



# 9

## Management and Monitoring Summary

In addition to the conditions of the existing Development Consent, the following is a summary of operational controls for all activities associated with the Project. A summary of predicted air quality and noise impacts outlined in Section 8 is also included.



## 9.1 Summary of Project Air Quality and Noise Impacts

A summary of the air quality impacts above relevant criterion as identified in Section 8.1.3 and significant noise impacts as described in Section 8.3.3 for the Project are provided in Table 101. Table 101 provides a summary of receptors predicted to experience either (or both) significant air quality and noise impacts as a result of the Project.

An additional 15 properties owned by 11 individual landholders are also predicted to be impacted by the Project as detailed in Section 8.1.3 and Section 8.3.3, however already have rights to acquisition upon request by another mining company.

**Table 101** Project Air and Noise Impacts above Criteria

Receptor ID	Description	Air Quality	Noise
106*	MJ & MJ Duncan	✓	
110N*	GR & MK Walsh	✓	✓
110S*	GR & MK Walsh	✓	
152	MR Peel		✓
153	PR Ellis		✓
154	PSJ Murray		✓
156E	NJ & RY Ellis		✓
156S	NJ & RY Ellis	✓	✓
<b>25 % Contiguous Property</b>			
111*	GR & MK Walsh	✓	✓
211	TM Peel		✓
109*	EJ & CA Denton	✓	
245, 246, 249 & 250	JS & NM Lonergan	✓	

# Denotes property affected by cumulative air quality impacts only if Mt Arthur Coal Mine seeks further approvals after 2026.  
No privately owned receptors are predicted to experience significant impacts from blasting (see Section 8.4.3)

## 9.2 Summary of Management and Monitoring Measures

Table 102 provides a consolidated summary of the major proposed environmental management and monitoring measures proposed in this EIS.

**Table 102** Summary of Management and Monitoring Measures

Ref	Commitment	Section
<b>Mining Operations</b>		
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
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
<b>Environmental Management</b>		
3.	<p>BMC will revise their 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&amp;I which shall comprise:</p> <ul style="list-style-type: none"> <li>• Environmental Monitoring Program (incorporating groundwater, surface water, air quality, meteorological, blast and noise monitoring);</li> <li>• Air Quality and Greenhouse Gas Management Plan;</li> <li>• Noise Management Plan;</li> <li>• Blast Management Plan (incorporating Road Closure Management Plan);</li> <li>• Rehabilitation Management Plan (including Mine Closure Management Plan);</li> <li>• Bushfire Management Plan;</li> <li>• Landscape Management Plan;</li> <li>• Water Management Plan (incorporating Surface Water and Groundwater);</li> <li>• Aboriginal Cultural Heritage Management Plan;</li> <li>• European Heritage Management Plan (incorporating Conservation Management Plans for Bengalla Homestead and Overdene Homestead);</li> <li>• Biodiversity Management Plan; and</li> <li>• Dry Creek Reinstatement Management Plan.</li> </ul>	8
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
<b>Air Quality and Greenhouse Gas</b>		
5.	<p>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:</p> <ul style="list-style-type: none"> <li>• Continued use of all feasible and reasonable air quality controls for reducing dust emissions;</li> <li>• Best practice dust management techniques;</li> <li>• 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;</li> <li>• Commitment to achieving 85% control on primary haul roads; and</li> <li>• Address interim and long term energy and greenhouse management plans and initiatives, including monitoring, reporting and continuous improvement</li> </ul>	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
<b>Noise</b>		
7.	<p>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:</p> <ul style="list-style-type: none"> <li>• Continued use of all feasible and reasonable mitigation measures;</li> <li>• 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</li> <li>• Mining machinery to generally work below the surface during the sensitive night period, undertaking surface work during the day where practical.</li> </ul>	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

Ref	Commitment	Section
<b>Blast</b>		
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
<b>Visual and Lighting</b>		
14.	<p>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:</p> <ul style="list-style-type: none"> <li>• The rehabilitation of the eastern face of the OEA to open woodland/scattered tree landscapes with higher density natural woodland;</li> <li>• 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</li> <li>• Detailed topographic and tree planting design around the explosive storage facility and reload facility to reduce its visibility in the landscape.</li> </ul>	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
<b>Surface Water</b>		
16.	<p>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:</p> <ul style="list-style-type: none"> <li>• Detailed baseline data on surface water flows and quality for water bodies that could potentially be impacted by the Project;</li> <li>• Surface water and stream health impact assessment criteria including trigger levels for investigating any potentially adverse surface water impacts; and</li> <li>• A program to monitor surface water flows and quality, impacts on water uses, stream health and channel stability.</li> </ul>	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
<b>Groundwater</b>		
20.	<p>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:</p> <ul style="list-style-type: none"> <li>• Groundwater impact assessment criteria, including trigger levels for investigating potentially adverse groundwater impacts;</li> <li>• A program to monitor and assess groundwater inflows to the mining operations;</li> <li>• Impacts on local (including alluvial) groundwater systems including drawdown from the Hunter River alluvium; and</li> <li>• Impacts on any groundwater dependent ecosystems and riparian vegetation.</li> </ul>	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

Ref	Commitment	Section
<b>Geochemical</b>		
23.	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
24.	No Archerfield Sandstone or coarse reject materials will be placed in the Western OEA.	8.8.4
25.	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
<b>Aboriginal Archaeology and Cultural Heritage</b>		
26.	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: <ul style="list-style-type: none"> <li>• 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;</li> <li>• Identification of appropriate long term management options for recovered artefacts which will be developed in consultation with RAPs;</li> <li>• 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</li> <li>• Provisions regarding the appropriate management actions for previously unrecorded Aboriginal sites identified within the Project Boundary.</li> </ul>	8.9.4
<b>European Heritage</b>		
27.	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
28.	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
<b>Ecology</b>		
29.	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
30.	An 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
31.	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: <ul style="list-style-type: none"> <li>• Aim to reproduce Dry Creek to a quality similar or greater to that which currently exists by using collected pre-mining baseline ecological information;</li> <li>• 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);</li> <li>• Provide appropriate rehabilitation, monitoring and provide timing for regular maintenance protocols; and</li> <li>• 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.</li> </ul>	8.11.4
32.	BMC will provide a financial contribution to the Upper Hunter Offset Fund in accordance with the credits generated under the Upper Hunter Strategic Assessment (or alternative offset strategy as agreed with relevant regulators) to secure sufficient offsets to compensate for the direct removal of native vegetation.	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.	BMC will enhance the habitat along selected areas of Hunter River frontage on which BMC land as part of the Upper Hunter Strategic Assessment.	8.11.4
35.	Prior to the clearing of any native vegetation, a Ground Disturbance Permit will be prepared.	8.11.4

Ref	Commitment	Section
<b>Traffic and Transport</b>		
36.	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
37.	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
38.	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
39.	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
40.	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
41.	Prior to the transportation of over-dimensioned loads on State roads, BMC will obtain the necessary approvals from RMS and MSC.	8.13.4
<b>Social</b>		
42.	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
43.	BMC will revise its existing Voluntary Planning Agreement with MSC.	8.14.4
44.	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
45.	BMC will continue to operate the BMC Community Consultative Committee.	8.14.4
<b>Hazards</b>		
46.	BMC will continue to maintain a database to assist in the recording and management of chemicals.	8.16.4
47.	Explosives, diesel, oil and hazardous materials will be transported, stored and used in accordance with relevant Australian Standards and legislation.	8.16.4
<b>Waste</b>		
48.	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
<b>Contamination</b>		
49.	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
50.	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
<b>Rehabilitation</b>		
51.	The existing Rehabilitation Management Plan will be revised for the Project with consideration of the management and mitigation measures described in this EIS.	8.21
52.	Rehabilitation will be designed to permit the reintroduction of relevant agricultural activities into appropriate the rehabilitated landform as soon as practicable.	8.21
53.	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
54.	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
<b>Training and Reporting</b>		
55.	BMC will provide regular and relevant training to all employees and contractors in relation to EIS commitments.	8





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## Project Justification



## 10.1 Overview

This EIS has assessed the potential impacts of the Project in accordance with the DGRs issued on 13 March 2012 and the supplementary DGRs issued on 12 July 2012. All relevant regulatory requirements and the findings from the consultation program undertaken for the Project have also been considered in its preparation.

The Project as designed, after considering all options, will maximise the continued social and economic benefits from the extraction of this NSW government owned coal resource. At the same time it will minimise any impacts to the natural environment.

Further, the Project is consistent with the objects of the EP&A Act when its resultant social and economic benefits are weighed carefully against its predicted social and environmental costs.

When the management and mitigation measures committed to in this EIS are adopted, the residual environmental impacts of the Project are within acceptable limits. These impacts are justifiable when considered against the need for the Project and its social and economic benefits.

## 10.2 Approved Operations

In 1990, the NSW government called for expressions of interest from mining companies to develop the in-situ coal resource at Bengalla. BMC won this open and transparent tendering process.

Following a rigorous assessment process, Bengalla was granted planning approval in 1995 for the development of the Bengalla Coal Mine and in 1996 was granted a mining lease over the area. Mining operations commenced in 1998 with the first coal exported in 1999.

Bengalla is arguably considered one of the most technically advanced and productive coal mining operations in NSW with real time noise and air monitoring systems in place since 1999 and the first coal mine in Australia to gain EMS accreditation to ISO14001 standards. Since commencement of production in 1999, Bengalla has produced 78 Mt of thermal coal (BMC, 2012a) the majority of which is exported.

BMC has maintained a commitment to coexist within neighbouring agricultural enterprises since its approval in 1995.

Approximately 2,200 ha of the land not required for mining is used for agricultural purposes including dairying, cattle production and horse stud industries. The BMC has made a commitment to maintain the agricultural productivity of its land holdings which it has done since 1995. There are also a variety of agricultural enterprises present adjacent to the Project Boundary including grazing, dairying, equine industries, viticulture and an olive grove.

Approved mining operations at Bengalla are scheduled to continue until the expiry of the DA 211/93 in 2017. The Bengalla 1993 EIS recognised that significant coal reserves occur to the west beyond the 21 year mining extent as follows:

'The coal reserves continue to the west of the limit of excavation and beyond the edge of the Authorisation area. It is anticipated that these reserves will be mined by open cut methods in the future, subject to appropriate approvals'.

As such, approval of the Project will allow up to 316 Mt of ROM coal to continue to be mined at Bengalla, ensuring security of employment for the existing workforce and continuity of the socio-economic benefits currently experienced in the Hunter region, NSW and Australia. The Project will facilitate the recovery of a valuable coal resource in an area that has long been set aside for mining by the NSW government on land acquired by BMC for the specific purpose of the continuation of coal mining.

## 10.3 Project Need

### 10.3.1 Continued Employment and Social Benefits

During its operation, BMC has been a major employer of the local community, employing 358 full time equivalent workers of which approximately 46% reside in the Muswellbrook LGA; and 89% within the Muswellbrook, Upper Hunter and Singleton LGAs as at September 2011. A large proportion of the existing Bengalla workforce were employed as 'clean-skins' (i.e. workers without coal mining experience which BMC has afforded significant training).

Approved mining operations at Bengalla will continue until the expiry of DA 211/93 in 2017. The Project will allow mining to continue at Bengalla, ensuring security of employment for the existing workforce and continuity of socio-economic benefits for the Hunter Valley region, NSW and Australia.

The Project will facilitate the continuing recovery of a valuable coal resource in an area that has long been set aside for mining by the NSW government and acquired by BMC for the specific purpose of facilitating the continuation of mining at Bengalla.

Estimated total wages, in present value terms, is in the order of \$186 M with current wage payments in the order of \$124 M pa. Amounts paid to local contractors represent a major contribution to the local economy. Total rates and royalties paid to the Commonwealth and NSW State Government are in excess of \$509 M (present value) and \$778 M (present value) respectively.

BMC has worked in partnership with the local community in an endeavour to provide positive long term outcomes for the Hunter Valley region. Since operations commenced, BMC has directly contributed over \$700,000 to community based sponsorship programs. Additionally, the VPA between MSC and BMC allows annual funding of \$400,000 for the Bengalla Coal Community Fund, \$125,000 for Council Roads Maintenance Fund, \$15,000 to assist in employing a Council Environmental Officer and four apprentices each year.

Since commencement of production in 1999, the Coal & Allied Community Development Fund has contributed over \$11 M to projects aimed at providing benefits for the local community. Specific objectives have been identified based on an understanding of the local and economic environment, as well as through direct feedback from members of the community. Due to the quality of applications for funding, Coal & Allied has increased this voluntary funding commitment to \$4.5 M for the 2012 to 2014 period.

The Project maximises resource recovery and economic returns from capital invested in Bengalla and minimises environmental costs by utilising the existing infrastructure at Bengalla. The Project provides continuity for the existing workforce, services and supply contracts and maintains the beneficial social and economic interactions between Bengalla and the local community. The Project will not cause the community disruption and the environmental costs that would otherwise be associated with the establishment of a new mine.

### 10.3.2 Demand for Energy and Coal World

Bengalla primarily produces a high quality (12% to 13% ash content) thermal coal primarily used internationally for electricity generation. A relatively small amount of a lesser quality (approximately 27% ash product) steaming coal is also produced for the domestic electricity generation market. The average strip ratio at Bengalla is very low when compared to most other NSW open cut coal mines at approximately 3.5 bcm of overburden to each ROM t of coal recovered.

There is general acceptance, including from the United Nations sponsored International Energy Agency (2012) and Australian Energy Market Operator (2011), that there will be a continuing need for thermal coal to meet anthropological basic energy needs, in particular electricity generation (at least 1.7 per cent annual growth). International and local predictions are that the need for coal as a source of energy for electricity production will increase for some years to come, despite an expectation of an increase in energy generated by alternate sources.

Whilst there are steps being taken across the world to reduce the reliance on the use of fossil fuels generally, particular for electricity production, the forecasts are that increasing energy production from alternate energy sources (such as wind and solar) and energy saving actions will not match the anticipated increased demand for electricity particularly from the developing countries of south-east Asia, Africa and South America. The result will be an increase in demand for energy from coal over (at least) the next 20 years.

Whilst there is expected to be an increase in the contribution of alternate sources of energy in the form of wind and solar as well as the lesser greenhouse contributing natural gas it is predicted that a substantial source of the required energy will continue to come from the burning of coal.

Coal remains a highly sought after global energy source. The International Energy Agency of the United Nations (2012) acknowledges that coal has met nearly half of the rise in global energy demand over the last decade, growing faster even than total renewable. It is anticipated that the demand for world coal is set to rise to approximately 2020 with the key drivers being China and India.

The United States Energy Information Agency (2013) highlights that coal remains the largest source of electricity generation with consumption predicted to reach 14.7 quadrillion British Thermal Units in 2040. Although there is anticipated to be short term decline in the market share, coal production in the reference case increases by an average of 0.6 percent per year from 2016 through 2040 as a result of growing coal exports and increasing use of coal in the electricity sector as electricity demand grows and natural gas prices rise.

The United States Energy Information Agency predicts that world energy consumption will increase by 53 per cent from 2008 to 2035 from 505 quadrillion British Thermal Units in 2008 to 770 quadrillion British Thermal Units in 2035 (United States Energy Information Agency, 2011).

The International Energy Agency of the United Nations projects that the worlds demand for coal will increase at an average annual rate of 1.9% between 2007 and 2030. The share of coal-fired electricity generation is projected to increase from 42% in 2007 to 45% in 2030 (Geosciences Australia and the Australian Bureau of Agricultural and Resource Economics, 2010).

## Australia

Coal's contribution to Australia's electricity generation was approximately 75% in 2007-2008, but is projected to decrease to 43% in 2029–30. Australia is fortunate in its relatively abundant quantities of energy sources in the form of coal, natural gas and even wind, solar and uranium. Australia has 8.9% of the world's recoverable coal reserves as compared to 27.6% by the United States, 18.2% by Russia, 13.3% by China and 7.0% by India (World Energy Council, 2010). Due to its relatively smaller population, Australia has the largest per capital coal reserves in the world and, unlike other jurisdictions, more coal than it needs for its own use.

Being a politically stable society with its coal reserves being close to the coast, Australia is currently a desirable low cost provider of coal to the world markets resulting in material economic benefits for Australia. With relatively stable agricultural production and diminishing manufacturing, mining (including coal mining) is increasingly important to Australia's economy and the maintenance of Australia's standard of living. In the 2010, and 2011 financial year, a national total of 405 Mt black coal was produced and after processing, 326 Mt of this coal was available for both domestic use and for export (ACA, 2013a).

## NSW and the Hunter Coalfield

NSW's demand for electricity is met 89% from locally mined thermal coal. NSW has a recoverable coal resource of approximately 16,640 Mt (Montoya and Wales, 2011) of which currently some 157 Mt is produced annually. Of this, approximately 122 Mt is exported and 33 Mt is used domestically and primarily for electricity generation for the State (NSW Minerals Council Ltd, 2011).

In 2009 the known coal resource of the Hunter coalfield was 6,832 Mt, equating to approximately 41% of the NSW recoverable coal resource, of which 116.9 Mt was produced in that year (DTIRIS – DRE, 2011a). The majority of coal product from the Hunter coalfields is exported, with the remainder of the product used domestically and primarily for electricity generation (DTIRIS – DRE, 2011a). In NSW alone, coal accounts for approximately 90% of the State's energy production (ACA, 2013b).

In addition to the critical function of supporting the production of electricity the coal mining within NSW and the region provide significant economic contributions to their respective communities and underpin the economy of particularly NSW and the Hunter region.

## 10.3.3 Economic Benefits

The Australian and NSW economies are increasingly reliant on mining in a world that is experiencing and will continue to experience fiscal and economic challenges. The Project will result in material beneficial effects on the economies of Australia, NSW and the Hunter region. The economic consequences of the Project are assessed in **Appendix S** and discussed in **Section 8.15**.

The Project will facilitate the recovery of a valuable, export quality thermal coal. Thermal coal remains a highly sought after energy source in Asian countries, including Japan, Korea, Taiwan, China and India. These countries continue to be the world's largest coal importers and will largely account for the growth in total coal imports through to 2035 (International Energy Agency of the United Nations, 2012). This increasing demand supports the need for the Project and justifies further investment in the thermal coal mining industry.

To this end the Project will continue to:

- Assist Australia to continue to meet the international demand for thermal coal for at least the next 24 years, during which time it is expected that there will continue to be a strong world demand for coal for the purposes of generating electricity;
- Support Australia in maintaining its reputation as a consistent and reliable supplier of thermal coal to its existing and expanding markets; and
- Contribute materially to sustaining the Australian economy and maintaining the economic stability of NSW and the Hunter region.



The Project will deliver substantive socio-economic benefits to the Muswellbrook LGA but in doing so will create a need for additional supporting infrastructure and services. To this end, BMC is working with MSC with the view of revising the existing Bengalla VPA pursuant to Section 93F of the EP&A Act. The operational phase of the Project is expected to generate approximately 900 full time equivalent jobs in the local Muswellbrook LGA. On a regional basis (Muswellbrook, Upper Hunter and Singleton LGAs) the Project is expected to contribute approximately 1,745 annual direct and indirect jobs.

Additionally, should the Project be approved, BMC will implement the following strategies which will result in tangible social benefits to the Muswellbrook and its surrounding LGAs:

- The continued use of best endeavours to achieve the majority of its permanent workforce residing within the Muswellbrook, Upper Hunter and Singleton LGAs;
- A workforce recruitment strategy which addresses the needs of the semi-skilled and unskilled workforce which is available locally but will require on the job and more specific operator training;
- Continue to provide apprenticeships, traineeships and graduate placement programs to local Muswellbrook and surrounding LGA residents;
- Provide part time and/or flexible employment opportunities to encourage a higher rate of labour force participation;
- Encourage skilled partners of the incoming mining workforce to also relocate to the local area to skilled jobs that are required outside the mining industry; and
- Revise the existing VPA with MSC for the Project to provide contributions to address demands on local community infrastructure from the Project.

When the Project production costs (acquisition of affected land, opportunity cost of land, operating costs, environmental costs, decommissioning costs, etc.) are considered in the context of production benefits (revenues from production, residual values of land, etc.), the net production benefits of the Project accruing to Australia are approximately \$1,790 M.

The Project will deliver significant socio-economic benefits to the region and the State of NSW through the provision of employment, taxes and fees.

The Project is estimated to make up to the following contribution to the local economy:

- \$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 direct and indirect household income; and
- 1,745 direct and indirect jobs.

The Project is estimated to make the following contribution to the NSW economy:

- \$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 direct and indirect household income; and
- 4,868 direct and indirect jobs.

## 10.4 Project Development

### 10.4.1 Mine Plan Alternatives Considered

A number of options were developed and analysed with the primary objective being to develop a mine plan adhering to the principles of ESD whilst providing the best possible environmental, social, physical and economic outcomes for the Project.

Each of the alternatives investigated were refined according to the environmental impacts, the approvals required, operational practicality, timing and economic limitations. The various Project alternatives that were considered during this process are described below and will be described in detail in the EIS.

#### Option 1 – Do Nothing Approach

Under Option 1, Bengalla would cease operations in 2017. This would result locally in the loss of approximately 400 full time equivalent jobs and associated future employment opportunities. It would also lead to the loss of local socio-economic benefits created by Bengalla in addition to the loss of ongoing benefits and royalties and other payments to both the Federal and NSW State Government.

#### Option 2 – 24 Years at production of 10.7 Mtpa

Option 2 includes continuation of mining for a further 24 years at a maximum ROM coal production rate of up to 10.7 Mtpa. This would result in no additional increase in wealth generation and employment numbers and hence reduced economic and social flow on effects when compared to 15 Mtpa (Option 3).

#### Option 3 – 24 Years at 15 Mtpa down to the Basal Seam

Option 3 includes continuation of mining for a further 24 years at a maximum ROM coal production rate of up to 15 Mtpa however mining the entire coal resource down to the Ramrod Creek seam. This option would involve mining to a greater depth and would require the subsequent increase in height of the existing OEA above the current RL 270 m. Detailed mine planning has indicated that there are no economically viable coal seams available for extraction via open cut methods as proposed by the Project beyond the Edderton seam.

#### Option 4 – Continuation of Mining Retaining the Existing Bengalla Link Road

Development of a viable mine plan that does not impact on the Bengalla Link Road would result in the sterilisation of approximately 8 Mt of coal reserves and would impede the efficiency of the dragline strip operation.

#### Option 5 – Underground Operation

An assessment was undertaken of the underground mining potential of the resource proposed to be extracted via open cut methods in this EIS. The study concluded that the Edinglassie seam is the only seam currently capable of supporting large scale longwall mining and that the Edinglassie seam could not support a standalone underground operation at Bengalla under current market conditions.

#### Option 6 – Production Levels Greater than 15 Mtpa

Option 6 considered the development of a production levels greater than 15 Mtpa from Bengalla. High level studies revealed that the mining area is too confined to enable efficient operations and resource extraction to occur and as a result was not considered any further.

#### Option 7 – The Project

Option 7 represents the preferred Project for which Development Consent is sought, which includes the continuation of mining directly to the west for a period of 24 years at a maximum ROM coal production rate of 15 Mtpa achieved from Year 4 onwards.

Coal mining extraction is constrained by Wybong Road and Mount Pleasant Project to the north, Roxburgh Road to the west and alluvium associated with the Hunter River to the south.

The Project proposes to utilise largely established infrastructure, personnel and equipment currently employed at Bengalla. The Project is mostly within existing mining authorities held by and land owned by BMC. Further, this option, although increasing the socio-economic benefits to society does not proportionally increase the environmental impact envelope of the Project. In fact, due to mining efficiencies and better utilisation of existing infrastructure there is relatively little increased impact on the surrounding environment.

#### 10.4.2 Dry Creek Reinstatement

Dry Creek is an ephemeral creek that generally only flows following periods of intense rainfall due to its relatively small catchment area. Dry Creek only occasionally holds small pools of water for a few days following rainfall events. Dry Creek drains to the Hunter River approximately 1 km south of the Project Boundary.

Dry Creek will be intercepted as mining progresses to the west. To maintain the ongoing safety of operations in the mining area, the construction of a water storage dam and temporary diversion of Dry Creek will be required to temporarily divert clean water around mining operations through the use of a pipe network. A permanent reinstatement of Dry Creek will be constructed using best practice engineering design to ensure its successful stabilisation following mining.

Since 2007, a range of engineering studies were undertaken to assess the feasibility of diverting the creek and to determine the preferred option from at least seven considered. Considerations were made in relation to environmental impacts, engineering and cost perspectives to determine the preferred reinstatement of Dry Creek as assessed in this EIS.

### 10.5 Environmental Impacts

The Project has been assessed based on a worst case scenario and assuming that operations will be undertaken at a maximum ROM coal production rate of 15 Mtpa, with all feasible and reasonable management and mitigation measures applied (as described in this EIS). The Project mine plan has been prepared to facilitate resource extraction and economic productivity within the constraints of the site and all relevant environmental impact criteria.

The environmental assessment of the Project has adopted the following general methodology:

- Considering the objects of the EP&A Act, including the principles of ESD and leading practice environmental and social standards (Section 5.2.1);
- Consultation with stakeholders to identify any additional issues to be addressed in this EIS (Section 6);
- Performing a Project risk assessment (Section 7);
- Undertake a detailed technical assessment to quantify potential environmental impacts with certainty (Section 8); and
- Develop environmental management and mitigation measures (Section 8 and Section 9).

Project impacts are outlined in Section 8 with the most significant environmental impacts (despite the application of all reasonable and feasible management controls) summarised below.

### 10.5.1 Amenity

#### Air Quality

The assessment determined that any impacts caused by construction activities would be short and sporadic and the total dust generated by construction is minor compared to operational dust emissions. As a result, construction activities are not expected to cause any discernible impacts above the predicted operational impacts.

Air quality modelling for the operational phase indicates that no exceedances of the TSP or Dust Deposition criteria are predicted at any private receptor (which does not currently have a right to acquisition upon request by a mining company). The cumulative annual average  $PM_{10}$  criterion is predicted to be exceeded at three private receptors (Receptors 106, 110N and 110S) (excluding 13 properties currently entitled to acquisition by another neighbouring mining development). At all 16 receivers, the annual average  $PM_{10}$  concentrations resulting from the Project alone are below the criterion. A total of six (excluding properties currently entitled to acquisition by another neighbouring mining development) private owned receptors are predicted to experience exceedances of the maximum 24-hour average  $PM_{10}$  criterion during the Project life. Of these a systematic exceedance (i.e. more than 5 days in any year) of the maximum 24-hour average  $PM_{10}$  is predicted at only one private receptor (Receptor 156C).

An additional five private properties owned by two landholders (Receptors 109 and 245/246/249/250) (excluding one property currently entitled to acquisition by another neighbouring mining developments) are predicted to experience exceedances of the  $PM_{10}$  annual average criteria over greater than 25% of vacant land in a single, contiguous ownership.

In summary the Project will impact on four private receptors (Receptor 106, 110N, 110S, 156S) and six private properties owned by three landholders (Receptors 109, 111 and 245/246/249/250) that are not entitled to acquisition upon request by another neighbouring mining development.

No privately owned receptors are predicted to experience annual average  $PM_{2.5}$  concentrations above the advisory reporting standard of  $8 \mu\text{g}/\text{m}^3$ . No exceedances of the advisory reporting standard for the maximum 24-hour average  $PM_{2.5}$  concentration are predicted to occur at privately owned properties which do not have a right to acquisition upon request.

An assessment of fugitive fume and particulate matter emissions from blast activities determined that blasting at 7:00 am, 4:00 pm and 5:00 pm has the potential to result in blast fume impacts. With consideration of the existing stringent and proposed blast management practices, no blast fume impacts are expected to occur at private receptors.

BMC will implement real-time dust monitoring and management

system for the Project including a predictive meteorological forecasting system. BMC will also update its existing Air Quality and Greenhouse Gas Management Plan to minimise and manage air quality impacts associated with the Project.

#### Noise

Despite BMC continuing to implement best practice noise management and mitigation measures for the Project, noise modelling indicates that a significant noise impact (greater than 5 decibels above the intrusive criteria) is predicted to occur at six private receptors (110N, 152, 153, 154, 156E, and 156S) owned by five landowners that are not currently subject to acquisition by other mining companies upon request of the landowner.

An additional 11 private receptors (105, 106, 108, 110S, 126N, 146, 156W, 161, 186N, 180 and 184) owned by nine landowners would be moderately affected (between 2 - 5 decibels above the intrusive criteria) by the Project under a worst-case noise modelling scenario. A total of 12 private receptors have been predicted to experience mild noise impacts (between 1 - 2 decibels above the intrusive criteria) from the Project.

There are two additional properties (111 and 211) predicted to experience a significant noise impact from the Project in one or more modelled years over more than 25% of vacant land in contiguous landownership that is not currently subject to acquisition by another mining company on request.

BMC will revise the existing real-time monitoring and management system for the Project to include a predictive meteorological forecasting system. BMC will also update its existing Noise Management Plan to minimise and manage noise impacts associated with the Project.

#### Visual

Since operations commenced at Bengalla in 1998, BMC has established the Main OEA to provide a barrier to sensitive public viewing locations east of Bengalla. The Approved Bengalla Mine, as part of the Mine and Industrial Uses VCU is currently a visible part of the landscape in this locality. The Project will continue to progress in a westerly direction as operational areas continue for the Project and the height of the Main OEA will not increase above the currently approved maximum elevation of RL 270 m.

Private sensitive receptors are primarily located to the east and west of the Project. The Visual Impact Assessment determined that visual sensitivity of the Project from Northern and Southern View Sectors would be low to moderate due to a number of factors including existing land use, distance from the Project, the already established Main OEA and continued westerly progression of mining. Areas associated with the eastern and western VCUs including Ironbark Road, Racecourse Road and Roxburgh Road were assigned a high sensitivity as a result of their elevation and proximity to the Project.

Throughout the life of the Project, the progressive rehabilitation of the Main OEA will provide for the most significant element in relation to visual effects and impacts on the surrounding landscape. The eastern face of the main OEA will be revegetated with higher density natural woodland. This will decrease the visual contrast of the operation to the existing landscape in addition to rehabilitation strategies that emulate patterns, shapes, line and colour of the existing landscape.

Various onsite and offsite mitigation measures are proposed to reduce the visibility of the Project to sensitive receivers. The final design and for the rehabilitation of the final landform will be developed in consultation with relevant visual specialists and included in the revised Rehabilitation Management Plan and Landscape Management Plan.

### 10.5.2 Aboriginal and Historic Heritage

A total of 263 Aboriginal archaeological sites within the Disturbance Boundary will be directly impacted by the Project. These comprise 259 artefact scatters and isolated finds, three potential scarred trees and one remnant quarry site (where no Aboriginal heritage items have been previously recorded).

The 26 sites within the Project Boundary but outside the Disturbance Boundary will not be impacted as a result of the Project and will be protected.

To manage and account for impacts to Aboriginal archaeological and cultural heritage, BMC will update its existing ACHMP that will detail the appropriate salvage methodology and long term management options for remaining artefacts in consultation with Aboriginal stakeholders and relevant regulators.

There are five historic sites within the Project Boundary and a further six items with potential historic heritage significance adjacent to the Project Boundary. The Project will directly impact on three historic heritage sites, with House Sites 1 and 2 assessed as having no heritage significance. The Stockyard has been determined to be of local significance and an archival recording will be undertaken of this site.

Both the direct and indirect impacts associated with the Project will continue to be managed through a revised European Heritage Management Plan in consultation with relevant regulators for the Project.

### 10.5.3 Ecology

A total of 12 vegetation communities were identified within the Project Boundary of which three are listed as CEEC under the EPBC Act and six are listed as EEC under the TSC Act. One flora species listed as Vulnerable under the EPBC Act with a further one flora species listed as an Endangered Population under the TSC Act were identified in the Project Boundary.

Eight fauna species all listed as Vulnerable under the TSC Act was recorded within the Project Boundary. Although not recorded during field surveys, a number of other fauna species listed as threatened or migratory under the TSC Act and/or the EPBC Act are considered to have potential to occur.

The Project will disturb a total of 950 ha of native vegetation consisting of 554 ha of vegetation communities (the majority of which is derived native grassland) listed under the EPBC Act and / or the TSC Act.

A biodiversity offset strategy has been formulated to compensate for ecological impacts of the Project that will achieve a net gain in biodiversity in the bioregion in the long term. Offsets will be sourced in accordance with the planned Upper Hunter Strategic Assessment which involves the development of a Biodiversity Plan which identifies impacts and likely offset requirements for participating mining companies in the Upper Hunter. Participating Companies will be able to contribute to the Upper Hunter Offsets Fund (established under the Environmental Trust) to satisfy any offset requirements that are imposed as a condition of approval.

The ToR associated with the Upper Hunter Strategic Assessment were recently publicly exhibited on the DP&I website with comments due on 5 July 2013. Following the exhibition period, the ToR will be agreed between the NSW and Commonwealth Governments. It is currently anticipated that a final Upper Hunter Biodiversity Plan is to be completed by 31 December 2013.

The Upper Hunter Strategic Assessment process provides two avenues for projects to progress to enable projects. It is anticipated that BMC will follow the Path 1 process requiring approval to clear before the Draft Biodiversity Plan has been released for public exhibition. In this case approvals by NSW and the Commonwealth may be issued on a case by case basis and conditioned to cover any uncertainties about expected outcomes of the Biodiversity Plan and the proposed offset fund.

The Upper Hunter Strategic Assessment is intended to satisfy both Commonwealth and State biodiversity impact assessment requirements and utilises the BCAM as the key assessment tool. The Upper Hunter Biodiversity Plan has been developed and is currently being finalised by OEH and DP&I in consultation with SEWPaC and is expected to comply with the current principles for offsetting set out by SEWPaC's *Environmental Offsets Policy* (SEWPaC 2012) and the OEH *Principles for the Use of Biodiversity Offsets in NSW* (DECC, 2008a).

BMC intends to provide a contribution under this Plan to the Upper Hunter Offset Fund (to be set up under the NSW Environmental Trust and managed by the OEH on behalf of the Trust) that will be used to secure sufficient offset land and contribute to the cost of its ongoing management.

This contribution will provide for offsets to compensate for the direct removal of 950 ha of vegetation, including 881 ha of native vegetation, including woodland, forest and Box Gum Woodland. Contributing to the Fund will fulfil BMC's statutory offsetting requirements.

The offset funding will meet state and federal ecological objectives by conserving offset land in perpetuity, managing strategically located land to high ecological standards and restoring the condition and/or extent of terrestrial and aquatic habitats to ensure there is no net loss to biodiversity within the region.

Should the Upper Hunter Strategic Assessment not be established or not to BMC's satisfaction, the preparation of an alternative offset strategy would be conducted in consultation with relevant regulators and will be completed within two years following the determination of Development Consent for the Project.

#### 10.5.4 Soils and Agricultural Resources

BMC has a history of maintaining agricultural production on its lands with seven individual licensees currently operating a dairy, thoroughbred stud and brood mare farm, beef cattle breeding, lucerne hay and industrial hemp production. BMC will continue to implement the private licensing arrangements to ensure the ongoing success of agricultural enterprises on BMC land.

The land within the Disturbance Boundary lost to agricultural production represents a gross value of \$1.1 M pa. This equates to 0.36% of the total agricultural production of the Hunter Valley region, 0.014% of NSW and 0.003% of Australia. As such there will not be any material reduction in agricultural productivity of the Hunter Valley region or the State as a result of the Project.

#### Strategic Regional Land Use Plan Gateway Criteria

The Project is located adjacent to the Hunter River alluvial floodplain which is mapped under the criteria for BSAL. The SRLUP indicates that an area of approximately 28 ha of mapped BSAL falls within the Project Boundary (including the Approved Bengalla Mine). The consideration of the gateway criteria within this EIS draws from the reports of various technical specialists. The "Site Verification" concludes that there is 1 ha of verified BSAL within the Disturbance Boundary.

In order to verify the mapping associated with the Viticulture CIC as outlined in the SRLUP Appendix, the relevant criteria were investigated. The Soils and Land Capability Impact Assessment (to determine soil fertility and land capability) and the Groundwater Impact Assessment (to determine the extent of any alluvial aquifer) were investigated to determine if land within the Project Boundary conformed to the requirements of Viticulture CIC. These verification criteria in relation to determining the extent of Viticulture CIC are presented in Section 8.20.

Following the verification process, the Project Boundary contains 494 ha of Viticulture CIC that meets the criteria. The "Site Verification" conducted in accordance with the criteria described on page 84 (Appendix) of the SRLUP concluded that there is approximately 369 ha of the Viticulture CIC within the Disturbance Boundary. The area of verified Viticulture CIC is presented on Figure 67. The total area mapped as Viticulture CIC within region covers 107,135 ha. As a result, the area of verified Viticulture CIC within the Project Boundary and Disturbance Boundary represents 0.46% and 0.34% respectively of the total Viticulture CIC.

No existing vineyards occur within the Project Boundary and all land is owned by BMC (or another mining company). The nearest privately owned and operating vineyards are located approximately 12 km to the south-west, thus the Project was determined to have a minimal impact to the total land available for viticulture. In addition, as there is no discernible concentration of either viticulture or equine enterprises in proximity to the Project Boundary, the Project will have no impact on these CICs.

There is no land within the Disturbance Boundary which falls into the Equine CIC.

#### Benefit Cost Analysis

The direct annual output of the Project is estimated at \$1,174 M pa. In contrast, the direct annual output of the continued use of the agricultural lands and water for agricultural purposes that will be utilised by the Project is estimated at \$1.1 M pa. The direct and indirect regional employment provided by the Project will be up to 1,745 jobs compared to up to 1 agricultural-related job that would be foregone as a result of the Project.

Gillespie Economics also undertook a benefit cost analysis which included an estimation of the present value of production costs and benefits of the Project over a 24 year period. The present value of net production benefits of the Project to Australia are estimated at \$1,773 M (7% discount rate). In contrast, the present value of the continued use of the agricultural lands and water for agricultural purposes that will be utilised by the Project is estimated at \$12.5 M (7% discount rate). Based on these comparative values, the Project is considered to be a significantly more efficient land use than continued agricultural production.



## 10.5.5 Water Resources

### Surface Water

The water balance model predicts that raw water will continue to be sourced from the Hunter River in all years of the Project. Under median conditions, the Project will require approximately 1,500 ML/year from external sources. BMC currently holds water access licences with a total share component of 1,449 High Security Units and 4,562 General Security Units. Under very dry conditions, the maximum external water requirement is predicted to be approximately 2,257 ML/year.

The peak operational water demand is expected to occur between Years 5 and 24, when the operation achieves the maximum production rate of 15 Mtpa ROM. Wherever possible, operational demands will be met using recycled water and water stored within the water management system, consistent with current practices. Raw water will only be extracted from the Hunter River when there is a water shortage on site and additional licences will be sought on an as need basis which will be primarily influenced by production levels.

BMC is licensed to discharge water under the HRSTS and EPL 6538. The results of the water balance indicate that under median rainfall conditions there is no requirement to discharge from the mine water management system. In addition, there is a 10% probability that more than 350 ML would need to be discharged from the mine water management system in any year up to a maximum of 1,000 ML (during extremely wet conditions). Under all rainfall scenarios, the amount of water that needs to be discharged by the Project increases significantly in Year 8. This is due to a large increase in the catchment area reporting to the water management system.

Due to the ephemeral nature of Dry Creek, controlled discharges are likely to occur when there is no flow in the creek. The existing operations at Bengalla have discharged water at up to the maximum flow rate. Therefore, the impacts on the condition of Dry Creek are not expected to exceed what is currently experienced.

### Groundwater

The flow of Permian groundwater into the Hunter River alluvial aquifer is likely to be reduced by the cumulative impact of the Project, Mt Arthur Coal Mine and Mount Pleasant Project. The maximum reduction in groundwater flow to the alluvium is approximately 0.63 ML/day at the beginning of Year 1. The maximum annual reduction in flow to the alluvium is predicted to be 220 ML/day, occurring in Year 1. As mining moves away from the alluvium, the reduction in leakage decreases to approximately 0.25 ML/day. The maximum annual volume of groundwater inflow is predicted to be 365 ML/year which is predicted to peak in Year 2.

During the last 10 years of mining, the total volume of inflows is expected to be approximately 0.2 ML/day. Evaporative losses have been estimated at 0.3 ML/day. As a result, virtually no 'pumpable' inflows are expected during the last 10 years of mining. Mining at Bengalla will continue to advance in a westerly direction. As mining moves away from the Hunter River alluvium, the drawdown of the Hunter River alluvium will progressively decrease. By Year 4, the drawdown generated by the Project ceases to combine with the drawdown generated by Mt Arthur Coal Mine. The area of the Hunter River alluvium within the 1 m and 2 m drawdown contours will continue to decrease as mining progresses to the west.

Dry Creek does not intersect the water table and therefore does not have any baseflow. As a result, Dry Creek is not impacted by the depressurisation caused by the Project.

After the completion of mining, groundwater seepage from the overburden and the Permian strata will accumulate in the final void before stabilising at RL 30 m to RL 37 m after 1,000 years. This water level is significantly lower than the crest of the final void, making it very unlikely that the final void will overflow. The long term water level is also below the regional water table. The final void will behave as a "sink", which means that water will only flow into the void. Therefore, saline water will not flow from the void into the surrounding groundwater systems.

## 10.6 Consistency with the Objects of the EP&A Act

Section 5 of the EP&A Act describes its objects which are reproduced below followed by a consideration as to how the Project achieves these:

*"To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment."*

The Project will facilitate the environmentally acceptable recovery of an additional 316 Mt of ROM coal reserves within the Whittingham Coal Measures and the already established mining area will appreciate the existing infrastructure and workforce. The social and economic benefits of the Project will include the generation of up to 1,745 direct and indirect jobs for the local economy and have a net production benefit to Australia of \$ 1,790 M of economic activity.

At the same time, the Project will provide for the proper management of land owned by BMC and the establishment of a Biodiversity Offset Strategy to conserve forests and natural systems. The Project will not materially affect local surface water or groundwater regimes and through the additional employment generated will assist in sustaining the socio-economic viability of the nearby population, towns and the Hunter region. Mining developments are a major driver of development for towns and villages in regional areas.

The rehabilitation of the final landform will ensure that the agricultural resources will be reinstated to the same quality and capability as pre Project for future use.

*"To encourage the promotion and co-ordination of the orderly and economic use and development of land."*

The Project will result in the recovery of a valuable coal resource within NSW's identified coal reserves. The recovery of this coal resource as assessed in this EIS demonstrates that the Project can occur with identified, manageable and acceptable environmental and social impacts resulting in material social and economic benefit to NSW.

The mining land use will be the highest value land use available with the present value of net production benefits of the Project to NSW and Australia estimated at \$1,773 M (7% discount rate) as compared to the present value of the continued use of the same land and water resources for agricultural being \$12.5 M (7% discount rate).

The Project will generally stimulate the economy with regional spending for production related costs and with wages for labour which will also contribute to the regional economy.

*"To encourage the protection, provision and co-ordination of communication and utility services."*

The Project will expand utility services in the local area, improving the potential for increased connectivity by other users. The provision of services such as water, power and telecommunications to this location is already in place as part of the Approved Bengalla Mine. The Project will not threaten or diminish any existing communication and utility services.

*"To encourage the provision of land for public purposes."*

The Project will result in the establishment of a Biodiversity Offset Strategy which will include the conservation, restoration and rehabilitation of lands in accordance with the Upper Hunter Strategic Assessment. These areas will be set aside for scientific and conservation purposes in perpetuity.

*"To encourage the protection, provision and co-ordination of community services and facilities."*

The net economic benefit of the Project will encourage and support the provision and co-ordination of community services and facilities to the Hunter region. In particular, the Project

will also generate an estimated \$778 M (present value) in royalties, which will be used by the State government to provide community services and facilities across NSW.

The Project will also implement a revised VPA, which is being developed in consultation with MSC for the ongoing provision of community services, facilities and other local infrastructure commensurate with the impacts of the Project.

*"To encourage the protection of the environment, including the protection and conservation of native animals and plants, including the Threatened species, populations and ecological communities and their habitats."*

The Project will result in the loss of CEEC, EEC and some habitat relied upon by threatened species. In order to compensate for these impacts, BMC will participate in the Upper Hunter Strategic Assessment which will provide a contribution to the Upper Hunter Offset Fund (to be set up under the NSW Environmental Trust and managed by the OEHL on behalf of the Trust) that will be used to secure sufficient offset land and contribute to the cost of its ongoing management. This cost will provide for offsets to compensate for the direct removal of 950 ha of vegetation, including 881 ha of native vegetation, including woodland, forest and Box Gum Woodland. Contributing to the Fund will fulfil BMC's statutory offsetting requirements.

*"To encourage ecologically sustainable development."*

The Project has been developed through a comprehensive planning, stakeholder engagement and environmental assessment process to ensure that the principles of ESD are addressed. The Project has been determined by a careful consideration of the alternatives. The impacts of the Project have been predicted with certainty in a detailed assessment process outlined in this EIS. Management measures to address the impacts that will occur have been incorporated into the Project as required, thus addressing the Precautionary Principle.

The environmentally optimised recovery of the in situ coal resource and the establishment of the Biodiversity Offset Strategy address the principles of Intergenerational Equity and Improved Valuation. The Biodiversity Offset Strategy proposed for the Project also addresses the principle of the Conservation of the Biological Diversity and Ecological Integrity.

The Project is consistent with the principles of ESD as discussed further in **Section 5.2.1**.

*"To encourage the provision and maintenance of affordable housing."*

The revenues for the NSW government generated through mining royalties will assist the government in the provision and maintenance of affordable housing.

*“To promote the sharing of the responsibility for the environmental planning between the different levels of government in the state.”*

The stakeholder engagement process undertaken during the preparation of this EIS included ongoing consultation with State government agencies and the relevant Local governments (MSC). Further details of consultation with government stakeholders are provided in Section 6.

*“To provide increased opportunity for public involvement and participation in environmental planning and assessment.”*

Section 6 describes the stakeholder engagement process relied upon during the preparation of this EIS. This process was extensive and hence fulfils this objective of the EP&A Act.

## 10.7 Consistency with the Principles of ESD

The objects of the EP&A Act adopt the principles of ESD in the application of the Act. The principles of ESD are also articulated in Section 6 (2) (a) of the *Protection of the Environment Administration Act 1991* where it is stated that *“ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs: ...”*

The Principles of ESD are listed below with a summary of how the Project seeks to address each.

### 10.7.1 Precautionary Principle

The precautionary principle is *“that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*

- (i) *“careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and*
- (ii) *an assessment of the risk-weighted consequences of various options...”*

Adherence to the precautionary principle requires avoiding serious or irreversible environmental damage by properly assessing potential impacts and taking the necessary mitigation measures. This EIS identifies, with certainty, all environmental impacts from the development of the Project, which has been designed to avoid serious or irreversible environmental damage.

To ensure this, actions involving unquantifiable and unacceptable environmental consequences have been avoided. Environmental consequences have been assessed on a ‘worst case scenario’ basis, where if potential serious or irreversible damage was identified, an appropriate re-design of the Project was implemented to avoid those consequences. Additionally, this EIS adopted a risk-based approach to assessment whereby key aspects of the Project with the highest risk profile have been peer reviewed by authoritative experts to ensure certainty over the predicted impacts of the Project.

### 10.7.2 Intergenerational Equity

This principle requires *“that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations”*.

The Project design, determined through the examination of the alternatives along with the commitments to environmental management systems and the management and mitigation measures, will operate to ensure that there is no significant effect on the environment as a result of the Project which would diminish the health, diversity or productivity of the environment for future generations. The cost of environmental effects will be borne through the Project life and will not be left to be borne by future generations.

Cumulative air and noise modelling presented in this EIS is conservative in that it has included indicative mine plans operating in conjunction with the Project for the Mount Pleasant Project and Mt Arthur Coal Mines, the planning approvals for which cease in 2020 and 2026 (underground until 2030) respectively. Should further approvals not be granted or delayed for these operations, cumulative impact predictions in this EIS would be significantly less.

Long term ecological conservation areas will be established for the Project as part of the Biodiversity Offset Strategy. Expert peer review of key scientific studies have confirmed with certainty that the Project will not measurably impact on the productivity of the region’s groundwater resources.

### 10.7.3 Biodiversity Conservation

This principle requires the *“conservation of biological diversity and ecological integrity - namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration”* of any development proposal.

The Project is bounded by the Approved Bengalla to the east, Wybong Road in the north and existing infrastructure and the Main Northern Rail line to the south. The 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, subject to appropriate legislation, the participation of BMC in the Upper Hunter Strategic Assessment demonstrates adherence to this principle. These actions will ensure that the Project will not threaten the preservation of biodiversity and ecological integrity of the area and that the biodiversity and ecological value of the area is maintained and potentially improved in the long term.

### 10.7.4 Improved Valuation

This principle addresses “improved valuation, pricing and incentive mechanisms” —namely that environmental factors should be included in the valuation of assets and services, such as:

- (i) *“polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
- (ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- (iii) *environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.”*

Since BMC will be a producer of coal, only the ‘polluter pays principle’ is applicable through:

- The requirement to obtain WALs in accordance with the relevant WSP to ensure water extraction limits are not exceeded;
- Capital investment in the acquisition of offset lands under the Upper Hunter Strategic Assessment and the establishment of rehabilitation programs to protect and enhance local and regional ecological biodiversity values;
- Establishment of the perpetual protection of the offset lands via the Upper Hunter Strategic Assessment;
- The maintenance of an EPL under the POEO Act; and
- Direct payments to the Commonwealth government in accordance with requirements of the Carbon Tax.

BMC also accepts the cost of mitigation measures designed to reduce impacts, such as air quality management and dust suppression and as such abides by this principle to the extent that it is applicable.

## 10.8 Matters for Consideration Under Section 79C of EP&A Act

The Minister for Planning and Infrastructure (or delegate) is to take into consideration the following matters in Section 79C of the EP&A Act as are of relevance to the Project:

- “(a) *the provision of:*
- (i) *any environmental planning instrument and*
  - (ii) *any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved) and*
  - (iii) *any development control plan and*
  - (iiia) *any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F and*
  - (iv) *the regulations (to the extent that they prescribe matters for the purposes of this paragraph) and*
  - (v) *any coastal zone management plan (within the meaning of the Coastal Protection Act 1979), that apply to the land to which the development application relates,*
- (b) *the likely impacts of that development, including environmental impacts on both the natural and built environments and social and economic impacts in the locality,*
- (c) *the suitability of the site for the development,*
- (d) *any submissions made in accordance with this Act or the regulations,*
- (e) *the public interest.”*

The sections below describe how this EIS has addressed each in relation to the Project.

### 10.8.1 Permissibility and Planning Controls

The Project is located entirely within the Muswellbrook LGA. The majority (66%) of the land within the Project Boundary is zoned as “RU1 Primary Production” under the Muswellbrook LEP. The majority of the remaining land is zoned as “E3 Environmental Management” with lesser amount of land zoned “SP2 Rail Infrastructure Facilities”.

The land use table in the Muswellbrook LEP provides that open cut mining is permissible with Development Consent in zone RU1. Therefore, mining is permissible with Development Consent on all land within the Project Boundary on which mining or mining operations would occur. The land within the Project Boundary which is zoned SP2 would contain only the rail infrastructure which is part of the Approved Bengalla Mine or “*development ordinarily incidental or ancillary to...*” rail infrastructure facilities which, under the Muswellbrook LEP is permissible in that zoning. Therefore, the provisions of section 89E do not prohibit the development.

The Muswellbrook LEP provides that development for the purposes of “extensive agriculture” is permissible within zone E3. By virtue of clause 7(1)(b)(i) of the Mining SEPP, mining is also permissible within zone E3. This is inconsistent with the land use table in the Muswellbrook LEP. Clause 5 of the Mining SEPP states that where there is an inconsistency between the SEPP and another EPI, the SEPP will prevail to the extent of the inconsistency. Therefore, the Mining SEPP will override the Muswellbrook LEP, resulting in mining being permissible in zone E3. The land use table in the Muswellbrook LEP provides that open cut mining is permissible with Development Consent in zone RU1. Therefore, mining is permissible with development consent on all land within the Project Boundary and the provisions of section 89E do not prohibit the development.

Section 93F enables a VPA to be established which may replace the imposition of a condition under Section 94 or Section 94A. BMC has commenced discussions with MSC in relation to updating the existing VPA to meet the required contributions in relation to the Project under Division 6 of Part 4 of the EP&A Act.

This EIS has been prepared in accordance with Part 2 of Schedule 2 of the EP&A Regulation as shown in Section 6.4.1. Detailed design as required under Schedule 1 of the EP&A Regulation is provided in Appendix C. DGRs were issued for the Project under Part 2 of Schedule 2 of the EP&A Regulation on 13 March 2012 (with supplementary DGRs issued 30 April 2012). Section 6.4.1 lists each DGR and indicates where each is addressed in this EIS.

### 10.8.2 Natural and Built Environment Impacts

This EIS provides a detailed assessment of identified potential impacts on the natural and built environments. Section 8 provides a summary of the predicted impacts associated with the Project. The Project design minimises the environmental impacts to the natural and built environment whilst maximising resource recovery.

### 10.8.3 Site Suitability

The Upper Hunter region has a long history of rural land use for a variety of agricultural and industrial activities, predominantly coal mining and grazing. The dominant land uses within and adjacent to the Project Boundary include open cut coal mining (Mount Pleasant Project to the north, Mt Arthur Coal Mine to the south, Xstrata Mangoola to the further west and the West Muswellbrook Coal Assessment Lease immediately west). The Project is not likely to have a significant impact regarding land use trends or be incompatible with any of those existing, approved or likely preferred uses of land surrounding the Project Boundary.

The Project will largely rely upon the currently approved and constructed mine site infrastructure including the CHPP, rail loop and loading facility, workshop and administrative buildings. All land within the Project Boundary is owned by BMC (with minor areas owned by another coal mining company). Existing coal authorisations exist over the entire Project Boundary.

Coal mining operations at Bengalla have occurred since 1998. The Bengalla 1993 EIS recognised that significant coal reserves occur to the west beyond the 21 year mining extent of that approval. The Project will facilitate the recovery of a valuable coal resource in an area that has long been set aside for mining by the NSW government on land acquired by BMC for the specific purpose of the continuation of coal mining.

A significant buffer of approximately 2 km exists to the closest private landholder, located to the west of the Disturbance Boundary. The closest private landholder to the east, towards the township of Muswellbrook is over 2.5 km from mining in Year 1 of the Project. The Project is therefore consistent with the surrounding land use and is suitable to the continuation of coal mining and related activities.

### 10.8.4 Submissions

It is assumed that the Minister will consider any submissions made in accordance with the EP&A Act or the EP&A Regulation.

### 10.8.5 Public Interest

On the basis of this EIS which has quantified the Project’s social and environmental impacts with a high degree of scientific certainty, it is available to conclude that the Project is consistent with the objects of the EP&A Act, the principles of ESD and that the economic and social benefits of the Project outweigh its social and environmental costs. As such, it may be concluded that the Project is in the public interest.

## 10.9 Conclusion

The Project has been rigorously environmentally assessed in accordance with the EP&A Act, its 'objects', including the principles of ESD and by processes and in the manner required by the DGRs. This EIS has concluded that the Project should be approved under the EP&A Act.

There are environmental costs, which have been identified and which are capable of being acceptably managed by operational controls, land acquisition and management plans that would be established and adopted as approved by the Director-General of Planning & Infrastructure and appropriate other government agencies and authorities. Ecological and long term costs have been minimised and will be accounted for by management strategies to maintain and improve vegetation and ecological values in the long term. The Project will maximise the economic and social value from the remaining coal resource by a mine plan that will appropriately address the environmental and socio-economic constraints and the objects of the EP&A Act, including the principles of ESD.

The Project will provide net production benefits to Australia of \$1,790 over the 24 year Project life and will:

- Maximise the recovery of a high quality, thermal coal resource for which there is an increasing global demand;
- Create approximately 1,745 (direct and indirect) jobs in the regional economy;
- Create approximately 4,868 (direct and indirect) jobs in NSW
- Continue and extend financial support to the region, NSW and Australia with taxation and royalty benefits of \$1,278 M over the Project life; and
- Achieve the most efficient economic use of the land.

It has been demonstrated that the Project represents a low strip ratio, low ash content product which will continue to provide thermal coal for current and future generations and will generate significant economic benefits in the process. The Project's social and environmental impacts have been minimised as far as practicable by implementing all reasonable and feasible management and mitigation measures. As a consequence, the socio-economic benefits of the Project will outweigh its social and environmental costs. Therefore, the Project is in the public interest.





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## Abbreviations

Table 103 provides a list of abbreviations used in this EIS.

**Table 103** Abbreviations

Abbreviation	Description
µg	Microgram
µm	Micrometre
µS	Microsiemens
ABA	Acid Base Account
ACCC	Australian Competition and Consumer Commission
Aboriginal Consultation Guidelines	<i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i> (DECCW, 2010a)
ACHMP	Aboriginal and Cultural Heritage Management Plan
ACDF	Aboriginal Community Development Fund
AECOM	AECOM Australia Pty Ltd
AGE	Australasian Groundwater and Environmental Consultants
AIP	<i>Aquifer Interference Policy</i> (NOW, 2012)
AIS	Agricultural Impact Statement
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ANC	Acid Neutralising Capacity
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZECC Guidelines	<i>Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration</i> (ANZECC, 1990)
A	Authorisation
AL	Assessment Lease
ARTC	Australian Rail Track Corporation
ARI	Average Recurrence Interval
AS	Australian Standard
ASS	Archerfield Sandstone
AUSRIVAS	Australian River Assessment System
BCA	Benefit Cost Analysis
BCAM	Biodiversity Certification Assessment Methodology
bcm	Bank cubic metres
Bengalla 2008 EA	<i>Bengalla Mine Development Consent Modification Environmental Assessment</i> (Hansen Bailey, 2008)
Bengalla 2010 EA	<i>Bengalla Mine Development Consent Modification Environmental Assessment</i> (Hansen Bailey, 2010)
Bengalla 1993 EIS	<i>Environmental Impact Statement for the Bengalla Coal Mine</i> (Envirosciences, 1993)



Abbreviation	Description
Bengalla 2006 SEE	<i>Bengalla Mining Company Modifications to Mining Operations Statement of Environmental Effects</i> (Hansen Bailey, 2006a)
BMC	Bengalla Mining Company Pty Ltd
BMP	Biodiversity Management Plan
BoM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
CALMET	A diagnostic meteorological modelling system known as California Meteorological
CALPUFF	A dispersion model used to predict the maximum 24 hour PM <sub>10</sub> , annual average PM <sub>10</sub> , annual average TSP and annual average dust deposition
CCC	Community Consultative Committee
CEEC	Critically Endangered Ecological Community
CGE	Computable General-Equilibrium
CHPP	Coal Handling and Preparation Plant
CIC	Critical Industry Cluster
cm	Centimetre
UHCMA	Upper Hunter Catchment Management Authority
CO	Carbon monoxide
CO <sub>2</sub> -e	Carbon dioxide equivalent
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAA	Directly Affected Area
DA	Development Application
Dams Safety Act	<i>Dams Safety Act 1978</i>
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
DCCEE	Federal Department of Climate Change and Energy Efficiency
DGRs	Director-General's Environmental Assessment Requirements
DP&I	NSW Department of Planning and Infrastructure (formerly Department of Planning, DIPNR, Planning NSW and DUAP)
Draft RING	<i>Draft Rail Infrastructure Noise Guideline</i> (OEH, 2012a)
DSC	NSW Dams Safety Committee
DSE	Dry Sheep Equivalent
DoS	Degree of Saturation
DTIRIS	NSW Department of Trade & Investment, Regional Infrastructure and Services (formerly I&I NSW)
DTIRIS - DRE	NSW Division of Resources and Energy (within the Department of Trade & Investment, Regional Infrastructure and Services)
E-BAM	A portable beta attenuation mass monitor used for the measurement of the mass concentration of dust particles
EC	Electrical Conductivity
eCEC	Cation Exchange Capacity
EEC	Endangered Ecological Community
Economic EIA Guidelines	<i>Draft Guidelines for Economic Effects and Evaluation in Environmental Impact Assessment</i>
EIS	Environmental Impact Statement
EL	Exploration Licence

Abbreviation	Description
EMP	Environmental Monitoring Program
EMS	Environmental Management System
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
ESP	Exchangeable Sodium Percentage
FEFLOW	A computer based modelling package that is capable of simulating two and three-dimensional, density coupled groundwater flow
GDE	Groundwater Dependent Ecosystem
GDP	Ground Disturbance Permit
GWh	Gigawatt hours
HIPAPs	Hazardous Industry Planning Advisory Papers (Guidelines for Hazard Analysis)
ha	Hectares
Hansen Bailey	Hansen Bailey Environmental Consultants
Heritage Act	<i>Heritage Act 1977</i>
HRSTS	Hunter River Salinity Trading Scheme
HSEQ	Health, Safety, Environment and Quality
Hunter REP	<i>Hunter Regional Environmental Plan 1989 (Heritage)</i>
Hunter River WSP	<i>Water Sharing Plan for the Hunter Regulated River Water Source 2003</i>
Hunter Unregulated WSP	<i>Water Sharing Plan for the Hunter Unregulated and Alluvial River Water Sources 2009</i>
HVAS	High Volume Air Sampler
HVCCC	Hunter Valley Coal Chain Coordinator
HVEC	Hunter Valley Energy Coal Pty Ltd
ICNG	<i>Interim Construction Noise Guideline (DECC, 2009)</i>
INP	<i>NSW Industrial Noise Policy 2000 (EPA, 2000)</i>
Interim Policy	<i>Interim Strategic Agricultural Land Policy for State Significant and Transitional Part 3A Mining and Coal Seam Gas Proposals in the Upper Hunter and New England North West Regions</i>
I-O	Input-Output (I-O) analysis
ISO	International Organisation for Standardisation
Kg	Kilogram
KLC	Kinetic leach column
km	Kilometres
kV	Kilovolt
kVA	Kilovolt-ampere
KW	Kilowatt
LA <sub>1</sub>	The noise level exceeded for 1% of the time
LA <sub>10</sub>	The noise level exceeded for 10% of the time
LA <sub>90</sub>	Commonly referred to as the background noise, this is the noise level exceeded for 90% of the time.

Abbreviation	Description
LA <sub>eq</sub>	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
L	Litres
LEP	Local Environment Plan
LGA	Local Government Area
LOX	Limit of oxidation
LoS	Level of Service
LUDS	Muswellbrook Shire Council Land Use Development Strategy
m	Metres
M	Million
Mt Arthur Coal Mine	HVEC's Mt Arthur Coal Mine
Mbcm	Million bank cubic metres
mg	Milligram
ML	Megalitres
Mlcm	Million loose cubic metres
mm	Millimetre
MNES	Matters of Environmental Significance
MOP	Mining Operations Plan
MPA	Maximum Potential Acidity
MIA	Mine Infrastructure Area
MIC	Maximum Instantaneous Charge
Mining SEPP	<i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2011</i>
Mount Pleasant 2010 EA	<i>Mount Pleasant Project Modification Environmental Assessment Report (EMGA Mitchell McLennan, 2010)</i>
Mount Pleasant 1997 EIS	<i>Mount Pleasant Mine Environmental Impact Statement (ERM Mitchell McCotter, 1997)</i>
MSC	Muswellbrook Shire Council
Mt	Million tonnes
Mtpa	Million tonnes per annum
Muswellbrook LEP	<i>Muswellbrook Local Environment Plan 2009</i>
MW	Megawatt
NAF	Non Acid Forming
NAPP	Net acid producing potential
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NGA	National Greenhouse Accounts
NO <sub>2</sub>	Nitrogen dioxide
NOW	NSW Office of Water
NO <sub>x</sub>	Nitrogen oxides
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPC	Newcastle Port Corporation
NT Act	<i>Native Title Act 1993</i>
NV Act	<i>Native Vegetation Act 2003</i>

Abbreviation	Description
OEA	Overburden Emplacement Area
OEH	NSW Office of Environment and Heritage
OH&S	Occupational Health and Safety
OPSIM	A surface water computer-based simulation model.
PAC	Planning Assessment Commission
PAF	Potentially Acid Forming
PM <sub>1</sub>	Particulate Matter <1 micron
PM <sub>10</sub>	Particulate Matter <10 microns
PM <sub>2.5</sub>	Particulate Matter <2.5 microns
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PVC	Primary Visual Catchment
PVS	Peak Vector Sum
PVZ	Primary View Zone
PWCS	Port Waratah Coal Services
RAP	Registered Aboriginal party
RGS	RGS Environmental Pty Ltd
RL	Reduced Level
RMS	NSW Roads and Maritime Services
RNP	<i>NSW Road Noise Policy (DECCW, 2011)</i>
Roads Act	<i>Roads Act 1993</i>
ROM	Run of Mine
RTA	NSW Roads and Traffic Authority (abolished mid-2012, responsibilities transferred to NSW Roads and Maritime Services)
RTCA	Rio Tinto Coal Australia
RTEMS	Real Time Environmental Management System
SAL	Strategic Agricultural Land
SEPP	State Environmental Planning Policy
SEPP 33	<i>State Environmental Planning Policy 33 - Hazardous and Offensive Development Application Guidelines</i>
SEPP 44	<i>State Environmental Planning Policy 44 - Koala Habitat Protection</i>
SEPP 55	<i>State Environmental Planning Policy 55 - Remediation of Land</i>
SEWPaC	Federal Department of Sustainability, Environment, Water, Population and Communities (formerly Commonwealth Department of Environment, Water, Heritage and the Arts)
SO <sub>2</sub>	Sulphur dioxide
SRD SEPP	<i>State Environmental Planning Policy (State and Regional Development) 2011</i>
SRLUP	<i>Strategic Regional Land Use Plan - Upper Hunter</i>
SSD	State Significant Development
t	Tonne
TDS	Total Dissolved Solids
TEOM	Tapered Element Oscillating Microbalance
The Project	Bengalla Continuation of Mining Project
ToR	Terms of Reference
tpa	Tonnes per annum

## 11 Abbreviations

Abbreviation	Description
tph	Tonnes per hour
TSC Act	<i>Threatened Species Conservation Act 1995</i>
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
UHSA	Upper Hunter Strategic Assessment
US EPA	United States Environmental Protection Agency
VCU	Visual Character Units
VPA	Voluntary Planning Agreement
WAL	Water Access Licence
WLALC	Wanaruah Local Aboriginal Land Council
WM Act	<i>Water Management Act 2000</i>
WM Regulation	<i>Water Management (General) Regulation 2011</i>
WMS	Waste Management System
WRM	WRM Water & Environment
WSP	Water Sharing Plan
Xstrata Mangoola	Xstrata Mangoola Pty Limited
ZOA	Zone of Affection



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**Study Team**

Section	EIS Component / Role	Team Member and Company	
<b>Project Management</b>			
	General Manager	Dan Janney	Bengalla Mining Company
	Technical Services Manager	James Davison	
	Environmental Approvals Specialist	Craig White	
<b>EIS Management</b>			
	Project Director	Dianne Munro	Hansen Bailey
	Project Manager	Jason Martin	
	Project Coordinator	Andrew Wu	
	Advisor and Peer Review	James Bailey	
<b>Stakeholder Engagement</b>			
	Environmental Approvals Specialist	Craig White	Bengalla Mining Company
	Project Director	Dianne Munro	Hansen Bailey
	Project Manager	Jason Martin	
<b>EIS Sections</b>			
	Executive Summary	Dianne Munro and Jason Martin	
1	Introduction	Jason Martin	
2	Existing Environment	Jason Martin	
3	Approved Operations	Jason Martin	
4	The Project	Jason Martin	
5	Regulatory Framework	Dianne Munro	
6	Stakeholder Engagement	Andrew Wu	
7	Risk Assessment	Jason Martin	
8	Impacts, Management and Mitigation	Dianne Munro, Jason Martin, Joanna Graham, Andrew Wu, Elisabeth Webster, Dorian Walsh and Amy Porter	
9	Management and Monitoring Summary	Jason Martin	
10	Project Justification	Dianne Munro	
11	Abbreviations		
12	References		
13	Study Team		
<b>Appendices</b>			
Appendix A	Existing Development Consents		Hansen Bailey
Appendix B	Schedule of Land to which this EIS Applies		Hansen Bailey
Appendix C	Detailed Design Drawings		SKM
Appendix D	Regulatory Correspondence		Hansen Bailey
Appendix E	Stakeholder Engagement		Hansen Bailey
Appendix F	Revised Environmental Risk Assessment	Jason Martin and Kyle Prowse	Hansen Bailey

Section	EIS Component / Role	Team Member and Company	
<b>Appendices cont'</b>			
Appendix G	Air Quality and Greenhouse Gas Impact Assessment	Aleks Todoroski and Philip Henschke	Todoroski Air Sciences
Appendix H	Acoustic Impact Assessment	Mark Bridges	Bridges Acoustics
Appendix I	Visual Impact Assessment	John Van Pelt	JVP Visual Planning and Design
Appendix J	Surface Water Impact Assessment	David Newton and Tallulah Kaegi	WRM
Appendix K	Groundwater Impact Assessment	James Tomlin and Douglas McAlister	AGE
		Frans Kalf	Frans Kalf and Associates
Appendix L	Geochemical Impact Assessment	Alan Robertson	RGS Environmental
Appendix M	Aboriginal Archaeology and Cultural Heritage Impact Assessment	Geordie Oakes	AECOM
Appendix N	Historical Heritage Impact Assessment	Susan Lampard	AECOM
Appendix O	Ecological Impact Assessment	David Robertson	Cumberland Ecology
Appendix P	Stygofauna Impact Assessment	Peter Hancock	Eco Logical Australia Pty Limited
Appendix Q	Traffic and Transport Impact Assessment	Damien Chee	DC Traffic Engineering
Appendix R	Social Impact Assessment	Doug Martin	Martin and Associates Pty Ltd
Appendix S	Economic Impact Assessment	Robert Gillespie	Gillespie Economics
Appendix T	Preliminary Hazard Analysis	Elisabeth Webster	Hansen Bailey
Appendix U	Contamination Assessment	Dorian Walsh	Hansen Bailey
Appendix V	Soil and Land Capability Impact Assessment	Rhys Worrall and John Lawrie	GSS Environmental
Appendix W	Agricultural Impact Statement	Scott Barnett	Scott Barnett & Associates
Appendix X	Interim Dry Creek Diversion and Reinstatement Report	Cesar Martinez and Andrew Russell	Parsons Brinkerhoff
Legal Advice provided by Andrew White of Sparke Helmore Drafting and Graphics Design by: Hansen Bailey, Pegasus Technical Pty Limited and Greenpond TSG			