Cumulative Impacts

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20 Cumulative Impacts

20.1 Introduction

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative. There are three separate levels of cumulative impacts considered: project site localised cumulative impacts; regional cumulative impacts; and global cumulative impacts.

- **Project site localised cumulative impacts**
  These are the cumulative impacts that result from mining operations in the immediate vicinity of the project site. Project site localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers. These include dust deposition, noise and vibration, groundwater drawdown, groundwater and surface water quality, and transport. The EIS has specifically examined the cumulative impacts on sensitive receivers from the combined effect of the project and Peak Downs Mine to the immediate south.
- **Regional cumulative impacts**
  Regional cumulative impacts include the project's contribution to impacts that are caused by mining operations throughout the Bowen Basin region. Each coal mining operation in itself may not represent a substantial impact, however the cumulative effect on habitat value, water quality, and the socio-economics of a region may warrant consideration.
- **Global cumulative impacts**
  The only impact from the project that is potentially global is greenhouse gas emissions. However, the level of emissions from the project represents a very minor contribution at this scale.

This section also discusses the way in which the BMA Bowen Basin Coal Growth Project (BMA BBCGP) contributes or adds to the level of impact already experienced at these three levels. The BMA BBCGP involves: the development of new mines at Daunia and Caval Ridge; expanding operations at Goonyella Riverside Mine; and a new airport at Moranbah. The adverse regional environmental impacts of the BMA BBCGP are potentially cumulative in nature and include social and economic

impacts, regional loss of ecology and land resources, traffic and transport impacts, and greenhouse gas emissions. The potential cumulative impact of the BMA BBCGP is considered below.

The assessment of project site localised cumulative impacts is based on this EIS. The assessment of potential regional cumulative impacts from the BMA BBCGP is based on key impacts from the different elements of the BMA BBCGP presented in Table 20.1 at the end of this section.

20.2 Land Resources

A small amount of Good Quality Agricultural Land (GQAL) was identified within the project site (Section 4.4.7). This GQAL occurs within the project site but does not occur within the pit footprint area and, therefore, will not be disturbed. The majority of the project site is considered to be Agricultural Land Class C – land suitable for improved or native pastures due to limitations that preclude cultivation for crop production. Some Class B land - marginal for current and potential crops due to severe limitations and suitable for pastures (corresponding with Class 4 (cropping suitability) / Class 2 (grazing suitability)), and some Class D land - not suitable for agricultural uses due to extreme limitations, also exists on site.

The proposed post-mining land use for the project site is low intensity grazing, with minor areas of native habitat. The mosaic of bushland and grassland will link remnant native vegetation where possible and will aim to return some conservation values. The assessment of land suitability, capability, GQAL and rehabilitation of the project site is detailed in Sections 4.4 and 4.9 of the EIS.

The potential for the remaining elements of the BMA BBCGP to have cumulative impacts on regional land resources is presented in Table 20.1.

20.3 Surface Water Resources

The project will minimise water supply requirements by collecting, managing and reusing water on site. Water will be supplied to the project via the Eungella-Bingegang pipeline, which receives water from the Braeside Borefield and Eungella Dam. Approximately 3,200 ML per year of raw water can be sourced to service the requirements of the Caval Ridge Mine.

Potential impacts (increased sediment load and salinity) on the water quality of the Isaac River and tributaries occurring on the project site will be mitigated through the use of a mine water management system, sediment basins, restrictions to site water discharges, progressive rehabilitation, spill controls, and water quality monitoring. Given the mitigation measures proposed for the project (Section 6.2), and the mining industry standards and regulations for water quality protection, the regional cumulative impact on surface water quality is considered minimal.

The mining footprint within the project site occupies approximately 65 km^2, which represents approximately 0.3% of the total catchment area of the Isaac River. Post-mining, the project site will be contoured so that surface water flows away from the final voids into appropriate sediment control measures prior to leaving the site through stable water disposal areas. Surface water leaving site will discharge into the tributary creeks of the Isaac River, and therefore, the project is not expected to have a significant regional cumulative impact on surface water flows. The potential contribution of remaining elements of the BMA BBCGP is tabled and discussed in Table 20.1.

20.4 Groundwater

The cumulative groundwater drawdown and impacts on quality resulting from the project and Peak Downs Mine were assessed through numerical modelling of data from the Peak Downs Mine. The Peak Downs Mine is located along the strike of the Moranbah Coal Measures to the south of the project site. The cumulative impact will be to superimpose the drawdown of each mine along strike, resulting in a greater drawdown between the mines. No groundwater users were identified between the mines. The drawdown of the mines down-gradient of each mine will be as a result of that particular mine such that there will be no cumulative impact of drawdown on groundwater levels. The only other existing mine within a 10 km radius of the project is the Isaac Plains Mine operated by Vale Australia Pty Ltd, however the cumulative impact of the drawdown from that mine would be negligible. The groundwater wells identified on neighbouring properties are greater than 2 km from the site, thus it is anticipated that the proposed mine activities and subsequent groundwater drawdown will not have a significant impact on the regional groundwater users of the Permian aquifers.

After mining is completed, the groundwater system will re-adjust to the new aquifer conditions surrounding the mined area. Water levels/pressures within the regional aquifers will over time attain a new equilibrium level. This new equilibrium for the groundwater system will have a different potentiometric surface from that which was present pre-mining owing to the presence of final voids in the east of the mined area and the different hydrogeological parameters of the backfill material. Given that the climate of the area is semi-arid, a final void water level will form but the evaporative demand will result in the void behaving as a groundwater sink. This is likely to result in residual drawdown immediately surrounding the final void area when the potentiometric surface reaches the new equilibrium level. In the Moranbah Coal Measures, drawdown of the potentiometric surface close to the final voids at the cessation of mining is likely to begin to recover immediately following cessation of mining. This initial rise in the potentiometric surface close to the pits is related to the likely rise in the water levels within the final voids as dewatering from in-pit sumps is stopped. In contrast, outside the immediate vicinity of the final void, the potentiometric surface is likely to continue to fall in the near term following cessation of mining as the groundwater system adjusts to new regional aquifer conditions.

This drop in water level at distances away from the final voids (post-mining) occurs as a result of a flattening of the regional hydraulic gradient, as the groundwater system moves towards its new equilibrium state.

A rise in the final void water salinities may result from evaporative concentration processes, and from atmospheric weathering of excavated exposed bedrock. Water quality in the final void is expected to deteriorate over time but is not expected to impact the surrounding aquifers as the voids are expected to operate locally as a groundwater sink. Water within the void will not recharge the groundwater system unless water levels in the void rise above existing groundwater levels in the coal seams. Post-mining water quality within all aquifers surrounding the project site is expected to remain the same as pre-mining water quality.

Assessment of groundwater is presented in Section 7 of the EIS, with the management of groundwater drawdown impacts outlined in Section 7.2.

There are no significant regional users of the groundwater resource that the project will impact on.

20.5 Terrestrial Ecology

Extensive broadscale clearing has occurred in the Brigalow Belt Bioregion (within which the BMA BBCGP is located) since the Brigalow Land Development Scheme began in the 1960s and required landholders to develop land at a certain rate per annum in order to retain their leases (Australian Greenhouse Office, 2000). Overall, the development of mining in the region has resulted in limited clearing compared to other industries such as grazing. However, the historic broadscale clearing by other industries has effectively ceased, while the mining industry is in the process of expansion. Furthermore, clearing has been less extensive in areas where there was an identified potential for coal mining and therefore many of the larger areas of remnant vegetation lie over the region's coal resources.

The project site supports some remnant vegetation protected under State and/or Commonwealth legislation. The project will result in the clearing of approximately 30 ha hectares of EPBC endangered brigalow woodland, which represents approximately 0.01 % of the remaining area of this vegetation community within the Brigalow Belt North Bioregion. It will also result in the clearing of approximately 125 hectares of the endangered EPBC ecological community 'Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin' (formerly endangered bluegrass ecological community until EPBC amendment in January 2009), which represents approximately 0.07 % of the remaining area of this vegetation community within the bioregion extent. The vast majority of the habitat proposed to be disturbed is non-remnant vegetation and is currently grazed (refer Section 8.1).

Over 100 hectares of endangered brigalow dominant woodland, and 29 hectares of endangered natural grasslands has been retained within the project site through rearranging the mine footprint during the project's planning phase. Groundwater drawdown due to mine operations is unlikely to cause impacts to the Brigalow woodlands, as discussed in Section 7.2 of the EIS. Rehabilitation of the project site will seek to incorporate native tree, shrub and grass species where appropriate, as described in Section 4.9. As part of the project, offset areas will be established and managed to compensate for ecosystems and habitat impacted by the project. These areas will be managed to control pest species and fire, would ensure that significant ecosystems and habitat values for significant species are retained and enhanced within the local area. The assessment of terrestrial ecology impacts is detailed in Section 8.6 of the EIS.

The potential for the remaining elements of the BMA BBCGP to have cumulative impacts in the region on terrestrial ecology is presented in Table 20.1. When taken as a whole the BMA BBCGP involves clearing over 350 ha 'Endangered' vegetation communities as listed in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The clearing, disturbance and mining activities proposed as part of the Caval Ridge Mine would occur under normal mining associated with the Peak Downs Mine, albeit deferred for a period of time. The Caval Ridge Mine brings this clearing forward.

Further more the clearing will occur on the land subject to an existing mining lease (ML 1775), on which all but small areas have the necessary Surface Area Approvals under the Mineral Resources Act 1989. Finally, ML 1775 in it's entirety is the subject of an Environmental Authority granted pursuant to the Environmental Protection Act 1994 for the carrying out of mining activities.

Despite these approvals being in place, a full assessment of the environmental impacts on flora and fauna values of the site has been completed.

It is proposed that the loss of approximately 23 ha of Endangered Brigalow communities associated with the proposed open pit and infrastructure (i.e. that area not subject to existing surface area approvals for vegetation clearing, as shown on Figure 8.5) will be offset by the protection and management of an area of Brigalow regrowth.

It is also proposed that the loss of approximately 125 ha of the Endangered Natural Grassland community associated with the proposed pit will be offset. In addition, areas currently supporting RE 11.8.11 will be managed to control the extent of exotic species (e.g. *Parthenium*) to ensure the continued persistence of this community within the subject area.

20.6 Aquatic Ecology

All natural drainage lines occurring within the project site are ephemeral. During ground survey, natural drainage lines throughout the project site were predominantly dry (despite heavy rainfall events prior to the surveys) and largely devoid of aquatic vegetation. Conditions during the ground survey may be seen to represent the prevailing conditions in this locality.

No aquatic fauna species of special conservation significance were recorded during current or previous surveys of the project site and immediate surrounds.

A section of Horse Creek and a section of Caval Creek will be diverted during the project as they currently traverse areas that will be incorporated into Horse pit. The diversions have the potential to impact on downstream ecosystems through alterations to base flows and the frequency and extent of flooding. The diversions will be designed to ensure they replicate existing conditions as closely as possible to minimise such impacts. Rehabilitation of the diversions will focus on re-establishing naturally occurring riparian systems (e.g. RE 11.3.25 and RE 11.3.2), and also provide an opportunity to facilitate fauna movement and create habitat. The construction of dams as part of the mine water management system will increase the amount of non-ephemeral aquatic habitat on-site. The impacts to aquatic ecology are discussed in detail in Section 9.1.2 of the EIS.

Numerous mining operations are operating in similar ecological areas (ephemeral creeks and drainage paths) within the Isaac River catchment. The Isaac River catchment is mostly covered by either mining leases, mining claims or exploration permits (coal, petroleum and mineral). Current mining leases only cover a small portion of the catchment, at approximately 1,800 km^2 or 8%. Exploration permits, however, cover approximately two thirds of the catchment and if extensively developed they have the potential to cause significant cumulative impacts to aquatic ecology in the region.

The potential for the remaining elements of the BMA BBCGP to have cumulative impacts in the region on aquatic ecology are presented in Table 20.1.

20.7 Air Quality

Cumulative air quality impacts may result from increased dust generation and emissions from the mining operations in the localised area. The area surrounding the project site has several operating coal mines, coal seam gas projects and a quarry in addition to agricultural activities such as cropping and grazing which may all be sources of cumulative air quality impacts. These cumulative impacts were assessed through using ambient air monitoring data from nearby mining operations (Peak Downs and two locations near Poitrel). In addition, a site-specific monitoring station was installed in December 2007 to provide data on the existing levels of particulate matter (PM_{10}) at the project site.

The ambient air monitoring data suggests that the existing air quality at the project location is good, with no exceedences of the Queensland Environmental Protection Policy (EPP (Air)) objectives for dust recorded at the project site during 2008. Results of dispersion modelling suggest that air quality impacts due to project construction activities in Year 1 will be below the EPP (Air) objectives for total suspended particulates (TSP), $PM_{2.5}$ and dust deposition at residential locations. Operational impacts in Year 2 and Year 20 will satisfy the EPP (Air) objectives for TSP, $PM_{2.5}$ and dust deposition for typical operating conditions. There is potential for PM_{10} levels to exceed the EPP (Air) objective of 50 $\mu g/m^3$ for the 24-hour average concentration, at some sensitive receptor locations, for each of the three year scenarios assessed. Impacts under worst-case short-term operating conditions, accounting for the possible proximity of key dust-generating equipment to either the north or south of each pit, show that high dust levels are possible to the north of the project under adverse meteorological conditions. Estimated impacts for upset conditions, namely the failure of dust suppression measures on the haul roads, predicts high dust levels at locations to the north and west of the project site. The occurrence of upset conditions will be minimised by ensuring that adequate dust suppression measures are maintained at all times.

Adoption of a combination of engineering controls, dust suppression measures, rehabilitation of exposed surfaces, operational procedures, and measurement of ambient air quality is expected to result in adequate management of dust emissions from the project, and the cumulative impacts from these emissions. An ambient air monitoring program has been developed to monitor the impact of dust-generating emission sources at sensitive receptor locations around the project site. The information obtained from the monitoring program will feed into the operational management of site-based dust emission sources.

The assessment of air quality is presented in Section 10 of the EIS.

20.8 Noise and Vibration

Noise modelling for neutral and worst-case scenarios over the life of the project was undertaken to model all steady state (L90), average (Leq) and maximum (Lmax) noise emissions from the new rail line, processing plant, overland conveyor and mobile mechanical plant to be used for mining at the project site.

Steady state (L90) noise emissions from the processing plant and overland conveyor, are expected to exceed criteria at three locations for neutral weather, and noise at Location 7 will increase by a further 6 dBA under worst case weather conditions. The average (Leq) noise emissions from mining-related activities are predicted to exceed criteria for neutral weather at nine locations. Under 'worst-case' weather conditions, the exceedence at Location 7 will increase by 5 dBA and Locations 8, 10 and 11 will have minor (up to 3 dBA) exceedences. For maximum (Lmax) noise emissions from train or mobile

mechanical plant, three locations are predicted to exceed under neutral and worst-case weather conditions. No adverse noise impacts are predicted for road transportation into and out of the project site. Six locations are predicted to exceed the blasting criteria. Only one of these six locations is not currently owned by BMA, however it is already owned by neighbouring miner.

Based on the noise predictions undertaken for the project, engineering solutions can be implemented to achieve acceptable noise and vibration levels at all non-BMA owned properties with the exception of Location 4 (owned by a neighbouring miner) and Location 7. At these locations, the possibility of resumption, or entering into an agreement with the property owner, will need to be investigated further. A comprehensive noise monitoring program will be implemented to validate the predictions above before adopting appropriate mitigation measures.

Cumulative noise impacts were assessed through the measurement of background creep (L90) and specific/intrusive (Leq) noise criteria contained in the EPA's Planning for Noise Control guideline. Both criteria take into account the existing ambient noise level in an area from all existing industry and other noise sources such as road and railway traffic. The EPA's Planning for Noise Control assessment methodology is based on the existing ambient noise monitoring (undertaken at seven locations surrounding the project) and comparison to recommended ambient noise levels. The cumulative effect of the existing industry and other noise sources, together with the project, is assessed to not exceed the recommended ambient noise levels.

The assessment of noise and vibration is presented in Section 12 of the EIS.

20.9 Traffic and Transport

The assessment of traffic impacts is presented in Section 13 of the EIS. The construction phase of the project will generate the highest rates of traffic with an average workforce of 843 and average deliveries by 12 trucks per day over two years. Within the two year construction period it is expected that there will be a peak six month period with a 1,400-strong workforce and deliveries by 52 trucks per day. The mining operations phase will extend over 30 years with an average workforce of 495 staff and average deliveries by seven trucks per day. Staff will be predominantly bussed to site from the vicinity of Moranbah while goods and waste trucks are expected to primarily arrive from both Moranbah and Mackay.

The adjacent road network, particularly the Peak Downs Highway and Moranbah Access Road, are expected to experience significant traffic growth due to other industrial activities planned for the vicinity. In addition to that growth, other BMA BBCGP components are expected to commence activities during the assessed timeframe. These include the Daunia Mine development and the Goonyella Riverside Mine expansion. These growth projects have been considered in addition to the expected high

background traffic growth. Given the extent of the expected traffic growth (in the order of 5 to10% per annum compound), it is unlikely that this will be sustained for more than about 10 years. Moderate growth rates are likely beyond 2021.

A series of road works have been proposed to mitigate the traffic impacts of the project, however the assumed very high background traffic growths have a significant influence on the required works. It is recommended that the potential for joint infrastructure contributions from other developments be considered for upgrading the Peak Downs Highway/Moranbah Access Road intersection.

The additional heavy vehicle demands generated by the project do not warrant developer contributions towards pavement rehabilitation. Contributions towards pavement maintenance are however warranted for the section of the Peak Downs Highway between the site access and the Moranbah Access Road/Peak Downs Highway intersection. The potential for the remaining elements of the BMA BBCGP to have cumulative impacts in the region on traffic and transport is presented in Table 20.1.

20.10 Social

The assessment of social impacts is presented in Section 17 of the EIS. There was strong community concern noted through consultation about the potential cumulative impacts of the growth of the mining industry in the project area and, to a lesser extent, the region. While the project will bring with it a number of direct impacts (both positive and negative) in isolation it is unlikely to have significant impact on the local or regional communities. However, when combined with other growth projects and the expansion of mining operations by other proponents and the general increase in focus on the mining industry in general, the impacts become more significant. The local community of Moranbah and surrounds is currently facing a number of issues including:

- Housing shortages and affordability
- Skill shortages
- Increased traffic on the Peak Downs Highway.

While these issues will be exacerbated by the project, it is considered that they are manageable. However, given the scale of mining planned in the region and if there is a lack of concerted action by key stakeholders including government and industry, there is a high likelihood that significant social impacts will occur in Moranbah and the surrounding communities. Accordingly, the Queensland Government is working to legislate the development of Social Impact Plans (SIPs) as part of the EIS process as part of their Sustainable Resource Communities Policy. BMA supports the introduction of SIPs and is committed to producing a SIP as part of the overarching mitigation strategies of the BMA Bowen Basin Coal Growth Project.

The SIP will be designed to manage the overall impacts of the project and in particular to manage the overall impacts of the project in consideration of the cumulative impacts of mining in the study area and region.

The scale of potential cumulative impacts from the remaining elements of the BMA BBCGP are tabled and discussed in Table 20.1.

20.11 Economic

In terms of cumulative economic impacts, the project contributes to Queensland's most important export commodity, which in total earns Australia around $10 billion. In the financial year ending 30 June 2008, coal contributed $1.04 billion in royalties to the Queensland Government. Based on changes to royalties announced in the Queensland State Budget 2008-09, royalties from coal are projected to rise to over $3.21 billion in 2008-09. The industry is also a mainstay of rail and port services in Central Queensland.

An initial capital investment of approximately $4 billion will be required to bring the project to full production. Operational expenditure will be about $450-500 million per annum for the mine life. The operation will contribute significantly to the state in rail freight and royalties. This contribution coupled with the direct and indirect employment opportunities and associated spending, highlights the value of the project to Queensland.

Based on changes to royalties announced in the Queensland State Budget 2008-09, royalties from coal are projected to rise to over $3.21 billion in 2008-09. The coal industry in Queensland employs about 20,000 people directly. A further 70,000 indirect jobs are created through the industry's activities.

The project's high quality hard coking coal is attractive to overseas buyers. The project forms part of a growth strategy designed to strategically service the expanding demands of India, China and other international metallurgical coal markets.

The coal industry in Queensland employs about 20,000 people directly. A further 70,000 indirect jobs are created through the industry's activities. At full production, the project will directly employ approximately 495 people, with many more employed indirectly as a result of flow-on effects.

The cumulative economic impacts of the Project include increased export income, royalties and employment, generating wealth within Queensland and Australia that significantly benefits the wider community. An assessment of Economic impacts of the Project is presented in Section 18 of the EIS.

The potential for the remaining elements of the BMA BBCGP to have cumulative impacts on the regional economy are tabled in Table 20.1.

Table 20.1 Descriptors for Cumulative Impacts on a Regional Scale

Issue	Cumulative Impacts Descriptor	Daunia	Caval Ridge	Goonyella Riverside[1]	Airport	Comments
Production	Average annual coal production	4 Mtpa	5.5 Mtpa (+2.5 Mtpa from Peak Downs Mine)	Up to 9.5 Mtpa	Not applicable	The BMA BBCGP provides directly for an extra 21.5 Mtpa of coal production in the region. This increased production represents a significant contribution and cumulative effect on the region's socio-economic environment.
Land resources	Loss of good quality agricultural land – Class A and B	160 ha Class A 80 ha Class B 240 ha total	0 ha Class A 0 ha Class B 0 ha total	800 ha Class A 841 ha Class B 323 ha Class B-C 1964 ha total	To be confirmed during EIS	While a small amount of Class A Good Quality Agricultural Land is contained within the project site, this is not within the project footprint and is not expected to be disturbed.
	Percentage of GQAL (Class A and B) lost in the Isaac Regional Council area. (Total GQAL in Isaac Regional Council area: Class A 813,000 ha; Class B 337,000 ha.)	0.02 %	0%	0.17 %		
Surface water resources	Off site water source	Braeside Pipeline Eungella Pipeline	Eungella-Bingegang pipeline	Braeside Pipeline, Burdekin Pipeline, Eungella Pipeline	To be confirmed during EIS	A Water Management Plan has been developed for the Caval Ridge Project combining strorages for water collection to be used for mining related activities. The Caval Ridge Project will closely manage water consumption and release of water, use raw water, collect and reuse impacted water, and will investigate water efficiency opportunities.
	Water consumption from off-site (piped)	600 ML/yr	3200 ML/yr	1000 to 5000 ML/yr	To be confirmed during EIS	
	Project Site area compared to the total	0.1%	0.3%	5 to 10%	To be	Mining operations temporarily

Issue	Cumulative Impacts Descriptor	Daunia	Caval Ridge	Goonyella Riverside[1]	Airport	Comments
	Isaac River catchment (22,400 km^2)				confirmed during EIS	interfere with catchments. The Project and the BMA BBCGP as a whole represent a small percentage of the Isaac River Catchment.
Terrestrial ecology	EPBC and VMA 'Endangered' RE cleared on site (% of total on site)	15 ha (6%)	155 ha (20%)	191 ha (23%)	To be confirmed during EIS	The project will have a minimal impact at a regional scale, however, the BMA BBCGP includes clearing over 350 ha[1] of EPBC listed 'Endangered' RE. BMA will provide vegetation offsets for the total areas to be disturbed progressively during the BMA BBCGP assessment process. Opportunity for dispersal and movement of ground dwelling and arboreal fauna assemblages across the site is generally restricted to habitat of the Cherwell Creek riparian zone. Any disruption or fragmentation of riparian habitat will result in a loss of connectivity to the riparian corridor, and restriction of potential faunal movement across the site.
	EPBC 'Endangered' and VMA 'Of Concern' RE cleared on site (% of total on site)	0 ha (0%)	125 ha (16%)	0 ha (0%)		
	VMA 'Of Concern' RE cleared on site (% of total on site)	0 ha (0%)	378 ha (48%)	66 ha (5%)		
	VMA 'Not of Concern' RE cleared on site (% of total on site)	21 ha (94%)	374 ha (48%)	269 ha (9%)		
	Non-remnant vegetation cleared on site (% of total site)	1,750 (56%)	3,118 ha (65%)	2,457 ha (34%)		
	Fauna corridor disrupted	No	Yes	Yes		
	Habitat fragmented	No	Yes	Yes		
Aquatic ecology	Defined water courses removed or diverted.	0 km	9.6 km	To be confirmed during EIS	To be confirmed during EIS	Sections of two defined water courses (Horse Creek and Caval Creek) will be diverted on the Caval Ridge Project. These diversions will be designed to minimise impact on watercourses.
Greenhouse gases	Scope 1 and 2 emissions per year	0.2 Mt	0.4 Mt	2.8 Mt	To be confirmed during EIS	The total quantity of direct and indirect greenhouse gas emissions from the BMA BBCGP 2.8 Mtpa represent 0.4% of Australia's 2005
	Scope 3 emissions per year	10 Mt	15 Mt	59 Mt		

Issue	Cumulative Impacts Descriptor	Daunia	Caval Ridge	Goonyella Riverside[1]	Airport	Comments
						emissions. Total Scope 3 emissions represent 0.17% of annual global greenhouse gas emissions.
Traffic and transport	Construction period Operational traffic – light vehicles Operational traffic – heavy vehicles Reduction in pavement life	2009 to 2010 200 vpd 20 vpd 1 % reduction in 2009 Minimal during operation	2011 to 2012 165 vpd 7 vpd 19% reduction in 2009. Additional 5% reduction in 2025, decreasing over the project life	2011 to 2013 616 vpd 35 vpd 6% reduction in 2011, additional 9% in 2012, additional 5% reduction in 2016, decreasing over the project life	To be confirmed during EIS	Impacts from the project on traffic combined with an expected significant traffic growth due to other industrial activities, means the cumulative effect of the BMA BBCGP represents a significant impact. Contributions will be made for road upgrades and pavement maintenance.
	Increase in rail carriage movements (No. / year)	400	700	550	To be confirmed during EIS	The cumulative effect of this increase is significant only if the Gonyella Railway System is used for transport of all coal. In the long term the Goonyella Riverside Mine will use the Abbott Point Port, via the proposed Northern Missing Link. Other changes will include switching coal from Norwich Park, currently on the Goonyella Railway System, to a
	Per cent increase in use of existing use of Goonyella Railway System	4.5 %	Up to 9 %[2]	Up to 9%[2]	Not applicable	

Issue	Cumulative Impacts Descriptor	Daunia	Caval Ridge	Goonyella Riverside[1]	Airport	Comments
						new rail and train load-out facility travelling south to Gladstone. The net effect is expected to minimise impacts on the rail system.
Social	Peak total construction workforce Peak construction workforce in towns Total operational workforce Operational workforce in towns	450 45 300 90	1200 60 495 75	900 90 700 210	To be confirmed during EIS	The combined effect of the increases in workforce are expected to place a strain on the region. The consultation and social impact assessment processes initiated in this EIS will continue for other elements of the Project with a view to developing control strategies to minimise these impacts.
Economic	Value added to Mackay Region Value added to Queensland Value added to Australia	$56 – $70 M N/A $64 – $80 M	$133 – $167 M N/A $152 – $190 M	$130 – $240 M $270 – $480 M $130 – $230 M	To be confirmed during EIS	
	Jobs in Mackay Region (FTE persons) Jobs in Queensland Jobs in Australia	340 – 460 N/A 310 – 420	804 – 1082 N/A 744-992	370 – 580 460 – 710 330 – 520	To be confirmed during EIS	

NOTE:

1 – Information relating to the Goonyella Riverside Expansion is at this stage indicative only, as refinement of the project is in progress and detailed environmental baseline studies and impact assessments are yet to be finalised.

2 – Percentage increase to the Gooyella Rail System will be reduced if access to Abbot Point Coal Terminal is provided by the construction of the Northern Missing Link rail line.