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## Revised Environmental Risk Assessment

TABLE 1 – CONTINUATION OF BENGALLA MINE - REVISED ENVIRONMENTAL RISK ASSESSMENT

Issue	Aspect	Impact	Preliminary Risk Assessment			Proposed Control Measures	Revised Risk Assessment		
			C	L	R		C	L	R
Ecology (including stygofauna)	Vegetation clearing, drilling, blasting and topsoil stripping	Loss of biodiversity and disruption to threatened flora and fauna or likely habitats	2	A	High	An Ecological Impact Assessment has been completed by Cumberland Ecology in accordance with the DECCW <i>Draft Guidelines for Threatened Species Assessment under S94 of the Threatened Species Conservation Act (1995)</i> published by the NSW Department Environment and Conservation (now OEH) in 2005 and other relevant guidelines. This assessment has identified the potential impacts of the Project on flora and fauna (including threatened species and ecological communities). Management and mitigation measures have been recommended, including: <ul style="list-style-type: none"> <li>• Progressive rehabilitation and revegetation of disturbed areas;</li> <li>• Preparation of a Biodiversity Management Plan, including a monitoring program;</li> <li>• Implementation of a pre clearing protocol for all tree clearing to minimise impacts to resident fauna, which may need to be relocated to surrounding habitat prior to disturbance;</li> <li>• Protection and enhancement of existing vegetation;</li> <li>• Preparation of a Dry Creek Rehabilitation Management Plan in conjunction with relevant regulators;</li> <li>• Mine-owned riparian areas of Dry Creek nearby the Hunter River and a retained area within the Project Boundary that were not affected by mine disturbance will also be remediated;</li> </ul>	2	C	Moderate
		Disturbance to State and Federally listed species, communities or habitat	2	A	High		2	C	Moderate

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			C	L	R		C	L	R
						<ul style="list-style-type: none"> <li>Maintenance and rehabilitation works along selected areas of the Hunter River frontage on Bengalla Mining Company Pty Ltd (BMC) owned land; and</li> <li>Participation in the Upper Hunter Strategic Assessment - Projects Requiring Approval Prior to Completion of the Strategic Assessment (October 2012).</li> </ul>			
Aboriginal Archaeology and Cultural Heritage	Vegetation clearing, drilling, blasting and topsoil stripping	Disturbance of Aboriginal artefacts, sites or places of cultural heritage significance	2	A	High	<p>An Aboriginal Archaeology and Cultural Heritage Impact Assessment has been conducted for the Project by AECOM Australia Pty Ltd in accordance with the Cultural Heritage Guidelines. This assessment has identified the potential impacts of the Project on Aboriginal objects and places.</p> <p>In order to mitigate the impacts on Aboriginal archaeology, the existing BMC Aboriginal and Cultural Heritage Management Plan will be revised in consultation with the registered Aboriginal stakeholders, OEH and DP&amp;I. This management plan will outline how Aboriginal objects will be managed.</p>	1	C	Low
Air Quality	Vegetation clearing, drilling and topsoil stripping	Wind blown dust and machinery exhaust fumes contributing to elevated dust levels	2	A	High	<p>An Air Quality and Greenhouse Gas Impact Assessment has been conducted for the Project by Todoroski Air Sciences in accordance with the NSW EPA <i>Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales</i>.</p> <p>The Project has been designed so that material hauling and handling are minimised, resulting in reduced dust emissions.</p>	2	D	Low
	Overburden emplacement		2	A	High		2	D	Low
	Uncovering of coal		2	A	High		2	D	Low

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			C	L	R		C	L	R
	Coal, overburden and reject haulage		2	A	High	<p>To further reduce dust emissions, BMC will implement dust management measures, including:</p> <ul style="list-style-type: none"> <li>• Best practice dust management techniques (e.g. water sprays, sheltered emplacement during high wind, minimising fall heights of materials and expedited rehabilitation);</li> <li>• Guidance to employees on dust management measures and visual identification of dust for specific sources and activities;</li> <li>• Commitment to achieving high control on primary haul roads through watering or the use of chemical dust suppression agents;</li> <li>• The use of automated monitoring systems (visual monitors and dust and wind speed alarms) situated in and around active mining areas that detect adverse dust and meteorological conditions;</li> <li>• Temporary cessation of particular operations during periods of high dust to reduce the potential for further dust impacts.</li> <li>• Installation of TEOM monitors to largely replace or augment the HVAS monitoring network;</li> <li>• Best endeavours to establish an ambient air quality monitoring data sharing arrangement with neighbouring coal mines;</li> </ul>	2	D	Low
	Coal stockpiles		3	B	High		3	D	Moderate
	Coal processing and transport		3	B	High		3	D	Moderate

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			C	L	R		C	L	R
						<ul style="list-style-type: none"> <li>Commissioning of additional dust monitors to the west, north-west and south-west of the Project as mining continues to the west; and</li> <li>Update of the existing dust management system with a real time air quality and blast fume management system and combine with predictive meteorological forecasting.</li> </ul> <p>The measures proposed for the Project are consistent with the recommendations of the <i>NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining</i> (Katestone Environmental, 2010).</p> <p>The current BMC Air Quality and Greenhouse Gas Management plan will be updated in consultation with OEH and to the satisfaction of DP&amp;I.</p>			
Greenhouse Gas	Combustion of diesel	Greenhouse gas emissions	2	A	High	<p>The Air Quality and Greenhouse Gas Impact Assessment included the assessment greenhouse gas Scope 1, 2 and 3 emissions in accordance with the Australian Greenhouse Office <i>Factors and Methods Workbook</i> (2005).</p> <p>Greenhouse Gas emissions from the Project will be managed and minimised, where possible. BMC will achieve this through monitoring fuel efficiency of diesel equipment, optimising conditions for fleet operations, use of high efficiency electric motors and energy efficient lighting systems.</p>	2	C	Moderate
	Electricity use		1	A	Moderate		1	C	Low
	Emissions from burning coal		2	A	High		2	C	Moderate
Noise	Coal, overburden and reject haulage	Excessive noise generation at sensitive	2	A	High	An Acoustic Impact Assessment has been conducted for the Project by Bridges Acoustics in accordance with the <i>Industrial Noise Policy 2000</i> and other relevant guidelines.	2	C	Moderate

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	Machinery operating in-pit and on overburden emplacement areas	receivers	2	A	High	<p>The assessment identified the potential noise impacts of the Project, including associated infrastructure, traffic and rail noise. Cumulative noise impacts with surrounding mining operations and industry were also considered in the assessment.</p> <p>The current BMC noise monitoring program will be revised to provide a framework to manage monitoring, assessment and mitigation of noise impacts on any surrounding private receivers.</p> <p>BMC will update the existing Noise Management Plan which incorporates a combination of engineering controls and mitigation measures employed to manage and control noise impacts.</p>	2	C	Moderate
	CHPP operation and stockpiles		2	A	High		2	C	Moderate
	Coal loading at rail loop		2	A	High		2	C	Moderate
	Train movements on the rail loop and spur		2	B	High		2	D	Low
	Increased traffic movements		1	A	Moderate		1	C	Low
Blasting	Coal and overburden blasting	Overpressure and ground vibration impacts at sensitive receivers	2	B	High	<p>A Blast Impact Assessment has been conducted for the Project by Bridges Acoustics. This has predicted the overpressure and ground vibration generated by blasting associated with the Project.</p> <p>Blasting associated with the Project is unlikely to exceed relevant ground vibration and overpressure criteria at privately owned residences.</p> <p>The existing BMC Blast Management Plan will be revised for the Project, which will include management and mitigation measures to minimise blasting impacts.</p>	2	D	Low

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Agricultural Productivity & Land Use	Vegetation clearing and topsoil stripping	Loss of agricultural land	2	B	High	<p>An Agricultural Impact Statement was prepared for the Project by Scott Barnett &amp; Associates Pty Ltd, undertaken in accordance with the <i>Guidelines for Agricultural Impact Statements</i>. The assessment included:</p> <ul style="list-style-type: none"> <li>Identify agricultural resources and enterprises within the Study Area and surrounding locality;</li> <li>Identify the agricultural domains within the Study Area ;</li> <li>Assess the current and maximum agricultural potential for each agricultural domain in terms of the quantum, gross value and net value of production;</li> <li>Assess the applicability of the SRLUP (Hunter Valley) categories for Strategic Agricultural Land;</li> <li>Assess the loss of agricultural production within from within the Study Area;</li> <li>Assess the use of the Project's regulated water supply and compare it to its use for agricultural purposes;</li> <li>Assess potential impacts on agricultural resources and enterprises within the locality; and</li> <li>Recommend appropriate mitigation and management measures.</li> </ul> <p>BMC will revise the existing Rehabilitation Management Plan for the Project in consultation with relevant regulators. The revised Rehabilitation Management Plan will contain a strategy, as appropriate, to implement an invasive weed and pest (feral animal) management plan in consultation with the Hunter Livestock Health and Pest Authority.</p>	1	B	Moderate

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			C	L	R		C	L	R
Economics	Increased employees residing in the local area	Demands on local infrastructure and services	2	B	High	Gillespie Economics completed an economic impact assessment for the Project, which included an assessment of the impacts of the Project on the local economy. BMC will employ a range of management strategies for the EIS to mitigate identified impacts from the Project on the community.	1	B	Moderate
Visual and Lighting	Overburden emplacement areas	Visual impact to surrounding receivers	2	B	High	A Visual Impact Assessment was completed for the Project by JVP Visual Planning and Design to assess the potential visual impacts of the Project and identify mitigation and management measures, as appropriate.	2	D	Low
	Exposed earthworks		2	B	High	Management commitments will include the establishment of vegetation screens in key areas, rehabilitation, evaluation of earthworks and final landform design, consideration to night lighting, the construction and placement of Project infrastructure and implementation of effective operational measures.	2	D	Low
	Lighting from fixed and mobile equipment		2	C	Moderate	BMC will update its existing Landscape Management Plan for the Project in consultation with relevant regulators in consideration of the commitments made in the EIS. The Landscape Management Plan will be prepared to consider specific impact mitigation strategies for sensitive viewing locations.	2	D	Low
Surface Water	Topsoil stripping, haul roads, un-rehabilitated spoil	Dirty water runoff entering local waterways	2	C	Moderate	A Surface Water Impact Assessment has been undertaken for the Project by WRM Water & Environment.	2	E	Low



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			C	L	R		C	L	R
	Coal processing and production	Water demand for dust suppression and coal washing	2	A	Moderate	<p>This assessment included a review of existing surface water assessment reports, the identification of surface water resources, assessment of existing surface water hydrology, assessment of potential surface water impacts onsite and offsite, assessment of post-mine surface water impacts and predicted final void water levels.</p> <p>The existing BMC Surface Water Management System will be revised for the Project which will source, capture, divert, store, monitor, utilise and reticulate water onsite.</p> <p>Surface water management commitments will also include controls which ensure clean runoff is separated from runoff within disturbed areas; drainage lines are constructed to be stable and natural in appearance and the maintenance improvement of water quality in the local area.</p> <p>BMC will update the existing Surface Water Management Plan a section of the Water Management Plan, for the Project to the approval of relevant regulators to include the commitments in this EIS.</p>	1	C	Low
	Water discharges into local waterways	Surface water contamination	2	C	Moderate		2	E	Low
		Contaminated water from wash down bays, etc	2	C	Moderate		2	E	Low
	Flooding	Flooding impact on mining operations	2	D	Low		2	E	Low
Groundwater	Coal extraction and overburden removal	Groundwater inflow into pit	1	A	Moderate	<p>A Groundwater Impact Assessment was conducted for the Project by Australasian Groundwater and Environmental Consultants Pty Ltd. A finite 3D, numerical simulation package (SURFACT MODFLOW) was utilised to simulate the likely impacts of the Project on groundwater (including groundwater inflows, drawdown of the Permian and alluvial aquifers and any possible impacts on surrounding private boreholes).</p>	1	D	Low

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						The modelling considered potential cumulative impacts on the groundwater regime with neighbouring mining operations. The existing BMC Environmental Monitoring Program, including groundwater monitoring, will be revised to validate predictions from this model. Appropriate licences for the interception of groundwater will also be sought from NOW. In addition, BMC will update the existing Groundwater Management Plan as a section of the Water Management Plan, for the Project to the approval of relevant regulators to include the commitments in this EIS.			
Social	Employees residing in local region	Social Impacts	1	A	Moderate	Doug Martin and Associates Pty Ltd completed a social impact assessment for the Project which developed a social profile for the Muswellbrook Local Government Area (LGA) and aimed to identify any future social impacts which may result from the Project (including the cumulative impacts from existing and potential future projects). BMC will employ a range of management strategies to mitigate identified impacts from the Project on the community. BMC will provide timely and appropriate operations workforce information to MSC, to assist Council to plan for future needs for the Muswellbrook LGA. In addition, BMC will revise its existing VPA with MSC which will be proportionate to the identified social and community impacts of the Project in consideration of social mitigation measures which are described in this EIS.	1	C	Low

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			C	L	R		C	L	R
Soils and Land Capability	Topsoil stripping and land preparation	Loss of productive topsoil	2	C	Moderate	A Soils and Land Capability Impact Assessment has been completed for the Project by GSS Environmental. The assessment included the mapping of the soil types within the Project Boundary, identification of any soil materials with potentially adverse quality and identification of the suitability of topsoils for use as topdressing material. Topsoil materials will be initially stripped and placed on shaped spoil where possible or stockpiles for later use on rehabilitation areas.	2	D	Low
		Deterioration of land capability	2	C	Moderate		2	D	Low
Rehabilitation and Final Landform	Rehabilitation	Erosion	2	C	Moderate	The final landform is designed to result in a generally undulating landscape, with slopes generally to 10° and up to a maximum of 18° on the low wall. Progressive rehabilitation of disturbed areas will incorporate the construction of erosion and sediment control and water management structures. It is anticipated that the landform will be predominately rehabilitated to grazing pasture, with plantings of native woodland vegetation to achieve vegetation cover. Where possible, any tree planting will be connected to remnant areas of forest or woodland.  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). Rehabilitation planning for the Project will be undertaken progressively to ensure the total area of disturbance at any one time is minimised to reduce the potential for wind-blown dust, visual impacts and increased sediment-laden runoff.	2	D	Low
		Weed invasion	1	C	Low		1	C	Low
		Feral animal invasion	1	C	Low		1	C	Low
	Final Landform	Unstable landform	3	D	Moderate		3	E	Moderate
		Poor drainage	3	D	Moderate		3	E	Moderate
		Erosion	2	C	Moderate		2	D	Low

Issue	Aspect	Impact	Preliminary Risk Assessment			Proposed Control Measures	Revised Risk Assessment		
			C	L	R		C	L	R
Historic Heritage	Vegetation clearing, drilling, blasting and topsoil stripping	Disturbance of non-indigenous heritage sites	2	C	Moderate	<p>A historical archaeological and cultural heritage impact assessment has been conducted for the Project in accordance with the NSW Heritage Office guidelines for <i>Assessing Heritage Significance</i> and the NSW Heritage Office's <i>NSW Heritage Manual</i>.</p> <p>The existing BMC European Heritage Management Plan will be revised for the Project in consultation with the relevant authorities and to the satisfaction of DP&amp;I. The HHMP will include, but not be limited to, a photographic and archival recording of sites predicted to be impacted for the Project, provision of a Statement of Heritage Impact along with archival recording to establish a baseline for the ongoing monitoring of sites with the potential for indirect impacts</p> <p>As the Stockyard is located within the proposed Disturbance Boundary, archival recording of the site will be undertaken to mitigate the significance of the item and ensure that information pertaining to this item is retained into the future. The recording will comply with the OEH Heritage Branch guidelines: <i>How to Prepare Archival Records of Heritage Items</i> (1998) and <i>Photographic Recordings of Heritage Items using Film or Digital Capture</i> (2006). House sites 1 and 2 were assessed as having no heritage significance and therefore do not require mitigation or management on heritage grounds.</p>	2	E	Low

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			C	L	R		C	L	R
Geochemistry	Overburden emplacement	Potentially acid forming materials affecting soil and water resources	2	C	Moderate	A geochemical impact assessment was completed for the Project by RGS Environmental Pty Limited. The assessment included identification of any potentially acid forming materials. Best practice management measures will be undertaken to prevent acid forming materials affecting soil and water resources. The current management methods for PAF Archerfield Sandstone overburden will continue. This will occur in the Main OEA open pit by covering Archerfield Sandstone material with acid neutralising and inert overburden to a depth of at least 60 m. In addition, no Archerfield Sandstone materials will be placed in the Western OEA to avoid any potential connectivity with Dry Creek.	2	E	Low
		Acid Rock Drainage	2	D	Low		2	E	Low
Spontaneous Combustion	Spontaneous combustion	Release of harmful emissions	2	D	Low	The potential impacts arising from spontaneous combustion were addressed as a component of the air quality and greenhouse gas impact assessment prepared for the Project by Todoroski Air Sciences. The risk for spontaneous combustion due to the Project is considered to be low and will be managed in accordance with the existing EMS Procedure 8.3 Air Quality – Spontaneous Combustion.	2	E	Low
Traffic and Transport	Increased vehicle movements from employees, deliveries and train loading	Increased traffic movements	2	D	Low	A Traffic and Transport Impact Assessment was completed for the Project by DC Traffic Engineering Pty Ltd in accordance with the <i>Guide to Traffic Generating Developments</i> developed by the Roads and Traffic Authority of NSW (now the NSW Roads and Maritime Services (RMS)) in 2002. The assessment has reviewed the capacity of the affected road network to cater for differing traffic volumes due to the proposed change in traffic flows.	2	E	Low
	Road Upgrades	Public Perception	1	D	Low		1	E	Low

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						The existing Road Closure Management Plan (as a component of the Blast Management Plan) will be revised for the Project and will include protocols for the temporary closure of Wybong Road associated with the construction of CW1 and will be developed in consultation with MSC. BMC will construct the approximate 6 km relocation 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 and associated intersections.			
Waste Management	Generation of General waste	Land contamination	1	D	Low	The existing BMC waste management system will be enhanced as required to appropriately manage the waste generated by the additional workforce and operational areas. The waste management system shall provide management procedures to ensure the environmentally responsible disposal, tracking and reporting of all relevant waste generated at Bengalla.	1	D	Low
	Generation of Sewage	Water contamination	2	D	Low		2	E	Low
	Rejects Management		2	C	Moderate		2	D	Low
Hazardous materials	Storage and Handling	Soil and water contamination	2	D	Low	All hazardous materials will be managed in accordance with the relevant hazardous materials management procedures.	2	D	Low
	Bushfire	Fire Hazard	2	D	Low	A review of the existing Rehabilitation Management Plan will be undertaken for the Project to ensure appropriate monitoring and maintenance of areas and equipment where bushfire hazards are present to prevent and minimise the potential outbreak of bushfire, control any outbreak of fire, and minimise the risk of bushfires spreading from the Project to adjacent private properties.	2	E	Low

**Continuation of Bengalla Mine – Risk Assessment Tools**

**HSEQ Matrix for Determining Level of Risk**

Likelihood	Consequence				
	1 – Minor	2 - Medium	3 - Serious	4 - Major	5 - Catastrophic
<b>A – Almost Certain</b>	Moderate	High	Critical	Critical	Critical
<b>B - Likely</b>	Moderate	High	High	Critical	Critical
<b>C - Possible</b>	Low	Moderate	High	Critical	Critical
<b>D – Unlikely</b>	Low	Low	Moderate	High	Critical
<b>E - Rare</b>	Low	Low	Moderate	High	High

**Likelihood Classification Used for the HSEQ Risk Framework**

Likelihood	Likelihood Description	Frequency	Substance Exposure
<b>Almost Certain</b>	Recurring event during the life-time of an operation / project	Occurs more than twice per year	Frequent (daily) exposure at > 10 x OEL
<b>Likely</b>	Event that may occur frequently during the life-time of an operation / project	Typically occurs once or twice per year	Frequent (daily) exposure at > OEL
<b>Possible</b>	Event that may occur during the life-time of an operation / project	Typically occurs in 1-10 years	Frequent (daily) exposure at > 50% of OEL Infrequent exposure at > OEL
<b>Unlikely</b>	Event that is unlikely to occur during the life-time of an operation / project	Typically occurs in 10-100 years	Frequent (daily) exposure at > 10% of OEL Infrequent exposure at > 50% of OEL
<b>Rare</b>	Event that is very unlikely to occur during the life-time of an operation / project	Greater than 100 year event	Frequent (daily) exposure at < 10% of OEL Infrequent exposure at > 10% of OEL