guide' and the report clearly states it is an estimation (not an absolute date). Available sources indicate that the Aboriginal population in the Hunter Valley had been significantly reduced by the 1860s and those people that remained had begun to adapt to European lifestyles (Brayshaw, 1987; Miller, 1985; Richards, 1862) making it unlikely that there was continued widespread tree scarring in the Hunter Valley.

Nonetheless, the assessment of potential scarred trees undertaken for the Project (see Appendix F of AECOM, 2013) identified 'natural causes' (i.e. branch tear etc.) as the cause for the scarring of all assessed trees, not age.

5.3.14 Existing Aboriginal Cultural Heritage Management Plan

Issue

OEH notes that Condition 29 of the existing approval (DA211/93) requires the development of an ACHMP by the end of February 2012. OEH further notes that the current ACHMP appears incomplete and has not been endorsed by OEH.

Response

OEH's comment is in regard to the already approved ACHMP which was updated for the Bengalla Development Consent Modification Environmental Assessment (Hansen Bailey 2010) in accordance with DA 211/93 Schedule 3, Condition 29. The existing ACHMP was updated following granting of DA 211/93 (Mod 4) and subsequently approved by DP&I on 9 November 2012.

Following determination of the Project the existing ACHMP will likely be required to be updated in consultation with OEH and other regulators to the satisfaction of DP&I.

5.3.15 Upper Hunter Offset Fund

Issue

This response addresses the submission regarding Upper Hunter Offset Fund

Response

As noted in Section 8.11.4 of the EIS, in the event that the UHSA process is not implemented or is not acceptable to BMC, it will consult with the relevant regulators to determine an alternative offset strategy for the Project to be completed within two years following the receipt of Development Consent for the Project. All submissions regarding the Bengalla Ecological Offsets Strategy are addressed in **Section 8.3.1**.

5.3.16 Upper Hunter Strategic Assessment

Issue

The proponent is participating in the Upper Hunter Strategic Assessment and which will provide the opportunity to offset the impact of the development on threatened biodiversity primarily by paying into the Upper Hunter Offset Fund which will be established as part of the Upper Hunter Biodiversity Plan. The amount to be paid into the Fund will be determined by the Biodiversity Certification Assessment Methodology (BCAM)(OEH, 2011) and two calculators to convert credits to hectares then hectares to dollars.

The details of the Upper Hunter Offset Fund are to be finalised in 2014 when the final offset package for the Continuation of Bengalla Mine project will be able to be calculated.

Response

See **Section 4.1.1** for details of the revised Project BOS.

5.3.17 BVT Classification of White Box Vegetation Communities

Issue

The White Box vegetation communities, including the Derived Native Grasslands after White Box woodland were matched to a Narrow-leaved Ironbark vegetation BVT (HU905) in which White Box is very rare. The EIS seems to indicate that a more appropriate White Box - dominated woodland BVT (which OEH has identified as HU820} could not be flagged as an EEC in BCAM, and thus a Narrow- leaved Ironbark vegetation community (HU905) was used instead (EIS, App. L of App. 0, p. L.5.2). The BCAM calculator does not give any additional weighting to EEC vegetation communities for the main driver of credits generated per vegetation zone is instead based on the percentage that any given vegetation community is cleared within a given CMA subregion. A consequence of choosing HU905 rather than HU820 has been a slight reduction in the number of ecosystem credits generated by the three White Box vegetation zones. OEH found that it would increase the number of credits for White Box communities by about 106 per cent which would increase the total number of credits generated by the project (as per Table 5.3 in App. L of App. 0 of the EIS) by 1025 ecosystem credits for a new total of 28,545 ecosystem credits.

Response

The open canopy is typically dominated by *Eucalyptus albens* (White Box) and/or *Eucalyptus albens* x *Eucalyptus moluccana* (White-Box-Grey Box intergrade). The Biometric Vegetation Type (BVT) selected is the same as for Upper Hunter White Box – Ironbark Grassy Woodland, despite this community lacking Narrow-leaved Ironbark. The plant species present in this community are the same as for Upper Hunter White Box – Ironbark Grassy Woodland except for the lack of Ironbark and the community occurs in the same landscape position and generally the same soils as Upper Hunter White Box – Ironbark Grassy Woodland. Moreover, the lack of Ironbark may potentially be influenced by selective clearing and regeneration post settlement. As such, the additional assessment has indicated that the assigned BVT (HU905) is appropriate for use in the assessment.

5.3.18 Additional Surveys Required in Derived Grassland

Issue

109.7 ha of 'Low Diversity Derived Native Grassland/Exotic Pasture is described from the project area but not included in the BCAM assessment. OEH understands that this grassland, which occurs on the Hunter River floodplain will not be cleared by the project. Thus for the BCAM assessment the native element of this grassland must either be assigned to a BVT, adequately sampled and included in the BCAM calculator, or have justification provided as to why that area is excluded from the project area assessed by BCAM.

Response

Additional field surveys were conducted on 6 February 2014 to collect additional data in order to address this point.

An additional two quadrats were undertaken in previously mapped Low Diversity Native Grassland/Exotic Pasture areas plus rapid assessments to try to differentiate between Low Diversity Native Grassland and Exotic Pasture and assign it to a BVT. As a result of the analysis of the floristic data it was found that these areas are comprised of a mosaic of native and exotic vegetation and as such, it was deemed not appropriate to split this community in the BCAM assessment.

5.3.19 Insufficient Surveys Data

Issue

The vegetation community 'Derived Native Grassland after Upper Hunter Hills Exposed Ironbark' (HU819) was not sampled sufficient as per BCAM guidelines. Not sampling in full accordance with BCAM weakens the robustness of BCAM results, and for transparency OEH recommends additional field quadrat data is provided so that this issue is resolved.

Response

Additional field surveys were conducted on 6 February 2014 to collect additional data in order to address this point. An additional three quadrats were undertaken in Derived Native Grassland from Ironbark Communities in order to satisfy BCAM assessment requirements. The raw quadrat data findings are included in **Appendix E**.

5.3.20 Allocation of Vegetation Communities to BVTs

Issue

OEH found that the EIS did not fully document the thought process involved in matching vegetation communities within the project area to the BVTs used in BCAM assessment, which made it difficult to check that the process was done correctly. Since selecting the most appropriate BVT generally involves finding the one with the most number of shared species in a particular vegetation community, once factors such as geographic location, soil type and position in landscape have been taken into account.

However, the vegetation community descriptions in exhibited EIS are light on details of the dominant plant species that they contain. This lack of detail makes OEH's role difficult in checking that the most appropriate BVTs were selected for the vegetation communities in the project assessment area, and the calculations that followed in the calculator. This data must be provided for the Bengalla continuation of mining project to show that the process was done correctly and in a transparent manner.

Response

Updated vegetation community descriptions have been provided in **Section 5.3.21** to describe each community in further detail to include geographic location, soil type and position in landscape. Raw survey data of the species distribution is provided in the EIS (see EIS Appendix O). The additional species information collected on the 6 February 2014 survey provided in **Appendix E**. Recalculation of the number of credits required as a result of the further survey effort is provided in **Table 16**.

Table 16
Ecosystem Credit Generation

Zone	Vegetation Community	BioMetric Vegetation Type	Area (ha)	EEC	Number of credits required
1	Upper Hunter White Box – Ironbark Grassy Woodland (EPBC CEEC; TSC EEC)	Narrow-leaved Ironbark Grey Box Grassy Woodland of the central and upper Hunter	45.3	Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions	2,024
2	Grey Box/White Box Intergrade Grassy Woodland (EPBC CEEC; TSC EEC)		27.88		982
3	Derived Native Grassland(EPBC CEEC; TSC EEC)		462.12		13,767
4	Hunter Floodplain Red Gum Woodland Complex	Blakely's Red Gum – Rough-barked Apple Shrubby woodland of the central and upper hunter	9.44	Not an EEC	348
5	Central Hunter Ironbark - Spotted Gum Forest (TSC Act EEC)	Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter	6.72	Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	209

Zone	Vegetation Community	BioMetric Vegetation Type	Area (ha)	EEC	Number of credits required
6	Narrabeen Footslopes Slaty Box Woodland (TSC Act EEC)	Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin	2.93	Not an EEC	94
7	Derived Native Grassland (Slaty Box)		0.02		0
8	Upper Hunter Hills Exposed Ironbark Woodland	Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter	167.92		6,253
9	Upper Hunter Hills Exposed Ironbark Derived Native Grassland		159.23		2,587
TOTAL			**881.56**		**26,264**

5.3.21 Additional Survey Information

Issue

OEH requires more detailed floristic data in vegetation communities identified on a site and assessed by BCAM. The required details include a description of the position in the landscape and the soil type(s) on which each vegetation community occurs, and the habitat features they contain, in addition to floristic details that include the listing of at least the top three dominant shrubs, groundcover forbs, groundcover vines, groundcover sedges and rushes and grasses, and the identity of plants in the following grass genera: Aristida, Austrostipa and Rytidosperma (Austrodanthonia) to species level.

Such details are needed to support the matching of a vegetation community to the most appropriate available BVT, and its condition which will then be run in the BCAM calculator. Where a vegetation community may not have a single best fit BVT then a decision of which one of a shortlist of options was used must be justified, including any assumptions made. Where the information provided does not allow OEH to fully assess the decisions made in data used in the BCAM calculator then this will prevent OEH from being able to fully carry out its assessment role for the UHSA.

Response

All vegetation community descriptions have been updated to reflect the requirement to include landscape position and soil type as well as additional species information and an additional description for Low Diversity Native Grassland has been provided.

The updated descriptions are as follows:

Zone 1 - Upper Hunter White Box - Ironbark Grassy Woodland

Conservation Status: Box Gum Woodland; CEEC (EPBC Act), EEC (TSC Act)

BioMetric Vegetation (2013) Equivalent: Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter

Upper Hunter White Box-Ironbark Grassy Woodland typically occurs as mid to tall grassy woodland on clay soils derived from Permian, Carboniferous or Quaternary geology. It is concentrated in the north of the Hunter region where rainfall is relatively low, on undulating slopes and hills that surround the floodplains along the Hunter River.

The open canopy is typically dominated by *Eucalyptus albens* (White Box) and/*or Eucalyptus albens* x *Eucalyptus moluccana* (White-Box-Grey Box intergrade), *Eucalyptus crebra* (Narrow-leaved Ironbark), although *Brachychiton populneus* (Kurrajong) and various red gum species may also be present.

The understorey is typically sparsely shrubby and the ground cover can range from sparse to dense. Common understorey species include; *Notelaea microcarpa* var. *microcarpa* (Native Olive), *Myoporum montanum* (Water bush), *Acacia decora* (Western Golden Wattle) and *Maireana microphylla* (Eastern Cottonbush). The groundcover is diverse and is generally dominated by grasses and forbs, such as *Aristida ramosa* (Threeawn Wiregrass), *Cymbopogon refractus* (Barbed Wire Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Chloris ventricosa* (Windmill Grass), *Austrodanthonia fulva* (Wallaby Grass), Cynodon dactylon (Couch Grass), *Calotis lappulaccea* (Yellow Burr-daisy), *Dichondra repens* (Kidney Weed), *Desmodium varians* (Variable Tick-trefoil) and *Einadia nutans* (Climbing Saltbush).

Toward the southern extent of its range, Upper Hunter White Box-Ironbark Grassy Woodland grades into Central Hunter Box-Ironbark Woodland. In these areas, *Eucalyptus albens* x *Eucalyptus moluccana* (White-Box-Grey Box intergrade) displays a stronger *Eucalyptus moluccana* (Grey Box) influence; and *Allocasuarina luehmannii* (Bulloak) and *Acacia salicina* (Cooba) become more dominant.

Within the Biodiversity Assessment Area (BAA), this community occurs as both regenerating and regrowth woodland, with some areas containing dense stands of young regrowth *Eucalyptus crebra* trees and other areas containing a more diffuse occurrence of mature *Eucalyptus albens* x *Eucalyptus moluccana* intergrade trees. The open grassy understorey contains a diverse collection of herbs, forbs and grasses, with a sparse shrub layer and relatively few weed species present in low abundance.

Approximately 93 ha of this community occurs within the BAA and 45.3 ha occurs in the Disturbance Boundary.

Zone 2 - Grey Box / White Box Intergrade Grassy Woodland

Conservation Status: Box Gum Woodland; CEEC (EPBC Act), EEC (TSC Act)

BioMetric Vegetation (2013) Equivalent: Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter

Grey Box/White Box Grassy Woodland typically occurs as mid to tall grassy woodland on clay soils derived from Permian, Carboniferous or Quaternary geology. It is concentrated in the north of the Hunter region where rainfall is relatively low, on undulating slopes and hills that surround the floodplains along the Hunter River.

The open canopy is typically dominated by *Eucalyptus albens* (White Box) and/or *Eucalyptus albens* x *Eucalyptus moluccana* (White-Box-Grey Box intergrade). The BVT selected is the same as for Zone 1, despite this community lacking Narrow-leaved Ironbark. The plant species present in this community are the same as for Zone 1 except for the lack of Ironbark and the community occurs in the same landscape position and generally the same soils as Zone 1. Moreover, the lack of Ironbark may potentially be influenced by selective clearing and regeneration post settlement.

Within the BAA, this community occurs as both regenerating and regrowth woodland, with some areas containing dense stands of regrowth canopy trees and other areas containing a more diffuse occurrence of mature *Eucalyptus albens* x *Eucalyptus moluccana* intergrade trees.

The open grassy understorey contains a diverse collection of herbs, forbs and grasses, with a sparse shrub layer and relatively few weed species present in low abundance (Photograph 3.2). Common understorey species include; *Notelaea microcarpa* var. *microcarpa* (Native Olive), *Myoporum montanum* (Water bush), *Acacia decora* (Western Golden Wattle) and *Maireana microphylla* (Eastern Cottonbush). The groundcover is diverse and is generally dominated by grasses and forbs, such as *Aristida ramosa* (Threeawn Wiregrass), *Cymbopogon refractus* (Barbed Wire Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Chloris ventricosa* (Windmill Grass), *Austrodanthonia fulva* (Wallaby Grass), *Cynodon dactylon* (Couch Grass), *Calotis lappulaccea* (Yellow Burr-daisy), *Dichondra repens* (Kidney Weed), *Desmodium varians* (Variable Tick-trefoil) and *Einadia nutans* (Climbing Saltbush).

Approximately 37 ha of this community occurs within the BAA and 27.9 ha occurs in the Disturbance Boundary.

Zone 3 – Derived Native Grassland (Box Gum Woodland)

Conservation Status: Box Gum Woodland; CEEC (EPBC Act) and EEC (TSC Act).

BioMetric Vegetation (2013) Equivalent: Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter.

This community is native grassland that has been derived from the previous clearing of canopy trees of Upper Hunter White Box - Ironbark Grassy Woodland and Grey Box / White Box Intergrade Grassy Woodland and is characterised by an assemblage of understorey species representative of the understorey that typifies the woodland community. It predominately occurs on clay soils derived from Permian, Carboniferous or Quaternary geology.

The canopy is largely absent from this community with scattered and regenerating occurrences of by *Eucalyptus albens* (White Box) and/or *Eucalyptus albens* x *Eucalyptus moluccana* (White-Box-Grey Box intergrade) and *Eucalyptus crebra* (Narrow-leaved Ironbark).

To be considered as conforming to Box Gum Woodland, these grasslands support over 12 native non-grass species and at least one grazing-sensitive species within a 0.1 ha area. This community conforms to this guidance and contains a rich sward of both grass and non-grass groundcover species. Groundcover species present across this community include *Einadia polygonoides*, *Maireana microphylla* (Small-leaf Bluebush), Calotis lappulacea (Yellow Burr-daisy) and *Asperula conferta* (Common Woodruff) at frequent to dominant levels. *Dichondra repens* (Kidney Weed), *Euchiton sphaericus*, *Wahlenbergia stricta* (Australian Bluebell) and *Cheilanthes sieberi* (Poison Rock Fern) are also widely occurring Box Gum Woodland indicator species. Grass species include *Aristida ramosa* (Purple Wiregrass), *Austrostipa verticillata* (Slender Bamboo Grass) and *Austrostipa scabra* ssp. *scabra* (Speargrass) in high frequency of occurrence.

Approximately 555 ha of this community occur within the BAA and 462.1 ha occurs in the Disturbance Boundary.

Zone 4 – Hunter Floodplain Red Gum Woodland

Conservation Status: EEC (TSC Act)

BioMetric Vegetation (2013) Equivalent: Blakely's Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter Floodplain Red Gum Woodland is a floodplain woodland that occurs on deeper soils at the base of foothills and along creek lines. It has a sparse distribution in the Hunter region and is strongly associated with alluvial soils on floodplain rises along major rivers and creeks. It is generally found in locations where regular inundation occurs during river overflow and flood events. *Eucalyptus camaldulensis* (River Red Gum) can often occur as the sole canopy species; however in some areas it is common to find co-dominants of *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus melliodora* (Yellow Box) (sometimes to the exclusion of other tree species), *Angophora floribunda* (Rough-barked Apple) and *Casuarina cunninghamiana* (River Oak). *Casuarina cunninghamiana* (River Oak) often occurs as a gallery forest in the core of drainage lines and is known as Hunter Valley River Oak Forest.

This community occurs in the BAA in association with Dry Creek. This community exists as scattered occurrences of *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus tereticornis* x *Eucalyptus blakelyi* intergrades and *Angophora floribunda* (Rough-barked Apple) over a variable understorey.

The lower section of Dry Creek contains a small number of *Eucalyptus melliodora* (Yellow Box). A gallery forest of *Casuarina cunninghamiana* (River Oak) is generally absent; this is likely to be a result previous clearing for agriculture and ongoing disturbances associated with livestock access to the creek line.

The understorey is dominated by native spear grasses (i.e. *Austrostipa verticillata* and *Austrostipa scabra* ssp. *scabra*), although there are moderate to high occurrences of weed species present, with parts of the creek line floodplain dominated by dense thickets of pasture weeds. An assemblage of native forbs are present but in low frequencies.

Despite obvious impacts due to livestock grazing and trampling and areas of weed invasion, this vegetation conforms to the TSC Act listed EEC, Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions.

Approximately 9 ha of this community occur within the BAA and the Project Disturbance Boundary.

Zone 5 - Central Hunter Ironbark - Spotted Gum Forest

Conservation Status: EEC (TSC Act)

BioMetric Vegetation (2013) Equivalent: Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter

Central Hunter Ironbark – Spotted Gum Forest is an open forest or woodland community that is dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia maculata* (Spotted Gum). This community occupies a small isolated pocket in the northeast portion of the BAA on clay soils derived from Permian, Carboniferous or Quaternary geology. The community conforms to the TSC Act listed EEC Central Hunter Ironbark - Spotted Gum – Grey Box Forest.

The understorey assemblage is generally continuous with surrounding woodland/forest communities. The shrub layer is sparse to moderately dense and supports species such as *Acacia paradoxa* (Kangaroo Apple) and *Notelaea microcarpa* (Native Olive). The understorey is dominated by the grass species *Austrostipa verticillata*, *Austrostipa scabra* ssp. *scabra, Aristida ramosa*, and *Bothriochloa decipiens*. The diversity of forbs is moderately high and includes *Dichondra repens*, *Chrysocephalum apiculatum*, *Glycine tabacina* and *Sida corrugata*.

This community occurs as regenerating and regrowth woodland, with some areas containing stands of young regrowth *Eucalyptus crebra* trees, and other areas containing more sparsely distributed mature *Corymbia maculata* trees. This community has been grazed for many years but has not been subject to intensive grazing or cropping. As a result, it is generally less affected by weed invasion compared with other areas of the BAA, such as those areas along the Hunter riverfront.

Approximately 14 ha of this community occur within the BAA and 6.7 ha occurs within the Disturbance Boundary.

Zone 6 - Narrabeen Footslopes Slaty Box Woodland

Conservation Status: VEC (TSC Act)

BioMetric Vegetation (2013) Equivalent: Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin

Narrabeen Footslopes Slaty Box Woodland typically occupies hot, dry locations in the Central Hunter and its distribution is strongly influenced by underlying geology (Peake 2006). The community is typically situated where colluvial soils derived from younger sandstone and conglomerate lithology overly older Permian sediments occur. It is mainly distributed around Jerrys Plains.

This community occurs within in one small isolated area within the southwest corner of the BAA. This vegetation conforms to the TSC Act listed VEC, Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion.

In the BAA, the community is dominated by *Eucalyptus dawsonii* (Slaty Box) and *Allocasuarina luehmannii* (Bulloak). The shrub layer was generally absent but where present was dominated by *Maireana microphylla* (Black Salt Bush) and the exotic *Lycium ferocissimum* (African Boxthorn).

The groundcover within this community was generally sparse with relatively low species richness. The species composition was variable and in places, supported a dominance of exotic species such as *Cynodon dactylon* (Couch Grass), *Pennisetum clandestinum* (Kikuyu), *Sida rhombifolia* (Paddys Lucerne), *Polygonum aviculare* (Wire Weed), *Modiola caroliniana* and *Galenia pubescens* (Galenia). In other less weedy areas, variable proportions of *Sporobolus creber* (Rats Tail Grass), *Chloris ventricosa* (Windmill Grass*), Bothriochloa macra* (Red Leg Grass) and *Aristida racemosa* were present as a dominant grass layer.

Approximately 4 ha of this community occur within the BAA and 2.9 ha occurs within the Disturbance Boundary.

Zone 7 - Derived Native Grassland (Slaty Box)

Conservation Status: Not listed as part of Woodland TEC

BioMetric Vegetation (2013) Equivalent: Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin

This community has been derived from the previous clearing of Narrabeen Footslopes Slaty Box Woodland, although the Derived Native Grassland does not form part of the TSC Act listed TEC. The community is typically situated where colluvial soils derived from younger sandstone and conglomerate lithology overly older Permian sediments occur.

The canopy cover is largely absent but contains some regenerating *Eucalyptus dawsonii* (Slaty Box) and *Allocasuarina luehmannii* (Bulloak).

The groundcover within this community was generally sparse with relatively low species richness. The species composition was variable and in places, supported a dominance of exotic species such as *Cynodon dactylon* (Couch Grass), *Pennisetum clandestinum* (Kikuyu), *Sida rhombifolia* (Paddys Lucerne), *Polygonum aviculare* (Wire Weed), *Modiola caroliniana* and *Galenia pubescens* (Galenia). In other less weedy areas, variable proportions of *Sporobolus creber* (Rats Tail Grass), *Chloris ventricosa* (Windmill Grass), *Bothriochloa macra* (Red Leg Grass) and *Aristida racemosa* were present as a dominant grass layer.

Approximately 0.6 ha of this community occurs within the BAA and 0.02 ha occurs within the Disturbance Boundary.

Zone 8 - Upper Hunter Hills Exposed Ironbark Woodland

Conservation Status: Not listed.

BioMetric Vegetation (2013) Equivalent: Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter

This is a grassy open forest or woodland community that often occurs on drier north-facing slopes receiving high solar radiation and is characterised by the ubiquitous presence of *Eucalyptus crebra* (Narrow-leaved Ironbark). Other canopy species occurring in very low numbers include *Eucalyptus moluccana* x *Eucalyptus albens* (Grey Box-White Box intergrade), *Angophora floribunda* (Rough-barked Apple), *Brachychiton populneus* ssp. *populneus* (Kurrajong) and *Allocasuarina leuhmannii* (Bulloak).

This community is the most extensive forest/woodland community within the BAA. It occurs on the steeper slopes of the BAA as large patches of regenerating open forest. The understorey stratum is variable and supports a sparse to relatively dense shrub/sub shrub layer, including *Maireana microphylla* (Black Salt Bush), *Bursaria spinosa* (Blackthorn), *Acacia paradoxa* (Kangaroo Apple) and *Notelaea microcarpa* (Native Olive).

The open grassy understorey contains a diverse collection of herbs, forbs and grasses. The ground layer is dominated by grasses such as *Aristida jerichoensis* (Jericho Grass) and *Austrostipa verticilliata* (Slender Bamboo-grass) and to a lesser extent *Cymbopogon refractus* (Barbed-wire Grass) and *Bothriochloa decipiens*. Common forbs include *Dichondra repens*, *Chrysocephalum apiculatum*, *Glycine tabacina* and *Einadia trigonos*.

Approximately 268 ha of this community occurs within the BAA and 167.9 ha occurs within the Disturbance Boundary.

Zone 9 - Derived Native Grassland (Upper Hunter Hills Exposed Ironbark Woodland)

Conservation Status: Not listed.

BioMetric Vegetation (2013) Equivalent: Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter

This community has been derived from the previous clearing of Upper Hunter Hills Exposed Ironbark Woodland and occurs predominantly on clay soils derived from Permian, Carboniferous or Quaternary geology.

Within this community there are rare occurrences of regenerating *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Allocasuarina leuhmannii* (Bulloak).

The shrub layer is largely absent other then the presence of *Maireana microphylla* (Black Salt Bush) within areas of regenerating canopy.

The open grassy understorey contains a diverse collection of herbs, forbs and grasses. The ground layer is dominated by grasses such as *Aristida jerichoensis* (Jericho Grass) and *Austrostipa verticilliata* (Slender Bamboo-grass) and to a lesser extent *Cymbopogon refractus* (Barbed-wire Grass) and *Bothriochloa decipiens*. Common forbs include *Dichondra repens*, *Chrysocephalum apiculatum*, *Glycine tabacina* and *Einadia trigonos*.

Approximately 220.74 ha of this community occurs within the BAA and 159.2 ha occurs within the Disturbance Boundary.

5.3.22 Proposed Planting of River Red Gums

Issue

Proposed planting of River Red Gum (Eucalyptus camaldulensis) trees as part of the maintenance of the Hunter River frontage of the project area must only use propagules collected from within the Hunter Catchment, so as to retain the genetics of the local and endangered population. Further, seed collection from source trees must be done in accordance with FloraBank guidelines (www.florabank.org.au).

Response

The planting of River Red Gums on Dry Creek as indicatively shown in Figure 68 of the EIS will only use plants grown from seed sourced from the Hunter Catchment and collected according to the appropriate guidelines referenced above. Details of the seed collection and propagation protocol will be provided in the BMP that will be prepared for the Project.

5.4 NSW HERITAGE COUNCIL

5.4.1 European Heritage Management Plan

Issue

The Heritage Division on behalf of the NSW Heritage Council provided a submission on the EIS noting concern over the previously completed European Heritage Management Plan for the DA 211/93 (as modified).

Response

As the Heritage Division's comments were regarding the already approved European Heritage Management Plan (EHMP) which was updated for the Bengalla Development Consent Modification Environmental Assessment (Hansen Bailey, 2010) in accordance with DA 211/93 Schedule 3, Condition 29 (c) and not the Project EIS additional consultation has been completed outside the preparation of this RTS including the provision of a final copy of the approved EHMP and associated archival recordings. In an email response dated 18 March 2014, the Heritage Division indicated that they are satisfied with the additional consultation completed and required no further information at this stage.

Following the receipt of Development Consent for the Project the existing EHMP will likely be required to be updated in consultation with the Heritage Division and other regulators to the satisfaction of DP&I.

5.5 DIVISION OF RESOURCES AND ENERGY

5.5.1 Mining Authorisations

Issue

DRE understands the proposed mining activities are within Mining Lease 1397, 1450, 1569 and 1592, held by the Proponent, and that a mining lease application over Assessment Lease 13 and Authorisation 438 and a mining lease application for purposes over part of Authorisation 102, held by the Crown, will be submitted to DRE. DRE also notes that a plan of the proposed mining lease application for purposes is not included in the EIS.

In addition, the proponent also proposed the part transfer of Mining Lease1645 held by Coal & Allied, but this will require the consent of the existing title holder.

Response

Noted. As discussed in Section 5.4.1 of the EIS, BMC will seek the following authorisations under the Mining Act:

- Renewal of existing Mining Leases (1397, 1450, 1469 and 1592);
- Convert BMC Assessment Lease (AL) 13 and Exploration Lease (EL) A438 to new Mining Lease for coal mining; and
- A new mining lease for surface purposes to a depth of 40 m for surface mining purposes only (being the surface activities described in this EIS) over the area west of AL13 within A102 required for necessary Project infrastructure.

Section 4.12, Table 14, Section 5.4.1 and Figure 28 of the EIS all describe the process for securing the various mining authorisations with consideration and consultation of the Mount Pleasant Project.

It is proposed that the areas of Mining Lease 1645 (held by Coal & Allied Operations Pty Limited) necessary for supporting the relevant elements of the Project will be part transferred at the appropriate time having regard for progress of the Project by the holder of Mining Lease 1645 (Coal & Allied Operations Pty Ltd) to BMC, which includes areas to the:

- South of Wybong Road; and
- North of Wybong Road in the area of the Dry Creek clean water diversion dam.

Additional consultation with DRE was held on 12 March 2014 which confirmed that the abovementioned approach is the appropriate course of action for the progression of mining authorisations to facilitate the Project.

5.5.2 Final Landform

Issue

DRE requires final landform design to be consistent with the surrounding topography. DRE accepts the conceptual landform design outlined in the EIS. However, the Proponent should be aware that as part of the MOP, DRE will require further information on final landform design, with specific reference to topographic relief and drainage.

Response

Noted. Following the granting of Development Consent for the Project, BMC will provide further information on final landform design with specific reference to topographic relief and drainage in the revised MOP or Mining Rehabilitation and Environmental Management Plan (MREMP) (as required) by conditions of Development Consent.

5.5.3 Level of Cover for Potentially Acid Forming Material

Issue

There appears to be conflicting information provided within the EIS regarding the intent and recommendations for proposed storage of both Archerfield Sandstone interburden and Wynn Seam washery waste material, which are likely to be Potentially Acid Forming (PAF). The EIS refers to PAF material being covered by at least 5 metres of acid neutralising and inert fill (Volume 1) but also recommends that this material should be covered by inert overburden to a depth of at least 60 metres (Volume 4). The proponent should provide clear advice on the proposed depth of burial and the adequacy of that depth of burial to manage PAF waste materials.

Response

As noted in Section 8.8.4 of the EIS, BMC currently manages PAF material in accordance with the existing Acid Mine Drainage Management Plan (AMDMP). The AMDMP states that management methods for PAF Archerfield Sandstone overburden to be emplaced within the Main OEA open mining area by covering Archerfield Sandstone material with acid neutralising and inert overburden to a depth of at least 5 m.

Section 4.3 of the Geochemical Impact Assessment (Appendix L of the EIS) is providing comment in relation to the onsite practice whereby Archerfield Sandstone material is commonly covered with acid neutralising and inert overburden to a depth of at least 60 m which is generally the case at Bengalla.

BMC will review the existing AMDMP for the Project in consultation with relevant regulators to ensure:

- The current management methods for PAF Archerfield Sandstone overburden will continue. This will occur in the Main OEA open mining area by covering Archerfield Sandstone material with acid neutralising and inert overburden to a depth of at least 5 m; and
- That no Archerfield Sandstone materials will be placed in the Western OEA to avoid any potential connectivity with the adjacent Dry Creek.

5.5.4 Maximum Final Slope of the Low Wall

Issue

There appears to be conflicting statements in the EIS as to the maximum final slope of the low wall - both 18 degrees and 21 degrees are nominated. Clarity on maximum final low wall grade should be provided. The proponent should be aware that DRE has a preference for maximum 18 degree unless prior approval/discussion with DRE.

Response

As noted in 8.21.7 of the EIS should further mining approvals not be granted or sought at BMC after Year 24, for the preferred Option 1. Following the cessation of mining, the low wall, which is the side of the void containing overburden and disturbed material, will be stabilised in the following manner (following consultation and agreement with relevant regulators):

- The low wall will be battered back from the angle of repose to ensure the long term geotechnical stability of the face, with the determination of geotechnical stability and recommendations as to the final slope undertaken by a qualified geotechnical engineer. This will be based on an assessment of the overburden material, the likely degree of settlement, and the degree of weathering expected in the long term. However, it is expected that the low wall sides of the final voids will be battered back to 10 degrees where practical or a maximum of 21 degrees;
- The highwall is the actively mined side of the void and is generally comprised of undisturbed, solid material generally above the economically lower-most limits of the mineable seam. As part of the final landform it is planned that the final void will have the majority of the highwall blasted back to improve the safety and stability to an angle of repose of between 23 and 25 degrees;
- The endwalls proposed for the final void will be blasted back to improve the safety and stability to an angle of repose of approximately 33 degrees;
- Surface water drainage on and over the low wall will be minimised through the construction of drainage control structures and the aim of diverting as much of the catchment as possible away from the final void and back into the surface water system; and
- Erosion of the low wall will be controlled by limiting the length of slope through the use of contour and graded drains, minimising the slope, and by the establishment of suitable vegetation.

Final rehabilitation completion criteria for mine closure will be developed and agreed in consultation with the relevant government agencies and community and incorporated into the final Mine Closure Plan (developed as part of the Rehabilitation Management Plan). These criteria will continue to be revised and developed to demonstrate that the rehabilitation objectives have been achieved. The achievement of the completion criteria post closure will be monitored and reported to relevant stakeholders.

As noted in Section 8.21.5 of the EIS, the main objective of rehabilitation at Bengalla is to develop an undulating, free-draining landform (excluding the final void) with an optimum land capability to support the nominated final land use for the site. BMC will seek the relevant approvals necessary to allow the continuation of mining operations at Bengalla prior to the completion of the Project life.

Should future approval not be granted for the continuation of mining operations to develop additional areas and coal reserves then mine closure planning and the final landform and associated void design would be revisited at that time.

5.5.5 Rehabilitation Vegetation Cover

Issue

A minimum of 10% vegetated cover over rehabilitated areas is nominated in the EIS. DRE consider that this would be insufficient vegetative cover on sloping ground to achieve an acceptable degree of risk for the prevention of erosion and topsoil loss. DRE notes that the Bengalla Rehabilitation Management Plan (2013) nominates a minimum of 70% vegetative cover over 80% of rehabilitation areas.

Response

As presented in Section 8.21.6 of the EIS, it is anticipated that the landform will be predominately rehabilitated to grazing pasture, with plantings of native woodland vegetation to achieve a minimum of 10% treed vegetation cover and higher density tree coverage of the eastern face of the Main OEA. The intent is to rehabilitate all disturbed areas (with the exception of the final void) to its pre mining land use (grazing) with plantings of native woodland vegetation.

Following additional consultation with MSC, a revised tree plantings pattern for the eastern face of the Main OEH has been developed with consideration of their requests (see **Section 5.7**). The aim of the revised tree plantings is to develop a more natural looking rehabilitation area whilst maintaining some agricultural and ecological values into the future.

In addition, BMC has in place comprehensive rehabilitation commitments and these are outlined in the existing Rehabilitation Management Plan. BMC will update the Rehabilitation Management Plan for commitments provided in the EIS and will build on successful techniques developed and currently undertaken on site.

5.6 NSW OFFICE OF WATER

5.6.1 Loss of Catchment Area

Issue

The diversion of Dry Creek will result in the loss of inflow into the Hunter River and consequently a loss of recharge into the Hunter Alluvial aquifer down gradient from the project site. The loss of catchment area (i.e. including Dry Creek) from mining will result in reduced flow which is equivalent to 0.5% flow volume at Denman.

In the EIS, 'this is considered negligible'. However, the EIS statement needs to clarify that 'it is negligible' under average rainfall condition but may be a significant loss during drought or extreme drought. Contingent water supply arrangements should be investigated.

Response

Loss of catchment area to the Hunter River is not caused by the diversion of Dry Creek. The loss of catchment area to the Hunter River is a direct consequence of the requirement to capture potentially contaminated runoff from industrial areas, spoil runoff and the catchment area of the void.

As detailed in Section 5.6.2 of the Surface Water Impact Assessment (Appendix J of the EIS), the maximum average net runoff reduction of 923 ML/a (less than 0.5% of the median annual flow rate in the Hunter River at Denman) is predicted to occur for the Year 15 mining stage of mining operations only. Post-mining, this value is reduced due to rehabilitation of mining areas and overburden emplacement area and final void design to 423 ML/a (less than 0.2% of the median annual flow rate in the Hunter River at Denman).

During periods of drought or extreme drought, there is reduced flow in the Hunter River, but also reduced rainfall runoff at the catchment areas captured by the mining operations (due to low rainfall). Therefore the reduction in runoff during drought conditions would represent the same proportion and is not expected to be a significant loss compared to the runoff that would have been directed to the Hunter under pre-mining and existing conditions.

As stated in Section 5.4.4 of the EIS, BMC will hold all relevant licences, share component and allocation required to comply with the WM Act and Water Act at all times water is taken, whether during or after the life of the Project.

5.6.2 Dry Creek Loss of Yield

Issue

The EIS indicates that the mining company holds sufficient water access licences to account for water taken from water sources affected by operations. Modification to Dry Creek will result in reduction of its yield by 923 ML/y (page 182, EIS main report).

Diversion of the Dry Creek may also result in partial loss of alluvial aquifer and alluvial groundwaters of the Muswellbrook Water Source. These water requirements are not included in the Table 56 of the main report.

Response

As mentioned above, the loss of catchment area to the Dry Creek is not caused by the diversion of Dry Creek. The loss of catchment area is a direct consequence of the requirement to capture potentially contaminated runoff from industrial areas, spoil runoff and the catchment area of the void itself. Post-mining, the only catchment area removed from Dry Creek is that which is directed to the final void. The catchment area directed to the final void will be minimised through the implementation of clean water drains which direct upslope clean catchment around the final void and into Dry Creek. The method of calculating the clean water taken by the Project, as well as the allowable 'harvestable use right' is presented in Section 5.3 of the Surface Water Impact Assessment (Appendix J of the EIS).

Section 11.4 of the Groundwater Impact Assessment (Appendix K of the EIS) describes the potential impact of the development on alluvial aquifers and watercourses. Dry Creek, as the name suggests, is an ephemeral drainage line which does not intersect the water table and therefore would not be expected to have any contribution to baseflow from groundwater. Figure 7.26 of the Groundwater Impact Assessment (Appendix K of the EIS) presents regional potentiometric level pre-mining. In the headwater areas of Dry Creek the regional groundwater level is typically 30 m below the creek bed whilst in the lower reaches the groundwater level is approximately 10 m below the creek bed. The predicted depressurisation of the Permian strata as a result of the Project will therefore not impact upon Dry Creek.

The report also predicts the impact of the proposed modification on the groundwater in the alluvial aquifer alongside the Hunter River. The maximum predicted impact is less than the existing Bengalla Mine and is expected to occur in Year 1 of the Project, with flow to the Hunter River Alluvium from the Permian reduced by a maximum of 0.63 ML/day. As the Project moves further away from the Hunter River however this loss of contribution to the alluvium is predicted to reduce and by Year 10 of mining the flow to the Hunter River Alluvium is predicted to be reduced by approximately 0.25 ML/day.

As stated in Section 5.4.4 of the EIS, BMC will hold all relevant licences, share component and allocation required to comply with the WM Act and Water Act at all times water is taken, whether during or after the life of the Project.

5.6.3 Water Access Licences

Issue

The loss of surface and groundwater due to mining operation within the Dry Creek Catchment need to be accounted for by holding sufficient shares of unregulated category access licences and aquifer access licences from the Muswellbrook Water Source of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources. The proponent is required to estimate the shares (volumes of water) that need to be held to account for water taken from each water source. The proponent will be required to undertake water access licence dealings under the Water Management Act 2000 to satisfy these requirements.

Response

As noted in Section 5.4.4, BMC will hold all relevant licences, share component and allocation required to comply with the WM Act and Water Act at all times water is taken, whether during or after the life of the Project. **Table 17** lists water licences which will need to be progressively sought for the Project.

Table 17
Project Water Licensing Requirements

Water Type	Water Source	Predicted Annual Take (ML/year)		BMC Current Entitlements Held	Licence Allocation Required (ML/year or Units)	Water Available in Water Source
		Avg	Max			
Water Management Act 2000						
Groundwater	Hunter Unregulated and Alluvial Water Source – Hunter Regulated River Alluvial Water Source	112	220	442 ML	0	23,722 units
Surface Water	Hunter Regulated River Water Source (Management Zone 1A)	1,500	2,257	3 high security WALs totalling 1,455 units 25 general security WALs totalling 4,562 units	0	10,378 high security units 75,035 general security units
	Hunter Unregulated and Alluvial Water Source - Muswellbrook Water Source	20	39	109 ML	0	636 units
Water Act 1912						
Groundwater	Coal seam and Bedrock Aquifer	110	365	125 ML	240	N/A

Water Access Licences (WALs) with sufficient water allocation (derived from share component) must be held under the WM Act to account for all water taken by the Project from a water source in any one “water year” (1 July to 30 June). Similarly, a groundwater licence under Part 5 of the Water Act with sufficient annual entitlement must be held to account for the maximum amount of water taken by the Project from outside a Water Sharing Plan (WSP) area (i.e. the Permian coal measures).

BMC hold WALs with sufficient share component totalling 6,017 units (comprising 1,455 high security units and 4,562 general security units) to account for the maximum predicted take for the life of the Project from the Hunter Regulated River Water Source (Management Zone 1A). BMC maintains exclusive rights for the dedicated use of at least 2,534 units (comprising 1,449 high security units and 1,085 general security units) under these WALs for the Project. The remaining units of the WALs (comprising 2,702 units) are currently subject to use by licensees of BMC owned land for agricultural purposes.

BMC also holds WALs with sufficient share component totalling 490 units for the Hunter Unregulated and Alluvial Water Source (Hunter Regulated River Alluvial Water Source). BMC maintains exclusive rights for the dedicated use of at least 377 units under these WALs for the Project.

Given that BMC does not currently hold a WAL for the Hunter Unregulated and Alluvial Water Source (Muswellbrook Water Source), water will not be taken from this source until BMC has secured a WAL(s) with sufficient share component (as per **Table 17**) to authorise the take for the Project should it be required.

In accordance with Part 5 of the Water Act, BMC holds a licence to authorise the take of 125 ML of groundwater. To account for the maximum amount of groundwater taken by the Project at any one point during its life, BMC will make the required application to amend its licence conditions so as to increase the volumetric extraction authorised by the licence.

A WAL is not required to take and use water by means of harvestable rights dams in accordance with the applicable harvestable rights order under the WM Act. Harvestable rights may be available to account (wholly or partially) for the take of water from a water source. In the case of the Project, the maximum take from the Muswellbrook Water Source is estimated at 39 ML/year. BMC's calculated harvestable rights (based on its total landholding of 3,203 ha less the Disturbance Boundary and the Approved Bengalla Mine resulting in a net area of 1,551 ha) has been determined to be 109 ML per water year and hence water can be taken from the Muswellbrook Water Source without a WAL as allowed under the Harvestable Rights Order.

5.6.4 NSW Aquifer Interference Policy High Level Risk Assessment

Issue

The proponent should undertake a high-level risk assessment in relation to potential risks to water resources, to satisfy the requirements of section 3.2 (3) of the NSW Aquifer Interference Policy.

Response

Section 3.2 (3) of the NSW Aquifer Interference Policy (NOW, 2012) requires proponents consider:

> *'proposed remedial actions for impacts greater than those that were predicted as part of the relevant approval. The requirement for remedial actions may occur where modelled predictions were inaccurate or where planned mitigation, prevention or avoidance strategies have failed. The assessment will include:*
>
> *(a) consideration of the potential types and risks of unforeseen impacts that may occur during the operational phase or post-closure of the aquifer interference activity; and*

(b) whether the proposed mitigation, prevention or avoidance strategies will minimise these risks; and

(c) whether the proposed remedial actions are adequate, should the proposed risk minimisation strategies fail; and

(d) advice on what further mitigation, prevention, avoidance or remedial actions may be required; and

(e) appropriate conditions that maintain any mitigation, prevention, avoidance or remediation actions until they are no longer required to keep the impacts at or below the predicted levels.'

The magnitude of risk is commonly assessed using matrix that considers the likelihood and the consequence of the event. A risk matrix is provided in **Figure 10**. **Table 18** presents the key risks and the assessed risk rating using the risk matrix.

Figure 10
Risk Matrix

Likelihood of Impact	*Consequence*					
	1 Minor	2 Medium	3 Serious	4 Major	5 Catastrophic
5 Almost Certain	6 (Moderate)	7 (High)	8 (Critical)	9 (Critical)	10 (Critical)
4 Likely	5 (Moderate)	6 (High)	7 (High)	8 (Critical)	9 (Critical)
3 Possible	4 (Low)	5 (Moderate)	6 (High)	7 (Critical)	8 (Critical)
2 Unlikely	3 (Low)	4 (Low)	5 (Moderate)	6 (High)	7 (Critical)
1 Rare	2 (Low)	3 (Low)	4 (Moderate)	5 (High)	6 (High)

Table 18
Risk Rating Analysis

Ref	Key Risk	Likelihood	Consequence	Risk Rating
1	Zone of drawdown is larger than predicted by modelling and supply in private bores is affected	3	2	5 (Moderate)
2	Zone of drawdown is larger than predicted by modelling and flow in Hunter River affected by mining	2	2	4 (Low)
3	Take of groundwater from aquifers exceeds estimates in EIS	2	2	4 (Low)
4	The post mining void acts as a source, not a sink for groundwater flow allowing void water to enter the aquifers	2	2	4 (Low)

1. Impact on private bores

A potential risk is the modelling underestimating the zone of drawdown around Bengalla. The likelihood of this is low as the modelling was conservative and did not represent structures such as faults that would serve to reduce the growth of the zone of influence. The model satisfied the Class 2 criteria outlined in the Australian Groundwater Modelling Guidelines making it suitable for estimating impacts on medium value aquifers and dewatering requirements for excavations. If the modelling did underestimate drawdown it would result in the zone of influence extending further south and west. Land to the immediate south of the mine to the Hunter River is wholly owned by BMC and therefore there is no predicted consequence to private land if this occurs. Land 1 to 2 km west of Bengalla is also owned by BMC, but beyond this distance ownership is private however there are only four registered bores on the private land to the west of Bengalla before land is owned by Glencore for Xstrata Mangoola.

BMC has an existing comprehensive monitoring network comprised of standpipes and vibrating wire piezometers between Bengalla and private bores to the west of Bengalla that would detect any impacts early, prior to private bores being affected. This monitoring would allow BMC sufficient time to address the matter with landowners. This will be outlined in the revised Water Management Plan following approval of the Project.

2. Impact on Hunter River

A potential risk is the modelling underestimating the zone of drawdown around Bengalla, increasing the flow of water from the Hunter River to the underlying alluvium. The likelihood of this is low as Bengalla is already operating in close proximity to the alluvium and river, and there is no evidence that the flow in the Hunter River is being compromised by existing mining operations. The segment of the Hunter River adjacent to Bengalla is regulated by upstream releases from Glenbawn Dam, and any losses from the river to the underlying alluvium would likely be masked by these flows, resulting in no significant consequence. Further to this, BMC have an extensive monitoring network in the alluvium to detect any significant drawdown within the alluvium that may draw from the Hunter River. This will be outlined in the revised Water Management Plan following determination of the Project.

3. Water take

A potential risk is that the estimated take of water from the alluvial and Permian groundwater systems exceeds the estimates predicted in the Groundwater Impact Assessment (Appendix K of the EIS). As noted above the likelihood of this is low as the modelling was conservative (see EIS Appendix K, Section 10). BMC will monitor groundwater levels routinely and analyse the results. Should the results indicate the water take from the aquifers exceeds the predicted rates, the groundwater model will be updated. The updated model will reassess the water take and BMC will account for any additional take of water by acquiring further water licences at the appropriate time should this be required. This will be outlined in the revised Water Management Plan following determination of the Project.

4. Final void – source not a sink

There is a potential risk the final void will act as a source, not a sink as predicted in the Groundwater Impact Assessment (Appendix K of the EIS). This would result in groundwater flows out of the void into surrounding aquifers, instead of being contained by evaporation on the lake void.

This likelihood of this is considered low as both the surface water and groundwater model (see Appendix J and Appendix K of the EIS), both using different methodologies concluded the water levels in the void will stabilise below the static water level forming a sink. However should outflow occur, the consequences are not likely to be serious as the groundwater modelling indicated that recharge to the alluvium and river leakage dominates the alluvial water budget, and flow from the Permian comprises only a small portion. The groundwater quality in the Permian sequence is already known to be poor, and therefore the final void is unlikely to result in any further deterioration to groundwater quality.

5.6.5 Assessment Against Aquifer Interference Policy

Issue

This response addresses the submission noting that an assessment against the NSW Aquifer Interference Policy (AIP) requirement that the proponent state the 'ability to demonstrate that adequate arrangements will be in place to ensure that the minimal impact considerations can be met' (AIP, s3.2, p11) is not able to be carried out as the existing Groundwater Management Plan has not been provided.

Response

As described in Section 5.7.14 of the EIS, there are different minimal impact considerations that apply to "highly productive" and "less productive groundwater". The criteria for "highly productive groundwater" are:

(a) Total dissolved solids of less than 1,500 mg/L; and

(b) Contains water supply works that can yield water at a rate greater than 5 L/s.

The Hunter River alluvial aquifer satisfies these criteria and therefore constitutes highly productive groundwater. The Permian coal measures are a less productive groundwater source.

For both highly productive and less productive groundwater, the maximum allowable water table variation is 10% at a distance of 40 m from any high priority Groundwater Dependent Ecosystems (GDEs) or culturally significant sites listed under a WSP. There are no high priority GDEs or culturally significantly sites within the zone of depressurisation associated with the Project.

The maximum allowable decline in the water table at any water supply work is 2 m. Only one registered bore (GW073576) is expected to experience a decline in water levels. The drawdown at this location is predicted to be 2 m. Therefore, the Project complies with this minimal impact consideration.

For highly productive groundwater, the maximum allowable decline in pressure head at a water supply work is 2 m or 40% (whichever is lower). For less productive groundwater, the maximum allowable decline is 2 m. The maximum drawdown predicted by the groundwater model is 2 m. which occurs at bore GW073576.

With respect to water quality, the minimum impact considerations for highly productive groundwater are:

- Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity;

- No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. Redesign of a highly connected surface water source that is defined as a "reliable water supply" is not an appropriate mitigation measure to meet considerations 1.(a) and 1.(b);
- No mining activity to be below the natural ground surface within 200 m laterally from the top of high bank or 100 m vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a "reliable water supply"; and
- Not more than 10% cumulatively of the three dimensional extent of the alluvial material in this water source to be excavated by mining activities beyond 200 m laterally from the top of high bank and 100 m vertically beneath a highly connected surface water source that is defined as a "reliable water supply".

For less productive groundwater, only the first consideration applies. Since mining will move away from the alluvium, the impacts of the Project on salinity are expected to be lower than the impacts caused by existing mining operations. Historical monitoring data has shown that mining at Bengalla has indicated a stable to falling salinity in the Hunter River alluvial aquifer. Therefore, the Project is not expected to lower the beneficial use category of the groundwater source. Similarly, the Project is not expected to increase the salinity of the Hunter River by more than 1%.

Mining will not be undertaken within 200 m of the high bank of the Hunter River or beneath the river. The Project will not involve the extraction of alluvial material. Therefore, the Project complies with the minimal impact considerations for water quality.

5.7 MUSWELLBROOK SHIRE COUNCIL

5.7.1 Bengalla Link Road Realignment

Issue

The Project, taken individually and in aggregation with other proposals requiring road closures and road realignments will have a substantial impact on traffic efficiency in the local government area.

Response

The Project will require realignment of the Bengalla Link Road however this is not anticipated to be required until approximately Year 15 of the Project. The Traffic and Transport Impact Assessment (TTIA) (Appendix Q of the EIS) completed for the Project (with consideration of other projects and cumulative traffic growth) predicts that all of the key intersections used by BMC employees on route to Bengalla will perform at a satisfactory level of service (or better) for the duration of the Project following the completion of the already scheduled or approved intersection upgrades.

It is acknowledged that MSC is undertaking a Mine Affected Road Study with the view to revisiting the Western Roads Strategy originally prepared in 1997. As part of the original Western Road Strategy, BMC constructed the 6 km Bengalla Link Road connecting Denman Road to the south and Wybong Road in the north. Whilst the revision to Western Roads Strategy is yet to be finalised, BMC remain committed to consulting with MSC and the RMS regarding the future realignment of the Bengalla Link Road, intersection design and ongoing management of the surrounding road network.

As noted in Section 5.4.3 of the EIS section 138 of the *Roads Act 1993* (Roads Act) work cannot be carried out in, on or over a public road unless the appropriate roads authority has granted consent. Consent under section 138 of the Roads Act will be required for the closure and gazettal of a new section of the Bengalla Link Road with MSC being the relevant road authority.

BMC has a long history of maintaining the road network adjacent to Bengalla. BMC has provided significant funding associated with upgrade and support of the existing road network as part of its original Section 94 contributions, existing Voluntary Planning Agreement (VPA) and Development Consent conditions since Bengalla was approved in 1995.

The alignment of the Bengalla Link Road (Stage 1 and Stage 2) was funded and constructed by BMC in consultation with MSC and the RMS. In 2009, the Bengalla Link Road Stage 2 was constructed before being formally dedicated as a MSC road with BMC's commitment to maintain the Bengalla Link Road to the 1 in 100 year flood limit. BMC have committed in the EIS to remain responsible for the life of the Project for the costs of the maintenance of the Bengalla Link Road to the western limit of the 1 in 100 year flood level.

BMC is also currently working with DP&I, MSC and neighbouring mines regarding the development of the *Department of Planning and Infrastructure Thomas Mitchell Drive Contributions Study* (TMD Study) (GHD, 2013).

5.7.2 Final Landform

Issue

The Project falls well short of 'best practice' insofar as final landform and rehabilitation is concerned. The Project fails to provide adequate micro relief of its overburden emplacement and proposes a deep final landform void.

Response

Final Landform

Bengalla has been operating successfully in accordance with DA 211/93 (as modified) since 1998. As a result the Main OEA is already approved under existing approvals and is well established in the landscape.

Due to the westerly slope of the topography and detailed mine planning the Project has not proposed to increase the height of the OEA. As a result Year 1 of the Project is largely a continuation of the already approved operation and does not require any overburden emplacement above the approved maximum height of RL 270 m. In addition, no overburden material is required to be emplaced on the eastern face of the Main OEA which has largely completed rehabilitation and is showing positive signs of early pasture growth and tree establishment.

MSC Draft Land Use Development Strategy

As noted in Section 8.21.6 of the EIS the Project has been designed with consideration of the final landform principles of the MSC Draft Land Use Development Strategy (LUDS) (MSC, 2012). The way in which the Project has considered and adopted these key principles is as follows:

Final Void

- The development of a single final void;
- Final void design at Bengalla has been engineered to including stable highwalls; and
- The Project final void will have sufficient freeboard and as such, will not require a spillway and is not free draining.

Overburden Emplacement Area

- Final OEA has been designed to ensure contours will be as natural as possible, developing a free-draining landform, as far as practicable. This will ensure the stability of the final void highwalls and will minimise natural erosion and sedimentation; and
- The final landform design has incorporated the re-establishment of the pre-disturbance catchment areas as far as practicable.

Rehabilitation

- Rehabilitation of the eastern face of the OEA directed towards Muswellbrook will consist of a higher percentage of woody vegetation designed to replicate the species found within the Box Gum Woodland community present within the Disturbance Boundary.

Further details into the LUDS components are provided below.

Final Void

The conceptual final landform illustrated in the EIS (EIS, Figure 68) was prepared on the assumption that mining operations would cease at the end of the approval period sought for the Project and the site would be rehabilitated to industry standards. A single final void has been developed for the Project following the completion of mining in Year 24. The development of a single void ensures that the number of residual landform voids are minimised, which is a key principle of the LUDS.

Also in consideration of MSC's LUDS, a number of options for final void development and rehabilitation were considered and presented in the EIS (see EIS Section 8.21.7) during the development of the Project mine plan. An assessment of each option considered the economic costs and environmental constraints associated with each, including overburden volumes, overburden rehandle requirements and the potential coal resource sterilisation. The options considered the following alternatives for the development of a final void:

- Option 1 – 'Blast and Doze' to a stable final landform (the Project);
- Option 2 – Backfill the void to the original surface level; and
- Option 3 – Backfill to re-establish natural drainage.

As noted in Section 8.21.7 of the EIS Option 1 was the preferred option for the Project should no further approvals be sought or granted beyond Year 24. The final void will be stabilised in the following manner (following consultation and agreement with relevant regulators):

- The low wall will be battered back from the angle of repose to ensure the long term geotechnical stability of the face, with the determination of geotechnical stability and recommendations as to the final slope undertaken by a qualified geotechnical engineer. This will be based on an assessment of the overburden material, the likely degree of settlement, and the degree of weathering expected in the long term;
- The final void will have the majority of the highwall blasted back to improve the safety and stability to an angle of repose of between 23 and 25 degrees;
- The endwalls proposed for the final void will be blasted back to improve the safety and stability to an angle of repose of approximately 33 degrees;
- Surface water drainage on and over the low wall will be minimised through the construction of drainage control structures and the aim of diverting as much of the catchment as possible away from the final void and back into the surface water system; and
- Erosion of the low wall will be controlled by limiting the length of slope through the use of contour and graded drains, minimising the slope, and by the establishment of suitable vegetation.

As discussed in Section 8.6.3 (Surface Water) and Section 8.7.3 (Groundwater) of the EIS, water runoff and groundwater seepage will settle in the remaining void, creating a lake up to approximately RL 70 m at 1,000 years following the cessation of mining (see EIS Figure 68). The freeboard between the water level surface and the void spill height is predicted to be over 100 m under worst case conditions and as such does not warrant a spillway.

Should a future approval not be sought and/or granted BMC will develop a Final Void Management Plan within 7 years of mine closure. Following consultation with MSC on 10 March 2014, BMC has committed to complete additional tree and / or shrub rehabilitation within and adjacent to the final void to ensure a natural as possible landscape. As such the Conceptual Final Landform for the Project (EIS Figure 68) has now been revised accordingly. The Revised Conceptual Final Landform is now presented on **Figure 11**. The final requirements of the Rehabilitation Management Plan will be developed in consultation with MSC and other relevant regulators to the satisfaction of DP&I.

Overburden Emplacement Area

As mining operations progresses to the west, the overburden emplacement area will continue to be established to the east of active mining areas. Once established, the overburden emplacement areas will be shaped for progressive rehabilitation as soon as practicable.

Rehabilitation

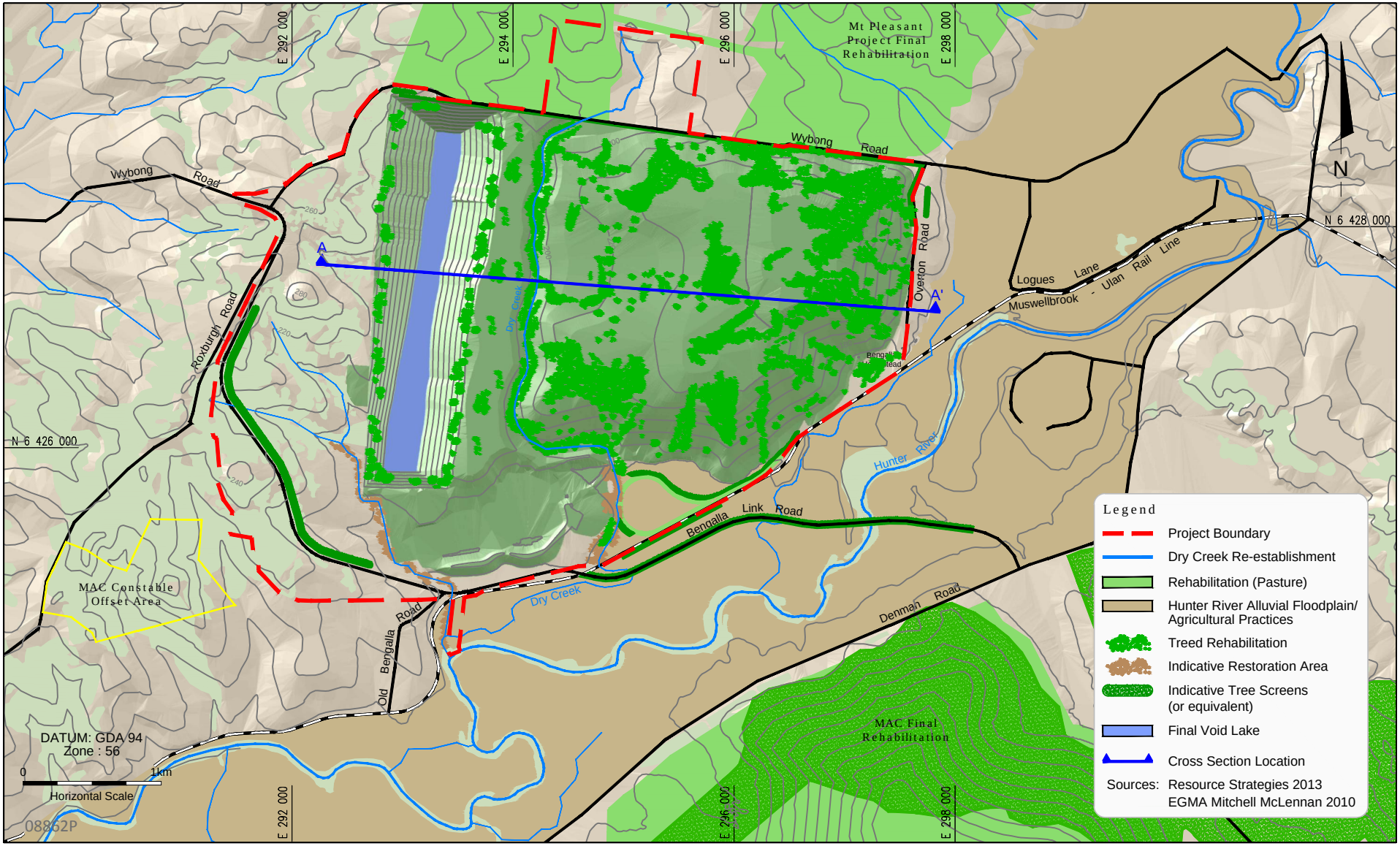
As described in the EIS it is anticipated that the Project final landform will be predominately rehabilitated to grazing pasture, with plantings of native woodland vegetation to achieve a minimum of 10% vegetation cover and higher density tree coverage of the eastern face of the OEA. The revegetation strategy at Bengalla has been developed as a result of previous rehabilitation experience and in accordance with current leading practice and to be similar to the landscape presently found within and adjacent to the Disturbance Boundary.

As noted in Section 8.21.6 of the EIS it is anticipated that the landform will be predominately rehabilitated to grazing pasture, with plantings of native woodland vegetation to achieve a minimum of 10% treed vegetation cover and higher density tree coverage of the eastern face of the Main OEA.

Where possible, any tree planting will be connected to remnant areas of forest or woodland, so as to provide corridors and habitat for fauna migration and colonisation. BMC is continuing to investigate the development of vegetation plantings in conjunction with DRE and in accordance with the Synoptic Plan.

BMC will continue to liaise with DRE and MSC with regard to the end mine landform design and establishment of the final landform for the Project following the determination of Development Consent.

However, in response to comments from MSC relating to the requirement for an improved outcome of the eastern face of the Main OEA additional assessment have been completed to further improve the visual outcomes as discussed in **Section 5.7.3**.



BENGALLA MINE

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Revised Conceptual Final Landform

FIGURE 11

5.7.3 Rehabilitation Management Plan

Issue

Council noted specific concerns regarding the rehabilitation proposed for the Project, in particular the rehabilitation of the eastern face of the Main OEA.

Response

As part of this RTS, BMC has completed further detailed landscape designing by JVP Integral Design in order to improve the overall look of the OEA with focus provided on the eastern face (the primary view point from Muswellbrook). The detailed landscape design is aimed at enhancing ideas presented on the conceptual final landform in the EIS (see EIS Figure 68) with a summary provided below.

Landscape Design

Additional landscape design work completed for the RTS by JVP Integral Design has indicated the OEA rehabilitation works could be amended to meet MSC's requirements by:

- Increasing the visual integration of final mining landforms into the landscape settings of the locality are emphasised, especially as seen from the east;
- Enhanced by creating larger patterning of tree groupings as woodland or forest and is to regular in patterning;
- Strategic tree plantings along dropdown structures and drainage lines;
- Add woodland plantings that utilise the upper slopes; and
- Planting includes the ecological scattered trees at three trees per hectare (with trees within each hectare being randomly aligned but along continuous lines.

In addition to the above, the vegetation patterns present in the surrounding hills have been incorporated into the revised landscape design including:

- Forest – includes dense planting with large tree species to emulate natural forests often found along ridgelines and down hillsides;
- Woodland – sparse to dense planting of medium height tree species. This planting is patchy around hillsides and on open plains;
- Scattered trees – scattered trees in small groupings or individually planted. These are located in between other groupings of forest or woodland planting;
- Woodlands and scattered trees – dense woodland with scattered trees to ensure large areas of empty land are avoided. Both to fit in with existing patterns of landscape, and also to provide bridging for biodiversity especially along drainage lines and dropdown structures; and

- Woodland and grassland – this type of landscape treatment emulates the natural hillsides, with dense patches of vegetation and grassland in between.

The abovementioned vegetation patterns have been conceptually used to enhance the Conceptual Final Landform figure included in the Bengalla EIS (Bengalla EIS Figure 68) with the revised Conceptual Final Landform presented on **Figure 11**.

Following determination of the Project the final densities of the vegetation patterns will be included in the revised Rehabilitation Management Plan. However, in order to view the above amendments to the conceptual Project rehabilitation strategy the photomontage from Ironbark Ridge (PM3) in Muswellbrook has been updated.

Figure 12 presents the existing view (as presented in Figure 38 of the EIS) along with the revised Year 8 tree plantings. **Figure 13** presents the original Year 24 rehabilitation from the same location in comparison to the improved design of the OEA based on the strategies proposed above.

The landscape design works has indicated that that the proposed conceptual final landform does comply with MSC's requirements including biodiversity connectivity that is no more than 3 km spacing between minimum patches sizes of 10 ha and interstitial tree plantings at 60-80m spacing (3-4 trees per ha).

The landscape design works have also indicated that high density tree plantings over the entire eastern face of the OEA would lack the patterning that is the character of the adjoining hill. Planting high density tree plantings on the eastern face would likely reinforce the visual simplicity of the 'planar' landform.

BMC will revise the existing Rehabilitation Management Plan to include outcomes of the landscape assessment in consultation with MSC and other relevant regulators to the satisfaction of DP&I.

HB1375 012 Bengalla - Photomontage Existing And Year 8.dwg

BENGALLA

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

BENGALLA MINE

Photomontage Location 3
Ironbark Road (Existing and Year 8)

FIGURE 12

HB1375 013 Bengalla - Photomontage Year 24.dwg

BENGALLA

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BENGALLA MINE

Photomontage Location 3
Ironbark Road (Year 24 EIS and Revised)

FIGURE 13

5.7.4 Dry Creek Reinstatement

Issue

Council does not support the reconstruction of Dry Creek and notes that experience has shown the inability to reconstruct waterways to an appropriate standard.

Response

Dry Creek is ephemeral and has a total catchment area of about 18 km^2. Dry Creek was determined to be a 3rd order stream under the Strahler stream classification system. Over the 60 month period November 2008 to November 2013, sampling at Dry Creek has been attempted on at least 57 separate occasions. For all but three of these sampling efforts, Dry Creek at the upstream location has not had sufficient flow for sampling.

The preliminary design for the proposed reinstatement of Dry Creek has been completed by Parsons Brinckerhoff and is provided in Appendix X of the EIS with a summary provided in Section 8.21.8 of the EIS. In order to obtain the best possible outcome for the reinstatement within the constraints of the existing environment and Project mine plan, a number of alternative options were assessed (see EIS Section 4.13.9).

A baseline photographic record and visual fly-through of the Dry Creek alignment within the Project Boundary was completed for the Project (see Appendix X of the EIS). **Plate 6** and **Plate 7** provide a representative example of Dry Creek from within the Project Boundary.

The geomorphology of the reinstated channel has been designed to be similar to that of the existing Dry Creek channel (see EIS Section 8.6.1), with the exception of the channel slope, which is flatter for the majority of the re-established reach and with a short reach of increased slope towards the downstream end. A conceptual location, cross section and indicative rehabilitated image of the reinstated Dry Creek is included in Figure 70, 71 and 72 of the EIS.

The modifications to the channel slope morphology of the reinstated creek will likely result in the more efficient conveyance of surface water flows than the existing creek. To account for the effect of increased flow efficiency, a longer stream length has been introduced. Opportunities to incorporate channel meanders have been maximised to control flows and replicate existing conditions while at the same time recognising existing constraints such as the existing morphologically sound sections of creek.

Several mines in the Hunter Valley have demonstrated that sections of existing creeks and tributaries can successfully be realigned and rehabilitated similar to pre disturbance conditions. A number of examples include the successful Ashton Coal's Bowmans Creek Diversion (Ashton Coal, Recreating Nature Brochure) and the Mt Owen Complex's Bettys Creek (through various stages) and Swamp Creek Diversions (Mt Owen Complex AEMR, 2012).

Plate 6
Typical Dry Creek Section – Central Project Boundary

Plate 7
Typical Dry Creek Section – Central Project Boundary

BMC will develop a Dry Creek Reinstatement Management Plan within five years of the proposed construction in consultation with relevant regulators to ensure that effective management measures are employed during the construction and reinstatement and revegetation of Dry Creek. The Dry Creek Reinstatement Management Plan will describe the monitoring and rehabilitation techniques and provide erosion and sediment control measures to be implemented.

5.7.5 Community Services

Issue

The Project would have an unacceptable impact on the provision of community services.

Response

The Social Impact Assessment (Appendix R of the EIS) completed for the Project identified a significant shift in the unemployment rate in the Muswellbrook LGA has occurred over the 12 months to June 2013, associated with the recent downturn in the coal mining industry. In June 2012, the unemployment rate for the Muswellbrook LGA was 2.8% (233 people) which was slightly higher compared to the Singleton and Upper Hunter LGA's, which were 1.2% and 1.3% respectively although significantly lower than NSW (5.2%).

In contrast, the unemployment rate in December 2012 in the Muswellbrook LGA was 4.7% (412 people). These figures have been trending upward consistent with the Secondary Study Area where unemployment levels have returned to similar levels as in 2008 with almost 1,000 persons being unemployed. This is in marked contrast to the situation in June 2012 when it was considered that the local economy was enjoying very close to full employment with any remaining unemployment considered to represent long term unemployed or structural unemployment. The current unemployment numbers suggest that there are unemployed people available with appropriate skills to support the Project (as at 2013).

The operations phase is expected to generate a total of approximately 1,164 jobs, 491 being direct and an additional 673 being flow-on jobs. Both scenarios will result in 118 jobs being generated for local workers and an additional 862 being generated for non-local workers (residing outside the Secondary Study Area).

The Social Impact Assessment (Appendix R of the EIS) identified that assuming the full scale operation of all approved mining operations and projects (and the downturn in the coal industry is reversed) then the potential cumulative impacts include the exacerbation of impacts on child care and on some elements of physical infrastructure such as the sewerage treatment facilities will further increase demand on facilities which are already considered to be at capacity. The cumulative impact on primary and particularly secondary education facilities would also change the situation from manageable to a situation where current physical facilities would need to be expanded.

BMC will provide timely and appropriate operations workforce information to MSC, to assist MSC to plan for future needs in relation to housing and accommodation, affordable housing and child care.

In addition, BMC has agreed revised terms with MSC associated with the existing VPA which will provide in kind and monetary contributions to ensure any potential effects of the Project are accounted for and can be allocated in such a way to minimise any potential future impacts of the Project.

5.7.6 Cumulative Air Quality

Issue

The Project would contribute to particulate matter in the Upper Hunter air shed in circumstances where the air shed is at capacity insofar as the National guideline is concerned. The Project makes no sufficient attempt to manage dust with best practice techniques.

Response

A summary of ambient air quality monitoring data conducted by the NSW EPA in the Upper Hunter Valley and by the various mining operations surrounding Bengalla is presented in Section 6 of the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS). The review of the ambient air quality data indicates that the air quality in the region is typically good to fair for the majority of the time as classified by the NSW EPA Air Quality Index.

Best practice operational dust mitigation measures committed to be utilised by BMC are described in Section 7.2 and Section 11.2 of the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) and reproduced in the Summary of Mitigation Measures proposed for the Project (see **Table 21**).

BMC has also committed to continuing to investigate and review the feasibility and practicality of new and improved dust control technologies over the course of the Project, in line with continuous improvement principles to ensure the mine operation is achieving best practices where possible.

BMC has also committed to updating the existing dust and blast management systems with a contemporary real time air quality management system combined with predictive meteorological forecasting.

The best practice operational dust mitigation measures reflect those identified in the BMC Particulate Matter Control Best Practice Management Determination (BMC, 2012). The measures proposed for the Project are consistent with the recommendations of the '*NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining'* (Katestone Environmental, 2010).

The current BMC Air Quality and Greenhouse Gas Management Plan will be updated for the Project in consultation with the relevant regulators for construction and operational activities associated with the Project and shall include commitments in this EIS.

5.7.7 The National Environment Protection Measures

Issue

The National Environment Protection Measures, of no more than 50 µg/m^3 of 10 micron particulate matter averaged over a 24 hour period (and having a target goal of no more than 5 breaches of that standard over a 12 month period) has already been exceeded in the Muswellbrook township and grossly exceeded in the Singleton township. The putative standard for the potentially more harmful 2.5 micron material has been exceeded substantially more in the Muswellbrook township.

Response

The ambient air quality monitoring data collected by the NSW EPA in Muswellbrook and Singleton (and applied in the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS)) include contributions from all sources in the wider area which include; active mining, agricultural activities, anthropogenic sources, commercial sources, industrial sources and biogenic sources. The ambient air quality monitoring data also include contributions from regional events as such as bushfires and dust storms.

Initiatives by the NSW EPA include the Upper Hunter Air Particles Action Plan which outlines a range of measures to improve air quality in the Upper Hunter and the Dust Stop program being implemented through pollution reduction programs attached to each coal mine licence to ensure the most reasonable and feasible particulate control options are implemented for each coal mine. These initiatives are aimed at improving air quality in the Upper Hunter and reducing the potential for exceedances of the air quality criteria.

The National Environment Protection Measure (NEPM) standards apply to the population as a whole, and specifically do not apply to individual dwellings or to hot-spot locations such as receptors or populations near highways or near industry.

NSW EPA impact assessment criteria are applied to modelling assessments in order to identify the potential risk impacts. DP&I acquisition criteria apply to indicate where unacceptable impacts may occur.

In the recent study *Upper Hunter Valley Particle Characterization Study* (CSIRO Study) (CSIRO, 2013) examining the characterisation of $PM_{2.5}$ in the Upper Hunter Valley has found that wood smoke from sources such as wood heaters is a significant contributor to measured $PM_{2.5}$ levels in the Muswellbrook area, contributing approximately 30% of the total measured $PM_{2.5}$ levels in the area. The contribution in winter periods in Muswellbrook is much higher again.

The CSIRO Study found that mining activities are not a significant contributor of $PM_{2.5}$ emissions generally, as these fine particles are predominantly the result of combustion processes, rather than physical activity on crustal matter.

Wood smoke is a serious issue in many larger rural towns particularly those towns with cool winters and low lying topography which traps $PM_{2.5}$ particles. Resources and specific legislation are available to Local Government for more effective community education, enforcement to reduce problematic wood smoke emissions and agricultural burning.

5.7.8 Hunter Air Shed and Human Health

Issue

The proposed development will contribute additional dust to the Upper Hunter air shed in circumstances where human health has already been intolerably compromised. The Proponent's air quality methodology avoids assessing the cumulative impact of its emissions on the tolerance threshold created by the standard in circumstances where the air shed has cumulatively exceeded the threshold. Council submits that the development will have an intolerable impact on human health and development approval should be refused.

Response

A NSW Health study on the analysis of respiratory and cardiovascular diseases and cancer health for the Hunter New England Health Area Service (NSW Health, 2010), did not identify the area subject to mining as having any significantly different health outcome compared to areas where mining does not occur. The available evidence does not support the claim that human health in the Hunter is intolerably compromised.

Coal mining, and specifically this Project would make no tangible change to the existing levels of fine particulate that is closely associated with health impacts. The Project has also shown that it would have minimal effect on coarse particulate matter, given that it is moving west, further from Muswellbrook over time.

An Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) has been completed for the Project in accordance with the DGRs. Results from the Air Quality and Greenhouse Gas Impact Assessment are summarised in Section 8.1.3 of the EIS.

Table 31 of the EIS identifies all receptors predicted to experience exceedances of relevant air quality criteria for life of the Project. Following determination of the Project any significantly impacted receptor above relevant air acquisition criteria (that is not already located within an existing Zone of Affectation (ZOA) by another mining company) will then be subject to acquisition upon request from the landholder.

5.7.9 Night-time Dust Emissions

Issue

Further, Council notes that 12:00pm to 12:00am dust readings have typically been higher than daytime readings. A mix of different operational methods during the night together with air inversion compressions is likely to be contributing factors. Council notes that the night mining close to townships is a challenging environment but notes that routine high levels of dust emission during the night offset by lower day emissions (so as to approach but not exceed the daily average) is not best practice.

Response

Stable atmospheric dispersion conditions during night-time periods can be a cause of higher ambient air quality readings compared to day-time conditions when the atmosphere is generally more unstable. The highest emissions readings in rural towns and cities often occur on winter nights when many wood heaters are inappropriately damped (starved of fresh air and smoulder overnight) and air dispersion is limited.

The predominant night time air flows at Muswellbrook occur under a gentle downhill katabatic drift, which is orientated down river towards Bengalla from the town. Whilst night time air dispersion in these conditions may be poor, there would less dust from mining as there would not be any wind erosion, and there would not be sufficient wind to increase dust from normal mining activities to levels as high as occur in the day time.

5.7.10 European Heritage

Issue

Council notes that a number of items of significant European heritage including Bengalla Homestead will have been inaccessible for a substantial period of time if the application is approved.

Council submits that a detailed management and access plan for these items are drafted to the satisfaction of Council as part of any conditional approval.

Response

The Bengalla Homestead (along with the Overdene Homestead) is owned and managed by BMC in accordance with the approved EHMP as required by DA 211/93 (as modified). The existing EHMP will be updated for the Project in consultation with MSC and other relevant regulators.

Due to the proximity to existing and Project mining operations it is not practicable that the Bengalla Homestead be made accessible until such time that all mining operations and associated activities are located at a safe distance from the homestead to ensure high standards of safety are maintained at Bengalla.

5.8 NSW HEALTH – HUNTER NEW ENGLAND LOCAL HEALTH DISTRICT

5.8.1 Noise Mitigation Measures and Consultation

Issue

This response addresses the submission regarding noise mitigation measures implemented at mine owned residential properties or privately owned residential properties that are predicted to be impacted by the Project or are already subject to acquisition by another mining company. The response recommends that detail of consultation with potentially noise affected residents be provided and that a complaints mechanism be incorporated into a real-time noise management system.

Response

Since operations commenced at Bengalla in 1998, BMC has placed significant resources into achieving all reasonable and feasible noise mitigation measures in an effort to minimise operational noise levels. Section 8.3.4 of the EIS outlines the existing and proposed noise control strategies that will be implemented for the Project.

BMC will revise the existing Noise Management Plan to consider all reasonable and feasible noise management measures to minimise construction and operational noise levels at all privately owned receptors. BMC operates a real time noise monitoring system to provide feedback regarding Bengalla's acoustic performance allowing equipment to be carefully positioned to avoid excessive noise at private receptors. BMC has committed to updating its existing real time noise monitoring system to incorporate predictive modelling of meteorological conditions against planned operations.

As noted in Section 8.3.3 of the EIS, 15 of privately owned receptors are predicted to be impacted by the Project however are already subject to acquisition by another mining company. BMC will consult with any such private receptor to ensure they are made fully aware of their predicted impacts as a result of the Project and will implement any additional mitigation measures (if required) in consultation with the other mining company.

Pending determination of Development Consent for the Project and consistent with the requirements of BMC's existing development consent a number of noise mitigation measures will be implemented at private receptors located within the Project noise management and acquisition zone should they be requested by the landowner. These measures may include double glazing of the windows, insulation and/or air conditioning.

All complaints received regarding operational noise impacts will continue to be responded to in accordance with BMC's existing Complaint's Response Procedure. This Complaint's Response Procedure details BMC's processes in regards to receiving, handling, responding to and recording details of all community complaints. A summary of the nature and outcomes of complaints is also reported in the Annual Review.

Throughout the development of the EIS, BMC has provided a number of opportunities to any private receptor to meet and discuss the Project with members of the Project Team (including predicted noise affected receivers). Details of the comprehensive stakeholder engagement completed for the Project is included in Section 6 of the EIS and summarised in **Section 5.8.7** of this RTS.

5.8.2 Predicted air quality impacts

Issue

The EIS predicts deterioration in air quality across a wide area adjacent to the mine that will impact upon neighbours of the mine - including over 100 private properties. A total of 16 private receptors are predicted to experience exceedances of the maximum 24 hour average PM_{10} criterion of 50 µ/m^3 during the project life. The EIS proposes acquisition of properties subject to high PM_{10} levels to address these exceedances.

Response

The Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) has predicted the potential effect of the Project on air quality in the surrounding environment. A number of properties were predicted to experience levels above the relevant air quality criteria, of which the majority of properties are those owned by mining operations.

In total, the Project is predicted to impact four privately owned receptors (Receptors 106, 110S, 110N and 156S) and six private properties (109, 111 and 245/246/249/250) above relevant air quality criteria excluding those that are currently entitled to acquisition by other mining companies.

5.8.3 Dust Control Measures

Issue

Acquisition of properties to achieve air quality goals is disruptive of the psychosocial fabric of the community and should be avoided where possible. If additional dust control measures are available and have not been included in the dispersion model, it is recommended that they are included before acquisition of properties is considered. Many mine owned properties will be greatly impacted by the proposal.

Response

Dust control measures as committed in Section 8.1.4 of the EIS include all feasible and reasonable measures and are consistent with the recommendations of the *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and / or Minimise Emissions of Particulate Matter from Coal Mining* (Katestone Environmental, 2010).

5.8.4 Advising Receptors of Health Risks

Issue

It is unclear what impact this will have on human habitation and the viability of small residential clusters in the vicinity of the mine. Residents of mine-owned properties should be fully informed of the health risks of residing in houses where levels of particulates are above assessment criteria.

Response

In accordance with the existing Development Consent (DA 211/93) BMC is required to send a copy of the NSW Health fact sheet entitled *"Mine Dust and You"* (as may be updated from time to time) to the owners and/or existing tenants of any land (including mine-owned land) where the predictions in the EA (Bengalla Development Consent Modification EA, Hansen Bailey 2010) identify that dust emissions generated by the development are likely to be greater than the relevant air quality criteria at any time during the life of the development. This condition (or equivalent) will be included Development Consent if approved for the Project.

5.8.5 Haul Road Control Emission Factor

Issue

The emission factors underlying the PM_{10} modelling assume an emission factor of 85% for control of dust due to hauling on unsealed roads. We acknowledge this may be theoretically achievable but it exceeds current practice as described in the referenced Katestone report. Hence we recommend that a sensitivity analysis should be performed using a realistic range of inputs, e.g. 65-80%, to provide a plausible estimate of the development's potential impact. We note the EIS assumes existing air quality criterion will be acceptable out to 24 years from the commencement of the project.

Given that air quality criteria are likely to be revised downward within that time it would be reasonable to assume a more conservative air quality goal will be applied two decades hence.

Response

Haul Road Control

An 85% control level for dust emissions from hauling on unsealed roads has been applied in the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS). This is based on the findings presented in the *BMC Particulate Matter Control Best Practice Management Determination* (BMC, 2012) and investigation of the annual evaporation rate for the site and the available water application rate of the haul road surface as described in Section 7.2 of the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS).

The NSW EPA has imposed a Pollution Reduction Program (PRP) for particulate matter requiring the existing Bengalla Mine to achieve and maintain a dust control efficiency of 80–85% (BMC, 2012). This commitment is consistent with other recent projects which have presented the same haul road control efficiencies in their Environmental Impact Statements including Mt Arthur 85% (Resource Strategies, 2013) and Drayton South 85% (Hansen Bailey, 2012).

The relevant equations and variables used in the haul road calculations are provided in the appendices of the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS). A direct proportional calculation can be applied to the data to calculate the effect of increasing or decreasing the applied control efficiency for dust suppression on haul roads. For example, in Year 1 reducing haul road control effectiveness from 85% to 80% would increase dust emissions by 14% relative to those modelled. Similarly, increasing control efficiency from 85% to 90% would decrease emissions by 14% relative to those modelled in Year 1. This would have a relatively similar influence on predicted off site dust concentrations due to the Project in isolation.

Results from the sensitivity analysis indicated that in reducing haul road control effectiveness from 85% to 80% would lead to an increase dust emissions by 14% and 19% in Years 1 and 24 respectively. Additional PM_{10} 24 hour (Project alone) and annual average (cumulative) impacts will be experienced at 32 private receptors (including receptors already located within a ZOA for another mining project) along with a significant number of mine owned tenanted properties.

In addition, the reduction in haul road control efficiency to 80 % will result in the acquisition of one additional private property (Receptor 180) as a result of PM_{10}, 24 hour impacts (50 $\mu g/m^3$ – 6 exceedances per year) that is not already subject to acquisition as a result of another mining project.

The EIS does not specifically assume that *"…existing air quality criterion will be acceptable out to 24 years from the commencement of the project."* The EIS has applied the criteria, as required in the current approval framework and nominated predicted properties that exceed these criteria (see EIS Table 31).

In this regard it is noted that the approval framework permits regulatory enforcement action in regard to continuous improvement, as part of best practice. Therefore, Bengalla will continue to improve its dust control measures and management practices into the future to ensure it is operating within the approved limits and is minimising its emissions as noted in Section 8.1.4 of the EIS.

BMC is committed to maintaining best practice operations including maintaining haul road control levels consistent with the BMC Particulate Matter Control Best Practice Management Determination (BMC, 2012).

5.8.6 Rainwater Tanks

Issue

The EIS does not provide comment on issues associated with drinking water, specifically for residents without a reticulated water supply and reliant on rain water tanks. A detailed analysis of issues associated with water quality from rainwater tanks at residences is recommended. Hunter New England Population Health strongly supports the inclusion of measures to address impacts to drinking water quality from rainwater tanks. The installation of first flush systems for private rainwater tanks and implementing a tank cleaning program for properties affected by air quality impacts of the project are suggested strategies.

Response

A number of scientific studies have been conducted investigating the potential health effects of mine dust entering rainwater tanks for receptors located near coal mining operations. Studies conducted in the NSW Hunter Valley (Noller, 2009), Queensland (Lucas et al., 2009) and in the Gloucester Valley (Parkinson & Stimson, 2010) investigated potential health effects of mine dust entering the rainwater tanks via the deposition of material on rooftop surfaces.

These studies found similar results with negligible amounts of trace elements (including lead) in the samples of tank water. Measured levels for these elements were below the relevant Australian Drinking Water Guidelines. Where it was investigated, the studies also found no significant difference in the water quality of tank water from houses close to mining operations compared to those further away or with town water.

The operation and maintenance strategies provided by NSW Health in regard to the use of rainwater tanks include first flush systems and other safeguards. These measures would minimise the risks associated with the consumption of rainwater regardless of location (i.e. whether near a mine or not). The NSW Health Guidelines are supported and it is considered that all receptors with rainwater tanks should utilise these strategies to ensure any potential health risks are minimised.

BMC has measures already in place (in accordance with DA 211/93) which will continue apply for the Project including the provision of first flush systems for all private properties subject to acquisition as a result of the Project (where not already in place from another mining company).

5.8.7 Level of Community Concern with the Project

Issue

The EIS considers a range of project specific and cumulative social impacts of mining in the area, including on demand for housing, education and health services, and to community identity and wellbeing. It is recommended that the proponent continue to monitor social impacts over time and make adjustments as necessary.

We note that while there is extensive description of the community and stakeholder engagement processes undertaken there is no information provided in the stakeholder engagement section of the EIS on the level of community satisfaction or dissatisfaction with the project.

Response

The extensive stakeholder engagement efforts completed for the Project is discussed in Section 6 of the EIS. Community stakeholder engagement activities carried out for the Project include:

- Coal and Allied's Muswellbrook shop front;
- Letter to near neighbours;
- Biannual Community Open Day and general community sponsored events;
- Reports and meeting information accessible in the Muswellbrook and Denman libraries;
- Newsletters;
- Website;
- Upper Hunter Show and Bursting With Energy Expo;
- Site tours and presentations;
- Local media; and
- Presentations at local schools.

Throughout the stakeholder engagement process, BMC was only contacted by nine individuals to discuss the Project. Of these individuals, seven are predicted to receive significant air and / or noise impacts from the Project; one was a near neighbour not predicted to be impacted above air or noise criteria and one additional community member. Each response was considered of high importance and concerns raised assisted in the development of the EIS and in particular the Social Impact Assessment (Appendix R of the EIS) for the Project. Section 6.4.3 of the EIS identifies the concerns raised by the community while Table 23 of the EIS indicates how these concerns were addressed.

No other community input was directly received through the extensive consultation process.

As discussed in **Section 2**, following the exhibition of the Project EIS, a total of 97 Public Submissions were received which outlined the significant support that community members have for the Project.

5.9 ROADS AND MARITIME SERVICE

5.9.1 Contribution to Intersection of Denman Road and Thomas Mitchell Drive

Issue

This response addresses the submission which recommends that BMC contribute to the upgrade of the Intersection of Denman Road and Thomas Mitchell Drive and bring forward the works.

Response

The TTIA (Appendix Q of the EIS) and as noted in Section 8.13.3 of the EIS it was identified that HVEC is obligated to carry out further improvements to Thomas Mitchell Drive as part of their Open Cut Consolidation Project. Project Approval 09_0062 requires HVEC to upgrade the Thomas Mitchell Drive/Denman Road intersection to the satisfaction of the applicable roads authority, by the end of December 2019 unless otherwise agreed by the roads authority.

As a result of the statutory requirement above this upgrade was included in the TTIA. Results presented in Section 8.13.3 of the EIS indicate that following the Thomas Mitchell Drive/Denman Road intersection upgrade the intersection performance will improve from 'unsatisfactory with excessive queuing' to 'acceptable', with a LoS of B.

The maximum queue length for the right turn from Thomas Mitchell Drive onto Denman Road will be reduced to 20 m for the AM peak and 27 m for the PM peak.

DP&I has commissioned the *Draft Department of Planning and Infrastructure Thomas Mitchell Drive Contributions Study'* (Draft TMD Study) (GHD, December 2013). As part of this study GHD will make recommendations associated with the upgrade and ongoing maintenance of Thomas Mitchell Drive.

5.10 NSW RURAL FIRE SERVICE

5.10.1 Bushfire Management

Issue

Although the EIS addresses the requirements of maintaining asset protection zones and land management in general it remains silent in regards to water supply, evacuation arrangements and public road access.

Response

As noted in Section 8.16.3 of the EIS, the potential risk of fires will continue to be managed in accordance with the existing Bushfire Management Plan. BMC will continue to maintained fire control infrastructure, with fire-fighting equipment located at key points and has an emergency team in place to respond in the event of a bushfire.

The Bushfire Management Plan outlines the evacuation procedure for the site. All primary access to and from the Project will remain via the existing Bengalla Mine Access Road off the Bengalla Link Road.

BMC will remain responsible for the life of the Project for the costs of the maintenance of the Bengalla Link Road to the Bengalla Mine Access Road (subject to MSC's responsibilities as the roads authority under the Roads Act).

5.11 DEPARTMENT OF PRIMARY INDUSTRIES

5.11.1 Strategic Agricultural Land Mapping

Issue

It is No Response that mapped Strategic Regional Land Use Plan Lands (SRLUP) indicate 28 hectares is within the project area, while the verification investigation shows that only 1 ha is to be affected in the disturbance area. None of the 35 hectares of equine CIC in the project area is to be disturbed and 369 ha of the 494 ha viticultural CIC land identified by verification will be disturbed. The amount of these lands is considered to now be less with the amended maps available per the DP&I announcement in "Getting the Balance Right - NSW Land Use' in early October 2013. This aspect and the fact that the land is used for grazing with the nearest vineyard 6 kilometres south of the project area leads us to determine that the impact on the viticultural industry is minimal.

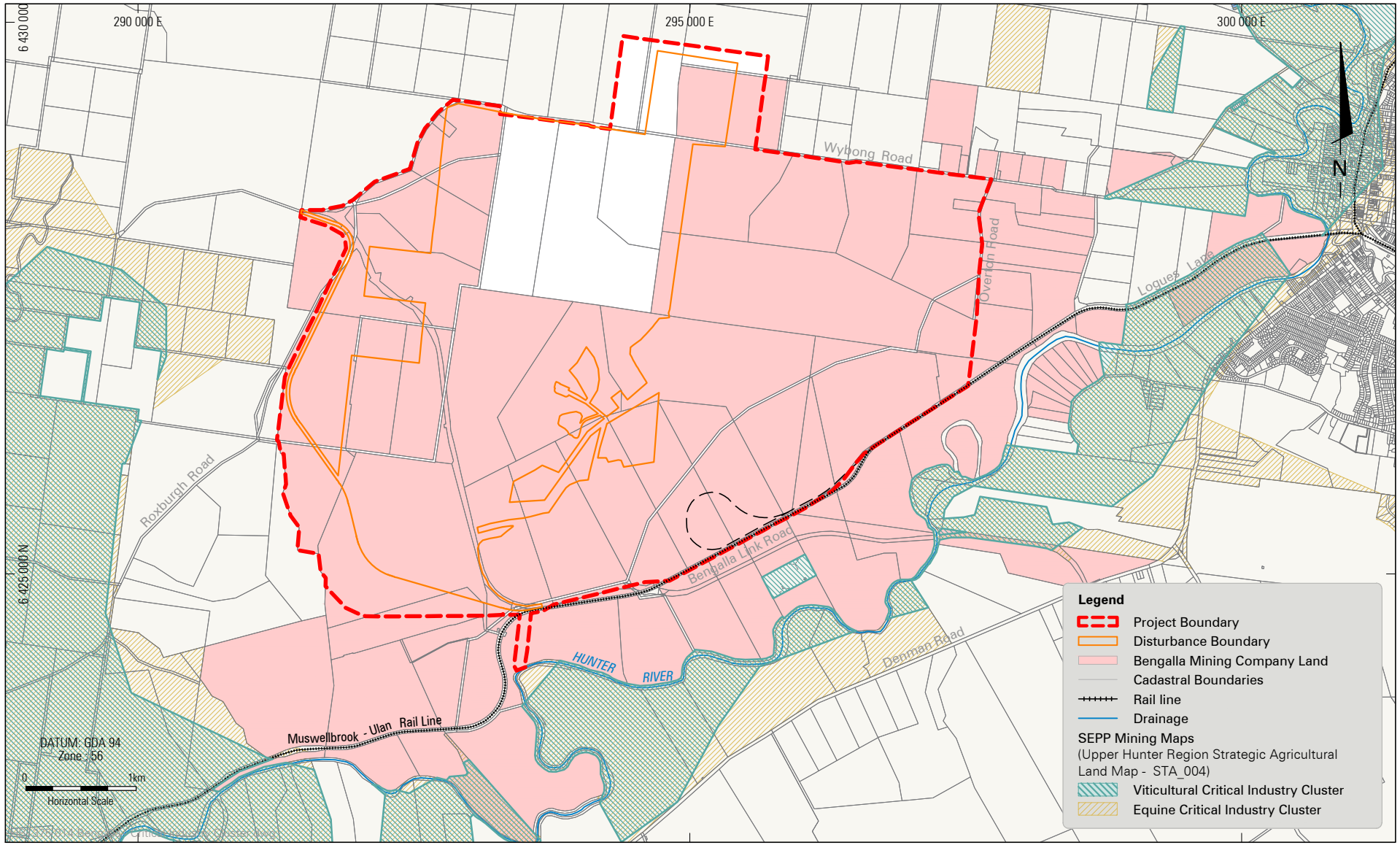
Response

On 28 January 2014 amendments were made to the SEPP Mining which included subsequent finalisation of the associated CIC Equine and Viticulture Mapping.

The relevant SEPP Mining map pertaining to the Project Boundary includes Upper Hunter Region Strategic Agricultural Land Map – STA_004. The final CIC mapping has resulted in no areas of mapped Equine or Viticulture CIC located within the Disturbance Boundary or Project Boundary (see **Figure 14**).

The amendments to the Mining SEPP did not result in any changes to the previously identified land mapped as BSAL as presented in the EIS (see EIS Figure 30 and 67).

A comprehensive BOS has been developed for the Project which is described in **Section** 4. As such an AIA has been completed by Scott Barnett and Associates for the BOS as described in **Section 4.2** and reproduced in **Appendix D**.



BENGALLA PROJECT

Critical Industry Cluster

FIGURE 14

5.11.2 Land Values

Issue

The proposed development is an expansion of an existing mine within the area for which the proponent has an exploration licence, in a landscape dominated by mining. Community consultation reported in EIS Section 6 - Stakeholder Engagement indicates that the community is concerned about the potential impact of the Project on "Property devaluation in the local area" (p.111, Table 23). The proponent claims to have addressed this issue in EIS Section 8.14 - Social, but this is not the case. Hence, no assessment can be made.

Response

Only properties directly adversely impacted by the Project, after implementation of mitigations measures, would potentially experience any property devaluation. Government policy requires that significantly affected properties are acquired by the proponent (see **Section 7.6.6**). Properties not physically impacted by the Project will experience normal fluctuations in value based on market supply and demand. Without the Project, mining at Bengalla will cease in 2017 with an associated reduction in demand for housing, if displaced employees leave the region seeking alternative work. The Project will ensure continued and expanded employment opportunities in the region and hence demand for housing in the region. Property devaluation in the region as a result of the Project is therefore unlikely.

The standard process (including compensation available) for the acquisition of significantly impacted properties is discussed in detail in **Section 7.6.6**.

5.11.3 Visual Amenity

Issue

The proponent claims that limited additional adverse impact on visual amenity is expected. However, there would be significant visual impact on the adjacent Pukara Estate olive grove. The proposed development would be in full sight of visitors approaching this tourist attraction. It is recommended that the proponent plant trees along the boundary of the proposed mine expansion and the olive grove to minimise adverse visual impacts. This tree planting should be designed, established and managed in consultation with Pukara Estate.

Response

As noted in Section 2.4.2 of the EIS Pukara Olives is an 80 ha olive grove located on Denman Road approximately 4.5 km south-west of the Project Boundary. Pukara Olives was established in 1999 and has coexisted within proximity to Bengalla since this time. Pukara Olives is owned by HVEC in conjunction with the operation of Mt Arthur Coal Mine.

As described in Section 8.1.2 of the Visual Impact Assessment, BMC will implement tree screening along Denman Road in the vicinity of Pukara Estate in consultation with the HVEC and the RMS.

5.11.4 Stakeholder Consultation

Issue

Stakeholder Engagement indicates that the community is concerned about the potential impacts of the Project (p.111, Table 23). However, no information is provided about the degree of concern for the issues raised. Details should be provided (e.g., a table detailing the number of times that an issue has been raised), so that an assessment can be made.

Response

As described in Section 6 of the EIS and discussed in **Section 5.8.7** of this RTS throughout the stakeholder engagement process, BMC was only contacted by nine individuals to discuss the Project.

Of these individuals, seven are predicted to receive significant air and / or noise impacts from the Project; one was a near neighbour not predicted to be impacted above air or noise criteria and one additional community member.

Each response was considered of high importance and concerns raised assisted in the development of the EIS and in particular the Social Impact Assessment (Appendix R of the EIS) for the Project.

Section 6.4.3 of the EIS identifies the concerns raised by the community while Table 23 of the EIS indicates how these concerns were addressed.

5.12 DAM SAFETY COMMITTEE

5.12.1 Prescribed Dams

Issue

Concept design for proposed dams (CW1, Bengalla Staged Discharge Dam and Mount Pleasant Discharge Dam) for the Project, including assessments of dam "Consequence Category" will need to be submitted to the DSC prior to construction. The consequence category assessment should include consideration of changing activities downstream of the dams in an active mining area.

The proposed dams should be designed to withstand impacts from mining.

Notification areas will be delineated any prescribed dams on the site and then the mine will need to contact DSC regarding mining within these Notification Areas.

Response

As noted in Section 5.4.5 of the EIS the *Dams Safety Act 1978* (Dams Safety Act) requires the NSW Dams Safety Committee (DSC) *to "formulate measures to ensure the safety of dams"* and to *"maintain a surveillance of prescribed dams".* A "*prescribed dam*" is any dam listed under Schedule 1 of the Dams Safety Act.

The Project will involve the construction of dams that are likely to be prescribed dams. These include the relocated Staged Discharge Dam (currently a prescribed dam), Mount Pleasant Discharge Dam and CW1.

If one or more of the proposed dams are deemed to be prescribed dams, then activities in the vicinity of these dams will be regulated by the Dams Safety Act and the DSC.

BMC will consult with the DSC at the appropriate time to ensure appropriate approvals are in place surrounding prescribing the required dams and mining within any nominated Notification Area.

6 SPECIAL INTEREST GROUP SUBMISSIONS

This section responds to the submissions received from special interest groups. Submissions were received from:

- *Muswellbrook Chamber of Commerce;*
- *CFMEU; and*
- *The Australian Institute.*

A response to each of the issues identified by the above mentioned submissions is provided below. The original submissions are presented in ***Appendix B****.*

6.1 MUSWELLBROOK CHAMBER OF COMMERCE

The Muswellbrook Chamber of Commerce noted *'On behalf of the Muswellbrook business community, the Muswellbrook Chamber of Commerce and Industry 'supports and encourages business enterprise in Muswellbrook and its districts'. Our support for this project is consistent with our Charter and recognises our reliance on the coal mining industry, particularly in our local area. Bengalla Mine is an important and respected member of the Muswellbrook business community and enjoys the Chambers support.*

As a result of the supporting submission no further response is required in this RTS.

6.2 CFMEU

The CFMEU noted that the *'Project considers the Bengalla Continuation Project is consistent with the objectives of the EP&A Act, and therefore supports the proponent's application and asks that the consent be granted in the term sought.'*

As a result of the supporting submission no further response is required in this RTS.

6.3 THE AUSTRALIAN INSTITUTE

6.3.1 Unemployment in the Primary and Secondary Study Area

Issue

At the 2011 census there were 28,671 people in the labour force working in Singleton, Muswellbrook and Upper Hunter Local Government Areas. The project would increase employment in the area by around 1 percent. This will not affect unemployment, however, with only 647 people looking for full time work in these areas at the census. Instead, they will come from outside the area, as is made clear in EIS appendix S6, who estimate the project will employ only 20 percent local workers, with 80 percent commuting from outside the area.

Response

As noted in Section 8.14.2 of the EIS in 2011 the level of unemployment in the primary and secondary study area was relatively low compared to the remainder of NSW when the local economy went through a period where it was approaching near full employment. However, since that time there has been a significant decline in employment. **Table 19** and **Figure 15** show the extent of the increase in unemployment from 431 in June 2011 to 1,192 in June 2013.

In comparison to NSW the unemployment rate for the secondary study area has stayed below the State benchmark. However, significantly the data also shows that the unemployment rate in Muswellbrook Shire (the primary study area) had increased to above the State level in June 2013 due to numerous difficulties facing the coal mining industry.

It should also be noted that the estimate reported in the Economic Impact Assessment (Appendix S of the EIS) comment was only in relation to the construction phase when it is quite normal to have low levels of local participation due to the nature of the skills required for construction in the mining industry. There is also a significant cluster of workers in the lower Hunter and Central Coast of NSW from where the bulk of this workforce would be recruited.

For the construction phase the project activities are relatively short term and for such short term assignments, construction workers prefer to work on a work week commuter basis. In addition, the construction phase scenario of 80 % non local and 20 % local was based on a conservative assumption when employment in the primary study area of Muswellbrook Shire was at the 2011 levels shown in **Table 19**.

However from a longer term sustainability and socioeconomic perspective, the much more important phase of the Project is the operational phase. It is well documented that the behaviour of the operations workforce is quite different to that of workers in the construction phase due to the relative short term nature of the work. The operations phase scenarios were based on a spatial distribution using the actual distribution of the existing full time workforce at Bengalla which shows that 89% of the BMC workforce lived within the secondary study area which includes Muswellbrook, Singleton and Upper Hunter Shires in September 2011 again at a time when unemployment was relatively low.

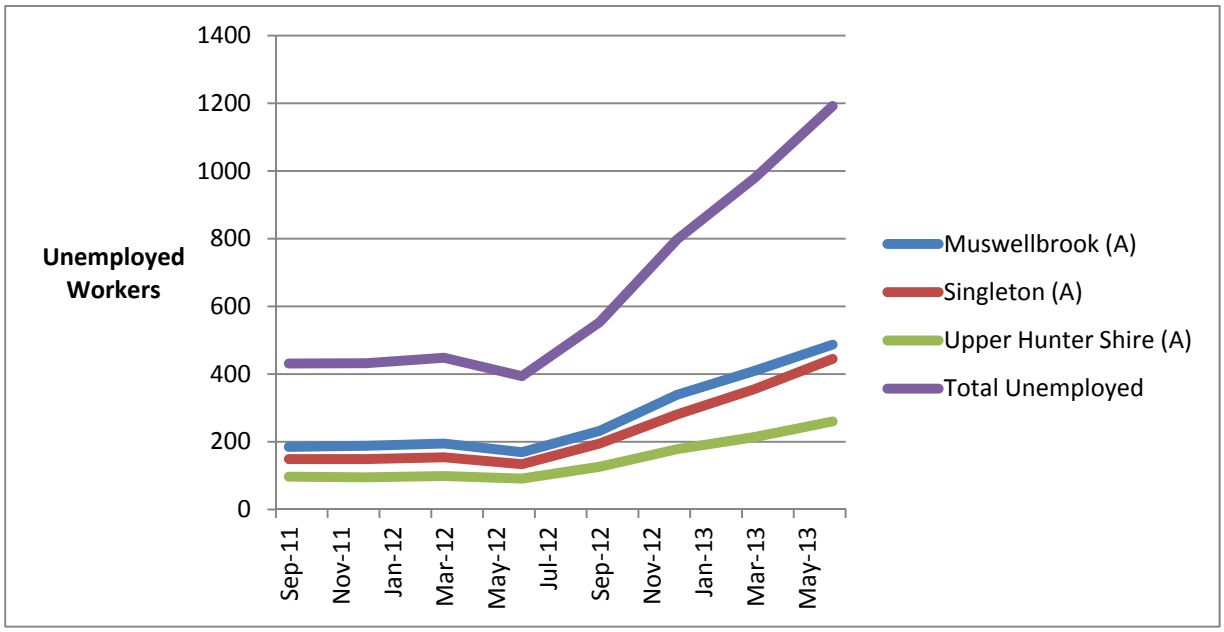
The data suggest that the local economy now has significant excess capacity so the assumptions used in the analysis on estimated sources of the workforce are now considered to be even more conservative and worst case.

Table 19
Unemployment Rate & Total Unemployed June 2011- June 2013 (Smoothed)

LGA	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12	Mar-13	Jun-13
Muswellbrook (A)	2.1	2.2	2.3	2.1	2.8	4	4.7	5.4
Singleton (A)	1.1	1.1	1.2	1.1	1.6	2.2	2.7	3.3
Upper Hunter Shire (A)	1.2	1.2	1.3	1.2	1.7	2.3	2.7	3.2
Unemployment Rate	1.5	1.5	1.6	1.5	2.0	2.8	3.4	4.0
NSW Rate	5.3	5.4	5.4	5.4	5.4	5.3	5.3	5.3
Muswellbrook (A)	185	188	195	169	232	339	410	487
Singleton (A)	149	149	154	134	195	281	356	445
Upper Hunter Shire (A)	97	95	99	91	126	178	214	260
Total Unemployed	431	432	448	394	553	798	980	1192

Source: DOE, 2013

Figure 15
Unemployment Trends June 2011 – 2013 (DOE, 2013)



6.3.2 Assumptions for Socioeconomic Impact Analysis

Issue

Appendix R Social Impact Assessment bases its multiplier assessment on the Gillespie Economics study, Appendix S7. Their multiplied employment estimates, summarised in EIS main volume also share the flaws of IO modelling, outlined above. Their results from Gillespie Economics' multipliers feed into their estimates of population change and housing requirements, which are also overstated.

Response

It should be noted that if the Gillespie Economics (Appendix S of the EIS) estimates were considered an overestimate of the employment impacts of the Project then the socioeconomic analysis should be a worst case due to a smaller increase in employment than has been modelled. This would result in the impacts on local population, housing and infrastructure would be significantly less than projected in the analysis.

However, before using the estimates from Gillespie Economics (Appendix S of the EIS), Martin & Associates conducted a reliability analysis of the Gillespie economic estimates using a more simplistic but well documented approach referred to as economic base analysis. This type of analysis classifies the local economy into those sectors of the local economy that are considered basic or "export oriented" (income flowing into the local economy) and those sectors which provide services to these expanding basic export sectors.

For example, jobs in the mining sector were classified as basic or export oriented because the share of mining jobs in the local economy was significantly above the benchmark economy. The classification uses actual Census data over three Census years totalling ten years from 2001 to 2011 to compare the secondary study area share (i.e. Muswellbrook LGA, Singleton LGA , Upper Hunter LGA) with a benchmark regional economy share (the Hunter Valley including Newcastle) using these data to calculate an index known as a "location quotient". The results of this analysis are shown in **Table 20** and **Figure 16**.

The results of this analysis were then compared to the more sophisticated input output analysis results from Gillespie Economics (Appendix S of the EIS). The economic base multiplier actually overestimated the input output analysis by 13% or 236 jobs. As significant work week commuting had been observed leading to a leakage from the local economy and thus service jobs, it was considered that the Gillespie Economics estimates were acceptable and were utilised for the socioeconomic analysis of population and housing impacts.

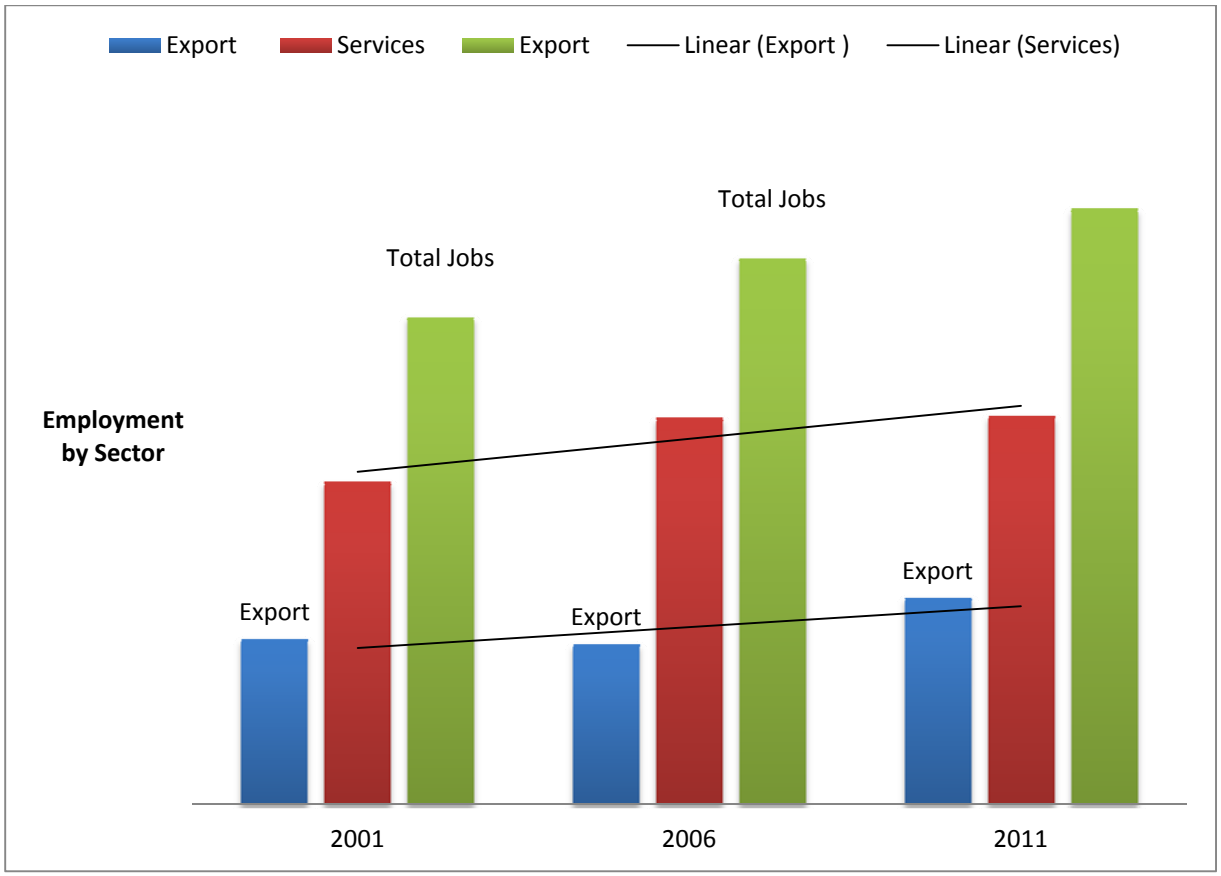
As discussed above, the significant reduction in capacity constraints of the local economy now means that the socioeconomic analysis should be considered as a worst case analysis with considerable excess capacity now being observed in both local employment and housing. The net result now is that there is adequate capacity within the local economy to absorb the Project.

Table 20
Results of Economic Base Analysis for Census 2001- 2006-2011

Census Year	2001	2006	2011	Change 2001-2011	Economic Base Multiplier
Basic or Export Jobs	7,011	6,801	8,790	1,779	-
Service Jobs	13,699	16,415	16,502	2,803	-
Total Employment*	20,710	23,216	25,292	4,582	2.58
Simple Multiplier	1.95	2.41	1.88	-	-

** Does not include non classified job*
Source: ABS Census Time Series Employment by Sector 2001, 2006, 201.1

Figure 16
Economic Base Trends 2001 – 2011



6.3.3 Input-Output Modelling is Not a Substitute for BCA

Issue

The Australian Institute (TAI) presents a quote from NSW Treasury to highlight that model based economic impact assessment such as Input-Output (IO) analysis is not a substitute for benefit cost analysis (BCA).

Response

Gillespie Economics agrees. The Economic Impact Assessment undertaken for the Project (see EIS Appendix S) does not suggest that Input-Output (IO) analysis is a substitute for Benefit Cost Analysis (BCA). The Economic Impact Assessment undertaken for the Project (EIS Appendix S, p. 5) clearly identifies that:

> *"It is important not to confuse the results of the economic impact assessment, which focuses on indicators of economic activity i.e. direct and indirect output (expenditure/ revenue), value-added, income and employment, in a specific region, with the results of BCA which is concerned with the net benefits from the Project."*

On page 25 of the Economic Impact Assessment (see EIS Appendix S) it is further identified that:

> *"The BCA in Section 2 is concerned with whether the incremental benefits of the Project exceed the incremental costs and therefore whether the community would, in aggregate, be better off 'with' the Project compared to 'without' it. In contrast, the focus of the regional economic impact assessment is the effect (impact) of the Project on the economy in terms of a number of specific indicators of economic activity, such as gross regional output, value-added, income and employment".*

6.3.4 Flaws in the Benefit Cost Analysis

Issue

TAI considers that the BCA of the Project contains flaws that overstate the value of the project for NSW decision makers.

Response

Gillespie Economics notes that this is incorrect. The BCA provides a true representation of the economic costs and benefits of the Project. TAI has made numerous errors in its critique of the Economic Impact Assessment of the Project. These are addressed individually below.

In order to further demonstrate the suitability of the Economic Impact Assessment (Appendix S of the EIS) an independent peer review has been undertaken by Professor Jeff Bennett, Crawford School of Public Policy, the Australian National University, who states that the *"study has been conducted in a professional manner and is of a high standard*". A copy of the complete peer review is included in **Appendix F**.

6.3.5 Benefit Cost Analysis not Undertaken from a NSW Perspective

Issue

TAI states that the BCA does not present the costs and benefits of the Project to NSW despite this being one of the Director Generals Requirements (DGRs) for assessment of the Project and the recommended approach of the NSW Treasury.

Response

Gillespie economics notes that this is incorrect. The Continuation of Bengalla Mine DGRs issued on 13 May 2012 requires *"a detailed assessment of the costs and benefits of the project as a whole, and whether it would result in a net benefit for the NSW community;"*

The BCA initially considers all the costs and benefits of the Project (as a whole) and then identifies the costs and benefits that accrue to Australia. Section 2.5.2 of the Economic Impact Assessment (see EIS Appendix S) identifies the distribution of costs and benefits and specifically considers the costs and benefits that accrue to NSW. This section concludes that *"as well as resulting in net social benefits to Australia the Project would result in net social benefits to NSW".*

6.3.6 Greenhouse Gas and Aboriginal Heritage Values

Issue

TAI considers that the scope for valuing impacts is not applied consistently through its analysis. The example given is that the valuation of impacts on Aboriginal cultural heritage is at a state level and impacts on greenhouse gas emissions at a global level.

Response

Gillespie Economics notes that this is an incorrect interpretation of the valuation approach undertaken in the Economic Impact Assessment (see EIS Appendix S). The BCA of the Project initially considers all the costs and benefits of the Project (as a whole) and then identifies the costs and benefits that accrue to Australia and NSW. Greenhouse gas emissions generated by the Project can potential have impacts globally and hence a global social damage cost of carbon value was initially included in the BCA.

Estimation of the non-market values for Aboriginal cultural heritage were valued using benefit transfer from choice modelling studies undertaken by surveying NSW households. However, this does not reflect an inconsistency in the scope of valuations but the fact that this is the population that is most likely to hold non-market values for the Aboriginal cultural heritage values impacted by individual mining projects. The non-market valuation literature identifies a distance-decay function whereby people further away from a resource hold lower values for its conservation. This is because actual use of a resource is likely to be lower for people who live further away from it, there are more likely to be different substitutes available as the set of resource possibilities expands, people feel less responsible for more distant assets in different jurisdictions and there may be lower awareness and knowledge of more distant assets.

While people outside of NSW may hold some values for the Aboriginal cultural heritage impacts of the Project, these are likely to be less significant relative to those held by NSW households. Furthermore, sensitivity testing undertaken in the BCA indicated that even significant changes in the magnitude of Aboriginal heritage values would have little impact on the BCA results.

6.3.7 Greenhouse Gas Impacts

Issue

TAI considers that the BCA of the Project should have included the greenhouse gas emissions associated with the additional burning of coal in the world as a result of the Project. TAI states that the present value of the costs of these emissions exceeds the benefits of the Project.

Response

To compare the Greenhouse Gas (GHG) costs of the burning of coal to the benefits of coal mining is methodologically incorrect. The burning of coal has no relevance to a BCA of the Project. As identified in Section 2.1 of the Economic Impact Assessment (see EIS Appendix S) of relevance to the Project BCA is the greenhouse emissions associated with the mining and transportation of coal to the port of Newcastle.

These emissions have been included in the Project BCA (see EIS Appendix S, Section 2.4.2) which included a shadow price of AUD$23/t $CO_{2\text{-}e}$ rising at 2.5 % per year in real terms for three years and then remaining constant was used. Sensitivity testing assuming a shadow price from AUD$8/t CO2-e to AUD$40/t CO2-e was also undertaken (see EIS Appendix S, Attachment 1).

Coal is an intermediate good (i.e. it is an input to other production processes such as production of electricity). However, these downstream uses of the coal constitute different projects, that themselves can be subject to BCA. For example, BCA of an electricity generation project would include the cost of coal, labour, land and capital inputs, electricity distribution and environmental impacts (such as GHG emissions from the burning of coal). The BCA of electricity generation would also include benefits such as the community's willingness to pay for electricity. There may also be externality benefits for economic development, education, and medical care. All of these costs and benefits are relevant considerations in the BCA at this next stage of the production process but not of a BCA of a coal mining project.

6.3.8 Royalty Calculation Unclear

Issue

TAI identifies that both the EIS Main Volume and Appendix S Economic Impact Assessment make numerous references to royalty revenue that will be generated by the Project, claimed at a present value of $778M, but no working is shown for this calculation.

Response

The Economic Impact Assessment (see EIS Appendix S) identifies that Project relates to mining of 15 Mtpa of ROM coal. At a recovery rate of 79% annual product coal available for sale is estimated at 11.85 Mtpa. The Economic Impact Assessment also identified that it assumes an average free on board (FOB) price of coal of AUD$99/t of product coal. The Project is an open cut mine and so in accordance with the *Mining Regulation 2010*, a royalty rate of 8.2% of revenue value was used in calculating royalties. The present value of royalties from the Project is estimated at $778M.

6.3.9 Royalties Calculation – No Deductions

Issue

TAI considers that the royalties from the Project are overestimated. TAI estimates a figure of $615 million (instead of $778M), based on:

- *Production schedule on EIS main volume p49, assuming a linear ramp up to year;*
- *Long term real price of $AUD99/t, as per EIS appendix S p14;*
- *Royalty rate of 8.2 percent;*
- *Deductions of $3.50/t for a full wash cycle and $0.05/t for the Australian Coal Association Research Program levy; and*
- *Discount rate of 7 percent.*

TAI shows its calculation in Appendix 1 of its submission.

Response

The main difference between the royalties estimate by TAI and in the Economic Impact Assessment (see EIS Appendix S) is that TAI incorrectly incorporates allowable deductions into its calculations. The correct inclusion of allowable deductions involves subtracting the allowable deductions from the gross value of the coal to provide an adjusted value of the coal to which the royalty rate is applied. Instead of adopting this approach, TAI has estimated the royalty amount in the normal way and then subtracted the allowable deductions from the royalty amount itself. This means that in the TAI calculation the allowable deductions result in a $44M reduction in annual royalties, rather than a $3.5M reduction in annual royalties per annum.

Allowable deductions include for levies and beneficiation of the coal but make only a few percentage points difference to estimation of royalties based solely on the royalty rate. This is well within the sensitivity testing range undertaken in the Economic Impact Assessment (see EIS Appendix S). As noted in Section 2.6 of the Economic Impact Assessment (see EIS Appendix S) the results of the BCA are most sensitive to the changes in the value of coal rather than other assumptions such as the royalty rate (see **Section 6.3.8**). Even with minor changes in the estimation of royalties, the Project is still considered to have substantial net social benefits to Australian and NSW.

6.3.10 Royalties Calculations – Thermal Coal

Issue

TAI considers that its erroneous calculation of royalties of $615 million (as identified above) is likely to represent an overestimate, as several other types of deduction for which the project may be eligible. Furthermore, TAI states that the calculation of royalties assumes that production will begin and continue at the planned rates of extraction throughout the life of the Project. Given the current difficulties for the coal industry and long term uncertainty around markets for thermal coal, TAI considers that this is not a conservative assumption.

Response

Incorporation of other allowable deductions (e.g. levies) in the correct manner, rather than the approach taken by TAI, would have very little impact on the estimation of royalties from the Project.

While the estimation of royalties in the Economic Impact Assessment (see EIS Appendix S) is based on mining rates of 15 Mtpa of ROM coal (consistent with all other specialist assessments of environment, social and cultural impacts in the EIS), it is based on a conservative long run estimate of the value of coal of AUD$99. As noted in Section 2.4.1 of the Economic Impact Assessment (see EIS Appendix S) there is some uncertainty around future coal prices (valued in USD) as well as the AUD/USD exchange rate and hence assumed coal prices were subjected to sensitivity testing. Sensitivity testing was carried out on the value of coal for 20% (+ and -) at varying discount rate. The analysis (see EIS Appendix S, Attachment 2) indicated that with a 20% reduction in coal price the Project would remain desirable from an economic efficiency perspective.

In contrast to the assertions of TAI, the long run outlook for thermal coal is for strong growth in demand from non-Organisation for Economic Co-operation and Development (OECD) countries such as China and India. This is demonstrated in Wood MacKenzie's (2013) *'China: The Illusion of Peak Coal'* which indicates that despite efforts to limit coal consumption and seek alternative fuel options, China's strong appetite for thermal coal will lead to a doubling of demand by 2030.

6.3.11 Calculation of Federal Taxes Overstated

Issue

TAI considers that the calculation of federal tax revenues in the Economic Impact Assessment is opaque. TAI identifies that Gillespie Economics estimate revenues at present value $580m, but no confirmation of this figure is possible without some understanding of the underlying data and assumptions. TAI states that it seems likely that Gillespie Economics has assumed an effective tax rate of 30 percent, while other researchers find that rates faced are lower - 17 percent and 13.9 percent - rather than the theoretical 30 percent. As such, the estimate of $580m seems likely to be an overestimate.

Response

The estimate of company tax payable on the Project was calculated by applying the Australian Tax Office (ATO) corporate tax rate of 30% to the estimated gross profit of the Project. This estimate of gross profit was based on assumed coal prices which, as identified above, are considered a reasonable assumption for the BCA.

In its submission, TAI suggests that the effective company tax rate is likely to be lower – 13.9% to 17% of gross profit and not 30% as required by the ATO, due to potential rebates, tax exemptions and depreciation allowances. Two studies are quoted to support this.

However, one study (Markle & Shackelford, 2009) calculates the effective tax rate for the entire "mining sector" (not the coal mining sector only or individual coal mining projects) in relation to Gross Operating Surplus (GOS) not gross profit. GOS does not consider the costs of production such as consumption of fixed capital, interest, royalties, land rent payments and direct taxes payable on inputs. Therefore, it is the incorrect denominator to use for estimation of the effective tax rate.

The second study (Richardson & Denniss, 2011) also refers to the Australian "mining sector" (all mining rather than the coal mining sector or individual coal mining projects) and it is not clear if any coal mining companies were included in the data used in the analysis.

As identified by Mott (1997) incorporation of the full rate of corporation tax, ensures that the analysis of the Project is independent of tax events not pertaining to the Project.

While the level of the effective tax rate on the mining sector in general and on this specific Project can be debated, changes to the tax rate do not change the conclusion of the Economic Impact Statement (see EIS Appendix S) that the Project will have net social benefits to Australia and NSW.

6.3.12 Private Financial Benefit of the Project

Issue

TAI considers that very little consideration is given to the private financial benefits of the Project. It identifies that a footnote on page 19 of the Economic Impact Assessment states that the economic assessment assumes 42 percent Australian ownership. No source for this estimate is provided. This was considered inappropriate by TAI given the importance of this assumption to the calculations of benefits to Australia and NSW.

Response

The level of Australian ownership in the Project is relevant to the calculation of the net social benefits that accrue to Australia. The Economic Impact Assessment (see EIS Appendix S) assumes 42% Australian ownership based on information provided by BMC. BMC is owned by the Bengalla Joint Ventures (BJV). The BJV is constituted by:

- CNA Bengalla Investments Pty Limited (a subsidiary of Coal & Allied Industries Limited, a Rio Tinto Group company) 40%;
- Wesfarmers Bengalla Limited (a wholly owned subsidiary of Wesfarmers Limited) 40%;
- Taipower Bengalla Pty Limited (a wholly owned subsidiary of Taiwan Power Company) 10%; and
- Mitsui Bengalla Investment Pty Limited (a wholly owned subsidiary of Mitsui Coal Holdings Pty Limited) 10%.

6.3.13 Distribution of Costs and Benefits

Issue

TAI considers that the discussion of how benefits are distributed is literally a "box ticking" exercise on page 22. This gives decision makers little understanding of the distribution of the benefits of this Project.

Response

Gillespie Economics does not agree with this statement. Section 2.5.2 of the Economic Impact Assessment (see EIS Appendix S) provides detailed consideration of the intra generational and intergenerational distribution of costs and benefits of the Project. The Economic Impact Assessment (see Section 2.5.2 of EIS Appendix S) clearly identifies that *"while BCA can provide qualitative and quantitative information on how costs and benefits are distributed, welfare economics and BCA are explicitly neutral on intra and intergenerational distribution of costs and benefits. There is no welfare criterion in economics for determining what constitutes a fair and equitable distribution of costs and benefits. Judgements about equity are subjective and are therefore left to decision-makers."*

6.3.14 Non-Market Values

Issue

TAI considers that the Economic Impact Assessment includes no value in the BCA for impacts on noise, air quality, visual amenity, ecology and biodiversity beyond those incurred in mitigation measures and offsets. This assumes that these mitigation measures and offsets will perfectly compensate local community's loss of amenity and the impacts on the local environment. TAI does not believe this is likely to be the case and as such this approach serves to understate the costs of the Project to the NSW community and overstate its final value.

Response

Gillespie Economics states that this is incorrect. All material potential impacts as identified in the EIS have been included in the Gillespie Economics BCA (see EIS Appendix S).

As identified by NSW Government (2012), *"in estimating... benefits and costs, there is the practical principle of materiality – costs and benefits that will not have a material bearing on the decision do not need to be included in a CBA."* The consideration of non-market impacts in BCA relies on the assessment of other appropriate technical experts reporting on the biophysical impacts of the Project. Where the environmental assessments undertaken by technical experts identify that biophysical impacts will be negligible, it is considered that there would not be any material economic impacts. For the Project, technical assessments identified negligible road noise, rail noise and blasting impacts. Consequently, there are no material impacts for inclusion in the BCA.

Where impacts are identified but are proposed to be mitigated or offset to the point where residual impacts become immaterial, the residual impact is no longer relevant for inclusion in BCA. For the Project number of properties were identified as being significantly impacted by air quality and operational noise. These impacts would likely result in a partial devaluation for these properties. Instead of including a partial property devaluation in the BCA the full property devaluation was included. This overstates the economic impacts for these properties.

In addition, an number of receptors were identified as experiencing moderate noise impacts and for these properties the cost of mitigation measures was included in the BCA. Similarly the BCA included the costs of mitigation measures for landholders that would experience visual impacts. It was noted in the BCA that to the extent that any residual noise impacts or visual impacts occur, after mitigation, noise and visual costs of the Project included in the BCA will be understated. However, given the overestimation of the economic value of significant noise and air quality impacts this would not materially impact the results of the BCA.

With regard to ecological impacts, the BCA of the Project recognised that the impacted flora and fauna is likely to have non-use values to the community that would be lost as a result of the Project and similarly the provision of offsets is likely to have non-use values to the community that would be gained as a result of the Project. Provided the values held by the community for the offsets are equal or greater than the values that would be lost then apart from including the costs of the offsets in the BCA there are no additional economic costs that warrant inclusion. This is consistent with Government policy which requires that offsets maintain or improve biodiversity values.

6.3.15 Aboriginal Heritage Values

Issue

TAI makes reference to a range of issues raised in the Warkworth Judgement in relation to a choice modelling study and BCA undertaken for that project to suggest that the values included in the BCA of the Bengalla Continuation of Mining Project for Aboriginal cultural heritage should be given little weight by the decision makers and are likely to understate the values.

Response

Most of the issues raised by TAI are irrelevant to the benefit transfer of values for Aboriginal cultural heritage impacts to the Project BCA. For example, comments in the Warkworth Judgement quoted by TAI with respect to how noise dust, amenity and ecological system values were included in the BCA for the Warkworth Project are irrelevant to a consideration of Aboriginal cultural heritage impacts. Similarly comments about the information provided in the Warkworth Choice Modelling (CM) study about endangered ecological communities are also irrelevant to a consideration of Aboriginal cultural heritage.

The value used for Aboriginal heritage impacts was sourced from a number of CM studies (Gillespie Economics 2008, 2009a, 2009b) that have examined the community values for impacts on Aboriginal heritage, not just the CM study undertaken for Warkworth. Few other studies have examined the values that the community hold for impacts on Aboriginal heritage sites. However, those that have examined this issue (e.g. Rolfe and Windle, 2003) have found values that are considerably lower than those reported by Gillespie Economics (2008, 2009a, 2009b). Indeed, Rolfe and Windle (2003) found that the Brisbane community held negative values for protecting more cultural heritage sites. If anything, the economic values used in the BCA for Aboriginal cultural heritage are likely to overstate community values not understate them.

As identified in Section 2.5.1 of the Economic Impact Assessment (see EIS Appendix S) while the major environmental, cultural and social impacts have been quantified and included in the Project BCA, any other residual environmental, cultural or social impacts that remain unquantified (including those that arise from debate amongst specialists and decision-markets about the magnitude of impacts) would need to be valued at greater than between $1,766M and $2,112M for the Project to be questionable from an Australian economic efficiency perspective.

6.3.16 Employment Values

Issue

TAI considers that CM studies are likely to overstate the non use value of employment. It states that the very existence of this latter value in relation to coal projects has been doubted for several years by a range of economists, including ANU professor Jeff Bennett.

Response

In relation to Aboriginal Cultural heritage values that were sourced from a number of CM studies, TAI suggests that the sampling of the NSW population instead of the Australian population in the referenced CM studies led to understatement of economic values. For some unexplained reason TAI states that this same sampling has resulted in overstatement of the employment values that were also sourced from the same studies.

TAI also misrepresents the views of other economists by stating that the very existence of this value has been doubted for several years by a range of economists, including Australian National University Professor Jeff Bennett. This is not accurate. The existence of non-use values for employment is consistent with micro-economic theory and has been confirmed in numerous empirical studies in a wide range of contexts. TAI has previously (but not in this submission) referenced Professor Quiggin and Dr Denniss as criticising the inclusion of the social value of employment in the BCA. However, examination of the references previously provided, does not support this claim. Neither has made comment on the existence of non-use values for employment.

Professor Bennett is one of Australia's most senior academic economists in the field of non-market valuation. Professor Bennett has included the social value of employment in a number of his research studies including the following peer reviewed and published studies:

- Morrison, M., Bennett, J. and Blamey, R. (1999) *Valuing improved wetland quality using choice modelling, Water Resources Research (* Vol. 35, No. 9, pp. 2805-2814);
- Bennett, J., Van Bueren, M. and Whitten, S. (2004) *Estimating society's willingness to pay to maintain viable rural communities*, Australian Journal of Agricultural and Resource Economics (Volume 48, Issue 3, pages 487–512);
- R.K. Blamey, J.W. Bennett, J.J. Louviere, M.D. Morrison and J.C. Rolfe (2002) *Attribute Causality in Environmental Choice Modelling*, Environmental and Resource Economics (23: 167–186, 2002);

- Blamey, R., Rolfe, J., Bennett, J., and Morrison, M., (2000) *Valuing remnant vegetation in Central Queensland using choice modelling*, The Australian Journal of Agricultural and Resource Economics(44(3): 439-56); and
- Gillespie, R. and Bennett, J. (2012) *Valuing the Environmental, Cultural and Social Impacts of Open Cut Coal Mining in the Hunter Valley of NSW, Australia*, Journal of Environmental Economics and Planning.

Notwithstanding this, as a form of sensitivity testing, the results of the BCA are reported with and without the inclusion of this value. That is, the Project is estimated to have net social benefits to Australia of between $1,766M and $2,112M. Even without the inclusion of the employment value there are considerable net social benefits of the Project to Australia and NSW.

6.3.17 Criticisms of Input Output Analysis

Issue

TAI states that economists and public institutions have criticised the use of IO for years. TAI refers to criticisms by the ABS, Productivity Commission and in the Warkworth Judgement.

Response

The main concern that economists have with the use of all methods which examine the economic activity of projects (e.g. input-output analysis, CGE, Keynesian multipliers etc.) is their correct interpretation.

As clearly identified in the Economic Impact Assessment (see EIS Appendix S) for the Project (p. 5):

> *"It is important not to confuse the results of economic impact assessment, which focuses on indicators of economic activity i.e. direct and indirect output (expenditure/revenue), value-added, income and employment, in a specific region, with the results of BCA which is concerned with the net economic efficiency benefits from the Project."*

On page 25 of the Economic Impact Assessment (see EIS Appendix S) it is further identified that:

> "The BCA in Section 2 is concerned with whether the incremental benefits of the Project exceed the incremental costs and therefore whether the community would, in aggregate, be better off 'with' the Project compared to 'without' it. In contrast, the focus of the regional economic impact assessment is the effect (impact) of the Project on the economy in terms of a number of specific indicators of economic activity, such as gross regional output, value-added, income and employment".

IO analysis is a suitable methodology for predicting changes in the structure of regional economies and is consistent with the NSW DP&I *Draft Guidelines on Economic Effects and Evaluation in EIA* (James and Gillespie 2002, p. 18) which relevantly states:

> *"If a proposal is predicted to have significant economic impacts at the regional or State scale, it is appropriate to assess these economy-wide effects.....These impacts can be assessed by means of a multi-sectoral or input-output model which identify regional impacts in terms of changes in the value of output for separate sectors of the regional economy, as well as changes in value-added, income and employment."*

The assumptions underlying IO analysis are well documented, including in the Economic Impact Assessment (see EIS Appendix S, Attachment 3) for the Project.

The issues with IO analysis referred to in the TAI submission relate to its inappropriate use. The concerns of the Productivity Commission referred to in the TAI submission relate to using IO analysis to *"make the case for government intervention."* It is agreed that this would be an inappropriate use of IO but this is not how IO analysis has been used in the Economic Impact Assessment.

The reference TAI makes to Australian Bureau of Statistics (ABS) concerns with IO analysis relate to it being a *"biased estimates of the benefits or costs of a project".* It is agreed that IO analysis is not a good indicator of costs and benefits but this is not how IO analysis has been used in the Economic Impact Assessment. A separate BCA has been undertaken to examine costs and benefits.

TAI also make reference to the Warkworth Judgement which criticised IO analysis for not *"assisting in weighing the economic factors relative to the various environmental and social factors, or in balancing economic, social and environmental factors".* However, this is an inappropriate criticism of the IO method, since it does not purport to do this. IO analysis is solely concerned with estimating the level of economic activity associated with a project and this was how it was used in the Economic Impact Assessment (see EIS Appendix S). It provides one piece of information for the consideration of the decision-maker, alongside all the other pieces of information provided via the environmental impact assessment process.

6.3.18 Computable General Equilibrium Modelling

Issue

TAI expresses a preference the more sophisticated CGE modelling to assess the Project as it doesn't have the assumptions of IO of fixed prices and no supply side constraints.

Response

The Direct Generals Requirements require "A detailed assessment of the potential direct and indirect economic benefits of the Project for local and regional communities and the State". IO analysis and Computer Generated Equilibrium (CGE) modelling are two alternative modelling methods for estimating the regional and State economic activity associated with a project.

The Economic Impact Assessment (see EIS Appendix S) utilised the Draft Guidelines for Economic Effects and Evaluation in Economic Impact Assessments (DP&I, 2002) which identified that either IO or CGE can be used for modelling economic impacts of a proposal on the regional or State economy. IO analysis has historically been applied at the regional level while CGE modelling has historically been applied at the State and National level for major policies and developments. CGE modelling has recently been adapted for use at the regional level.

IO analysis identifies the direct and indirect additional (positive) regional economic activity associated with a project in terms of a number of indicators of economic activity – output, income, value-added and employment. The impacts from IO analysis are based on a number of simplifying assumptions – most notable is that the regional economy has access to sufficient labour and capital resources (from both inside and outside the region) so that an individual project does not result in any regional price changes (e.g. wages in other industries or house rentals). Consequently there are no reductions in economic activity ("crowding out") in other sectors in the region. As identified in Section 3.1 of the Economic Impact Assessment (see EIS Appendix S), the results of IO modelling can be seen as representing an upper bound for the net economic activity associated with a project. IO analysis is a static analysis that looks at impacts in a particular year.

CGE modelling estimates the additional net (positive and negative) regional economic activity associated with a project in terms of a number of economic indicators – including value-added and employment – but also real income, gross domestic product, house rentals etc. CGE modelling is underpinned by an IO database as well as a system of interdependent behaviour and accounting equations which are based on economic theory (but mostly without econometric backing at the regional level). These equations ensure that any change in demand in a region, no matter how small, translates into some change in prices and hence there is some 'crowding out' of other economic activity in the region. Results can be sensitive to changes in these behavioural assumptions. The CGE modelling can be dynamic or comparative static.

Which modelling approach best represents the true situation depends on whether price changes occur at a regional level as a result of individual projects – not the industry as a whole. This is an empirical issue and would depend on the migration of labour into the region and timely management of land releases by Councils. Few studies exist that examine this issue. However, Deloitte Access Economics (2012) in a study for Singleton Council "*found insufficient evidence to conclude that house prices, rent or grocery prices were, on the whole more expensive than other regional communities".* Input-Output Analysis - Labour

Issue

TAI makes reference to a finding from the Warkworth Judgement criticising IO analysis because it assumes "that there is a ghost pool of highly skilled yet unemployed people in the Hunter region, from which labour for the existing mine would be drawn…".

Response

IO analysis does not assume that there is a pool of highly skilled yet unemployed people in the region to work on the Project. It assumes that relative to the level of increased demand for labour in a region as a result of a project, there is substantial available employed or unemployed labour inside and/or outside the region that can be accessed. This simplified assumption negates the need to attempt to model the extremely difficult and contentious matter of price rises and 'crowding out' of other economic activity in the region.

'Crowding out' would be most prevalent if the regional economy was at full employment and it was a closed economy with no potential to use labour and other resources that currently reside outside the region. In this situation a mining project requiring labour and other resources would compete for them with existing activities. However, the Hunter regional economy is not at full employment and is not a closed economy. Projects in the Hunter have potential access to employed and unemployed labour and capital resources from across the country and internationally. ABS data indicates considerable in-migration into the Hunter Region in recent years, illustrating that increased demand for labour from mining projects may be largely met via migration or even commuting. In these situations there is little impact on other sectors in the regional economy.

Even where a mining project utilises labour resources from inside the region, there is a natural filter effect where these jobs are filled by other employed or unemployed labour resources inside and outside the region (i.e. including the continual addition to the labour force from school leavers, TAFE and University graduates and potentially those not currently seeking employment). This in turn creates vacancies that are then filled by other employed or unemployed labour resource, with these employed and unemployed labour resources coming from both inside or outside the region.

The potential labour force to meet demand in a region from a project is therefore considerably greater than just the labour force in the region and hence from a regional perspective is virtually unlimited. Consequently, for small open economies, 'crowding out' of other economic activity is likely to be small.

While more complex models such as CGE modelling can conceptually deal with the positive economic activity impacts of a project and any partially offsetting negative economic activity impacts, for small regional economies it is unlikely that these more complex models will surpass the simpler input-output model. Firstly, the small open economy condition minimises the need to address offsetting impacts. Secondly, given the considerable difficulties associated with estimating a large number of coefficients and parameters required for CGE models (when there is virtually no regional data available), many exogenous assumptions are required to be made by the modeller and so the increased 'fuzziness' is likely to more than offset the increase in model sophistication.

6.3.19 Alternative Regional Economic Impact Assessment

Issue

TAI undertakes an alternative assessment of the regional economic impacts of the Project.

Response

TAI does not undertake either IO analysis or CGE analysis but instead "borrows" some ratios from the ACIL Allen's CGE modelling of a different project and apply them to the direct employment estimates of the Project.

This is simply not credible and indicates a mis-understanding of the ACIL Allen CGE modelling which is driven by project specific costs, sales and employment structures, which will vary from project to project. The borrowing of multipliers and ratios (as per TAI's submission) rather than undertaking project specific analysis is one of the key criticisms that is applied to regional economic impact analysis.

6.3.20 Crowding Out

Issue

TAI refers generally to 'crowding out' as indicating the level of jobs that are 'destroyed' in a region as result of a mining project and imply a reduction in employment in other industries as a result of the Project.

Response

Gillespie Economics notes that this is an incorrect interpretation of the results of CGE models. Any 'crowding out' of other economic activities estimated via CGE modelling does not indicate losses of jobs but the shifting of labour resources to higher valued economic activities. This reflects the operation of the market system where scarce resources are reallocated to where they are most highly valued and where society will benefit the most from them. This reallocation of resources is therefore considered a positive outcome for the economy not a negative.

7 PUBLIC SUBMISSIONS

This section responds to the submissions received from the public. Submissions were received from:

- *Confidential Submission – Ref 17;*
- *Confidential Submission – Ref 26;*
- *BL & ML Bates;*
- *H&J Brown;*
- *P&J Brown;*
- *Lane;*
- *Moore; and*
- *Rankin.*

A response to each of the issues identified by the above mentioned submissions is provided below. The original submissions are presented in ***Appendix B****.*

7.1 CONFIDENTIAL SUBMISSION – 17

7.1.1 Cumulative Impact

Issue

Concerns we have about the Bengalla Continuation Project are the air quality (dust) and noise, and the culmination of 3 existing mines and one other proposed mine. We have lived on this property for 40 years, and during Bengalla's 15 years of mining we have had no reason to complain about Bengalla's mining activities. Although we have sighted the Environmental Impact Statement our concern is as mining progresses in a westerly direction the projections may be higher than anticipated and this may affect the property.

Response

As outlined in Section 8.2.1 of the EIS, the cumulative air quality assessment conservatively considered emissions from all approved mining operations in the vicinity of the Project (Mt Arthur Coal Mine, Mount Pleasant Project, Mangoola Coal Mine, Drayton Mine (and Drayton South Coal Project) and Muswellbrook Coal Mine).

For the neighbouring Mount Pleasant Project which has not yet commenced, it has been conservatively assumed that construction activities will commence in Year 4, with coal extraction commencing in Year 8 of the Project and generally as described in the Mount Pleasant 1997 EIS.

Despite the current Mount Pleasant DA 92/97 expiring in 2020, it has been assumed for the purposes of modelling, that Coal & Allied would seek the relevant approval to enable future mining and as a result has been conservatively considered to be operational for the duration of the Project.

In order to assess worst case cumulative air quality impacts of Mt Arthur Coal Mine and Xstrata Mangoola operations, it has all been conservatively assumed that these operations will continue until the end of the Project life at existing approved rates (which are greater than production levels currently occurring). As such it would be anticipated that the air quality predictions presented in the EIS as conservative.

As noted in Section 8.3.2 of the EIS, the INP recommends amenity criteria designed to limit the total or cumulative noise impacts. Other industrial developments with the potential to produce significant environmental noise include the Mount Pleasant Project to the north, Mangoola Coal Mine to the south-west, Mt Arthur Coal Mine to the south, Muswellbrook Coal Mine to the distant east and Dartbrook Coal Mine (currently under care and maintenance) to the north-east. The INP amenity noise criteria for rural categories of 50 L_{Aeq} during day periods, 45 L_{Aeq} during evening periods and 40 L_{Aeq} during night periods has been adopted to assess cumulative noise levels.

Predicted combined noise levels from the Project and other industrial developments are predicted noise levels for the worst case year at each receiver. All private receptors are expected to receive cumulative noise levels below the 40 $_{LAeq,9hr}$ night criterion. The Project would contribute typically 25% to 30% (but up to 68%) of total predicted noise levels at potentially affected receivers.

7.2 CONFIDENTIAL SUBMISSION – 26

7.2.1 Project Acquisition

Issue

We would like to address some concerns that we have with the expansion of Bengalla Coal Mine. As stated in the EIS, all relevant neighbours were contacted in relation to the expansion. Our property i.e. approximately 1 km from the new mine boundary and the first notification of the expansion was through public notification / newsletters etc. The EIS states that the predicted noise, airborne dust and vibration levels that our property will be subjected to, will exceed governing regulations. We feel-this is a major concern and needs addressing as it will obviously greatly impact upon our families health, quality of life and sustainability of our farming operations. Any feedback on these matters and personalised contact or negotiation with Bengalla would not only be appreciated but one would assume a mandatory measure.

Response

As this is a confidential submission it is unclear as to which specific receptor the above comment relates. Nonetheless, throughout the development of the EIS, BMC has provided a number of opportunities to any private receptor to meet and discuss the Project with members of the Project Team. Details of the comprehensive stakeholder engagement completed for the Project is included in Section 6 of the EIS and summarised in **Section 5.8.7** of this RTS.

Should the Project be approved then the future, development consent would include the requirement for BMC to acquire such properties predicted to receive noise or air quality impacts above relevant acquisition criteria as a result of the Project in Table 31 and Table 40 – Table 42 of the EIS should the landholder request it. This opportunity would be available for the duration of the development consent.

BMC encourages the author of this confidential submission to directly contact them to discuss the predicted impacts from the Project at their property.

7.3 BL & ML BATES

7.3.1 Air Quality Impacts

Issue

The westward expansion of the Open Cut Pit will bring it to within 2km of our Property, (No. 171), and will cause major fundamental issues to our environment due to the impacts of the increased Dust levels generated, the increase in Mobile Lighting towards the west, the increase in Noise levels generated, the increase in Blasting Frequency and impacts caused by Ground Vibration, Overpressure (Noise) and the sickly toxic fumes that have been generated in the past by Bengalla's Blasts, that have gone wrong, (the last event where we were exposed to the sickly toxic fumes was 12th Dec. 2012 — both Bengalla Mining Company and the NSW Dept. of the EPA were notified of our official complaint).

Another major concern for us is that we are currently in the Zone of Affectation for the Mt. Pleasant Open Cut Coal Mine, (Rio Tinto), which currently is on hold, but could start construction anytime, and now with the Bengalla Mine Continuation Project, we will be doubly affected with an horrendous outcome for us, our future and the environment.

Response

The Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) prepared for the Project has predicted Receptor 171 to experience levels above the 24-hour average PM_{10} criteria in Year 8 and Year 24 and the cumulative annual average PM_{10} criteria in Year 24 (see EIS Table 31).

It is noted, that this property already entitled to acquisition as a result of predicted impacts arising from the Mount Pleasant Project. Despite the Mount Pleasant Project not being an operational mine, Receptor 171 is currently entitled to acquisition in accordance with the conditions of the Mount Pleasant Development Consent.

The Acoustics Impact Assessment (EIS Appendix H) prepared for the Project has predicted Receptor 171 to receive noise levels of 5 dBA or more over the intrusive noise criteria during Year 15 and Year 24. However, as noted above this property already entitled to acquisition as a result of predicted impacts arising from the Mount Pleasant Project.

The Acoustics Impact Assessment (EIS Appendix H) has also noted that the closest remaining sensitive receptors to active mining areas proposed for the Project would be Receptor 156, located approximately 1,500 m from the active mining area. Exceedances of the blast criteria were considered unlikely to occur at Receptor 156 and as other privately owned receptors (including Receptor 171) are located a greater distance from the active mining area any exceedances of blast criteria are in turn also considered unlikely.

As outlined in the EIS Summary of Management and Monitoring Measures and reproduced in this report (see **Table 21**), BMC has developed a comprehensive list of management and mitigation measures to ensure best practice operations are implemented for the Project.

BMC has undertaken consultation with the owners of Property 171 as the Project is predicted to impact the receptors above relevant regulatory criteria.

7.3.2 Diesel Usage

Issue

The increase in the volume of Diesel Fuel used 60,000 litres/day to 83,000 litres/day will result in $PM_{2.5}$ Air Pollutants making the Air Quality at our Property a Health Risk, under varying wind conditions.

The Environmental Impacts have not been addressed with the use of the 140,000 Litres of Diesel which may be used by the emergency power generators, and the location and service of these generators/pump station using Wybong Road which has a 12 Ton load limit, placed on it by the Muswellbrook Shire Council.

Response

The Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) has accounted for the increase in diesel usage for the Project and predicted the potential zone of impact from these activities. No exceedances of the predicted 1-hr average NO_2 have been predicted to occur at Receptor 171 as a result of the Project.

As noted in Section 4.9.2 of the EIS in order to provide for sufficient pumping capacity of CW1, three pumps are required to be commissioned and installed adjacent to CW1. The pumps will be supplied with power from generators which will be located within the Infrastructure Area and as a result will require power to be directed along internal power reticulation network to the pumps located adjacent to CW1.

Issue

We 'OBJECT' to the Diversion of Dry Creek via dams and pipe work on the grounds of it being a ruthless decision based on low capital expenditure, but carries a very high risk factor both to the environment and day to day human activity.

Response

During detailed planning for the diversion of Dry Creek, the options considered (as outlined in Section 4.13.9 of the EIS) considered a number of factors including (but not limited to) coal sterilisation, potential environmental impacts and capital costs.

As mining progresses to the west, it is anticipated that Dry Creek will be impacted from mid-way through Year 2 of mining operations. As such, the construction of CW1 north of Wybong Road will be required to commence in Year 1 and will be constructed to be capable of containing a 1 in 200 year rainfall event. To maintain safe operating levels, clean water from CW1 will have a design flow of 1,085 L/s into a pipe to divert clean water around mining operations until Dry Creek is reinstated after Year 15.

The preferred option for the reinstatement of Dry Creek as presented in Figure 18 of the EIS includes a creek alignment that would meander south (between the final void and the Main OEA) before heading east around the northern part of the CHPP and south along its original alignment towards the Hunter River. This option was sought for the Project due to the provision of the most natural alignment of the creek that fits in with the Project mine plans and creates the most natural meandering flow, consistent with existing conditions necessary to ensure the design grade parameters between 0.5% and 1.5%. Other options considered require the construction of steeper slopes that were less compatible with the final shaped overburden surface.

BMC will develop a Dry Creek Reinstatement Management Plan within five years of the proposed construction in consultation with relevant regulators to ensure that effective management measures are employed during the construction and reinstatement and revegetation of Dry Creek. The Dry Creek Reinstatement Management Plan will describe the monitoring and rehabilitation techniques and provide erosion and sediment control measures to be implemented.

7.3.3 Construction of Clean Water Dam 1

Issue

The High Risk Factor is due to the construction of the CW1 Storage Dam of 900ML which will be constructed adjacent to Wybong Road, (a public roadway), on the north side. This dam which is designed to be a Dry Dam is to have its walls and spillway positioned less than 50 metres from the Proposed Open Cut Coal Mine. The design criteria has no mention of the Blasting effects that may be a design safety factor in the construction of the dam wall for both when it is dry and full, (i.e. wall is dry and then wet, with blasting being so close, ground vibration within the range of 50mm/s to 100mm/s, this impact should be fully investigated).

Response

Designing CW1 to accommodate blasting will be a key aspect of the detailed design phase of the Project. The dam designers will liaise with BMC's mine planning engineers with regards to predicted vibration levels and modified blast patterns to maintain those predicted levels below what can be accommodated as part of the design.

Further, as this will likely be a "prescribed dam" under the Dam Safety Act, the DSC will be issued a detailed design report that will include predicted blasting levels and how they are accommodated within the design to achieve a suitable level of safety. The DSC is a NSW government statutory body and has a general responsibility to ensure the safety of all dams, and a special responsibility regarding prescribed dams and the oversight of activities that can affect their safety (e.g. coal mining nearby). As such, the DSC would not endorse the design if they are not satisfied that adequate measures included in the design for the effects of blasting.

7.3.4 Clean Water Dam 1 Design Event

Issue

The Dry Creek Catchment North of Wybong Road which is approximately 665 Hectares, and the CW1 Dam has been designed to cater for a 1 in 200 year rain event. The safety factors have not been projected into the design if consideration had been given for Climate Change extremes. If there was an extreme storm event and the Dam CW1 spills, and the water enters the Bengalla Void and Mine Workings, this outcome has not been addressed. Flooded Open Cut Coal Mines in Queensland during the 2010-11 have set a precedent for Environmental Issues, and this should be addressed by the Bengalla Mine Continuation Project.

Response

CW1 and the associated pump and pipeline infrastructure would be suitable should they have been designed to cater for the 1 in 100 year ARI, 72 hour event as this would be considered typical of the design criteria as noted in Managing Urban Stormwater, Soils and Construction, (Landcom, 2004) for a dam of this type and risk profile.

However, in direct response to the 2010-2011 Queensland floods, BMC directed that the design event for the CW1 and associated pump and pipeline be increased to the 1 in 200 year ARI, 72 hour event to further mitigate the risk against potential extreme climatic events.

7.3.5 Gravity Drainage Solution

Issue

The only safe way for this Proposal by Bengalla is to use a Gravity Drainage Solution with the capital cost borne by Bengalla Mining Company, (as per Option 1 Appendix B, Page 50-X).

Response

The pump and pipeline solution proposed by BMC is an engineered solution with appropriate engineering factors of safety and protocols in place to address project risks.

Further details into the options considered including detailed plans and justification for the preferred option is provided in the Dry Creek Interim Management System and Conceptual Re-establishment Study (Appendix X of the EIS).

A gravity drainage solution, whilst it could be effective in meeting the Projects aims, is inefficient from a cost/benefit perspective due to the depth of the cuttings and significant volumes of excavation required. It also has regulatory limitations including:

- Potential long term stability and maintenance issues with the very long batter lengths; and
- Potential long term maintenance issues with a 205 m long, 210 mm diameter buried reinforced concrete pipe.

7.4 H&J BROWN

7.4.1 Air Quality Impacts

Issue

Dust from this project as a constant issue for us as neighbours. The operation at Bengalla is Dragline / Excavator / Truck Fleet Etc. The dragline operation spreads dust unabated constantly which cannot be suppressed. The rest of the operation makes little or no effort to limit dust. This is going to get worse for us going forward.

Response

It has been assumed that H&J Brown is the same as Receptor 146 (land title nominated to June and Peter Brown) as presented on Figure 6 of the EIS. As identified in the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) no predicted exceedances of relevant air quality criteria are predicted at Receptor 146 during any of the modelled years for the Project.

As noted in Section 8.1.4 of the EIS, in order to address government and community concerns regarding the impacts of mining on regional air quality in the Hunter Valley, BMC will continue to implement best practice dust management practices, including:

- Best practice dust management techniques (e.g. water sprays, sheltered emplacement during high wind, minimising fall heights of materials and expedited rehabilitation);
- Guidance to employees on dust management measures and visual identification of dust for specific sources and activities;
- Commitment to achieving 85% control on primary haul roads through watering or the use of chemical dust suppression agents;
- The use of automated monitoring systems (visual monitors and dust and wind speed alarms) situated in and around active mining areas that detect adverse dust and meteorological conditions; and
- Temporary cessation of particular operations during periods of high dust to reduce the potential for further dust impacts.

The measures proposed for the Project are consistent with the recommendations of the '*NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining'* (Katestone Environmental, 2011).

In addition, proposed improvements to the current network will enhance BMC's ability to manage dust impacts and verify the environmental performance of the Project and include:

- Installation of Tapered Element Oscillating Microbalance (TEOM) monitors to largely replace or augment the HVAS monitoring network;
- Best endeavours to establish an ambient air quality monitoring data sharing arrangement with neighbouring coal mines;
- Commissioning of additional dust monitors to the west, north-west and south-west of the Project as mining continues to the west; and
- Update of the existing dust and blast management systems with a real time air quality management system combined with predictive meteorological forecasting.

The current BMC Air Quality and Greenhouse Gas Management Plan will be updated for the Project in consultation with the relevant regulators for construction and operational activities associated with the Project and shall include all commitments from the EIS.

7.4.2 Noise Impacts

Issue

Noise from this project will obviously intensify with the project. We are already at times affected by audible noise, low frequency vibration and infrasound from Bengalla's operation. The clanging / banging of the dragline chains, engine noise continuum etc. Is clearly audible at time, and will be even closer operationally going forward. The CHPP is a secondary source of infrasound at our property and ramping up of the production will only worsen this.

Response

It has been assumed that H&J Brown is the same as Receptor 146 (land title nominated to June and Peter Brown) as presented on Figure 6 of the EIS. As identified in the Acoustic Impact Assessment (Appendix H of the EIS) and summarised in Table 40 of the EIS Receptor 146 is predicted to receive a moderate exceedance (37.4 dBA $L_{Aeq,15min}$) of between 2 and 5 dBA above the intrusive noise criteria. This exceedance is not predicted to occur until Year 24 of the Project with all previous years remaining below criteria.

As noted in Section 8.3.4 of the EIS the Project will continue to use existing noise management measures currently being implemented at Bengalla. Further to this, additional feasible and reasonable noise mitigation measures have been incorporated into the existing CHPP and will be continued in all proposed infrastructure modifications associated with the Project, including:

- Mobile machines including trucks, dozers, graders and water carts generally operate on elevated and exposed sections of the OEA during the day and early evening and on lower and more shielded sections of the OEA during the sensitive night period;
- Mining machines generally work below the surface during the sensitive night period. Surface work including clearing, topsoil stripping, stockpiling and rehabilitation is completed during the day;
- Drilling and drill pad preparation generally occurs at least 6 m below the natural surface during the evening and night;
- Use of wheeled dozers instead of tracked dozers on exposed areas;
- A continuous data link from the weather monitoring station was established to allow informed decisions to be made regarding appropriate equipment operating locations;

- A real time noise monitoring system was established to provide feedback regarding Bengalla's acoustic performance and to allow equipment operating locations to be fine-tuned to avoid excessive noise at receivers.
- The proposed relocated ROM hopper will include an equivalent level of noise control as the existing hopper, which was designed and constructed following best practice procedures;
- Best practice modifications will continue to be implemented at the CPP building, which currently produces a sound power level of 115 dBA;
- Conveyors will continue to be limited to a sound power level of no more than 76 dBA per metre for sections of conveyor that cannot be enclosed; and
- The rail load out facility, stackers and reclaimers will continue to be managed and modified following best practice control measures.

BMC will update the existing Noise Management Plan which incorporates a combination of engineering controls and mitigation measures employed to manage and control noise impacts associated with the existing Bengalla operations. Existing noise control and management measures will continue to be implemented as part of the Project to ensure best practice controls are maintained.

7.4.3 Blasting Impacts

Issue

As the project moves closer to us and intensifies, the regularity of blasting, as well as distance to source will be more of a constant issue. Blasting fuming will, as expected be more of an issue as well.

Response

As noted in Section 8.4.3 of the EIS the closest private sensitive receptors to Project active mining areas would be Receptor 156, located approximately 1,500 m from the active mining area. Results from the Acoustic Impact Assessment found that exceedances of the blast criteria are unlikely to occur at Receptor 156 given the nature of the blasts coupled with the distance away. Given that all other private receptors (including Receptor 146) not subject to acquisition by a mining company are located at least 1,500 m from active blast areas, no other exceedances at private receptors has been predicted.

BMC is committed to implementing best practice noise and blast mitigation measures as outlined in **Section 7.4.2** to minimise offsite noise and blasting impacts as a result of the Project. The revised Blast Management Plan will consider the progression of the mine and blasting locations in conjunction with the prevailing weather conditions and sensitive receptor locations.

The revised Blast Management Plan will incorporate the use of updated existing blast management systems where appropriate with a real time air quality management system combined with predictive meteorological forecasting capabilities.

7.4.4 Rain Water Impacts

Issue

As present, like all similar projects, the mine is a huge contributor to diesel emissions and petro-chemical residues. These are a problem to all of us that rely on rain water for our source of water. The intensification of this project will provide more emissions and more residues.

Response

A number of studies have been conducted investigating the potential health effects of mine dust entering rainwater tanks for receptors located near coal mining operations. Studies conducted in Queensland (Lucas et al., 2009) and in New South Wales in the Hunter Valley (Noller, 2009) and Gloucester Valley (Parkinson & Stimson, 2010) investigated potential health effects of mine dust entering the rainwater tanks via the deposition of material on rooftop surfaces.

These studies found similar results with negligible amounts of trace elements (including lead) in the samples of tank water. Measured levels for these elements were below the relevant Australian Drinking Water Guidelines. Where it was investigated, the studies also found no significant difference in the water quality of tank water from houses close to mining operations compared to those further away or with town water.

BMC will offer installation of first flush systems for all occupied properties within its zone of management for the Project, where not previously installed by another mining operation.

7.4.5 Cumulative Impacts

Issue

This project will, of course, add to the cumulative effects of the mines on our lives. When is ENOUGH ENOUGH!!! The majority of people in employment at these projects do not live in close proximity to the huge polluting abomination. For us who do, we are significantly impacted. We are treated as collateral damage in the pursuit of profit, for uncaring, unconscionable multinational company's, putting profit before people and incongruous to peoples lives.

The modelling provided for the cumulative effects of this project looks to be done without consultation with the other projects in close proximity.

The dust modelling from Mt Arthur has us between the 30mg and 50mg contours (2016). Bengalla so called modelling for cumulative effects does not even have us close to 30mg contour.

The noise modelling from Mt Arthur, once again, would also indicate that any additional noise from Bengalla, when overlayed to Mt Arthur noise contours, has made little or no contribution, and in fact according to Bengalla modelling the noise improves during the day/evening period.

These are just some of the reasons we feel that the modelling provided for this project is inaccurate at best.

Bengalla movement westward will see an increase in the stripping ratios. This could over time be up to 100% increase on present stripping ratios. If only 50% increase on average this would represent a need to increase movement of overburden by 50% on present levels (10.7ml to 15.0ml) would therefore see this further increase of a similar percentage. This would take the yearly production (coal & overburden), to roughly a 95% increase on present ground disturbance. We do not believe the modelling reflects this!!

It is also of our belief that their dumping emplacement profiles for not represent the 30%+ increase in mining spoils that you get when mining, and further modifications will be sought in the future for dumping emplacements.

We do not therefore support their modelling, we reject their assertions, and obviously in light of this, object to the modification and intensification of this project on the grounds the impacts on us will be greater than they assert.

Response

Air Quality

As stated in **Section 7.4.1** the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) no predicted exceedances of relevant air quality criteria are predicted at Receptor 146 during any of the modelled years for the Project.

As outlined in Section 8.2.1 of the EIS the cumulative air quality assessment considered emissions from all approved mining operations in the vicinity of the Project (Mt Arthur Coal Mine, Mount Pleasant Project, Mangoola Coal Mine, Drayton Mine (and Drayton South Coal Project) and Muswellbrook Coal Mine). This requires a level of conservatism to ensure predicted impacts are not underestimated.

For the neighbouring Mount Pleasant Project, it has been conservatively assumed that construction activities will commence in Year 4, with coal extraction commencing in Year 8 of the Project and generally as described in the Mount Pleasant 1997 EIS. Despite the current Mount Pleasant DA 92/97 expiring in 2020, it has been assumed for the purposes of modelling that Coal & Allied would seek the relevant approval to enable future mining and as a result has been conservatively considered to be operational for the duration of the Project.

In order to assess worst case cumulative air quality impacts of Mt Arthur Coal Mine and Xstrata Mangoola operations, it has all been conservatively assumed that these operations will continue until the end of the Project life at existing approved rates (which are greater than production levels currently occurring). As such it would be anticipated that the air quality predictions presented in the EIS are conservative.

Noise

As stated in **Section 7.4.2** Receptor 146 is predicted to receive a moderate exceedance (37.4 dBA $L_{Aeq,15min}$) of between 2 and 5 dBA above the intrusive noise criteria. However this exceedance is not predicted to occur until Year 24 of the Project with all previous years remaining below criteria.

As noted in Section 8.3.2 the INP recommends amenity criteria designed to limit the total or cumulative noise impacts. Other industrial developments with the potential to produce significant environmental noise include the Mount Pleasant Project to the north, Mangoola Coal Mine to the south-west, Mt Arthur Coal Mine to the south, Muswellbrook Coal Mine to the distant east and Dartbrook Coal Mine (currently under care and maintenance) to the north-east. The INP amenity noise criteria for rural categories of 50 L_{Aeq} during day periods, 45 L_{Aeq} during evening periods and 40 L_{Aeq} during night periods has been adopted to assess cumulative noise levels.

Predicted combined noise levels from the Project and other industrial developments are predicted noise levels for the worst case year at each receiver. All private receptors are expected to receive cumulative noise levels below the 40 $_{LAeq,9hr}$ night criterion. The Project would contribute typically 25% to 30%, but up to 68%, of total predicted noise levels at potentially affected receivers.

Overburden Handling

Detailed quantities and staging of overburden generated as a result of the Project have been included in all the necessary EIS studies in particular the air quality and acoustic impact assessments. It is noted that the total overburden will vary for the Project consistent with production levels; mine planning objectives and terrain (see EIS Table 10).

7.5 P&J BROWN

7.5.1 Air Quality Impacts

Issue

Dust from this project as a constant issue for us as neighbours. The operation at Bengalla is Dragline / Excavator / Truck Fleet Etc. The dragline operation spreads dust unabated constantly which cannot be suppressed. The rest of the operation makes little or no effort to limit dust. This is going to get worse for us going forward.

Response

See **Section 7.4**.

7.5.2 Noise Impacts

Issue

Noise from this project will obviously intensify with the project. We are already at times affected by audible noise, low frequency vibration and infrasound from Bengalla's operation. The clanging / banging of the dragline chains, engine noise continuum etc. Is clearly audible at time, and will be even closer operationally going forward. The CHPP is a secondary source of infrasound at our property and ramping up of the production will only worsen this.

Response

See **Section 7.4**.

7.5.3 Blasting Impacts

Issue

As the project moves closer to us and intensifies, the regularity of blasting, as well as distance to source will be more of an constant issue. Blasting fuming will, as expected be more of an issue as well.

Response

See **Section 7.4**.

7.5.4 Rain Water Impacts

Issue

As present, like all similar projects, the mine is a huge contributor to diesel emissions and petro-chemical residues. These are a problem to all of us that rely on rain water for our source of water. The intensification of this project will provide more emissions and more residues.

Response

See **Section 7.4**.

7.5.5 Cumulative Impacts

Issue

This project will, of course, add to the cumulative effects of the mines on our lives. When is ENOUGH ENOUGH!!! The majority of people in employment at these projects do not live in close proximity to the huge polluting abomination. For us who do, we are significantly impacted. We are treated as collateral damage in the pursuit of profit, for uncaring, unconscionable multinational company's, putting profit before people and incongruous to peoples lives.

The modelling provided for the cumulative effects of this project looks to be done without consultation with the other projects in close proximity.

The dust modelling from Mt Arthur has us between the 30mg and 50mg contours (2016). Bengalla so called modelling for cumulative effects does not even have us close to 30mg contour.

The noise modelling from Mt Arthur, once again, would also indicate that any additional noise from Bengalla, when overlayed to Mt Arthur noise contours, has made little or no contribution, and in fact according to Bengalla modelling the noise improves during the day/evening period.

These are just some of the reasons we feel that the modelling provided for this project is inaccurate at best.

Bengalla movement westward will see an increase in the stripping ratios. This could over time be up to 100% increase on present stripping ratios. If only 50% increase on average this would represent a need to increase movement of overburden by 50% on present levels (10.7ml to 15.0ml) would therefore see this further increase of a similar percentage. This would take the yearly production (coal & overburden), to roughly a 95% increase on present ground disturbance. We do not believe the modelling reflects this!!

It is also of our belief that their dumping emplacement profiles for not represent the 30%+ increase in mining spoils that you get when mining, and further modifications will be sought in the future for dumping emplacements.

We do not therefore support their modelling, we reject their assertions, and obviously in light of this, object to the modification and intensification of this project on the grounds the impacts on us will be greater then they assert.

Response

See **Section 7.4**.

7.6 LANE

7.6.1 Noise Impacts

Issue

Volume 1 Section 8: Table 40 shows 155 in the significantly affected section. We are the closest receiver to the West of this development. Table 42: also shows us as being significantly impacted by this development.

I cannot find any information as to the noise impact of the realignment of the link road in year 15. There is mention in Appendix H table 16 of link road construction noise exceedance, but no mention in table 18 "Existing and proposed operational traffic noise, LAeq" This relocation will have a major impact as now it is approx 1km from our residence after realignment it will be approx 200m from our house with traffic travelling at 100kh. Also this road will eventually be a major heavy vehicle bypass fitting in with MSC western roads strategy. There is no reference to 155 in Appendix Q section 7. and 7.1.

Response

Assuming Receiver 155 is 200 m from the realigned Bengalla Link Road and based on a traffic flow of 1,370 vehicles per day on the western end of the road as shown in Table 17 in the Acoustic Impact Assessment (Appendix H of the EIS) indicates a traffic noise level of 54.4 LAeq. The calculated level assumes the receptors has a full view of the road with no intervening topography, which is likely to be the case.

With a significant percentage of vehicles likely to use the Bengalla Link Road during the night period from 10 pm to 7 am depending on the shift change times at various mining developments in the region, the average traffic noise level over the 15 hr day and 9 hr night is not expected to change significantly from that experienced presently. The predicted noise level of 54.4 LAeq should therefore be compared to the 60 LAeq,15hr day and 55 LAeq, 9hr night traffic noise criteria shown in Table 8 of the Acoustic Impact Assessment (Appendix H of the EIS).

The calculated traffic noise level from the realigned Bengalla Link Road would therefore comply with relevant noise criteria.

It is noted, that this property already entitled to acquisition as a result of predicted impacts arising from the Mt Arthur Project. Receptor 155 is currently entitled to acquisition in accordance with the conditions of the Mt Arthur Development Consent.

The Acoustics Impact Assessment (EIS Appendix H) prepared for the Project has predicted Receptor 155 to receive noise levels of 5 dBA or more over the intrusive noise criteria during Year 24 (see EIS Table 40). However, as noted above this property already entitled to acquisition as a result of predicted impacts arising from the Mt Arthur Project.

Further to the above it is noted that MSC is currently completing a revision to the Western Road Strategy. BMC will continue to consult with MSC regarding the final realignment of the Bengalla Link Road.

7.6.2 Air Quality Impacts

Issue

Volume 1 Section 8 Table 31 shows exceedances for 155 but only in year 24. I would have thought that being the closest western receiver approx 500m from the disturbed area and mining coming towards us the impacts from dust and blasting would have been more significant. Especially cumulative impacts from MAC, Mt Pleasant and Mangoola. Left out of Appendix G Table 10-20. What are the cumulative impacts when surrounded by these 3 major developments especially when taking into account our elevation? Surely the impacts from this development and MAC would be far more significant than has been stated.

Response

The Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) has predicted the potential dust levels in the surrounding environment due to the Project utilising air dispersion modelling. The air dispersion modelling included a meteorological modelling component which has incorporated the proposed modifications to the local mine terrain and the effect this would have on the local dispersion meteorology in the general area.

The overall results show the greatest effects from Bengalla would be to the north west, which occur during prevailing south easterly wind periods. As would be expected, the westward mine progression would also shift the area of effect westward.

The Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) prepared for the Project has predicted Receptor 155 to experience levels above the 24-hour average PM_{10} criteria in Year 24 (see EIS Table 31).

It is noted, that this property already entitled to acquisition as a result of predicted impacts arising from the Mt Arthur Project. Receptor 155 is currently entitled to acquisition in accordance with the conditions of the Mt Arthur Development Consent and management mitigation measures as identified in DA 211/93, Schedule 3 Condition 5.

7.6.3 Groundwater Impacts on Private Bore GW073576

Issue

Appendix K Section 11.5: Impacts on Groundwater Users: There is only one bore on private land GW073576 which is within the modelled zone of depressurization associated with the project. That is our bore. The drawdown at this bore is predicted to be about 2m. This is quite a vague answer considering it is just outside the Aquifer Interference Policy.

To trigger the AIF the drawdown is to be greater than 2m. There is no mention of the impact to discharge rates or water quality. 12:3 states "It is not possible to collect all the data characterizing the whole groundwater system in detail and therefore various assumptions have to be made during development of the groundwater model". Modelling and assumptions are not real scientific evidence of the true impacts of interfering with underground aquifers.

Response

The AIP suggests detailed modelling, such as the model produced for the Project is the most appropriate method to simulate impacts on the groundwater regime from mining. The produced model has been externally peer reviewed and deemed “fit for purpose”. All simulations in science contain some uncertainty, groundwater models included. The parameters used in modelling were selected to be as conservative as possible and hence the 2 m drawdown predicted on this bore is a reasonable worst-case result.

Following determination of Development Consent, the privately owned bore in question (GW073576) would have a baseline assessment carried out on it to ascertain its construction and current condition, should the landowner be agreeable to this. This will include measuring the depth of available water within the bore.

Should the landholder be in agreement, BMC will enter into an agreement with the owner of bore GW073576 (if required by the landowner and whilst in private ownership) outlining that if there is determined to be any impact as a direct consequence of the Project, and if confirmed, then appropriate mitigation measures would be developed. Baseline assessment and regular water level monitoring in the bore is deemed the most appropriate method to assess any future impact.

Property 155 has been predicted to be significantly impacted as a result of the Project for both cumulative air quality and noise impacts. In addition, ID 155 is already subject to acquisition by Hunter Valley Energy Coal due to significant impacts associated with the Mt Arthur Coal Mine

Baseline assessment and regular water level monitoring in the bore is deemed the most appropriate method to assess any future impact. This commitment has been included in the revised summary of Management and Mitigation Measures proposed for the Project (see **Table 21**).

7.6.4 Blast Impacts

Issue

Section 8:4:3 Impact assessment states "BMC blast monitoring results for the period 2007-2011 indicates that a minimum setback distance from non mine owned receptors of 1470m from project blasting would be appropriate to ensure impacts remain below relevant criteria". Our residence will be approx 900m from the proposed pit. Closer than property 156.

This is considerably closer than the study's appropriate distance of 1470m and therefore impacts in our opinion would be significant.

When you take into account the massive plumes of orange gasses that escape after each blast are full of Nitrates and Sulphates 900m would be unliveable. Appendix G 15:4 acknowledges that the project is moving west and as it does the blast fume impacts to the west would increase." It would become increasingly more complicated and restrictive to apply only simple blast permissions to prevent impacts in this situation". One would also have to question the modelling for blast fume when there is so much inconsistency between each blast as to how much gas they produce. As stated earlier most blasts in the Valley now have an orange yellow cloud due to cheaper explosive and varying degrees of moisture in the blast hole. But all looks good on paper. Maybe that is why our tank water has a ph5. Used to be 7.2.

Response

Overpressure and Vibration

The Acoustic Impact Assessment (Appendix H of the EIS) calculated Receptor 155 is predicted to receive more than 5 dBA above the project specific noise levels during Year 24 and is therefore subject to acquisition upon request. It is noted, that this property already entitled to acquisition as a result of predicted impacts arising from the Mt Arthur Project.

The Acoustic Impact Assessment (Appendix H of the EIS) calculated blast effects to receivers excluding those predicted to be affected by mining noise and those owned by a mining company. Nonetheless, assuming a setback distance of 900 m (as suggested by the comment) from the closest blast events as noted in the submission results in a predicted ground vibration level of 9.5 mm/s and an overpressure level of 121 dB.

However, it appears more accurate that Receptor 155 is approximately 1,250 m (not the 900 m as suggested) from the closest mining area which results in a predicted ground vibration level of 5.6 mm/s and an overpressure level of 117 dB.

BMC is committed to implementing all feasible and reasonable noise and blast mitigation measures as outlined in **Section 7.4.2** to minimise offsite noise and blasting impacts as a result of the Project.

Blast Fumes

The blast impact assessment provided in the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) indicates that the potential impacts from blast events can be managed via the blasting management plan..

The emission estimates for the blast fume are considered conservative and were based on measurements presented in a CSIRO study for Hunter Valley Blasts (see Section 15.2 of Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS)).

It is noted that the amount of blast fume emissions generated from each blast will vary depending on a number of variables unique to each event.

The Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS) is to revise the Blast Management Plan will consider the progression of the mine and blasting locations in conjunction with the prevailing weather conditions and sensitive receptor locations to ensure impacts are minimised.

7.6.5 Visual Impacts

Issue

Appendix I Section 7.2 Residences: Western Sector. The visual impacts on residents with views to the project in this sector will continue to be moderate to high. I cannot find any information on the visual impact of the realignment of the link road which would be difficult when only 200m away. 7.7.2 Direct Light Effects: The only locations that will have direct line of sight to night lighting are elevated locations such as Roxburgh road that overviews any screening topography and vegetation. This impact has just increased with the mine now in a direct line of sight after taking out a ridge line. As the mine moves further west we will not have the benefit of screening from trees and ridge line. The overburden mountain is approx 50m higher than what was in the original EIS. Is the height of that going to change?

Response

The Project will not require any increase in the currently approved maximum height of the OEA above RL 270 m. The Project will not add significantly to the cumulative visual impact created by open cut mining in the locality as it is a visual catchment that also currently supports other mines.

As noted in Section 8.5.3 of the EIS there are limited sensitive receptors within the most exposed Western View Sector. However some receptors will have high visual exposure and sensitivity. Significantly, views of the Project for the Western Sector will be smaller in scale (OEA elevation of less than RL 180 m) although in closer proximity than the current view (OEA elevation of RL 270 m). The visual impact on receptors with views to the Project in this sector will continue to be moderate to high. Due to the intervening topography situated between Receptor 155 and the Project, it is anticipated the views would be restricted to the southern part of the Project, if at all.

View locations include elevated sections on Roxburgh and Wybong Roads and a limited view corridor from the relocated Bengalla Link Road to the west of the CHPP. Potential views are confined to the more elevated parts of the road for approximately the first 1 km from the intersection between Roxburgh Road and Wybong Road as well as from elevated parts of Wybong Road itself before the intersection.

The proximity of operations (approximately 1 km at Year 24) will create high potential visibility, although topography and roadside vegetation will screen views toward operations. This will result in a moderate sensitivity, while both Wybong Road and Bengalla Link Road will have moderate sensitivity adjacent to the Project.

As noted in Section 8.5.4 of the EIS the following onsite lighting treatments will be maintained or implemented for the Project:

- Where consistent with health and safety requirements, lights will be hooded or directed away from sensitive receptors to avoid direct light spillage from within the Project Boundary;
- The design of fixed night lighting will be to the minimum level necessary for operations and safety;
- Low flux lamps will be used with the direction of fixed lights orientated towards the ground, where practical;
- Work procedures related to the use of mobile lighting plants will continue to be relied upon to avoid adverse off site lighting impacts; and
- Where possible, operations will be conducted in shielded locations, especially at night and particularly on the Main OEA to avoid adverse off site lighting impacts.

The following offsite treatments will be implemented to account for visual impacts of the Project:

- Tree screen planting (or equivalent mitigation measure) along Wybong Road will be extended to the western edge of the Project Boundary (see EIS Figure 18);
- Landscape plans for screening the eastern side of Bengalla Link Road will be prepared and implemented. Planting (or equivalent mitigation measure) already established on Bengalla Link Road along the deviation and Roxburgh Road will be extended to the western end of the Project Boundary;
- Where appropriate, tree screen planting (or equivalent mitigation measure) will be implemented along Denman Road, Roxburgh Road, Wybong Road in consultation with local receptors and the RMS;
- Complete a site inspection and where required, prepare landscape strategies for receptors that will experience prolonged high levels of visual impact, where requested;
- Ensure offsite landscape treatments at Edinglassie and Rous Lench create visual separation between these elements and active faces of the OEA in consultation with Mt Arthur Coal Mine; and
- The reinforcement of plantings close to viewing locations will be undertaken where night lighting is visible.

7.6.6 Property Values

Issue

This topic has been bought up with each new mine development and still has not been properly addressed. This is a question for Planning "How is it possible for landowners to get proper valuations supposedly not affected by mining when they are surrounded by mining developments"? We envisaged up till now of being able to stay here and live out our lives, but this development makes our home unliveable. The impacts will be quite significant.

Response

As mentioned in **Section 7.6.1**, Receptor 155 is already significantly impacted as a result of predicted impacts arising from the Mt Arthur Project. As such, Receptor 155 is currently entitled to acquisition in accordance with the conditions of the Mt Arthur Development Consent.

Government policy requires that significantly affected properties are acquired by the proponent. This process is clearly defined in Schedule 4, Condition 6 of BMC's existing Development Consent (DA 211/93) which it is likely that it or a similar condition would be applied to Bengalla should Development Consent be granted) and states:

"6. Within 3 months of receiving a written request from a landowner with acquisition rights, the Applicant shall make a binding written offer to the landowner based on:

(a) The current market value of the landowner's interest in the land at the date of this written request, as if the land was unaffected by development, having regard to the:

- *Existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and*
- *Presence of improvements on the land and/or any approved building or structure which has been physically commenced on the land at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of any additional mitigation measures under condition 5 and/or condition 20 of schedule 3;*

(b) The reasonable costs associated with:

- *Relocating within the Muswellbrook, Singleton or Scone local government areas, or to any other local government area determined by the Director-General; and*
- *Obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired;*

(c) Reasonable compensation for any disturbance caused by the land acquisition process."

Properties not physically impacted by the Project will experience normal fluctuations in value based on market supply and demand.

7.7 MOORE

7.7.1 Acquisition Liability

Issue

Continuation of Bengalla Mine EIS September 13 clearly indicates that we shall be affected. Levels of noise and dust will be above relevant acquisition criteria. Noise, greater that 5 Decibels above the intrusive criteria, shall be experienced from year one of the project. Dust, above the cumulative annual average PM_{10} criteria (30pg/m3) from year eight of the project.

Response

It is noted that Receptor 168 will be significantly affected by the Project above relevant acquisition criteria for both predicted air quality and noise impacts.

This property is entitled to acquisition as a result of predicted impacts arising from both the Mount Pleasant Project and Mt Arthur Coal Project.

The Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) prepared for the Project has predicted Receptor 168 to experience levels above the 24-hour average PM_{10} criteria, annual average PM_{10} and Total Suspended Particulates (TSP) along with depositional dust levels with worst case results presented in Year 24 (see EIS Table 31).

The Acoustics Impact Assessment (EIS Appendix H) prepared for the Project has predicted Receptor 168 to receive noise levels of 5 dBA or more over the intrusive noise criteria during Year 24.

7.7.2 Blasting Impacts

Issue

What Bengalla does not adequately address are the direct impacts from Blasting (including chemical smell and orange plume).

We have concerns already with respect to the impacts of vibrations on our house as a direct result from Blasting. We do not feel confident with the way Bengalla already deals with our complaints of chemical smells from Blasting. These are real health issues.

Response

Results from the Acoustic Impact Assessment (Appendix H of the EIS) found that exceedances of the blast criteria are unlikely to occur at Receptor 156 (the closest private receiver to the Project) given the nature of the blasts coupled with the distance away. Given that all other private receptors not subject to acquisition by a mining company are located at least 1,500 m from active mining areas no other exceedances at private receptors has been predicted.

The Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) prepared for the Project indicates that the potential impacts from blast events can be managed via the existing Blast Management Plan (to be updated for the Project).

The emission estimates for the blast fume are considered conservative and were based on measurements presented in a CSIRO study for Hunter Valley Blasts (see Section 15.2 Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G). It is noted that the amount of blast fume emissions generated from each blast will vary depending on a number of variables unique to each event.

BMC is committed to implementing best practice noise and blast mitigation measures as outlined in **Section 7.4.2** to minimise offsite noise and blasting impacts as a result of the Project. The revised Blast Management Plan will consider the progression of the mine and blasting locations in conjunction with the prevailing weather conditions and sensitive receptor locations. The revised Blast Management Plan will incorporate the use of updated existing dust and blast management systems with a real time air quality management system combined with predictive meteorological forecasting capabilities.

7.8 RANKIN

7.8.1 Air Quality

Issue

The report of Todoroski Air Services in relation to Air Quality Assessment identifies our clients' properties as predicted to experience exceedences of air quality criteria, some of which are expressed to be systematic exceedences. The report notes that the properties are within the zone of acquisition under the existing Mount Arthur North approval. That of course does not assist our clients unless and until they exercise their right to request acquisition and in the meantime, they are left to endure increasingly uncomfortable and unacceptable conditions. Our clients request that the applicant address the measures that are proposed to mitigate the impact at our clients' properties.

Response

The Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) has predicted the potential dust levels in the surrounding environment due to the Project combined with other sources including existing and future mining operations. As noted in Table 31 of the EIS the results show that Receptors 117, 118 and 119 (assumed to be the private properties within the submission) are predicted to exceed relevant air quality acquisition criteria (see EIS Table 31).

Results from the Air Quality and Greenhouse Gas Impact Assessment (EIS Appendix G) identified that primary wind axis for the area is north-east and south-west aligned and hence impacts arising from the Project at these Receptors would be minimised with considering cumulative impacts and neighbouring sources.

It is noted, that this property already entitled to acquisition as a result of predicted impacts arising from the Mt Arthur Project. Receptor 117, 118 and 119 are all currently entitled to acquisition and management and mitigation in accordance with the conditions of the Mt Arthur Development Consent.

BMC will consult with any private receptors predicted to be impacts by the Project to ensure they are made fully aware of the predicted impacts.

7.8.2 Noise and Blasting

Issue

The Acoustic Impact Assessment undertaken by Bridges Acoustics similarly identifies our clients' properties as predicted to experience significant noise impact during all conditions for the Project, including sleep disturbance noise impacts (again, described as "significant"). Similarly, it is No Response that these properties fall within the Mount Arthur North zone of acquisition.

That of course is also of great concern to our clients given their experience of existing noise levels. Our clients request that the applicant specifically address the measures proposed to ameliorate noise impacts experienced by our clients.

Our clients also anticipate significant impacts from blasting operations and note that they fall within the group of residents who will be notified of a Sunday blast.

As previously stated, the properties are used in conjunction for the operation of a dairy farm and the safety of livestock depasturing thereon, as well as the safeguarding of Improvements including underground irrigation infrastructure, is of vital importance.

Response

The Acoustic Impact Assessment (EIS Appendix H) has predicted Receptors 117, 118 and 119 are predicted to exceed relevant noise acquisition criteria (see EIS Table 40).

It is noted, that this property is entitled to acquisition as a result of predicted impacts arising from the Mt Arthur Project. Receptor 117, 118 and 119 are currently entitled to acquisition and management and mitigation in accordance with the conditions of the Mt Arthur Development Consent.

BMC will consult with any private receptor predicted to be impacts by the Project to ensure they are made fully aware of their predicted impacts.

7.8.3 Visual

Issue

Our clients specifically note the visual impacts predicted from Denman Road, indicated to be of "high sensitivity". Our clients expect that the Project will be very visible from their properties. Our clients request specific screening treatments to limit the impact, noting that the ameliorative measures that have been, and will continue to be, undertaken by Mount Arthur North on their properties will not extend to screening at the northern boundaries of their land.

Response

As noted in Section 8.5.3 of the EIS the southern viewing sector (which Receptors 117, 118 and 119 are within) is largely associated with Denman Road, which will have a high sensitivity up to 2.5 km from Muswellbrook and a moderate sensitivity up to 7.5 km, after which sensitivity will reduce to low. The private properties along Denman Road within this sector are approximately 4.5 km away from the Project Boundary and active mining areas, will have some visibility toward the Project.

The Project will not add significantly to the cumulative visual impact created by open cut mining in the locality as it is a visual catchment that also currently supports Bengalla along with other mines. The visual effect of the active mine face from Denman Road will be similar in extent to current approved operations.

As noted in Section 8.5.4 of the EIS tree screen planting (or equivalent mitigation measure) will be implemented along Denman Road, Roxburgh Road, Wybong Road in consultation with local receptors and the RMS and MSC (as relevant).

8 REVISED MANAGEMENT AND MONITORING SUMMARY

This section provides a summary of the additional management and monitoring commitments from this RTS.

Following consideration of the submissions received from stakeholders, BMC has undertaken additional works as part of this RTS to address the issues raised in **Appendix B**. **Table 21** provides a consolidated summary of the proposed environmental management and monitoring measures included in the EIS and its source. Additional management and monitoring commitments from this RTS have been included in '**bold**'.

As described in this RTS several minor amendments to the existing management and monitoring summary as presented in the EIS (see EIS Table 102) has occurred, primarily associated with the development of the Biodiversity Offset Strategy (see **Section 4**). Accordingly, all previous EIS commitments which related to the utilisation of the Upper Hunter Offset Fund for the UHSA (including items 32 and 34 of EIS Table 102) have been removed from the summary of the proposed environmental management and monitoring measures presented in **Table 21**. 'Section' refers to the EIS except where stipulated.

The removal of all previous EIS commitments associated with the utilisation of the UHSA has now been replaced with the development of a Biodiversity Offset Strategy, as described in **Section 4,** in consultation with key regulators. This revised commitment is reflected in **Table 21** (see Ref 3, 35, 36 and 37).

Where relevant, this RTS has also reiterated the key findings of the technical assessments that were undertaken as part of the EIS in order to provide further clarification and a comprehensive response to all issues raised.

As demonstrated in the EIS and further within this RTS, the Project's socio-economic and environmental impacts have been minimised as far as practicable by implementing all reasonable and feasible management and mitigation measures.

In this regard, BMC proposes to operate the Project in accordance with the management and monitoring measures provided in the EIS along with those identified below.

Table 21
Revised Project Management & Monitoring Measures

Ref	Commitment	Section
Mining Operations		
1.	BMC will extract coal at a rate of up to 15 Mtpa of ROM coal for 24 years, generally in accordance with this EIS.	**4**

Ref	Commitment	Section
2.	Prior to carrying out any activity that requires a licence or approval listed in **Table 18**, BMC will ensure that such a licence is obtained.	**5.9**
Environmental Management		
3.	BMC will revise Bengalla Mine's existing Environmental Management Strategy in consultation with the relevant regulators (and the Aboriginal community where relevant) consistent with **Section 8** of this EIS to the approval of DP&I which shall comprise: • Environmental Monitoring Program (incorporating groundwater, surface water, air quality, meteorological, blast and noise monitoring); • Air Quality and Greenhouse Gas Management Plan; • Noise Management Plan; • Blast Management Plan (incorporating Road Closure Management Plan); • Rehabilitation Management Plan (including Mine Closure Management Plan); • Bushfire Management Plan; • Landscape Management Plan; • Water Management Plan (incorporating Surface Water and Groundwater); • Aboriginal Cultural Heritage Management Plan; • European Heritage Management Plan (incorporating Conservation Management Plans for Bengalla Homestead and Overdene Homestead); • Biodiversity Management Plan; • **Biodiversity Offset Management Plan**; and • Dry Creek Reinstatement Management Plan.	**8 & RTS 4.1.9**
4.	The existing environmental monitoring program as shown in **Figure 11** and **Figure 12** shall be revised and updated in consultation with relevant regulators over the life of the Project in consideration of operations and the location of private receivers.	**3.13**
Air Quality and Greenhouse Gas		
5.	The existing Air Quality and Greenhouse Gas Management Plan will be revised for the Project in consideration of the management and mitigation measures described in this EIS and will incorporate the following: • Continued use of all feasible and reasonable air quality controls for reducing dust emissions; • Best practice dust management techniques; • The use of automated monitoring systems situated in and around active mining areas that detect adverse dust and meteorological conditions and proactively manage operations during periods of high dust to reduce the potential for further dust impacts; • Commitment to achieving 85% control on primary haul roads; and • Address interim and long term energy and greenhouse management plans and initiatives, including monitoring, reporting and continuous improvement.	**8.1.4**
6.	BMC will update the existing dust and blast management systems with a real time air quality management system combined with predictive meteorological forecasting.	**8.1.4**

Ref	Commitment	Section
Noise		
7.	The existing Noise Management Plan will be revised for the Project in consideration of the management and mitigation measures described in this EIS and will incorporate the following: • Continued use of all feasible and reasonable mitigation measures; • Proactive management of mobile equipment to operate on elevated and exposed sections of the OEA during the day/ evening and on lower and (where required on) more shielded sections of the OEA during the night period; and • Mining machinery to generally work below the surface during the sensitive night period, undertaking surface work during the day where practical.	**8.3.4**
8.	BMC will upgrade the existing noise monitoring system with a contemporary real time noise management system at representative receptors to facilitate ongoing and proactive noise management.	**8.3.4**
Blast		
9.	The existing Blast Management Plan will be revised for the Project in consideration of the management and mitigation measures described in this EIS.	**8.4.4**
10.	Blasting for the Project is proposed to occur at the rate of up to 12 blast events per week, during the hours of 7:00 am to 5:00 pm, Monday to Saturday.	**4.3.3**
11.	Blasting on Sundays will be undertaken at up to one blast event per day when within 500 m of the infrastructure areas in accordance with Blast Management Plan.	**4.3.3**
12.	MSC along with all privately owned residents located within the Project noise management zone (see **Table 40** and **Table 41**) will be offered to be notified of a Sunday blast.	**8.4.4**
13.	BMC will investigate and implement an appropriate real time blast system combined with predictive meteorological forecasting capabilities.	**8.4.4**
Visual and Lighting		
14.	The existing Landscape Management Plan will be revised for the Project in consideration of the management and mitigation measures described in this EIS and will incorporate the following: • The rehabilitation of the eastern face of the OEA to open woodland/scattered tree landscapes with higher density natural woodland; • Detailed design for the development of new visual plantings areas (or equivalent mitigation measure) or extensions to existing areas for planting areas to achieve a good visual outcome to critical eastern and southern views inclusive of planting patterns consistent with the limited, woodland and grassland of the existing landscape; and • Detailed topographic and tree planting design around the explosive storage facility and reload facility to reduce its visibility in the landscape.	**8.5.4**
15.	Where appropriate, tree screen planting (or equivalent mitigation measure) will be implemented along Denman Road, Roxburgh Road, Wybong Road in consultation with local receptors and the RMS.	**8.5.4**

Ref	Commitment	Section
Surface Water		
16.	The existing Water Management Plan (surface water section) will be revised for the Project in consideration of the management and mitigation measures described in this EIS including: • Detailed baseline data on surface water flows and quality for water bodies that could potentially be impacted by the Project; • Surface water and stream health impact assessment criteria including trigger levels for investigating any potentially adverse surface water impacts; and • A program to monitor surface water flows and quality, impacts on water uses, stream health and channel stability.	**8.6.4**
17.	The existing Surface Water Monitoring Program will be revised and implemented throughout the duration of the Project. BMC will continue to monitor the quantity and quality of water in onsite storages, the Hunter River and Dry Creek (until mined through).	**8.6.4**
18.	Monitoring locations will be relocated to accommodate the diversion of Dry Creek and the relocation of Washery Dam, Staged Discharge Dam and Raw Water Dam. The sampling frequency and parameters monitored will be consistent with current monitoring.	**8.6.4**
19.	To account for the maximum amount of surface water taken by the Project at any one point during its life, BMC will make the required application to NOW to hold relevant licences as required.	**5**
Groundwater		
20.	The existing Water Management Plan (groundwater section) will be revised for the Project in consideration of the management and mitigation measures described in this EIS and will incorporate the following: • Groundwater impact assessment criteria, including trigger levels for investigating potentially adverse groundwater impacts; • A program to monitor and assess groundwater inflows to the mining operations; • Impacts on local (including alluvial) groundwater systems including drawdown from the Hunter River alluvium; and • Impacts on any groundwater dependent ecosystems and riparian vegetation.	**8.7.4**
21.	The existing Groundwater Monitoring Program will be revised and implemented throughout the duration of the Project.	**8.7.4**
22.	To account for the maximum amount of groundwater taken by the Project at any one point during its life, BMC will make the required application to NOW to hold relevant licences as required.	**5**
23.	**As part of the revision to the Groundwater Monitoring Program, BMC will conduct groundwater monitoring of privately owned bore GW073576 to ascertain if there is any impact as a direct consequence of the Project and if confirmed, develop appropriate mitigation measures in consultation with the landholder.**	**RTS 7.6.3**
Geochemical		
24.	BMC will review the existing internal Acid Mine Drainage Management Plan and will include mitigation and management measures to minimise the potential risk of overburden and coal reject the to cause harm to the environment and ensure their suitability for use in construction and revegetation.	**8.8.4**

Ref	Commitment	Section
25.	No Archerfield Sandstone or coarse reject materials will be placed in the Western OEA.	**8.8.4**
26.	Current management including burial under NAF overburden methods for Wynn coal reject and other coal reject materials within the mining void will continue.	**8.8.4**
Aboriginal Archaeology and Cultural Heritage		
27.	The existing Aboriginal Cultural Heritage Management Plan will be revised for the Project in consultation with the RAPs with consideration of the management and mitigation measures described in this EIS and will incorporate the following: • Detailed salvage methodologies to be carried out prior to the commencement of the Project for the surface collection of stone artefacts, scarred tree assessment and removal; • Identification of appropriate long term management options for recovered artefacts which will be developed in consultation with RAPs; • Procedures for the protection and conservation of archaeological sites that are not impacted by the Project by means of fencing and other appropriate management measures; and • Provisions regarding the appropriate management actions for previously unrecorded Aboriginal sites identified within the Project Boundary.	**8.9.4**
European Heritage		
28.	The existing European Heritage Management Plan will be revised for the Project with consideration of the management and mitigation measures described in this EIS and will continue to incorporate Conservation Management Plans for the Bengalla Homestead and Overdene Homestead.	**8.10.4**
29.	Complete detailed archival recording of the Stockyard site in accordance with the Heritage Branch guidelines 'How to Prepare Archival Records of Heritage Items' (1998) and 'Photographic Recordings of Heritage Items using Film or Digital Capture' (2006).	**8.10.4**
Ecology		
30.	BMC will develop a Biodiversity Management Plan for the Project with consideration of the management and mitigation measures described in this EIS.	**8.11.4**
31.	A regular ecological monitoring program will be developed as a component of the Biodiversity Management Plan to monitor the ongoing status and health of flora and fauna communities that will be retained within the Study Area as well as previously-disturbed rehabilitated areas.	**8.11.4**

Ref	Commitment	Section
32.	BMC will develop a Dry Creek Reinstatement Management Plan for the Project with consideration to the management and mitigation measures described in this EIS and will: • Aim to reproduce Dry Creek to a quality similar or greater to that which currently exists by using collected pre-mining baseline ecological information; • Ensure revegetation of Dry Creek's riparian zone will be undertaken to create a vegetation corridor to assist in fauna movement between areas of forest and woodland habitat to broader areas of Derived Native Grassland north of Wybong Road (in the absence of the Mount Pleasant Project); • Provide appropriate rehabilitation, monitoring and provide timing for regular maintenance protocols; and • Ensure that native grasses, reeds and shrub species that are characteristic of the Hunter Floodplain Red Gum Woodland community will be planted in the reconstructed bed and riparian areas of the reinstated Dry Creek.	**8.11.4**
33.	Mine-owned riparian areas of Dry Creek nearby the Hunter River and a retained area (adjacent the CHPP) within the Project Boundary that were not affected by the Disturbance Boundary will also be rehabilitated (including the planting of the regionally endangered population River Red Gum).	**8.11.4**
34.	Prior to the clearing of any native vegetation, a Ground Disturbance Permit will be prepared.	**8.11.4**
35.	**BMC will develop the Biodiversity Offset Strategy as described in the Response to Submissions to compensate for the direct ecological impacts associated with the Project in consultation with key regulators.**	**RTS 4**
36.	**BMC will ensure that all land sought for the Biodiversity Offset Strategy is subject to an appropriate legally binding conservation covenant (or equivalent) in consultation with relevant regulators.**	**RTS 4.1.10**
37.	**BMC will develop a Biodiversity Offset Management Plan in consultation with key regulators to ensure the long term conservation of all lands within the Biodiversity Offset Strategy.**	**RTS 4.1.9**
Traffic and Transport		
38.	The existing Road Closure Management Plan (as a component of the Blast Management Plan) will be revised for the Project consideration of the management and mitigation measures described in this EIS.	**8.13.4**
39.	The Road Closure Management Plan will include protocols for the temporary closure of Wybong Road associated with the construction of CW1 and will be developed in consultation with MSC.	**8.13.4**
40.	BMC will construct the approximate 6 km realignment of the Bengalla Link Road to replicate the existing two lane, two way rural road that was constructed by BMC in 2009. BMC will consult with MSC prior to undertaking the realignment of Bengalla Link Road.	**8.13.4**
41.	The design will include a 'like for like' replacement of the current Bengalla Mine Access Road intersection approximately 900 m south. The intersection will consist of a channelised right turn with a minimum 160 m right turn lane with a slight uphill grade.	**8.13.4**

Ref	Commitment	Section
42.	BMC will construct an intersection from the existing Roxburgh Road onto the realigned section of the Bengalla Link Road. This intersection will require Roxburgh Road to be altered to allow a 90 degree angle of intersection.	**8.13.4**
43.	Prior to the transportation of over-dimensioned loads on State roads, BMC will obtain the necessary approvals from RMS. Similarly, approvals from MSC will be obtained prior to transportation of over-dimensioned loads on local roads.	**8.13.4**
Social		
44.	BMC will continue to implement the existing internal policies to issues associated with employee relocations to the Muswellbrook LGA (including housing and general assistance), ensuring ongoing Aboriginal employment positions are available for the Project and continuing to provide a framework for managing fatigue issues.	**8.14.4**
45.	BMC will revise its existing Voluntary Planning Agreement with MSC	**8.14.4**
46.	BMC will provide timely and appropriate operations workforce information to MSC, to assist Council to plan for future needs in relation to housing and accommodation, affordable housing and child care.	**8.14.4**
47.	BMC will continue to operate the BMC Community Consultative Committee.	**8.14.4**
Hazards		
48.	BMC will continue to maintain a database to assist in the recording and management of chemicals.	**8.16.4**
49.	Explosives, diesel, oil and hazardous materials will be transported, stored and used in accordance with relevant Australian Standards and legislation.	**8.16.4**
Waste		
50.	The existing BMC Waste Management System will be enhanced as required to reflect the additional workforce and operational areas as they are commissioned.	**8.17.5**
Contamination		
51.	An appropriate contamination investigation will be undertaken by a licensed contractor to further assess the extent of contamination throughout the Disturbance Boundary in the areas of potential contamination associated with the sites of current and former rural residences.	**8.18.4**
52.	Weed and pest (feral animal) management will continue in consultation with the Hunter Livestock Health and Pest Authority as per the Landscape Management Plan.	**8.18.4**
Rehabilitation		
53.	The existing Rehabilitation Management Plan will be revised for the Project with consideration of the management and mitigation measures described in the EIS.	**8.21**
54.	Rehabilitation will be designed to permit the reintroduction of relevant agricultural activities into appropriate the rehabilitated landform as soon as practicable.	**8.21**

Ref	Commitment	Section
55.	Final rehabilitation completion criteria for mine closure will be developed and agreed in consultation with the relevant government agencies and community and incorporated into the Final Void and Mine Closure Plan (developed as part of the Rehabilitation Management Plan).	**8.21**
56.	Should BMC wish to cease operations at Year 24 a Mine Closure Plan will be developed within five years of the scheduled mine closure.	**8.21**
57.	**The Revised Conceptual Final Landform will include additional vegetation patterns as presented on Figure 11.**	**RTS 5.7.2**
58.	**The revised Rehabilitation Management Plan will include the final densities of the vegetation patterns conceptually presented on Figure 11 of the RTS.**	**RTS 5.7.3**
59.	**Appropriate tree and / or shrub rehabilitation within and adjacent to the final void will be developed as conceptually presented on Figure 11. The final requirements will be included within the Rehabilitation Management Plan to be developed in consultation with MSC and other relevant regulators to the satisfaction of DP&I.**	**RTS 5.7.2**
Training and Reporting		
60.	BMC will provide regular and relevant training to all employees and contractors in relation to the commitments in this EIS.	**8**
61.	BMC will prepare an Annual Review report (which summarises coal quantities, monitoring results and reviews performance against the predictions and commitments in this EIS).	**8**

* * *

for
HANSEN BAILEY

Jason Martin
Environmental Scientist

Dianne Munro
Principal

9 ABBREVIATIONS

Table 22 provides a list of abbreviations used in this RTS.

Table 22
Abbreviations

Abbreviation	Description
µS	Microgram
a	Annual
ABS	Australian Bureau of Statistics
ACHMP	Aboriginal Cultural Heritage Management Plan
AEMR	Annual Environmental Management Report
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AIA	Agricultural Impact Assessment for the Ecological Offset Properties
AIP	Aquifer Interference Policy (NOW, 2012)
AIS	Agricultural Impact Statement
AMD	Acid mine drainage
AMDMP	Acid Mine Drainage Management Plan
ANZECC guidelines	Australian New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000)
Approved Methods	*Approved Methods for Modelling and Assessment of Air Pollutants in NSW* (DECC, 2005)
AQMP	Air Quality Management Plan
ARI	Average Recurrence Interval
ARTC	Australian Rail Track Corporation
AS	Australian Standard
ASC	Australian Soil Classification
ASS	Acid Sulphate Soil
ATO	Australian Tax Office
BAA	Biodiversity Assessment Area
BCA	Benefit-Cost Analysis
BCAM	Biodiversity Certification Assessment Methodology
BJV	Bengalla Joint Venture
BMC	Bengalla Mining Company Pty Limited
BMP	Biodiversity Management Plan

Abbreviation	Description
BOMP	Biodiversity Offset Management Plan
BOS	Biodiversity Offset Strategy
BSAL	Biophysical Strategic Agricultural Land
BVT	Biometric Vegetation Type
CEC	Cation exchange capacity
CFMEU	Construction, Forestry, Mining and Energy Union
CGE	Computable Generated Equilibrium
CIC	Critical Industry Cluster
cm	Centimetres
CM	Choice Modelling
CO_2	Carbon Dioxide
CPP	Coal Preparation Plant
CPSS	Certified Professional Soil Scientist
CSIRO Study	*Upper Hunter Valley Particulate Characterisation Study* (CSIRO, 2013)
CW1	Clean Water Dam 1
d	Day
dBA	The peak sound pressure level, expressed as decibels (dB) and scaled on the 'A-weighted' scale, which attempts to closely approximate the frequency response of the human ear.
DCP	Development Control Plan
DGRs	Director-General's Requirements
DNG	Derived Native Grassland
DoE	Commonwealth Department of the Environment
DoP	NSW Department of Planning (now NSW Department of Planning & Infrastructure)
DP&I	NSW Department of Planning & Infrastructure
DPI - Agriculture	NSW Department of Primary Industries – Office of Agricultural Sustainability & Food Security
DRE	NSW Division of Resources and Energy (within the Department of Trade & Investment, Regional Infrastructure and Services)
DSC	Dam Safety Committee
DSE	Dry Stock Equivalent
EC	Electrical conductivity
EEC	Endangered Ecological Community
EHMP	European Heritage Management Plan
EIA	Ecological Impact Assessment

Abbreviation	Description
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ENM	Environmental Noise Model
EP&A Act	Environmental Planning & Assessment Act 1979
EP&A Regulation	Environmental Planning & Assessment Regulation 2000
EPA	NSW Environment Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
EPL	Environmental Protection Licence
FFA	Flood frequency analysis
FOB	Free On Board
GDEs	Groundwater Dependent Ecosystems
GHG	Greenhouse Gas
GOS	Gross Operating Surplus
ha	Hectares
Hansen Bailey	Hansen Bailey Environmental Consultants
HCRCMA	Hunter Central Rivers Catchment Management Authority
HHMP	Historic Heritage Management Plan
HRA	Health Risk Assessment
HRSTS	Hunter River Salinity Trading Scheme
HVEC	Hunter Valley Energy Coal
INP	Industrial Noise Policy
IO	Input-output
IPM	Incremental Profile Method
km	Kilometre
km/h	Kilometres travelled per hour
KPIs	Key Performance Indicators
KTPs	Key Threatening Processes
kV	Kilovolt
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source and is the equivalent continuous sound pressure level over a given period.
LAeq 15hr	The summation of noise over a selected period of time. It is the energy average noise from a source and is the equivalent continuous sound pressure level over a 15 hour period.
LAeq 9hr	The summation of noise over a selected period of time. It is the energy average noise

Abbreviation	Description
	from a source and is the equivalent continuous sound pressure level over a 9 hour period.
LAmax (95th Percentile)	The noise level exceeded 5% of the time.
LAmax 24hr	The maximum noise level experienced during a 24 hour period
LGA	Local Government Area
LoR	Limits of Reporting
LoS	Levels of Service
LUDS	Land Use Development Strategy
M	Million
m^2	Square meters
m^3	Cubic meters
mg	Milligram
MIA	Mine Infrastructure Area
ML	Megalitres
MLA	Mining Lease Area
mm	Millimetre
MNES	Matters of National Environmental Significance
MNRL	Main Northern Rail Line
MOP	Mining Operations Plan
MREMP	Mine Rehabilitation Environmental Management Plan`
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
NAF	Non Acid Forming
NMP	Noise Management Plan
NO^2	Nitrogen Dioxide
NOW	NSW Office of Water
NSW Health	NSW Department of Health
OECD	Organisation for Economic Co-operation and Development
OEH	NSW Office of Environment & Heritage
PAC	Planning Assessment Commission
PAF	Potentially Acid Forming
PASS	Potential Acid Sulphate Soils
PB	Parsons Brinckerhoff

Abbreviation	Description
PHA	Preliminary Hazard Analysis
PM	Particulate Matter
PM_{10}	Particulate Matter <10 microns
$PM_{2.5}$	Particulate Matter <2.5 microns
POEO Act	*Protection of the Environment Operations Act 1997*
PRP	Pollution Reduction Program
PSNC	Project Specific Noise Criteria
RING	*Rail Infrastructure Noise Guideline* (EPA, 2013)
RL	Reduced Level
RMS	Roads and Maritime Services
Roads Act	*Roads Act, 1993*
ROM	Run-of-mine
RTS	Response to Submissions
SAL	Strategic Agricultural Land
SEPP Mining	*State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*
SEWPaC	NSW Department of Sustainability, Environment, Water, Population and Communities
SIA	Social Impact Assessment
SRLUP	Strategic Regional Land Use Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
TAI	The Australia Institute
The Project	Continuation of Bengalla Mine
TSC Act	*Threatened Species Conservation Act 1995*
TSP	Total Suspended Particulates
TSS	Total suspended sediment
TTIA	Traffic and Transport Impact Assessment
TTMP	Traffic and Transport Management Plan
UHSA	Upper Hunter Strategic Assessment
WAL	Water Access Licence
Water Act	*Water Act 1912*
WM Act	*Water Management Act 2000*
WSP	Water sharing plan
ZoA	Zone of Affectation

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