Appendix 18

Bulga Optimistation Project:
Economic Impacts

Economics Consulting Services

BCM Optimisation Project:

Economic Impacts

Photo source: Mitra Images

Report prepared for:

BCM Management Pty Ltd, December 2012

This publication

This report describes a proposed coal mine extension in the Hunter Valley of New South Wales and the economic impact this continued mining will have on the local, regional and State economies.

The Project is at an advanced evaluation stage and government approvals are being sought covering environmental and planning issues.

The Director General for Planning and Infrastructure has declared this a State Significant Development and requested that the company address the social and economic impacts of the Project. This is to include an assessment of the costs and benefits of the development and whether it will result in a net benefit for the NSW community.

The estimates in this report are based on prices forecast by Economics Consulting Services and costs based on industry benchmarks. They reflect the expected benefits from a Project of this scale. They are not the actual BCM's figures at this early stage in the Project development.

No investments should be based on this assessment without independently verifying the information.

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Executive Summary

Précis

This report prepared by Economics Consulting Services for Bulga Coal Management Pty Ltd (BCM) describes the economic impacts of a proposed coal mine extension in the Upper Hunter Valley. BCM operates the BCC Complex (BCC) which includes an open cut mine (Bulga Surface Operations), an underground mine (Bulga Underground Operations) and a coal handling and preparation plant.

The BCC has been operating since 1982, when an open cut pit was developed by BHP as the Saxonvale mine. BCC is now operated by BCM, for Xstrata Coal NSW. Underground mining commenced at South Bulga in 1994 and continues today at the Blakefield South Mine.

BCM proposes a large capital investment to extend the mine life of the Bulga Surface Operations from its intended closure in 2018, when current coal reserves will be depleted. Under the extension proposal, the Project will allow continued mining at the Bulga Surface Operations till 2035 with 230Mt of ROM mined.

The report examines the economic impacts and benefits of the extension in accordance with directions issued by the Director General of Planning and Infrastructure for the preparation of an Environmental Impact Statement. A cost benefit analysis based on NSW Government Guidelines is included comparing a base case (without the extension) and a Project case involving the open cut mine extension.[1]

The **Base** case is:

- Continuation of the existing operation ramping down to mine closure in 2018 producing 20 million tonnes in saleable coal
- Sale of used equipment following closure
- Rehabilitated land still used by Complex for underground mines[2]

The **Project** case is:

- Continuation of the Bulga Surface Operations to 2035 with planned production of 155 million tonnes in saleable coal
- Continued use of the existing infrastructure with the current approved Bulga Underground Operation
- Construction works of $500 million in years one to four after Project approval
- Replacing ageing plant with some ultra class trucks to improve efficiencies
- Sale of all capital equipment at the end of the Project and the land rehabilitated to best land use

[1] NSW Government, November 2012, Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals

[2] Assumes in base case the Complex will be unable to relinquish lands, whilst approved undergrounds continue to operate

The Project will produce significant benefits at a local, regional, State and national level including:

- Continued employment of approximately 700 employees
- Creation of approximately 300 additional construction jobs (peak) over a three to four year construction phase
- Total additional employment attributable to construction including direct and indirect employment estimated at 800 jobs
- Total employment attributable to the Project during the operating years considering both direct and indirect employment from mine operations is predicted to be 2,450 jobs
- Upfront capital investment of the Project is approximately $500 million
- $410 million of the estimated economic activity from the Project is predicted to accrue to the regional economy
- A net benefit to NSW from the Project of $2,588 million
- Total increase in the undiscounted taxation and royalty revenue stream flowing to both the NSW Government from the Project is estimated to be $1,760 million over the life of the Project.
- Total increase in the undiscounted taxation revenue Carbon Tax stream flowing to the Commonwealth Government from the Project is estimated to be $450 million over the life of the Project

Economic impact evaluation

BCC is located in the Upper Hunter Valley approximately 4 kilometres to the south-east of Bulga, approximately 4 kilometres to the north of Broke and is approximately 12 kilometres south-west of Singleton.

There will be both positive and negative impacts on the small rural settlements at Broke, Bulga and Milbrodale. These are rural communities with many lifestyle and weekend properties. A small number of farms are commercial operations with a reliant on off-farm income. The expansion of the Project mine area involves relatively low quality land with impacted industries affected being relocated or compensated for any commercial disadvantage.

The local area has a tradition of grape production although the centre of production is in the nearby Pokolbin area. There are a small number of wineries and a growing number of alternative rural enterprises based around rural tourism. The viticulture and wine making sectors have faced over-supply issues for some years and the industry is endeavoring to reduce production and improve returns. Many properties would not survive without alternative income, with the mining sector being one source of that income.

Positive impacts on the local communities will include the additional work and business opportunities. Negative impacts will include an increase in the visual presence of mining Project in a rural setting, noise and air quality, increased road traffic during construction, slightly increased travel times and greater pressures on wages paid by other sectors. Many of these impacts are present in the local area due to the existing BCC operations and neighboring coal mining operations. BCM through the Project is managing the negative impacts with a range of measures that mitigate or offset the impact with visual, noise, traffic and air quality impacts predicted to decrease over the life of the Project.

Given the small local economy, most of the employment and business opportunities will flow to the surrounding region with Singleton, Maitland and Newcastle the key beneficiaries. The region has a tradition of mining and mine services and is well set up to handle the investment and expansion.

The mine extension will involve the investment of an estimated $500 million over a three to four year construction period starting from Project approval (three years used for the purposes of this economic assessment).

The total company expenditure to operate the Project for a further eighteen years is estimated at $12,230 million (excluding the initial capital but including the sustaining capital needed to maintain capacity) assuming industry benchmark expenditure levels.

This expenditure will flow through the economy with multiplier effects on local employment and business. Workforce participation in the area is high and unemployment low meaning there is limited opportunity for any additional workers from this area. The mine workers are well paid and some workers in other sectors may be attracted to the construction activities placing pressure on wages in those sectors.

The Project development investment will have a ripple effect through the economy as workers spend their wages on household goods and services and businesses expand to meet the needs of the Project. The multiplier effect is estimated to increase turnover in the local economy by $6 million a year, by $153 million in the regional economy and by $385 million a year in New South Wales during the construction phase of the Project.

During the eighteen years extended operating phase, the Project will increase economic output by $4 million in the local economy, $410 million in the region and $837 million in the State as a whole.

During the extended open cut operations, the mine will continue to employ an estimated 700 workers and contractors. The flow-on effect through the economy will mean a total of 52 local jobs, 1,010 in the region and 2,450 in the State. Most of these jobs are already in place – this project extends employment opportunities associated with open cut mining at the BCC for a further eighteen years.

A cost benefit analysis demonstrates the scale of this project and the long term benefits. There is a cost to the community from the loss of ecological communities, an increase in greenhouse gases, increased road use costs and visual amenity. The company has moved to address these impacts or to offset them and most of the cost is included in the mine operating cost. The cost benefit analysis estimates a net benefit to the community in NSW of $2,588 million using a 7% discount rate.

The company has a wide range of mitigation and offset measures to address the negative Project impacts. Under new Australian legislation, the cost of greenhouse gas emissions will now be factored into the cost of operations through an emissions trading scheme. The cost of the emissions trading scheme is included in the analysis and is put at $450 million over the extended mine life.

A large Noise and Visual bund will be constructed to limit the impact from continued operations. There will also be a new emplacement area to the north east of existing operations and upgrades to the coal handling and preparation plant and stockpile areas. The Project will require a new tailings storage facility, the relocation of two high voltage transmission lines, new water storage and the realignment of two local roads.

One of the key community concerns is the potential impact of the construction workforce on local accommodation.

A number of Projects are expanding and there is great pressure on accommodation. Local Governments do not favour temporary construction camps and hence longer term accommodation must be established. BCM is aware of the community concerns and will work with the local Council to assist where possible, the social issues, as part of the approval process. Xstrata does have other construction projects being completed at the time of construction of the proposed Project, which should alleviate some of these impacts.

Summary impacts*

Parameter	Impact
Development investment	$500 million
Total operating cost expenditure (excluding initial capital)	$12,230 million
Total forecast revenue increase (Project case less base case)	$16,983 million
Construction phase employment impact: Direct (average) Local impact Region impact State impact	 170 jobs a year 27 jobs a year 225 jobs a year 800 jobs a year
Operations phase employment impact: Direct Local impact Region impact State impact	 700 jobs a year 52 jobs a year 1,010 jobs a year 2,450 jobs a year
Construction phase annual economic output Local Region State	 $6 million $153 million $385 million
Operations phase gross annual economic output Local expenditure Region State	 $4 million $410 million $837 million
Net benefit (7% discount rate)	$2,588million
State government royalties ($m each year at maximum output) State government royalties ($m life of Project) Government emissions trading scheme ($m life of Project)	$76 million $1,760 million $450 million

* Numbers rounded

Chapter 1

1. Introduction

1.1 Overview

This report has been prepared by Economics Consulting Services for BCC Management (BCM). It describes the potential economic impacts of the continuation of an existing open cut coal mine at Broke in the Hunter Valley of New South Wales

BCM operates the BCC Complex (BCC) which includes an open cut mine (Bulga Surface Operations), underground mine (Bulga Underground Operations) and a coal handling and preparation plant.

BCM is the applicant for the Project. BCM manages the Bulga Surface Operations on behalf of the Bulga Joint Venture. The Bulga Joint Venture comprises Saxonvale Coal Pty Limited (a wholly owned subsidiary of Oakbridge Pty Limited) which holds an 87.5% share with the remaining 12.5% held by Nippon Steel Australia Pty Limited.

BCM is a wholly owned subsidiary of Oakbridge Pty Limited which is 78% owned by Xstrata Plc with the remainder held by Tomen Corporation (5%) Nippon Oil (15.2 %) and JFE Shoji Trade Corporation (1.8%).

The site has produced coal since 1982 when an open pit was opened by BHP as the Saxonvale mine to the east of Broke Road. The mine was transferred to Elders Resources in 1988 and then to Oakbridge Ltd after which it expanded to the west of Broke Road. Underground mining commenced at South Bulga in 1994 and at Beltana in 2003. The Beltana Mine closed in 2011 and longwall underground mining is now in the Blakefield Seam at the Blakefield South Mine.

BCM is seeking approval from the State Government to continue mining at the Bulga Surface Operations until 2035. Current approvals for the open cut mine extend to 2025, though reserves will be extracted by 2018. The Bulga Underground Operations is approved to operate to 2031.

The new **Project** is based on mining 230Mt between 2013 and 2035 with approximately 155Mt saleable coal. Approximately 30Mt is already approved for extraction. The coal will be mined from land that is largely within the existing mine area and production will continue at similar levels to the existing output. The coal will continue to be transported by rail to Newcastle for export.

The coal will come from deeper seams in the existing pits with some pit extensions to the east and south. Some upgrading of handling facilities will be involved. A substantial Noise and Visual Bund is to be developed to limit the visual and noise impact. There will also be a new emplacement area to the north east of existing

operations and upgrades to the coal treatment plant and stockpile areas. The Project will require a new tailings storage facility, the relocation of two high voltage transmission lines, new water storage and the realignment of two local roads.

Capital expenditure is estimated at around $500 million (m) over the first three to four years of the Project. Around 300 jobs will be created during this period with the subsequent operations phase continuing current employment levels of about 700.

The State government has confirmed that the extension is a State Significant Development under the State Environmental Planning Policy (State and regional Development) 2011 and requires development consent under the *Environmental Planning and Assessment Act 1979*.

This report is an appendix to an Environmental Impact Statement (EIS) which has been prepared to support the development application for the Project.

The environmental assessment requirements for the EIS provided by the Director General of the Department of Planning and Infrastructure require that the EIS address a range of issues. More specifically it sought:

> *A detailed assessment of the costs and benefits of the development as a whole, and whether it would result in a net benefit for the NSW community;*

This study focuses on the costs and benefits to the local, regional and state economies and assesses the net benefit of the extension to the NSW economy.

1.2 Historical context – local land development

1.2.1 Hunter Valley

The Hunter Valley, in Australian history, is an early colonial settlement area. The area is a recreation destination for Sydney residents with a strong wine and tourism association and there is a strong lifestyle movement to the area.

The first commercial activity in the area was coal mining with the Hunter River named Coal River by the British settlers at Sydney. The first coal was exported to India in 1799. A convict settlement was established at the mouth of the river (Newcastle) to mine and load the coal. Newcastle is now the largest coal port in the world.

Settlement for agriculture began at virtually the same time as coal extraction but there was a reluctance to encourage permanent land use while the penal settlement existed. Farm land was first allocated with freehold title around 1818. Following closure of the penal settlement in 1822, new settlers arrived in large numbers and the farm area expanded rapidly up the Hunter River.

Initial transport to the area was by boat from Sydney. The first overland route to the valley was discovered in 1820 and a cleared road-way constructed from Windsor to Singleton in 1823 - Putty Road.

The first built road was constructed using convict labour between 1826 and 1836. Known as the Great North Road, it crossed the Hawkesbury River at Wisemans Ferry and then north to Bucketty and then Wollombi. The road forked at Wollombi with one branch headed north to Jerry's Plains passing through Broke and the other branching east to Newcastle through Cessnock and Maitland.

1.2.2 The Singleton area

Expeditions led by William Parr in 1817, Benjamin Singleton in 1818 and John Howe in 1819 ventured north from Windsor to the land west of Singleton. Subsequent expeditions described the area as ideal for animal grazing and cultivation. Benjamin Singleton was in occupation by 1821.

The area was officially opened up for settlement in 1823 and large numbers followed along the new track. Large pastoral estates, aristocratic in tone, were granted to men of substantial capital who utilised convict labour to improve their properties. There were few small landowners.

Both grazing and agriculture soon commenced with wheat and tobacco proving early staples. Benjamin Singleton established a punt service across the river and the ford became a favourite river crossing for those headed north. He opened a flour mill on the riverbank in 1829 to process their grain and a post office was established at his inn the same year. Proper roads were in place by 1831. It was Singleton's grant which, when subdivided in 1836, formed the basis of the town.

Small amounts of coal were being uncovered by 1850 and the first mine opened around 1860 at Rix Creek, just to the north of Singleton. By the late 19th century there were said to be 16 mines operating in the district.

The army camp was established in 1941 and Singleton was declared a Shire in 1976.

1.2.3 Broke and Bulga

The Broke area was first founded with the allocation of land at Fordwich around 1820. The property was provided as a land grant to John Blaxland, the brother of the explorer Gregory Blaxland. John named it after his birthplace -Fordwich, Kent U.K.

Road transport quickly opened up the Hunter Valley to new settlers, who found that the sandy banks of the river flats were suitable for many types of agriculture. With the arrival of the settlers, agricultural and pastoral activities rapidly grew to rank with timber and mining in economic importance. Grapes were introduced in the early years and by 1840 there were over 200 hectares of grape plantings in the Hunter Valley.

The Broke-Fordwich area saw substantial farm development along the waterways with grazing stations on the lesser quality land away from the river and stream flats. The better land produces quality grapes but remained a small part of the viticulture industry with most plantings to the east in a triangular area between Rothbury in the north and Pokolbin and Cessnock in the south.

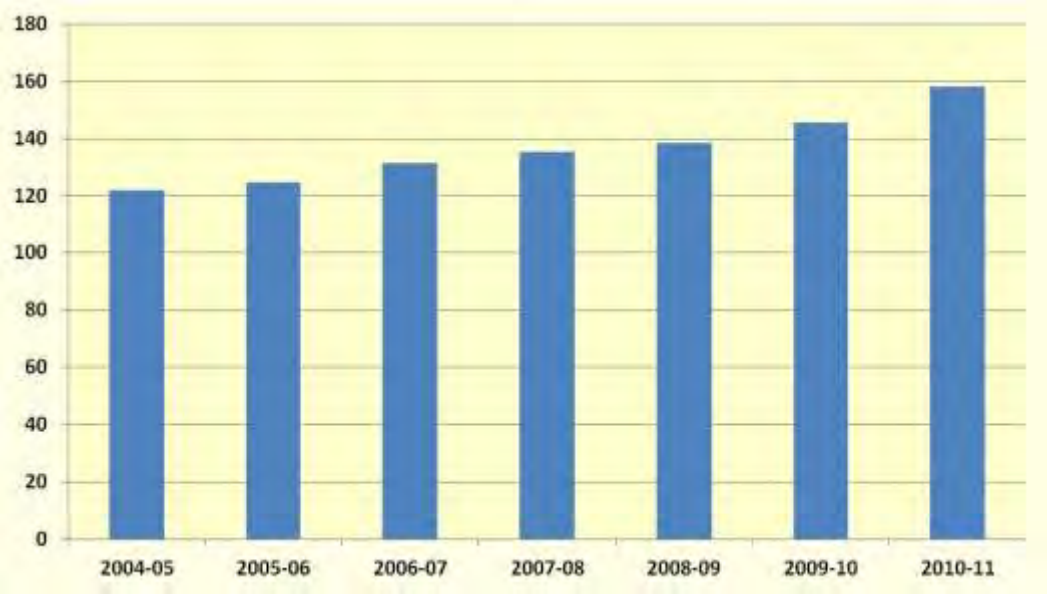
1.3 Coal industry development

Coal mining gradually spread out from Newcastle up the Hunter Valley. By the late 1800's there were 16 mines in the Singleton area east of Broke. Coal production has grown rapidly since the current commodity boom began around 2004 with saleable coal reaching 158Mt in 2010-11 (Figure 1).

Xstrata Coal has become a major Hunter Valley producer with 10 mining operations including the BCC.

Most coal produced in the Hunter Valley is sold by the producers to overseas buyers. There is also local electrical generation from coal produced from mines adjacent to large power stations.

Figure 1: Coal production for New South Wales (million tonnes saleable coal)



Source: Coal Services

Chapter 2

2. Project setting

2.1 Location

The BCC is located in the Singleton Local Government Area, in the central Hunter Valley (Figure2). The BCC lies approximately 14 kilometres (km) south of Singleton township and has a few small settlements as neighbors - Broke, Milbrodale and Bulga. Cessnock is over 30km east and the Project area is over 90km by road from Newcastle.

Figure 2: Location of Xstrata's BCC Complex

Source: Umwelt (2011)

The BCC is centered on Mining Lease ML1547 covering an area of approximately 9km from west to east and 8km from north to south (Figure 3). The BCC includes three other small Mining Leases and a number of exploration licenses that are not central to this study. The area which is being mined largely lies between Charlton Road and Broke Road although there is mine infrastructure on the eastern side of Broke Road.

Figure 3: Mining lease area

Source: BCC environmental submission, Umwelt 2005, Google earth

2.2 Physical setting

BCC is the southern-most coal Project in the Hunter Valley. The Mount Thorley/Warkworth Project is on the northern boundary with more than seven mines to the north to Muswellbrook, a distance of over 70km (Figure 4).

Figure 4: Coal mines in region

Source: Google maps

The mining activity at BCC is both open cut and underground, but the Project's mining extension sought only relates to the open cut operations. A relatively narrow belt of agricultural land lies to the west and south between the mine site and mountain ranges with a watercourse in the valleys in between (Figure 5 – south facing, Figure 6- west facing). The views are from the corner of the mine lease around the intersection of the Broke and Charlton roads.

Figure 5: South facing view towards Broke

Source: Google maps

Figure 6: West facing view towards Fordwich

Source: Google maps

The land to the north of the Project is dominated by the Mount Thorley mine and the Mt Thorley Industrial Area on the north eastern corner (Figure 7-north facing). To the east of the Project lies the Singleton Military Training Area.

Figure 7: North facing view towards Mt Thorley Industrial Area

Source: Google maps

Figure 8: East facing view towards Singleton Military Training Area

Source: Google maps

The Project expansion requires some additional land. The company has purchased two grazing areas and a vacant block that is not being used as a farm. BCM is consulting and in commercial negotiations with the owners of a stage 1 mushroom compost business with a view to acquire land within the Project area, with relocation of the existing facility.

2.3 The local area

"Local" is defined by Economics Consulting Services in impact studies to imply the areas that have a physical impact from the Project in terms of activities such as mining (noise, dust, and lighting), transport operations (trucks and worker transport vehicles) and any significant impact on local business services.

The Bulga Surface Operations are located about 4km from both Broke and Bulga.

Marketed as the "Tranquil side of the Hunter Valley[3]" the Broke area has a small village rural ambience. Grapes from the area have been processed in Pokolbin from early times with the Tulloch family being the most prominent. The area has small boutique wine holdings ranging from 2 to over 40 hectares. There are 4 wineries, 8 cellar doors, 20 accommodation places, and a small number of restaurants and other small farm produce shops and businesses. Bulga is more agricultural in nature than Broke with a very small town area and a population of only 358 people.

The area is a rural setting and mine related noise and lights can be seen and heard from some distance. The road network also means that mine employees use local roads. Given the geographical landform and climatic conditions, this implies that impacts from the BCC extend to the south and west. The Singleton Military Training Area to the east does not have a significant permanent residential population. The area to the north is more complex as the neighboring Mt Thorley mine means that impacts in that area are combined with the Mt Thorley operations and the activities at the Industrial area.

Based on land use and living patterns, the local area would ideally be defined as shown in Figure 9. However, statistics are not available on this area and an alternative local area is defined for this study based on the three statistical localities of Mount Thorley, Broke and Bulga[4] (Figure 10).

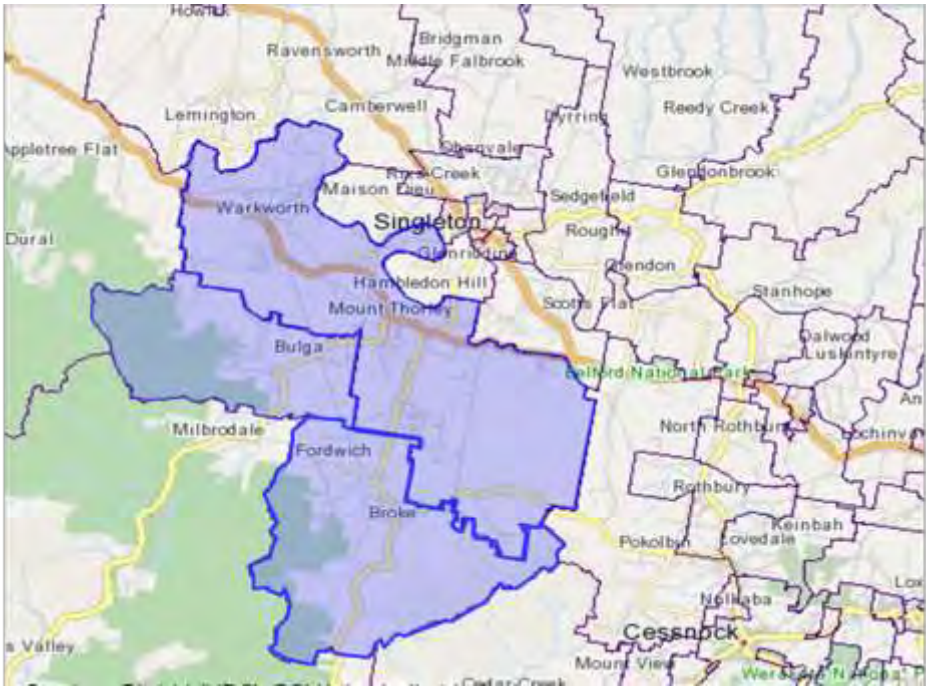
Figure 9: Local region for economic impacts

Source: Google maps

[3] Broke Fordwich Wine Region webpage www.brokefordwich.com.au
[4] Broke, Mount Thorley and Bulga are termed State Suburbs in the Australian Bureau of Statistics 2011 Census.

The three statistical localities cover the area of interest and include some land to the north towards Singleton. They have a combined area of around 680 square kilometres with Mount Thorley making up around 50%, Broke (30%) and Bulga (20%).

Figure 10: Broke, Mount Thorley and Bulga State Statistical Suburbs



ABS: 2011 Community Profiles

The Broke State Statistical Suburb includes the locality of Fordwich. Mount Thorley includes the BCCBCC itself.

In 2011, the Mount Thorley, Broke and Bulga localities had a combined population of 1,175 people, comprising around 5% of the total Singleton LGA population of 22,694 (Table 1).

Table 1: Population, 2011 Census

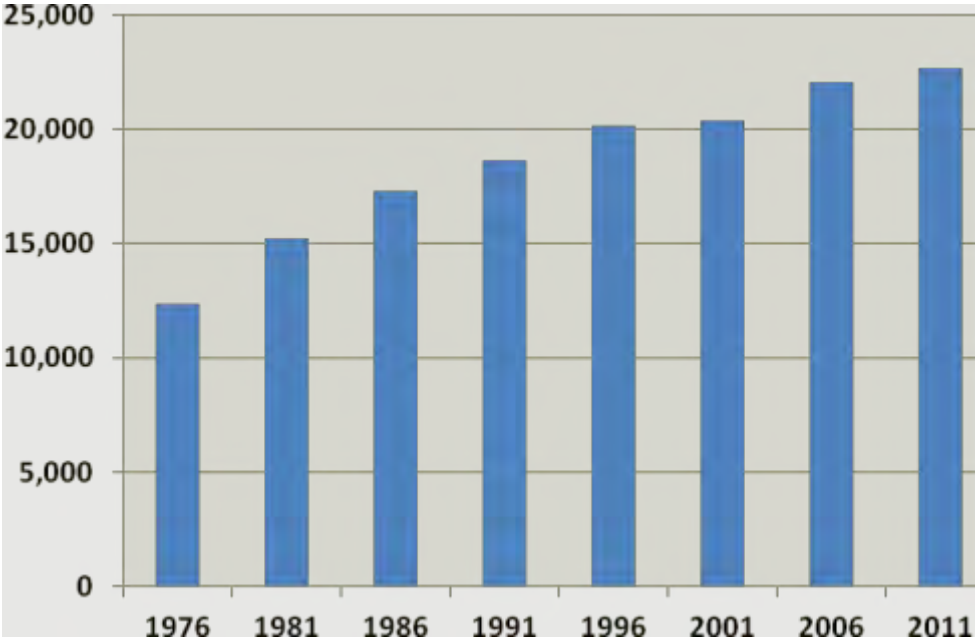
Area	Population
Broke	636
Bulga	358
Mount Thorley	181
Singleton LGA	**22,694**

Source: ABS 2011 Community profiles Table B1

Historical population data is not available for Mount Thorley, Broke and Bulga localities. Singleton Local Government Area increased in population steadily over the last thirty years from 12,300 to 22,694 people (Figure 11). The five years from 1996 to 2001 saw the smallest gain. Growth from 2006 to 2011 averaged 0.7% a year, 2001 to 2006 growth averaged 1.75% a year compared with 0.3% in the five years from 1996 to 2001. Growth is forecast to reach 31,800 people by 2036[5]. This appears high compared to historical growth and is clearly driven by expanding employment opportunities.

The Mount Thorley, Broke and Bulga communities have higher proportions of 0 to 14 year olds and 55 to 64 years old, and lower levels of 20 to 24 years old and the 65 years and over cohort, when compared to the Hunter and NSW averages. These figures are indicative of the largely rural nature of the area with limited higher education and employment opportunities for young adults, as well as less services for health and aged care.

Figure 11: Singleton population



Source: ABS

Workforce participation is very high at 69% in Mount Thorley and high in Singleton as a whole at 67%. Unemployment was correspondingly low in all locations at 3.3 to 4.8% (Table 2). Household median incomes were highest in Bulga at $1,882 a week or $98,000 a year.

[5] Coakes Consulting Community profile, December 2011

Table 2: Workforce statistics, 2011 Census

Area	Workforce	Participation (%)	Unemployment	Median household income ($/week)
Broke	328	65	4.0	$1,537
Bulga	186	65	4.8	$1,882
Mount Thorley	99	69	4.0	$1,583
Singleton LGA	**11,791**	**67**	**3.3**	**$1,692**

Source: ABS 2011 Community profiles Tables B2, B37

The largest industries of employment in the three areas are mining (19%), agriculture (12%) and manufacturing (9%) in (Table 3).

Table 3: Workforce employment, 2011 Census

Industry sector	Number	%
Mining	116	19%
Agriculture	73	12%
Manufacturing	55	9%
Services	48	8%
Hospitality	46	8%
Retail trade	38	6%
Health care	31	5%
Transport logistics	21	4%
Other	169	28%
Total	**597**	

ABS 2011 Community profiles Table 44

The professional status in the survey analysed in combination with this employment sector data suggests the following main employment groups:

- Mine technical staff and machinery operators 16%
- Farm owners/managers – 8%
- Retail sales/managers – 5%
- Manufacturing managers and professional staff – 5%
- Teachers/ school staff – 4%
- Health care -5%

This grouping of jobs made up close to half of the workforce (42%) in 2011.

There were 62 occupied dwellings in Mount Thorley, 112 occupied dwellings in Bulga and 213 in Broke in June 2011. The workforce participation data suggests that of the approximately 380 houses, around 50 to 70 are located on farms operating as agricultural enterprises and the rest in the small towns or on rural residential locations.

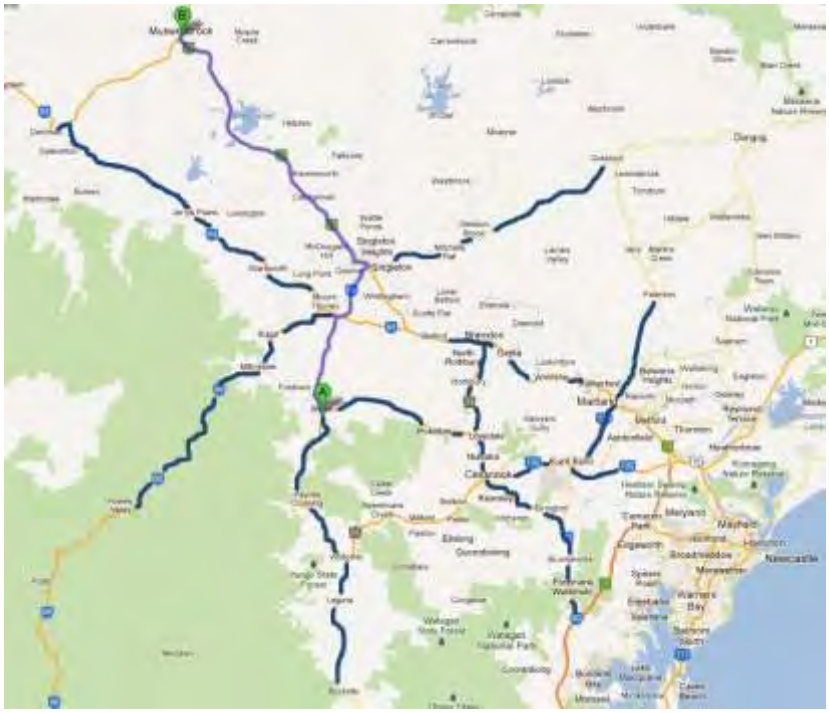
The median individual weekly income for Mount Thorley was $636 in 2011. Corresponding data were $596 for Broke and $576 for Bulga.

2.4 The region

The "region" is defined more broadly to include any area that might see a measurable economic impact from the Project. This includes areas from which employees are drawn as well as the purchase of goods and services.

The workforce in the coal mines in the Hunter Valley drive to-and-from their workplace by car. Unlike the more remote areas of Australia, there is no fly in-fly out roster with on-site accommodation camps. Based on experience with other Projects, it is suggested that the workforce will predominantly live within a one hour driving time of the mine site. The road pattern in the region means that the driving time limitation of one hour produces the workforce catchment shown in Figure 12. This is also broadly consistent with the findings or the Project's SIA. The catchment includes the larger towns of Muswellbrook, Singleton, and Maitland and many smaller settlements.

Figure 12: Employment catchment (one hour driving time)



Service providers may not need to be onsite every day and can have a larger catchment.

Logically this would include Newcastle as the major regional city.

For the purposes of this study the "Region" is described as the part of the Hunter area including the local government areas of Newcastle, Maitland, Cessnock, Singleton and Muswellbrook (Figure 13).

Figure 13: Study area region

Lands in these local government areas to the west of the BCM's Project are predominantly forest and hence most employees and services will come from the areas to the north and east of the mine site and down the Hunter Valley as far as Newcastle.

The inclusion of the large Newcastle population means that average demographic statistics will be dominated by that City (Table 4). Newcastle provided about half of the study region population.

Table 4: Study region population

Year	Singleton	Muswellbrook	Cessnock	Maitland	Newcastle	Region
1976	12,359	11,520	36,119	36,002	138,718	234,718
1981	15,211	12,978	38,724	39,938	135,207	242,058
1986	17,277	14,892	41,733	44,315	129,490	247,707
1991	18,661	15,111	43,849	46,909	131,305	255,835
1996	20,133	15,562	44,362	49,941	133,686	263,684
2001	20,384	14,796	45,204	53,803	137,307	271,494
2006	22,071	15,419	46,141	61,121	141,868	286,620
2011	23,019	16,098	50,863	67,113	149,219	306,312
Annual change*	**1.8%**	**1.0%**	**1.0%**	**1.8%**	**0.2%**	**0.8%**

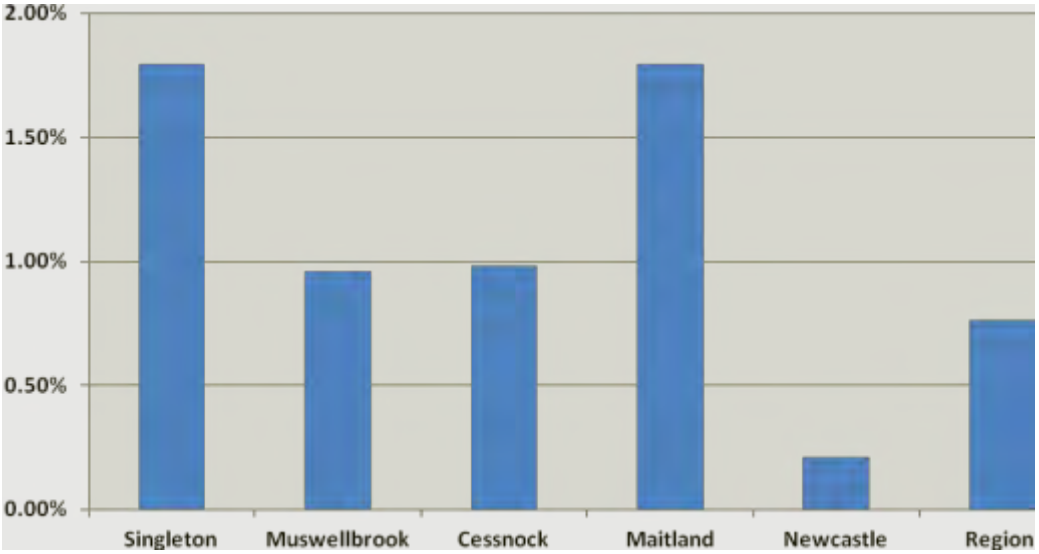
Source: ABS, Cat. No. 2003.0, Community Profiles, Table 1, * Average annual change 1976-2011

The population change in the period 1976 to 2011 was very varied with Singleton and Maitland seeing annual average growth of 1.8% while Cessnock and Muswellbrook were around 1% and Newcastle was almost unchanged (Figure 14). Singleton defied a common trend around Australia where the population of inland Shires is decreasing.

The New South Wales population grew on average over the thirty five year period at an average rate of 1.1% a year. Those Local Government Areas growing at less than the State average can expect to see some re-allocation of State financial resources to those areas experiencing above average growth. Hence Newcastle, Cessnock and Muswellbrook could expect to see resources shift over time to Singleton and Maitland.

The State economy in New South Wales has been restructuring for some years. The historic industries of steel and shipbuilding are disappearing and while agriculture remains important, its share of economic output is declining. Newcastle is an area that is re-inventing itself following the closure of the steel industry and population growth is slow. The Newcastle economy is expanding in terms of coal exports.

Figure 14: Study region average annual population change (% from 1976 to 2011)



Household income doubled in all local government areas over the 15 years from 1996 to 2011 (Table 5). The median income in Singleton was over 50% above Cessnock and Newcastle. The two areas with the highest mining sector employment (Singleton and Muswellbrook) recorded the highest household incomes in all census years.

Table 5: Median household income ($ per week)

Year	Singleton	Muswellbrook	Cessnock	Maitland	Newcastle
1996	821	712	525	616	508
2001	958	827	644	744	669
2006	1,256	1,058	788	1,024	886
2011	1,692	1,399	1,042	1,292	1,165

Source: ABS, Cat. No. 2003.0, Community Profiles, Table 2

Employment in the study region is diverse with large sectors including health (13%), retail and manufacturing each with close to 10% of the total (Table 6).

Hospitality and education each have just less than 8% and then mining with close to (7%). These six sectors made up 56% of all employment in the region.

Table 6: Employment by Industry, 2011[6]

	Singleton	Muswellbrook	Cessnock	Maitland	Newcastle	Region
Agriculture	439	439	526	378	321	188
Mining	2,807	2,807	1,576	2,125	2,000	1,129
Manufacturing	802	802	409	2,601	3,646	6,463
Utility services	260	260	332	240	473	1,146
Construction	702	702	496	1,596	2,571	4,634
Wholesale Trade	342	342	247	541	971	2,001
Retail trade	929	929	683	2,395	3,576	7,339
Hospitality	756	756	512	2,036	2,069	5,446
Transport/warehouse	358	358	222	823	1,420	2,852
Information services	53	53	29	122	250	872
Financial services	132	132	79	288	685	2,362
Property services	180	180	100	310	481	1,071
Tertiary services	409	409	212	708	1,582	5,220
Administration services	397	397	230	706	1,003	2,082
Public administration	603	603	296	888	1,828	4,813
Education and training	576	576	359	1,015	2,225	6,636
Health	729	729	509	2,266	3,616	11,203
Other/unknown	863	922	585	1,849	2,473	4,799
Total	**11,396**	**11,396**	**7,402**	**20,887**	**31,190**	**70,256**

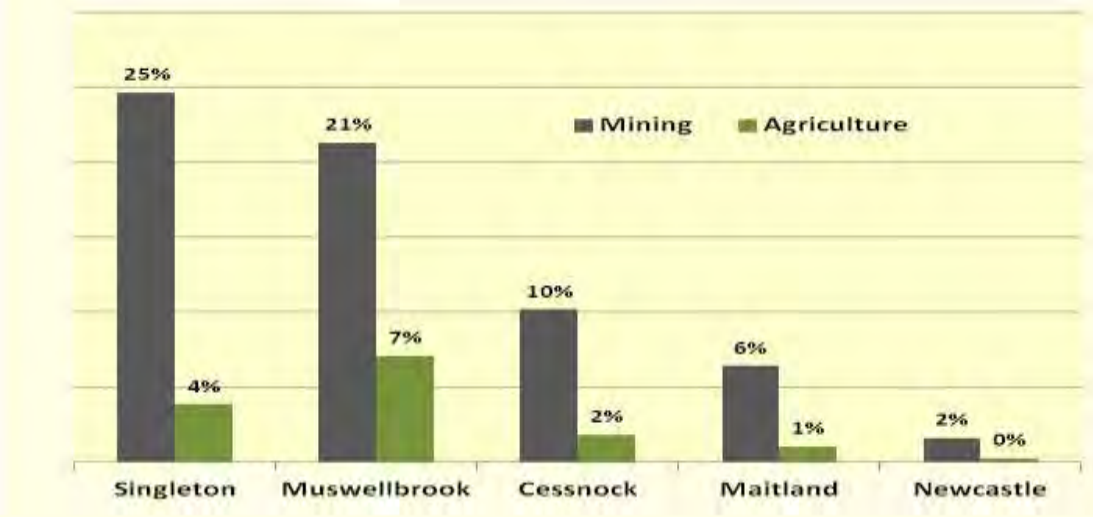
Source: ABS, Cat. No. 2001.0, Community Profiles, Table 43c

The employment distribution varies substantially across local government areas. The proportion of the two sectors of most relevance to this study demonstrates the importance of the mining sector in Singleton and Muswellbrook and the small contribution of agriculture in all local government areas (Figure 15).

The mining sector in Singleton provides 25% of the employment compared with 4% in agriculture while in Muswellbrook the levels are less diverse but still significantly different at 21% and 7% respectively. The mining proportions have increased significantly since the 2006 census. For example, the mining industry shares of total employment increased by 5% in Singleton and Muswellbrook, by 4% in Cessnock and by 2% in Maitland. The mining sector share fell by 3% in Newcastle.

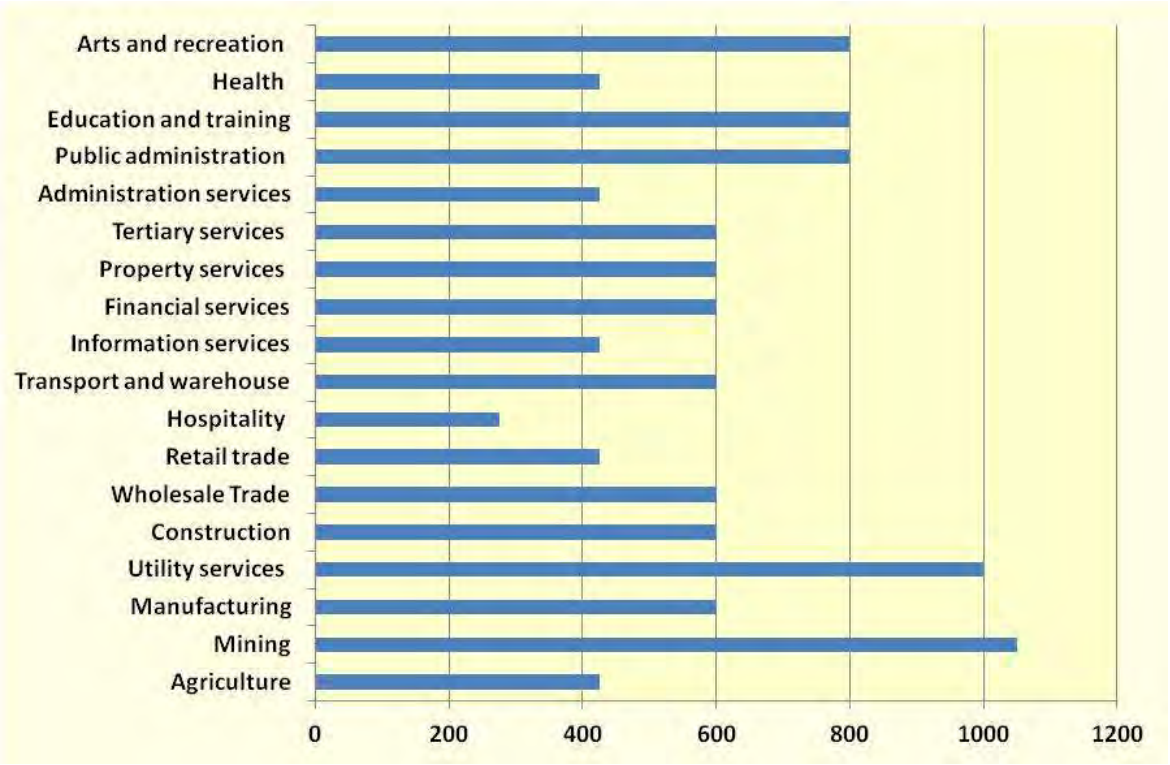
[6] Agriculture includes forestry and fishing, Utilities includes electricity, gas and water, Information services includes media and telecommunications, Tertiary services includes professional, scientific and technical services, Hospitality services includes accommodation and food, Property services includes rental, hiring and real estate, Health includes social assistance

Figure 15: Mining and agriculture employment by Local Government Area



The high income levels in Singleton reflect the strong mining sector employment. Data for a similar rural region in South Australia (Clare Valley) demonstrate the median income levels by industry for the 2006 census (Figure 16). The earnings for Broke and Bulga are likely to reflect a very similar relationship.

Figure 16: Median income by industry sector, Clare Valley



This data is based on the mid-point of the median range and is hence a simplification of the actual earnings.

This data is from the 2006 census. Since that time there has been a substantial increase in mine sector wages and salaries and the disparity with other sectors is almost certainly greater than in 2006.

The 1,864 businesses registered in 2009 in Singleton included 664 (35%) small enterprises with an annual income of less than $50,000 (Table 7). Most will be part time businesses or small contracting enterprises as the income is not sufficient to support a family if an allowance is made for some business costs out of this turnover

Half of these were in agriculture and will be small hobby farms with off-farm income. The numbers suggest there may be around 126 commercial agricultural enterprises in the Singleton Local Government Area. At the other end of the scale, only 6 businesses had a turnover in excess of $20 million – three in mining (coal operations) and three in the retail sector. There are more than three coal Projects in the Singleton area and this record of registrations understates the sector presumably because a number of the Projects are registered in other locations.

Table 7: Business turnover by industry, Singleton 2009*

Industry	$0 to $50k	$50k to $100k	$100k to $200k	$200k to $1m	$1m to $20m	$20m +	Total
Agriculture	343	65	62	52	12	0	**534**
Mining	6	0	6	9	3	3	**27**
Manufacturing	6	3	18	18	27	0	**72**
Utility services	0	0	3	6	0	0	**9**
Construction	43	34	39	66	24	0	**206**
Wholesale Trade	15	3	3	12	18	0	**51**
Retail trade	39	15	12	48	27	3	**144**
Hospitality	17	12	6	36	18	0	**89**
Transport and warehouse	27	6	12	35	12	0	**92**
Information services	0	0	0	0	0	0	**0**
Financial services	17	11	9	21	3	0	**61**
Property services	52	37	26	22	12	0	**149**
Tertiary services	26	24	19	49	15	0	**133**
Administration services	24	6	12	18	15	0	**75**
Public administration	0	3	0	0	0	0	**3**
Education and training	12	3	9	6	9	0	**39**
Health	3	6	3	24	3	0	**39**
Arts and recreation	15	3	6	6	0	0	**30**
Other services	12	18	12	22	18	0	**82**
Unknown	7	10	9	3	0	0	**29**
Total	**664**	**259**	**266**	**453**	**216**	**6**	**1,864**

It is possible to estimate the total business turnover of using the mid-point of the turnover range for each size group. This is difficult for the largest open ended category ($20m plus). A range is thus suggested for each category (Table 8). The potential business turnover in Singleton is thus put at between $3,400m and $8,600m.

This estimate is highly sensitive to the value put on the three coal mines as this category makes up at least 55% of the value of turnover in Singleton using this approach and it could be higher than 90%. The three coal mines almost certainly dominate the economy of Singleton when measured in value of output terms.

Table 8: Business turnover estimate, Singleton 2009*

Turnover range	Low turnover value ($)	High turnover value ($)	Business numbers	Low estimate ($m)	High estimate ($m)
$0 to $50k	$20,000	$40,000	664	$13	$27
$50k to $100k	$60,000	$80,000	259	$16	$21
$100k to $200k	$120,000	$160,000	266	$32	$43
$200k to $1m	$240,000	$600,000	453	$109	$272
$1m to $20m	$1,200,000	$16,000,000	216	$259	$3,456
$20m +	$500,000,000	$800,000,000	6	$3,000	$4,800
Total			**1,864**	**$3,400***	**$8,600***

*** rounded**

This approach underestimates the economy to the extent that wages and salaries of those working outside the region are not included and there may be businesses based outside Singleton that operate in the area and count the turnover elsewhere. Despite these flaws, the approach is one option to measuring an economy in the absence of more rigorous data collection. An alternative approach is to look at registered businesses.

The study region had over 21,000 businesses registered in 2009 (Table 9). Nearly two thirds were located in Newcastle (63%) with Singleton having 9% of the total. Around 30% had turnover levels of less than $50,000 a year suggesting a sole trader and/or part time businesses. The large number in construction reflects the industry structure with a lot of small contractors providing sub-contracting services. The largest sectors by business number were:

- Construction - 3,300 (16%)
- Tertiary services (professional, scientific and technical) – 2,398 (11%)
- Property services - 2,357 (11%)
- Retail trade – 1,620 (8%)
- Agriculture – 1,572 (7%)

Again the agriculture sector had a large number of small businesses with a turnover level that would struggle to qualify as a commercial enterprise. Nearly 1,200 agriculture (with forestry and fishing) enterprises had an income of less than $100,000.

Most of these will be part time businesses as the income is not sufficient to support a family if an allowance is made for some business costs out of this turnover. The numbers suggest around 370 commercial agriculture enterprises in the study region. Again, as with Singleton, this implies that many of the farms (possibly three quarters) are hobby properties with other sources of household income.

Table 9: Business turnover by industry, Study region 2009*

Industry	$0 to $50k	$50k to $100k	$100k to $200k	$200k to $1m	$1m to $20m	$20m +	Total
Agriculture	991	207	164	177	33	0	**1,572**
Mining	33	12	21	33	24	9	**132**
Manufacturing	114	72	132	261	198	9	**786**
Utility services	12	3	15	24	12	0	**66**
Construction	652	624	735	857	405	27	**3,300**
Wholesale Trade	123	87	54	141	207	18	**630**
Retail trade	298	183	174	544	403	18	**1,620**
Hospitality	134	108	156	473	220	0	**1,091**
Transport and warehouse	349	194	215	293	95	0	**1,146**
Information services	36	18	15	12	12	0	**93**
Financial services	698	245	193	258	113	3	**1,510**
Property services	812	528	409	491	114	3	**2,357**
Tertiary services	690	300	437	700	256	15	**2,398**
Administration services	246	121	141	270	109	0	**887**
Public administration	21	15	24	27	15	0	**102**
Education and training	93	45	57	78	33	3	**309**
Health	271	167	184	581	137	3	**1,343**
Arts and recreation	150	40	45	90	9	0	**334**
Other services	192	153	210	416	102	6	**1,079**
Unknown	155	63	58	45	9	3	**333**
Total	**6,070**	**3,185**	**3,439**	**5,771**	**2,506**	**117**	**21,088**

At the other end of the scale, 117 businesses had a turnover in excess of $20 million with 27 in the construction sector and 18 in each of the retail trade and accommodation and food sectors. There were only 9 mining enterprises registered with this turnover despite the significantly larger number of actual coal mines in the region and the fact that all of these would have a turnover in excess of $20 million a year. This suggests that many mines are not being recorded as based in this region.

An estimate of the economic output can be made using a similar approach to Singleton (Table 10). Again, the challenge of putting a mid-point estimate on the $20m plus category makes this difficult and a range is used here. The range used is far below that used for Singleton as there are only 9 mines registered and 108 businesses in other sectors. The total value of output implied is $17.5 billion to $54 billion. An alternative estimate is provided in the next section. Singleton is 5-6% of this total.

Table 10: Business turnover estimate, Study region 2009*

Turnover range	Low turnover value ($)	High turnover value ($)	Business numbers	Low estimate ($m)	High estimate ($m)
$0 to $50k	$20,000	$40,000	6,070	$121	$242
$50k to $100k	$60,000	$80,000	3,185	$191	$255
$100k to $200k	$120,000	$160,000	3,439	$413	$550
$200k to $1m	$240,000	$600,000	5,771	$1,385	$3,463
$1m to $20m	$5,000,000	$15,000,000	2,506	$12,530	$37,590
$20m +	$25,000,000	$100,000,000	117	$2,925	$11,700
Total			**21,088**	**$17,500***	**$54,000***

*** rounded**

2.5 Economic output

In 2006-07, the latest Gross Regional Product data estimated the economic output of the Hunter Valley region at $24,000 million. The total population of that region including Lake Macquarie was 651,000 people. Coal prices in 2012 have increased since 2006-07 and production has risen making this estimate almost certainly well below current values.

The study region holds 45% of the larger Hunter Valley region (most of the population is near the coast) although the business focus is more towards Newcastle and the coal mine areas. This study assumes 65% of the business turnover occurs in the study region. With an estimate of $40,000 million for the study region and 65% business activity, the study region would have a GRP of around $25,000 million.

The population of Singleton was 3.4% of the total. Assuming a similar business structure for Singleton to the region, the output for Singleton could be estimated at about $875m. A population share for Broke and Bulga would give a local value of economic output at $32m.

2.6 Setting summary

The Project is located in a quiet rural setting with a historic coal mining presence near the village of Broke. Key points on the physical and economic setting are.

- The local area defined for this study is the Broke, Bulga and Mt Thorley State Statistical Suburbs as defined by the Australian Bureau of Statistics.
- Broke and Bulga are described as the "Tranquil side of the Hunter Valley" in tourism promotional material. The landscape is rural with a mountainous backdrop to the south and west.
- The BCC sits in this rural setting.
- The local population is very small with only 613 people at the 2011 census accounting for 5% of the Singleton Local Government Area and much less than 1% of the Hunter Valley region.
- The local area has a population structure biased towards the younger and older age groups reflecting a population drift away from the area for education and employment and limited health and care services for the aged.
- The area enjoys high household incomes with median levels above that for all local government areas except Singleton.
- Workforce participation in the local area is high and unemployment is low.
- Employment is diverse with agriculture and mining the two largest sectors followed by manufacturing and retail trade. Around half of the jobs fall into seven broad categories – mine staff, farm owners/mangers, retail sales, manufacturing, teachers and school staff and health sector workers.
- Singleton has a high proportion of mining related employment undoubtedly explaining the high workforce participation and the relatively high household income. Data for a similar agricultural area demonstrates that mine sector incomes are double those in the agriculture sector.

- The workforce data suggests there are around 50-60 farms in Bulga and Broke with a total of approximately 300 houses in these localities.
- Population growth in the study region over the last thirty years has been fairly modest with the fastest growth being in the Singleton and Maitland LGAs. Growth is forecast to remain at levels above that seen in the last few decades for these two areas. The high growth rates in Singleton and Maitland reflect the expansion of the coal mining sector. Newcastle, while the dominant population centre, is experiencing very little growth.
- The region has a lengthy history of providing services to the coal mining sector and is well placed to benefit from any continued operations or industry expansion.

Chapter

3

3. The Project

3.1 History

Mining at Bulga began in 1982 as the BHP owned Saxonvale Colliery. The open cut mine was expanded in 1990 and again in 1999 when approval was given for operations to 2025. A number of modifications to the approvals have been made since then with the current maximum level of run of mine (ROM) production of 12.2 million tonnes per annum (Mtpa).

3.2 Land Ownership

The Bulga Joint Venture and related corporate entities own the majority of land within the Project area with discussions underway regarding securing the remaining non-mine owned land for the Project. The Joint Venture also owns a number of properties surrounding the Project area and has commercial arrangements regarding mining impacts with some private landholders which are immediately impacted by the mine.

The remaining land surrounding the Project area is owned by a variety of entities including other mining companies, State of NSW (Crown Land, including a former travelling stock reserve), the Commonwealth of Australia (Military Training Area) and private land holders.

3.3 Mine plan and production

This study focuses on extension of the open cut operations, the Project, to mine deeper coal seams. The mine operations will remain substantially in the existing disturbed mine area with the exception of two overburden emplacement areas, located to the east and west of the operation. Both features are designed to reduce impact from the nearest communities (Figure 17).

The pit operations will be extended approximately 1,500 metres to the east and 500 metres to the south. This study is based on mining from three contiguous pit areas with the extraction of around 200 million tonnes of coal between 2018 and 2035.

Extraction rates from the open cut will not exceed the current approved rate of 12.2Mtpa.

A large Noise and Visual Bund is proposed to the south and west to provide a noise, light and visual barrier to the rural communities of Broke Milbrodale and Bulga.

Figure 17: Mine area

Source: Umwelt Environmental Consultants

The key activities associated with the Project for this study include:

- Three contiguous open cut pit areas of operations
- New surface operations infrastructure
- Relocation of some underground infrastructure
- A new tailings storage area
- Enlargement of the mine stockpile areas
- Relocation of sections of two 330kV electricity transmission lines plus other smaller voltage transmission and distribution lines
- Relocation of sections of water supply pipelines
- Realignment of sections of Broke and Charlton Roads
- New water storage and discharge dams

The surface operations that affect local land use include:

- Open cut pits – largely within existing mine disturbance area
- Overburden emplacement areas – on land being partially undermined by Bulga Underground Operations, pastoral land and mushroom composting facility
- Tailings storage facilities – two on existing areas, one in mined area and one new dam on mining area land
- Diversion of a section of Charlton Road
- Diversion of a section of Broke Road
- New water storage dam
- Realignment of water, electricity and other service corridors

3.3 Construction Timeline

The construction phase is expected to be in years 1 to 4, post approval, with most activity in years 1 and 2. For the purposes of assessment, year 1 is assumed to be 2014.

3.4 Construction Workforce

The Project is expected to employ up to approximately 300 (full time equivalent) people during the construction phase which is defined for this study as the first 11 quarters or 33 months. Some capital works will continue beyond this period but such work is closer to an operational nature and is included in the numbers for that phase.

The workforce will ramp up and decline relatively quickly with most employment in the first seven quarters or twenty-one months (Figure 18). The construction phase (33 months) will have an average of 172 people employed in a quarter which is rounded to 170 for this study. Other workers will be on site for the delivery of specialist goods and services but are not counted in the direct workforce.

Figure 18: Indicative construction workforce years (2014 – 2016)

Employment categories will include administrative staff, engineers, surveyors, construction workers, machinery operators, mechanics, labourers, metalworkers, electricians, plumbers, truck drivers, and environmental staff.

Accommodation in the Broke and Bulga area is limited with some short stay tourism in houses and small tourism ventures. There is more accommodation in Singleton but again availability is currently limited. Significant accommodation is not needed until 2014 and local anecdotal evidence is that the availability will be greater by that time. This study adopts a conservative approach by assuming that only 10% of the construction workforce will live in the local Broke and Bulga localities and that a further 60% will come from the study region (Table 11). The remaining 30% will come from outside the study region and commute with this high proportion a reflection of the shortage of accommodation.

The operations workforce will continue to live in their current areas. A survey of employee residential locations revealed only 5% live locally with 80% in the wider study region and the remaining 15% from outside the region as defined (Table 11). Most of the latter appear to live on the coast and commute the extra distance to the mine with some employees driving from as far as Port Stephens over one and a half hours away.

Table 11: Indicative workforce residential location

Location	Construction workforce	Operations workforce
Broke/Bulga	10%	5%
Study region	60%	80%
Other	30%	15%
Total	**100%**	**100%**

The open cut operations will have an operating workforce of around 700 people winding back as the mine approaches closure around 2035.

BCC employees indicated in a survey that their salary most commonly fell in the $120,000 – $129,000 range (24%), followed by less than $90,000 (15%) and $130,000 - $139,000 (14%). The average using the survey response rate and the mid-point of each range was $122,500.

The construction workforce is likely to receive higher wages and salaries due to the intermittent nature of work in the sector and the living away from home disruption for many contractors. The average for this study is assumed to be $140,000.

This provides a total labour cost during the defined construction phase of $65m or an average of $24m a year.

3.5 Development investment

The initial activity will include the development of the outer face of the Noise and Visual Bund emplacements and the realignment of Charlton and Broke Roads.

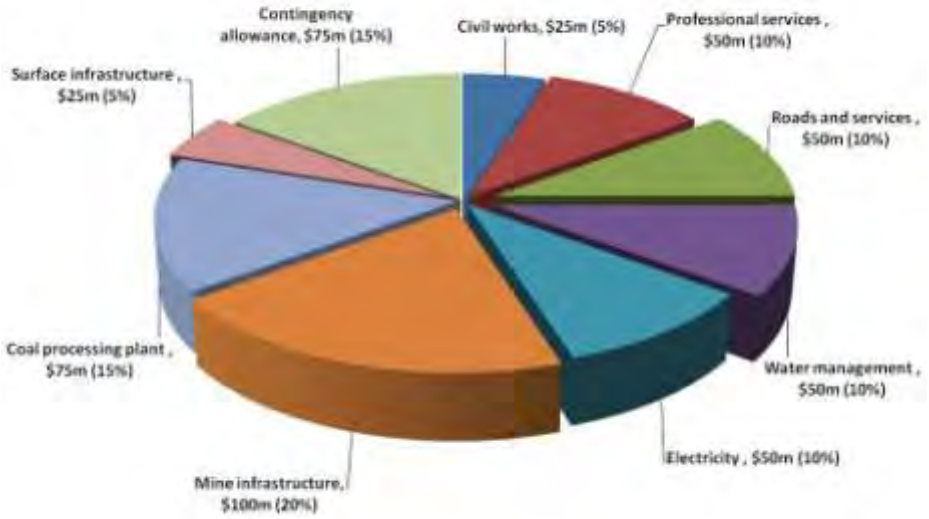
These activities will be completed by year three (around 2016) along with the new water storage dam, and relocation of the electricity transmission lines. The eastern overburden emplacement areas will be likely completed by year 7 (nominally around 2020).

A large proportion of the site will be rehabilitated by the end of the mine life (around 2035) with a void remaining in the south west of the Project area. The rehabilitation is likely to be in the form of native vegetation.

The Project is still in the feasibility study stage and hence accurate financial data is not available.

Preliminary studies have provided an indicative cost of $500m over three years. A breakdown of this has been prepared by Economics Consulting Services based on similar coal Projects (Figure 19).

Figure 19: Development costs by nature of expenditure (% and $'million)



Source: ABARE and Economics Consulting Services

Capital expenditure will continue during the life of the mine to maintain and replace equipment. Such expenditure is made through businesses that are more closely associated with operating projects than with the companies involved in capital development projects and hence the continuing capital is treated as an operating cost for the purposes of economic impact evaluation.

This estimate of construction costs ($500m) includes the labour cost of the directly employed workforce estimated at $65m.

The remaining $435m includes materials and equipment and services provided by contractors off-site. There is still a labour component to the "materials and services" expenditure but it is not incurred in the on-site activities and the workforce has less impact on local accommodation and transport.

The development expenditure can be disaggregated into direct on-site labour costs and materials/services (Table 12).

Table 12: Development costs by type and region source

Component	Site labour ($m)	Materials/services other than site labour ($m)		
		Local supply	Region supply	Outside region
Preliminary civil works	9	0.8	12	3.2
Professional services	6	2.2	28.6	13.2
Roads and services	6	2.2	28.6	13.2
Water management	5	2.25	33.75	9
Electricity	5	0	22.5	22.5
MIA	16	4.2	42	37.8
Coal processing plant	13	0	18.6	43.4
Surface infrastructure	5	1	13	6
Contingency allowance	0	3.75	37.5	33.75
Total	**65**	**16.4**	**236.5**	**182**

Part of the capital investment of approximately $500m will be spent on contractors and equipment suppliers within the Hunter Valley region. The Hunter Valley region has seen over a hundred years of coal mining and has a strong supply sector capable of providing most services and equipment.

Some equipment will be imported from specialist manufacturers overseas such as trucks and loading equipment.

Some services will have capable local suppliers in Singleton and the Mt Thorley Industrial Area and the indicative breakdown used in this study for each capital component reflects that capacity (Table 12). The net effect is the following expenditure by location (numbers rounded):

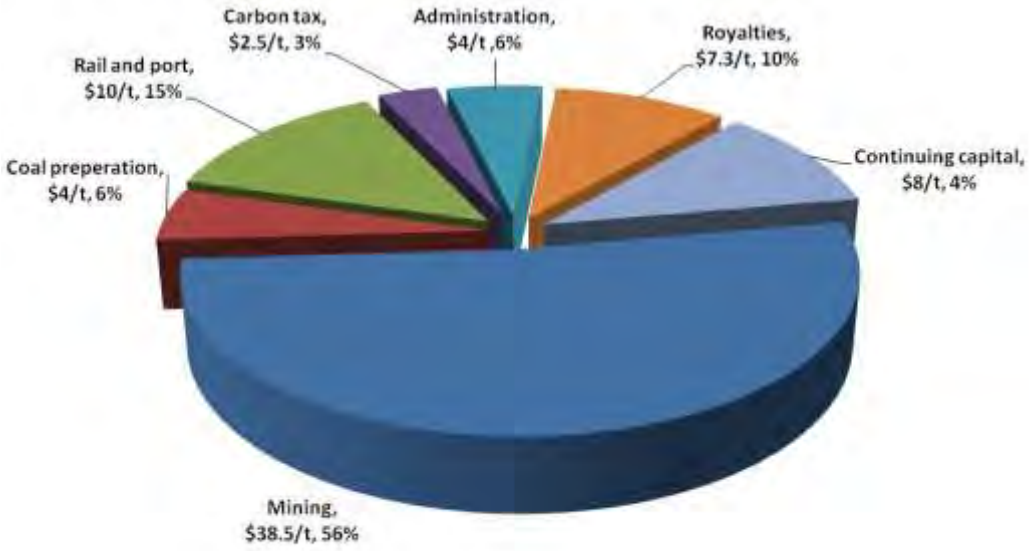
- On site labour - $65m total, $24m per year average (averaged over 33 months)
- Local suppliers - $16.4m, $6m per year average
- Study region -$236m, $86m per year average
- Outside region - $182m, $66m per year average

3.6 Operating costs

The Project assessment is based on the continuation of mine operations from 2018 to 2035 with a plateau production level around 11Mtpa and average sales over the full 23 years from 2013 to 2035 of 6.73Mtpa.

Operating cost estimates are based on industry standards. The breakdown comes from ABARE studies modified by Economics Consulting Services based on experience with actual projects. The company data is confidential and cannot be quoted in this report. An average cost of production is used that includes mining, coal preparation, rail and port charges, royalties, carbon emission price, administration costs and the continuing capital necessary to keep the mine operating (Figure 20). The costs have been rounded.

Figure 20: Indicative Operating cost estimates ($/tonne and %)[7]



Source: ABARE and Economics Consulting Services

These indicative costs include labour with 700 people on site and a wages and salaries bill estimated at $85m annually. The geographic spread of this operations expenditure can be estimated from the location of employees and by breaking down each expenditure category into labour and non-labour fractions and likely location of expenditure. This breakdown can only be done based on past experience with similar resource projects (Table 13).

Table 13: Operations expenditure by type and location (numbers rounded)

Operating cost category	Direct labour share (%)	Non-labour locations share (%)		
		Local	Region	NSW
Mining	20%	1%	75%	24%
Coal preparation	20%	1%	65%	35%
Rail and port	10%	1%	65%	35%
Carbon tax	0%	0%	0%	0%
Administration	50%	1%	50%	50%
Royalties	0%			100%
Continuing capital	15%		30%	70%

Allocation of this expenditure based on the average output over the 5 years of the base case and the 23 years of the Project case (4.1Mt and 6.73Mt respectively) provides a geographical distribution of the expenditure (Table 14).

The labour cost is assumed to be the same as the base case involves a declining level of productivity as the current open cut mine is wound down. The labour cost for the base case is thus a much higher proportion than in the Project case where increased output means greater productivity.

[7] Note that the state royalties have been included as a cost in the CBA

Table 14: Operations expenditure by type and location (numbers rounded)

	$m Base	$m Project
Labour cost	85	85
Local business	2	3
Study region business	112	230
Outside region	50	117
Government	41	65
Total	**290**	**500**

It is important to note that this is based on an average over the production period and industry benchmark expenditure levels. The total expenditure is much larger being multiplied by the duration (5 years and 23 years respectively).

3.7 Revenue

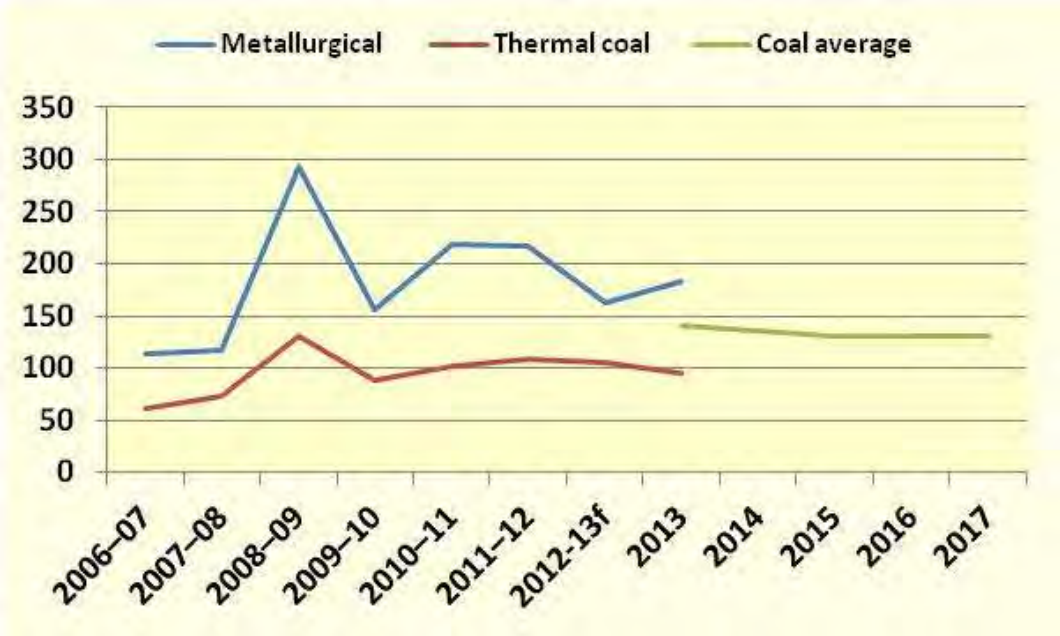
The BCC (surface and underground operations) produces approximately 16 million tonnes of semi soft coking coal and thermal coal a year for export to overseas markets (currently largely China and Japan). The coal is used predominately for steel making and power generation. Over the life of the Project, the Bulga Surface Operations are expected to contribute, on average, approximately 6.73Mt of saleable coal.

The long term trend for coal prices was down until 2004 when along with the resurgence of China, prices started to climb. The prices increased dramatically in 2008-09 before falling back and then recovering again from that point (Figure 21).

Thermal coal prices averaged $108 a tonne in 2011-12 and metallurgical (coking) coal $216 a tonne. The Bureau of Resource Economics forecasts lower prices in 2012-13 with thermal coal predicted to average $100 and metallurgical coal $162 a tonne – the average over all exports is forecast to be $132 a tonne in 2012-13. The six year average of all coal sales to 2011-12 was $140 a tonne.

This study uses a forecast based on the Bureau estimates for 2013 and then Projected out to stabilize at $130 a tonne (Figure 21).

Figure 21: Coal prices



Source: Bureau of Resource Economics and Economics Consulting Services

Chapter 4

4. Economic Impact

4.1 Evaluating the economic impact of Projects

The economic impact that a new development has on an area will be determined by the scale of Project and the size of the economy against which it is set.

The impact can be assessed in a number of ways. Multiplier analysis attempts to capture the flow on benefits as the wages and salaries are spent and the goods and services acquired by the company. This method measures the positive benefits but is static and does not measure any negative consequences for the community.

Cost-benefit analysis attempts to measure the benefits and costs adjusted for the time value of money, so that all flows of benefits and flows of Project costs over time (which tend to occur at different points in time) are expressed on a common basis in terms of their "net present value".

This chapter examines the multiplier impact while the following chapter looks at the broader costs and benefits.

4.2 Multiplier analysis

A new Project impact can be assessed in terms of the changes in financial output for the economy, changes in job numbers and household income. The impact will include the actual Project expenditure and employment and the ripple effect through the economy of this increase in activity. The flow-on effect is assessed using multiplier analysis. A précis of this technique follows with a more detailed description in Appendix 1.

The size of the multiplier ratio depends on several factors including the ability of the economy to supply the goods needed. If a large proportion of goods are imported from outside of the region, the multiplier will be reduced. Multipliers can be estimated for a local area economy, a regional economy, a State or a national economy. The size of the multipliers will always increase as the analysis moves from local to state to national simply because this shift will increase the capacity of the defined economy to supply the goods, and there will be fewer imports from outside the economy.

The multipliers used in this report represent the impacts in terms of economic output and employment. The output multipliers represent the increase in goods and services

produced throughout the economy, and are a sum of the materials and services needed by the Project, their flow-on requirements, and the goods purchased with the increased wages and salaries generated by the Project. The employment multiplier is similar and indicates the way in which the Project generates jobs throughout the wider economy as well as within the specific mining operations.

4.2.1 Employment and household income

For the construction phase of the Project, this study assumes an average of 170 workers over a 33 month construction period and an operations workforce of 700. The workforce is assumed to be distributed in the same pattern as the current workforce with 17 of the construction workforce living locally (10%) and 35 (5%) of the operations workforce (Table 15). The geographic distribution of accommodation is assumed to be the same for the base case and the Project extension.

Table 15: Predicted 'average' construction workforce residential location*

Location	Construction workforce (%)	Predicted Construction workforce	Operations workforce (%)	Operations workforce numbers#
Broke/Bulga	10%	17	5%	35
Region (not local)	60%	102	80%	560
Other	30%	51	15%	105
Total	**100%**	**170**	**100%**	**700**

***rounded**

 # based on survey of existing operations workforce (Coakes Consulting 2012)

Household expenditure will depend on the residential location and household expenditure pattern. The construction workforce is assumed to have an average annual income of $140,000 and the operations workers an average of $122,500 a year.

Australian Bureau of Statistics surveys have indicated that households in the income brackets relevant to this workforce spend on average 54% of gross income on consumable purchases including accommodation. Coakes Consulting used an employee survey to estimate the distribution of household expenditure by location over the full workforce as:

- Broke and Bulga 0.5% (this study uses 1% for future activities)
- Study region - 85%
- Outside region - 14%

The combination of these expenditure patterns suggests a distribution of expenditure with $100,000 a year at the local level during construction and $500,000 a year during the operating years of the mine (Table 16). The region will see most of the expenditure with $39.4m a year during the operating years.

Every dollar that is spent by households has a multiplier effect through the local and more distant economies. This means that there will be flow-on impacts of expenditures in the towns within the broader study region and significant impacts beyond the region - mainly in Sydney.

Table 16: Employee expenditure, ($m per annum)*

Location	Construction worker spend ($m)	Operations worker spend ($m)
Broke/Bulga	0.1	0.5
Study region	11.1	39
Other	1.8	6.5
NSW	**13**	**46**

*** Numbers rounded**

The local spend of the site construction workers ($0.1m a year) has an additional impact of $0.03m taking the total local expenditure to $0.13m a year (Table 17).

During the operations phase the local impact is to increase the worker expenditure from $0.5m a year to $0.7m a year. The impact is far more profound at the region level where the full impact is to add $17m a year during construction and $60m a year during operations. New South Wales will see additional expenditure of $36m and $102m respectively. Note that in this table the multiplier column for the region includes the expenditure in the local area while New South Wales includes the region and local area – they are cumulative expenditures.

Table 17: Employee expenditure flow on impact, ($m per annum)*

Location	Construction worker spend ($m)	Construction multiplied ($m)	Operations worker spend ($m)	Operations multiplied ($m)
Broke/Bulga	0.10	0.13	0.5	0.7
Study region	11.2	17	40	60
NSW	13	35	46	102

*** Numbers rounded and note that the multiplied impact includes the direct spend**

4.2.2 Business income

BCM purchase of goods and services from businesses as distinct from the direct workforce will also have a flow on impact through the economy (Table 18). During the three year construction phase, there will be an average annual spend in the local area on purchases of goods and services of $5m with the same average during operations. The multiplier effect means that this direct expenditure will have a flow on effect creating a total benefit to local business turnover of $7m a year.

It is important to note to that each step up in location includes the expenditure for the sub-location i.e. the region expenditure includes the Broke/Bulga and the New South Wales expenditure includes the region. The on-site labour has been removed as has the payments to the government by way of taxes and royalties. The net effect is that the study region impact is an addition to business turnover of $136m a year during construction and $336m a year during the operations phase based on the average year production of 6.73Mt. The State gains a total of $350m during construction and $672m during operations.

Table 18: Business flow on impact, ($m per annum)*

Location	Construction direct spend ($m)	Construction multiplied ($m)	Operations direct business spend ($m)	Operations multiplied ($m)
Broke/Bulga	5	6	3	3.6
Study region	85	136	233	350
NSW	146	350	350	735

*** Numbers rounded and note that the multiplied impact includes the direct spend**

The total flow on impact will include the direct workforce expenditure and that resulting from the expenditure on business goods and services (Table 17 and 18 combined). The total effect is to see local expenditure rise by $6m a year during construction and $4m during operations. The regional impact is far greater at $153m and $410m during construction and operations respectively (Table 19). The New South Wales economy adds an average of $837m for each year of mine operations.

Table 19: Economy impacts, ($m per annum)*

Location	Construction phase ($m)	Operations phase ($m)
Broke/Bulga	6	4.3
Study region	153	410
NSW	385	837

*** Numbers rounded and note that the multiplied impact includes the direct spend**

4.2.3 Employment impacts

The multiplier effect of expenditure by the Project workforce and the expenditure with the business sector means an increase on overall employment. Employment multipliers suggest that during the eighteen years of extended mine operations; the impact will be to see a total of 52 jobs in the Broke/Bulga area with 1,010 jobs in the study region and at least 2,450 jobs in New South Wales (Table 20). These jobs are a continuation of the current employment levels. It is reasonable to assume that these jobs would be lost from the economy if the mine was to close when the current reserves are mined out.

Table 20: Employment flow on impact, (jobs)*

Location	Construction workforce	Construction Multiplied	Operations workforce	Operations Multiplied
Broke/Bulga	17	27	35	52
Study region	119	225	595	1,010
NSW	170	800	700	2,450

*** Numbers rounded and note that the multiplied impact includes the employees**

The local area employment increase during the construction phase represents about 5% of the current workforce in the Broke/Bulga area. Such a small increase will have no measurable impact on local wages and salaries. Within the region, the average annual increase during construction of 170 jobs represents a tiny 0.1% of the workforce.

The mine will be able to continue to operate at its current workforce level from 2018 as a result of the proposed investment. There may be a small change in local employment with some people moving to Broke/Bulga permanently given the extended employment opportunities. The forecast workforce of 52 living locally is significantly larger than current levels but still represents only 10% of the local workforce. The potential small addition to the local workforce is unlikely to have any impact on wages in the area although the jobs will be highly sought after as mining rosters are attractive to workers seeking an occupation that allows a rural residential lifestyle. Mine income also supplements income from agriculture with the viticulture and winemaking sectors facing difficult terms of trade. The Project will add diversity to the employment opportunities and complement the existing job market.

4.3 Economic impact summary

In summary, the Project will provide employment opportunities for local workers and business opportunities for local companies. However, the very small size of the local area in which this mine is based will see most flow on economic impacts flow to the broader Hunter region. The construction phase impacts will see some additional pressure on local accommodation and some additional local spending.

The Broke/Bulga area will house an estimated 17 workers a year in the construction phase and an estimated 35 during the long term operations phase. The multiplier effect means that the workforce will grow by 27 jobs and 52 jobs respectively (Table 21). The operations phase are expected to see slightly more local employment than at present as some workers may move to the area to take advantage of the long term work opportunities. The difficult conditions in the small farms in the area will see a continuing trend to workers earning off-farm income in the coal industry either by way of employment or some form of business contracting to the companies.

Table 21: Economic impact of Project *

Location	Construction phase (jobs)	Operations phase (jobs)	Construction impact ($m)	Operations impact ($m)
Broke/Bulga	27	52	6	4
Study region	225	1,010	153	410
NSW	800	2,450	385	837

*** Numbers rounded**

The increase in economic output during construction is small at the local level but significant at the regional level adding $153m to the regional economy. There will be an increase of $385m at the State level. The operations phase produces a significant increase in the regional economy at $410m each year for the additional 18 year mine life while the State economy is boosted by $837m each year.

4.4 Distribution of benefits

The key beneficiaries of a mine extension are:

- Employees and contractors
- Local, regional and State businesses benefiting from the workforce expenditure
- The company and its shareholders
- The company financiers and service providers
- Goods and services suppliers
- Accommodation and hospitality services
- Government at all levels – Local, State and Commonwealth

Organisations and individuals disadvantage by the Project and its investment

- Adjacent landowners from 2018 to 2035
- Farmers and other businesses in the region affected by the demand for labour and the potentially higher wages and salaries
- Potentially all finance borrowers impacted by any increase in interest rates and exchange rates as a consequence of the boost in the economy

The environmental and social impacts of the Project are primarily local in nature while the benefits are far more widely spread. This is the nature of any regional development Project. This Project is located in a lightly populated area. While parts of the region have seen significant growth, the more traditional farming activities have seen a decline.

With the terms of trade pressures and changes in long-term climate adversely affecting the agricultural sector, there is limited scope for any change in this long-term trend. The mining and oil and gas sectors provide real potential to reverse the population trends in regional areas and provide substantial new investment in economic and social infrastructure.

Local concerns have been expressed that the coal operations adversely affect rural land values in the area and the rural lifestyle that many sought when moving to the area. This includes impacts on both agriculture and the tourism sector. State government requires that the impact on agriculture be specifically addressed. This issue will be covered in a separate report as will the impact on tourism – they are hard to separate in this locality as much of the tourism is viticulture and winery related.

Development of the noise and visual bund will improve the appearance of the Project and enhance the local tourism industry.

Additional benefits to flow to regions from large mining operations include:

- Improved local tax base
- Additional range of job opportunities for young people who would otherwise shift to the metropolitan area
- Improved prospects for the growth of local industries servicing the mines

Governments at all levels benefit from the investment and employment created by the Project. Local Government benefits from a higher rate base through the establishment of industrial work sites and the additional housing associated with the operating workforce. The Project will also make a development contribution to Singleton Council in accordance with *Environmental Planning and Assessment Act 1979* requirements.

The State Government receives payroll tax, royalties and stamp duties. Royalties on the coal are estimated at an average of $76 million a year over the eighteen year life of the Project for a total of over $1,760 million.

Payroll tax will be paid to the State government while the Commonwealth Government will receive custom duties on imported plant and equipment, PAYE tax on employees, GST on the purchase of goods and services, emission payments and company tax on profits from the Project. Payments for emission permits alone are forecast to be $450 million.

Chapter 5

5. Cost Benefit Analysis

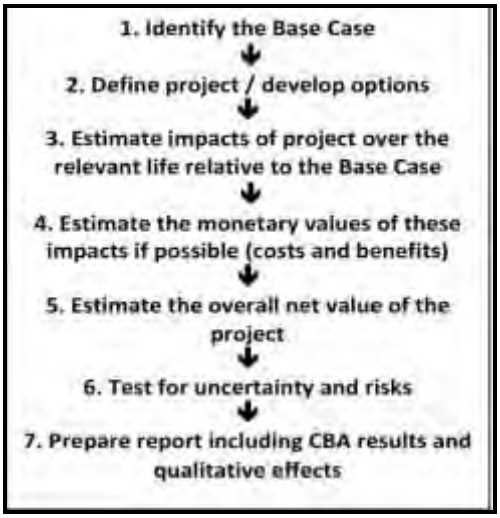
5.1 Introduction

Theoretically, a new Project is desirable if the benefits to the community as a whole outweigh the costs. Financial accounting as in a business case provides part of the answer but fails to account for impacts on third parties that do not form part of the budget. Cost benefit analysis is an assessment method that aims to encompass all the economic impacts of a new Project by including costs and benefits associated with environmental and social impacts (externalities) that do not otherwise appear in the 'bottom line' of a financial analysis.

Cost benefit analysis involves selection of a base case against which the new Project is assessed, assessment of external impacts and discounting to current day values.

The Project continues the current level of activity rather than new mining meaning that employment levels remain the same and output does not change. Cost benefit analysis however treats the Project as though it is a new Project. Guidelines for a cost benefit analysis have been produced by the New South Wales Government (Figure 22).

Figure 22: Generic steps in undertaking a cost benefit analysis[8]



[8] NSW Government, November 2012: Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals

The seven steps were followed in this study (Table 22).

Table 22: Analysis steps and report references

Cost Benefit Analysis	Section
1. Identify the base case	5.2
2. Define Project options	5.3
a) Project options	5.3
b) Life of Project	5.2, 5.3
3. Identify impacts of Project relative to base	5.4
4. Estimate the monetary value of impacts	
c) Environmental impacts	5.5
d) Health impacts	5.6
e) Social impacts	5.7
f) Economic impacts	5.8
g) Identify net benefit	5.10
h) Change in public infrastructure	5.9
5. Estimate overall net value of Project	5.10
6. Test for uncertainty/risks (Sensitivity)	
a) Discount at 7%, sensitivity test at 4% and 10%	5.11
7. Report qualitative impacts	
b) Identify non-quantifiable factors	5.12
c) Identify distribution effects	5.13
d) Stakeholder winners and losers	5.14

5.2 Identify the base case

The base case is the current mine open cut mine with production phased out in 2017-18 and the open cut pit closed and rehabilitated to the standard agreed with the government as part of earlier environmental and operational requirements. The study assumes that all open cut mining equipment is sold in 2018 and the rehabilitation completed in that year although in practice there will be ongoing remediation work. It is important to note that this is not the end of coal operations at the BCC with underground mining continuing under separate development consent. The base case is the cessation of open cut mining at the BCC.

The base case involves the mining of 30Mt of coal of which 20Mt is saleable.

5.3 Define Project options

BCM has evaluated many mining options, layouts, overburden emplacements and infrastructure arrangements as part of the development of the proposed open cut extension.

The overall goal was to maximise resource extraction efficiency and optimise the use of existing mining infrastructure, whilst minimising impacts on the environment and community.

The community impacts and issues identified from stakeholder engagement were carefully considered in the designs.

The key issues raised were:

- Noise, dust and visual impacts
- Potential impacts to Aboriginal cultural heritage and historic heritage
- Water resources
- Community sustainability
- Future landform and potential land uses following closure

Numerous combinations of open cut and underground mine layouts were tested to evaluate the financial, environmental and economic outcomes.

A number of alternatives were ruled out during the concept and pre-feasibility stages due to the increased impacts these alternatives would have had on the community and/or environment.

Quantitative air quality and noise modelling was undertaken on selected options. Technical, environmental, social and economic evaluations of various alternatives led to the development of a preliminary Project definition that was presented to the community and other stakeholders from April 2011.

Key local non-government organisations, Singleton Council and State and Commonwealth Government agencies were also consulted on alternates and their views considered in development of the final concept design.

The final Project adopted involves the continuation of open cut mining activities from 2018 to 2035 with construction of a noise and visual barrier on the western side of the open cut and an emplacement area on the eastern side.

The final design of the Project is estimated to produce 230Mt of run of mine coal of which 155Mt will be saleable.

For assessment purposes, capital investment is assumed to start in 2013 and all production is included from 2013 to 2035 inclusive. With the base case including production from 2013 to 2017 inclusive, the **difference** between the output levels (135Mt sale coal) represents the additional production due to the investment in the new Project.

5.4 Mining Project benefits and costs

5.4.1 Coal sale revenue

The Project will produce both thermal coal and semi-soft coking coal. The price forecast for the mix of coal sold is close to the estimated average for 2012-13 (section 3.7). This provides revenue of $2,793m for the base case and $20,312m for the Project case. The new Project thus produces a net increase in sale revenue of $17,530m.

5.4.2 Capital costs

The base case will not require infrastructure investment in new capacity but will need continuing investment in capital equipment to maintain mining capacity.

The Project requires investment to extend the open pits, relocate and install new infrastructure, build a new tailings storage, construct a bund and emplacement area and relocate water, power services and two roads. The preliminary estimate is $500m. Continuing capital investment is needed to replace mine equipment and maintain infrastructure over the mine operating life. Life of mine capital is forecasted to be approximately $1,400m which is a similar construction and capital cost as Xstrata's new Ravensworth mine which has a similar life and production profile.[9]

5.4.3 Annual operating costs

Operating costs are based on industry benchmark levels and while these have been rising in recent years, a softening in the industry is expected to see them stabilise in the medium term. This study uses $70 a tonne of saleable coal as the operating cost including the continuing capital.

Annual operating costs for the Project are also assumed to be $70 a tonne with the continuing capital, emissions trading scheme costs and government royalties. The government imposts represent transfer payments in the economy and are not counted as community benefits in a cost benefit study. Removing them from the analysis leaves them in the net Project margin that is part of the overall community benefit.

5.4.4 Land costs

There will be no additional land disturbance issues associated with the base case.

The total Project disturbance area has been estimated at 4,113 hectares, of which, just over half (2,188 hectares) has been previously disturbed, is in the process of being rehabilitated or has previously been planted to non-indigenous tree species. Approximately 1,077 hectares is located over the approved underground operations and will be subject to some level of disturbance over the life of the existing approved Underground Operations through subsidence and subsidence mitigation works. Some of the latter area is already disturbed.

The Bulga Joint Venture and related corporate entities own the majority of land within the Project area with discussions underway regarding securing the remaining non-mine owned land for the Project. BCM also owns a number of properties surrounding the Project area and has commercial arrangements regarding mining impacts with some of the other private landholders which are impacted by the BCC.

A private mushroom composting plant is located to the northeast of the Project area. This plant can continue to operate for three years while the commercial and logistical arrangements for the proposed relocation of this facility are negotiated and concluded. This means there is no net cost to the community with the facility on being relocated.

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[9] Xstrata coal webpage http://www.xstratacoal.com/en/aboutus/pages/developments.aspx

The remaining land surrounding the Project area is owned by a variety of entities including other mining companies, State of NSW (Crown Land, including a former travelling stock reserve), the Commonwealth of Australia (Singleton Military Training Area) and private land holders.

The Project extension requires additional land for the Noise and Visual Bund, the emplacement area and some infrastructure areas. Other industrial and Singleton Military Training Army areas are being negotiated for sale, relocation or land swap.

Areas such as the Eastern Emplacement Area (not required until Year 3) will be managed as buffer land and may include management for either grazing or other agricultural related land uses until such time as the land is required for mining purposes.

The Project will have a direct impact on the current grazing activities carried out within the Project area, the 'Vere Vineyard' and olive grove located within the Project disturbance area and the stage 1 mushroom composting facility. The olive grove is a marginal enterprise and removal will not reduce net income and will provide a marginal benefit for other regional producers from the reduced competition. The vineyard similarly is a loss making enterprise but has some valuable historical vines. The genetic stock of the cabernet grapes grown in the Vere Vineyard will be maintained through the planting vines propagated from this vineyard at Halkin Estate on the western side of Fordwich Sill, negating the loss of this historical material. The lost production from the Vere Vineyard will be permanent.

There will be up to 27 hectares of the Singleton Military Training Area impacted by the Project associated with the realignment of the 330 kV transmission lines and Broke Road. The area to be used for the Broke Road realignment is currently licensed by BCM for mining related activities and is not used for defence training purposes. The realignment of a section of 330 kV transmission line may have a temporary impact on defence training activities, however, the change of alignment only affects a very small area. The former alignment, which also passes through the SMTA, will no longer be required for the transmission line, allowing the land subject to the existing alignment to be returned to defence uses as required. BCM continues to consult with the SMTA management, Commonwealth agencies and TransGrid.

The only other land use directly affected by the Project is a small forestry trial area on BCM land. This area is part of an Australian Coal Association Research Program (ACARP) Project and will be impacted by the proposed Noise and Visual Bund.

The largest long term impact on agricultural productivity as a result of the Project will be the removal of some largely low class grazing land. This impact is long term and potentially permanent if land is not rehabilitated for grazing. However it is unlikely to impact on support industries in the area related to grazing operations due to the low productivity of the land being removed from current production.

A conservative approach has been adopted for this study by valuing the grazing land lost at the marginal return on cattle production. The cost is based on 1,363 hectares of agricultural land loss in the Project case and is assumed to involve a loss of $160,000 each year of the project. There is no cost in the base case.

Commercial negotiations will resolve the future of the stage 1 mushroom composting facility. This facility can be readily relocated and it is assumed that the cost can be met from the Project operating cost budget.

It is proposed that the minesite at the end of mining will be revegetated using local tree species and managed as a biodiversity area with no commercial sale value. Were the land to be returned to a form suitable for higher valued uses such as agriculture or aquaculture, the sale revenue would increase the Project benefits and offset part of the land costs. A conservative approach has been adopted by leaving out any commercial land value. For similar reasons, the value of grazing from the company owned properties in the buffer areas has not been included although it is a Project benefit.

5.4.5 Rehabilitation costs

Rehabilitation of disturbed land is designed to return the majority of the Project area to woodland habitat generally consistent with ecological communities that would have historically occurred in the area. Rehabilitation to achieve this objective will generally take the form of direct seeding of endemic tree, shrub and grass species into a growing medium established using soil removed during pre-stripping operations and/or imported material and, where conditions permit, directly into overburden. Tree and shrub seedlings may also be used either instead of or in addition to direct seeding where direct seeding alone is deemed unsuitable or past experience has produced suboptimal results. 'Cover crops' of exotic grasses may also be used where considered appropriate to provide protection for emerging shrub and tree seedlings, and for rapid establishment of erosion and sediment control and to minimise dust. Additional soil preparation works will be undertaken in flatter areas of the proposed final land form considered to have potential for grazing or other agricultural activities.

Infrastructure which is not able to be utilised by subsequent approved land uses will be removed. Soils within and surrounding former infrastructure areas will be assessed for potential contamination and any contaminated material treated or appropriately disposed of. As with other disturbed areas, former infrastructure areas will be revegetated unless proposed for other land uses.

Continuous rehabilitation will take place as part of mining operations and allowance has been included in the operating cost. A nominal allowance has been included for closure of $100m. This reflects the size of the existing BCC environmental security bond under the *Mining Act 1992*. With an early cost of the open cut in the base case, and the need to continue to use infrastructure for the underground the closure cost is estimated to be substantially less. It is estimated, with rehabilitation, $30m would be spent. This cost estimates are a worst case scenario for both the base and Project cases.

5.4.6 Residual equipment values

Mine equipment will have some value at the end of the Project life with mobile plant the most disposable and fixed plant requiring some demobilisation costs. It is very difficult to place a value on the equipment at this early stage and a nominal $20m has been included in current dollar values for the base case and $110m for the Project case in 2035. The latter value represents $20m in today's dollar terms using a 7% discount rate. This is a conservative estimate.

5.5 Environmental impacts

5.5.1 Greenhouse gas

The Project will continue to emit greenhouse gases from the operation of the mine and transport equipment. The company has captured some of the coal methane to use in a power station and is expanding the capacity of that plant.

The Project will generate estimated 871,000-e Scope 1 emissions per annum if emissions are not further mitigated. . As the fugitive emissions from the Project are subject to the market based regulatory regime established under the Clean Energy Act, these emissions will not limit the Federal Government achieving its national greenhouse gas objectives. Scope 1 emissions as a result of diesel usage on site, which are not currently subject to the *Clean Energy Act 2011*, are less than 50% of the emissions associated with fugitive emissions in terms of CO2-e and are unlikely to prevent Australia from meetings its emission reduction targets.

The operating cost budget has included an allowance for liabilities associated with the emissions trading scheme based on the current Commonwealth legislation. This legislation includes a fixed permit price for three years from July 2012 followed by an emission trading scheme with full auctioning of permits and no floor price. The carbon price under the trading scheme cannot be accurately forecast at this stage but allowance has been made for a moderate carbon penalty in the operating cost. It is not necessary to include a community cost for greenhouse gases as the carbon trading scheme and associated Commonwealth Government initiatives is the mechanism for capturing the cost of this externality. The study assumption is that the price paid for the carbon dioxide emissions has fully covered this cost.

5.5.2 Ecology impacts

Four threatened ecological communities (EEC) are known to occur throughout the Project area. There are two endangered flora populations recorded in the Project area (Weeping Myall - *Acacia pendula* and Tiger Orchid - *Cymbidium canaliculatum*); of which, only one, the Weeping Myall, will be impacted by the Project. Approximately 50 specimens of *Eucalyptus glaucina* (Slaty Red Gum), a threatened species, will also be impacted by the Project. Twenty one threatened fauna species have been recorded in the Project area.

Careful planning has meant that the area of Warkworth Sands Woodland EEC disturbed by the expansion is limited to 7.6 hectares of which 5.62 are bulloak dominated and are considered to be of lower ecological value.

The Project will result in the removal of 735 hectares of native woodland communities and 1,189 hectares of derived native grassland for a total disturbance of 1,924 hectares. Most of this area is of low ecological value having been cleared for agriculture in the past or with substantial areas of similar vegetation in the area. The only significant impact was judged to be on the Warkworth Sands Woodland (WSW) where clearing would reduce the extent of the community to only 353 hectares. Mitigation measures were designed to offset this loss, including the allocation of two sites as offset area for management for conservation in perpetuity and the

establishment of approximately 2505 hectares of rehabilitated land as woodland community similar to that removed by the Project.

The on-site offset area for the WSW is approximately 28 hectares in area and the Reedy Valley offset area is approximately 1,636 hectares in area. Costs for the offset Reedy Valley offset area have been included, as provided by BCM, at a cost of $3m, and $100,000 a year annual maintenance during the life of the Project. The Warkworth Sands offset area is located on land presently owned by BCM and the management of this area during the life of the Project is included in the Project operating costs.

Whilst the offset areas for the sites will not be formal bio-banking sites under the NSW *Threatened Species Conservation Act* 1995, the bio-banking methodology has been adopted for costs associated with the management of the offset areas in perpetuity. A rate of $3,250/hectare for management of the WSW and Reedy Valley offset areas in perpetuity has been assumed purposes based on numbers used in the NSW Office of Environment and Heritage Credit Calculator.[10] This sum is assumed to be paid in a lump sum at completion of the Project with management costs during the life of the Project assumed to be $100,000 per year based on existing Xstrata experience. A lump sum of $4.5 million has been applied for the purposes of the cost benefit analysis to cover these 'in perpetuity' costs. Long term management of on-site rehabilitation (which, other than the 28 hectare WSW offset area, will not have a management into perpetuity obligation) are included in rehabilitation costs for the purposes of the Cost Benefit Analysis.

5.5.3 Water impacts

The Project area is located within the Loders Creek and Wollombi Brook catchments. Clean water runoff is diverted away from mine operations while runoff from the mining area is contained on site and used for mine purposes. The company discharges some water into the Nine Mile Creek/Loders Creek system in accordance with the water license. The key elements of a water management system for the Project are thus in place. The changes to the mining areas and the overburden emplacement areas will change the local drainage pattern and require changes to the water management system. The company has prepared a detailed water assessment to address surface and groundwater impacts as part of the EIS process. No cost has been included on the assumption that the water impact will be managed without any significant impact on other land and water users.

There is an environmental cost associated with discharging saline water into the Hunter River system; however this potential externality is internalised and captured in operating costs through the cost of salinity credits under the Hunter River Salinity Trading Scheme administered under the NSW *Protection of the Environment Operations Act 1997*.

Water extractions are covered in operating costs through the cost of water licensing under the *Water Management Act 2000* and the *Water Act 1912*. Accordingly, this potential externality is already internalised in operating costs.

10 http://www.environment.nsw.gov.au/biobanking/vegbenchmarkdatabase.htm, 12-12-2012

5.6 Health impacts

5.6.1 Air quality

The mine will continue to operate much as it does at present for the next 22 years. There will be some increase associated with the construction activity during the 3-4 year construction phase. The expansion will involve some activities closer to existing rural properties than current mined areas.

The company understands that the community ranks air quality as the most important issue. Concerns relate primarily to dust levels and health effects. The company has designed the Project with a wide range of measures to minimise impacts and operates under an approved Dust Management Plan.

Dust emissions will be controlled in the construction phase with water trucks and standard dust control measures

During the operations phase, no private residences are predicted to experience 24 hour average PM2.5 or annual average PM2.5, PM10, TSP or dust deposition levels above the air quality assessment criteria required to be met by the EPA, either from the Project alone or from the cumulative impacts of the Project and all other sources.

Without the implementation of further controls, maximum predicted Project PM10 24 hour dust concentrations are predicted to exceed the relevant goal at four private residences. It is noted that two residences are currently subject to acquisition under the recently issued Project approval for the Warkworth Extension Project, one owned by AGL and one other in private ownership.

An analysis of the meteorological conditions on the days where exceedances were identified in the modelling showed that strong prevailing south-easterly winds occurred on these days. Further modelling was undertaken to identify the effect of shutting down particular mining plant in conditions identical to those occurring on the day when exceedances were predicted at all four residences. The model showed shutting down selected mining fleet in the Main Pit area would be effective in achieving the PM10 goals at but one all private residences (308) where a level of 51 µg/m3 was predicted for one day for the modelled year.

Where these conditions occur and elevated dust impacts occur as a result of the Project, BCM will modify operations to achieve compliance. BCM has demonstrated effective implementation of these reactive controls with mining equipment shut down on a number of occasions over the past 12 months to reduce impacts.

Landholders adversely affected by operations to the extent that certain relevant government imposed criteria are exceeded have the option of asking the company to purchase their property and BCM has already purchased land within the Project area and in potentially sensitive areas adjoining the BCC.

As the mitigation measures associated with potential exceedances of acceptable air quality criteria are captured in operating costs and all other properties are predicted to experience acceptable levels of air quality, no cost has been applied to this potential externality for the purposes of the Cost Benefit Analysis.

5.7 Social or amenity impacts

5.7.1 Visual impacts

The mine pits will expand predominately to the east, and to the current disturbed footprint in the west and south. A large bund will be built along the western and southern boundaries to minimise the visual impact from that side. The land use and topography to the south do not require such a barrier. The Singleton Military Training Area to the east does not necessitate a visual barrier while the land to the north is largely an existing coal mine.

Current mine operations are visible from Broke and Charlton Roads and the overburden emplacement area from Putty Road. The issue of visual amenity has been raised as a high priority issue for the local community.

The Noise and Visual Bund, once established, will minimise the visual impact. The cost of these treatments is included in the Project capital and operating costs for the purposes of the Cost Benefit Analysis.

5.7.2 Noise

Environmental noise modelling has been conducted to estimate the noise impacts on nearby landowners. The findings show that the noise levels from the Project will be similar to those of the approved operations in the early years. After Year 6 as the outer face of the Noise and Visual Bund is established and as mining progressively gets deeper noise levels are predicted to reduce from those currently experienced.

Model results indicate that up to 42 residences that are not owned by the company are predicted to experience exceedance of the noise impact criteria at some stage of the life of the Project. There are currently 39 properties for which exceedances of the noise impact criteria are predicted for the existing surface operations; 15 of these are not predicted to have exceedances of the intrusive noise criteria during the life of the Project.

Only one residence not owned by the company is predicted to exceed the acquisition criteria (>40dB) and it is currently within the BCC noise acquisition zone and its owner has an existing agreement with BCM regarding impact management. From approximately Year 3 onwards, there are no properties that are predicted to exceed the acquisition criteria.

Only two other non-mine-owned properties are predicted to be within the Project's Noise Mitigation Zone (between 38dB and 40db) at some stage during the life of the Project. One of these is currently within the acquisition zone for the existing operations while the other is already in the noise mitigation zone. From approximately year 13 onwards, there will be less than 3 properties predicted to exceed the noise management criteria with all other properties experiencing noise impacts related to the Project of 35dB or less.

BCM will maintain the acquisition rights presently available to residents in the acquisition zone for the existing operations. BCM will also respond to all requests for

noise mitigation and acquisition in accordance with government guidelines. This cost forms part of the mine operations budget and is not included as a separate item.

As the mitigation measures associated with potential exceedances of acceptable noise levels are captured in operating costs and all other properties are predicted to be within acceptable noise levels, no cost has been applied to this potential externality for the purposes of the Cost Benefit Analysis.

5.7.3 Agriculture

The existing BCC have an impact on the surrounding community but it has been able to demonstrate a positive coexistence with agriculture for over 30 years. During this time, the community and agricultural production in the area has changed with more lifestyle blocks and agri-tourism developing. The design of the Project will significantly mitigate the impact of operations on the neighbouring Broke-Fordwich Viticulture Sub-region and lessen any adverse impact the proximity of the mine to this area may have had on the tourism industry in the area.

The Project is unlikely to impact on the grape growing/wine making industries of the region any more than the existing operations which have demonstrated they are able to operate without significant detriment from the coal operations.

The agriculture impacts are not expected to be greater than they are now. Assessment against the government Biophysical Strategic Agricultural Land (BSAL) criteria found that there is no such land within the Project area and there would be a negligible impact on a small area of such land near the Project.

The opportunity cost of running a 400 head grazing operation on the 1,200 hectares of potential grazing land has been calculated[11] to be approximately $130 per hectare/annum ($158,860/ annum). This small opportunity cost has been included as a land cost in the analysis.

5.7.4 Blasting

The modelling indicates that without management controls, three properties will be in the zone of human exceedance for blasting annoyance. The impacts in all cases can be minimised by management practices which are included in operating costs. Accordingly, as the predicted impacts will be within acceptable criteria, no cost has been applied to this potential externality for the purposes of the Cost Benefit Analysis.

5.7.5 Housing

Any major new construction Project in a regional area involves a component of labour from outside the region. The Hunter Valley has the skills and resources for the construction activities planned and the level of imported labour will depend on the labour market at the construction time.

[11] Umwelt 2012, Agricultural Impact Statement, Bulga Optimisation Project

The construction workforce with multiplier impacts is estimated to result in 27 new employees living in the Broke/Bulga area and 227 in the broader study region with 800 overall in New South Wales.

The local area employment represents about 5% of the current workforce in the area. There may be a small impact on residential rental rates as a result of the increased demand for accommodation. This will disadvantage those competing for rental accommodation but will be a financial gain for the landlords renting accommodation. The impact on rental accommodation is effectively a financial transfer from one group in the economy (renters) to another (property owners). It has no impact on a State wide cost benefit analysis other than to a re-distribution effect.

Within the region, the average annual increase during construction of 170 jobs represents a tiny 0.1% of the regional population and has therefore, not been included in the cost benefit analysis.

5.7.6 Roads

With similar levels of production and employment, the Project is not predicted to result in any significant increase in operational traffic although there will be some increase and disruption during the construction period.

Broke Road will be re-aligned around the mine area with about 9.3 kilometres of new road constructed to the appropriate standards. The new alignment will add approximately 1.9 kilometres to the distance between Broke Road and Golden Highway. A 4 kilometre section of Charlton Road will also be re-aligned to the west around the proposed Noise and Visual Bund. The new alignment adds 400 metres to the length of Charlton Road.

The existing local road network experiences peak hour flows in the morning between 6.00 am and 7.00 am (morning peak period) and in the afternoon from 5.00 pm to 6.00 pm (afternoon peak period). The Traffic Impact Assessment (TIA) also assessed the traffic infrastructure performance of the roads in the area and found that the sub-regional road network operates at a relatively good level of service (LOS12).

Project related impacts to the sub-regional traffic network may include:

- The construction phase of the Project when additional Project construction trips will be generated (approximately Years 1 to 4);
- Operational road traffic movements for an additional 10 years after the current approval was due to expire (i.e. between 2025 and 2035);
- Potential redistribution of trips to the new BCC access intersections on Broke Road
- Potential for broader trip redistribution arising from the realignment of Broke Road and Charlton Road.

[12] Level of service is a measure of intersection performance based on vehicle delay.

In the construction phase, traffic modelling indicates that one intersection associated with the expansion of another Project will experience delays however these delays are attributable to already approved projects and not the proposed Project.

During operations, traffic conditions will continue as at present and no additional traffic impacts are predicted. However, the diversion of Broke and Charlton Roads will result in slightly longer travel times for drivers being:

- Broke Road –1 minute and 12 seconds extra when travelling at the speed limit
- Charlton Road – 15 seconds extra when travelling at the speed limit

From a traffic flow perspective, the travel time increases are considered minor and there is no evidence that the realignments would lead to any broader redistribution of trips within the sub-regional network.

The total traffic flow will be slightly higher during the construction period (on average a 17% increase in site workforce for 2.5 years) after which the traffic levels will return to current levels as the workforce is restored to the existing 700 people. The company has included road intersection costs to ensure efficient road access to the site and minimal disruption to local traffic.

A traffic cost methodology was used to calculate the worst case cost impact. This considered the cost of petrol and vehicle maintenance, estimated at $0.50/km, and two-way traffic, of 1,500 trips over 250 days, would cost $1m per annum and this cost has been included in the cost benefit analysis from 2018.

5.7.7 Historical Heritage

Pastoral grazing was the earliest established industry within the region which was first settled in the 1820s. This history can be seen in the clearance of native vegetation and construction of infrastructure such as dams and fences along with homesteads and other rural structures. There was a shift from wool production in the nineteenth century as mixed farming, dairying and grazing became more important in the twentieth century. Dairying was one of the initial impetuses for the division of large estates in the Upper Hunter and by the 1890s dairying had became an important industry in the Upper Hunter.

Coal was commercially exploited in the Upper Hunter from the 1890s. In the 1950s a rapid expansion of coal mining in the area took place with the establishment of large open-cut mines. Coal mining operations commenced in the Project area in 1982.

There are two notable historical issues in the Project area – the Charlton Road and Broke RAAF landing ground.

Charlton Road formed part of the convict built Great North Road. The section on the west of the Project area may not have been fully constructed and a full survey did not reveal any evidence of road formation or infrastructure.

The landing ground has been largely removed by mining activities and land restoration. Evidence of a system of drains remains but there is no evidence of former lookouts.

BCM proposes actions to recognise the former Great North Road and has committed funds to an Interpretation Plan. This forms part of the operating budget and is not included as a separate cost. The mitigation measures proposed for items of historical heritage are considered to fully offset the loss of heritage value associated with the Project. As these mitigation measures are included in the operating budget, it is not included as a separate cost for the purposes of the cost benefit analysis.

5.7.8 Aboriginal Cultural Heritage

The Project will impact on 74 Aboriginal sites, three of which are considered to have high archaeological and cultural significance. A variety of mitigation measures will be implemented in relation to these sites including salvage of artefacts, comprehensive site recording, relocation of grinding groves, protection of other areas of Aboriginal cultural and archaeological significance in the area and various other measures developed in consultation with the local Aboriginal community.

The mitigation measures proposed for items of historical heritage are considered to fully offset the loss of heritage value associated with the Project for Cost Benefit Analysis purposes. As these mitigation measures are included in the operating budget, it is not included as a separate cost for the purposes of the cost benefit analysis.

5.8 Economic impacts

Development of the Noise and Visual Bund is likely to have a positive impact on the tourism industry related to viticulture in the region in the medium to longer term.

The previous chapter in this report looked at the flow on benefits for the Project predicted using a multiplier approach. A wide range of businesses will see continued supply and service opportunities and 700 people will continue to be employed from 2018 to 2035 inclusive. The benefits are summarised here again to allow this chapter to be read in isolation from the remainder of this report.

In summary, the Project will provide employment opportunities for local workers and business opportunities for local companies. However, the very small size of the local area in which this mine is based will see most flow on economic impacts flow to the broader Hunter region. The construction phase impacts will see some additional pressure on local accommodation and some additional local spending.

The Broke/Bulga area will house an estimated 17 workers a year in the construction phase and an estimated 35 during the long term operations phase. The multiplier effect means that the workforce will grow by 27 jobs and 52 jobs respectively (Table 23). The operations phase are expected to see slightly more local employment than at present as some workers may move to the area to take advantage of the long term work opportunities. The difficult conditions in the small farms in the area will see a continuing trend to workers earning off-farm income in the coal industry either by way of employment or some form of business contracting to the companies.

Table 24: Economic impact of Project *

Location	Construction phase (jobs)	Operations phase (jobs)	Construction impact ($m)	Operations impact ($m)
Broke/Bulga	27	52	6	4
Study region	225	1,010	153	410
NSW	800	2,450	385	837

*** Numbers rounded**

The increase in economic output during construction is small at the local level but significant at the regional level adding $153m to the regional economy. There will be an increase in economic output of $385m at the State level.

The operations phase produces a significant increase in the regional economy at $410m each year for the additional 18 year mine life while the State economy is boosted by $837m each year. These multiplier effects are not included in the benefit cast analysis.

5.9 Public infrastructure impacts

A number of items of public and private services infrastructure adjacent to the existing roads will also require relocation including:

- Telecommunications infrastructure (predominately owned by Telstra)
- Water pipeline for transferring water from the Hunter River to the Broke-Fordwich Private Irrigation District
- Potable water pipeline providing water to Broke and surrounding areas

Detailed discussions have been undertaken with the owners and operators of this infrastructure regarding the design requirements for the infrastructure being relocated and the timing of relocation. This infrastructure will be constructed at the same time as the road alignments and commissioned in a manner that causes the least disruption to end users and the infrastructure operators. The cost is included in the capital investment for the Project and will not involve any disruption to services.

5.10 Net benefits

The net community benefit for the State of New South Wales is derived by subtracting from the coal sale revenue (plus the residual equipment proceeds), the Project capital costs, the ongoing mining costs and the negative external effects consistent with the NSW Government guidelines. The result is critically dependant on the assumptions used (Table 23). These are listed in dollars of the day and not discounted.

Table 23: Cost benefit analysis Project assumptions*

Component	Base case	Project case
Production	30Mt	230Mt
Saleable coal	20Mt	155Mt
Start year	2013	2013
Finish year	2018	2035
Total coal revenue	$3,310m	$20,202m
Initial capital investment	$30m	$500m
Total operating costs	$1,764m	$12,230m
Infrastructure (roads)	nil	In operating costs
Land costs	nil	$4m
Ecology offsets	nil	$21m
Road disruption	nil	$18m
Rehabilitation/Demobilization	$30m in 2018	$100m in 2036

*** Numbers rounded and undiscounted. The estimates are based on prices forecast by Economics Consulting Services and costs based on industry benchmarks.**

The outcome is a net benefit for the Project case over and above the base case of $2,588m when discounted to today's dollar terms at a 7% discount rate (Table 25).

Table 25: Cost benefit summary (Discounted $million)*

Parameter	Base case ($m)	Project case ($m)	Net increase ($m)
Revenue (coal sales & asset sales)	$2,373	$9,734	$7,362
Mining costs (capital and operating)	$1,252	$6,014	$4,762
Externalities	$21	$33	$12
Total costs	$1,274	$6,047	$4,773
Net impacts	**$1,099**	**$3,687**	**$2,588**

*** Discounted at 7% and numbers rounded**

5.11 Sensitivity analysis

Increasing the discount rate to 10% reduces the net benefit to $1,808m. A lower discount rate (4%) provides an increased net community benefit at $3,804 (Table 26). The net community benefit from this Project is very robust at the forecast prices and costs.

Table 26: Sensitivity analysis (Discounted $million)*

	Discount rate		
Parameter	4%	7%	10%
Revenue increase	$10,413	$7,362	$5,379
Mining Cost increase	$6,575	$4,762	$3,572
Increase in externality costs	$33	$12	$0
Net community increase	**$3,804**	**$2,588**	**$1,808**

5.12 Non-quantifiable factors

Many factors have been assessed in impacts of the project on the environment, and the social impacts of noise, visual changes, noise, and dust and traffic disruption. The greenhouse impact of emissions has now been internalised into the project with the introduction of the emission permit scheme.

One issue emerging in many of the resource rich areas of Australia is the emergence of what has been termed the "two speed" economy. While this concept is a simplification, there is underlying concern that those involved in, or doing business with, mining or oil and gas companies are doing very well while those in the non-resource sectors are seeing sluggish growth rates and weak employment prospects.

This division into two sectors is also likely to apply in the BCC location with benefits accruing in the form of work and business opportunities for those seeking to be involved in the resources sector. For those who do not seek to be involved, the higher wages and pressure on local services is a negative in this quiet rural setting.

5.13 Distribution effects

The multiplier analysis in this section provided estimates of the regional distribution of the Project impacts. In summary terms, the very small size of the local area in which this mine is based will see most flow on economic impacts flow to the broader Hunter region. The construction phase impacts will see some additional pressure on local accommodation and some additional local spending.

The Broke/Bulga area will house an estimated 35 workers during the long term operations phase. The multiplier effect means that the local workforce will grow by around 52 jobs. The operations phase will see slightly more local employment than at present as some more workers will move to the area to take advantage of the long term work opportunities. The difficult conditions in the small farms in the area will see a continuing trend to workers earning off-farm income in the coal industry either by way of employment or some form of business contracting to the companies.

The increase in economic output during construction is small at the local level but significant at the regional level adding $153m to the regional economy per annum. There will be an increase in economic output of $385m per annum at the State level. The operations phase produces a significant increase in the regional economy at $410m each year for the additional 18 year mine life while the State economy is boosted by $837m each year.

Local concerns have been expressed that the coal operations adversely affect rural land values in the area and the rural lifestyle that many sought when moving to the area. This includes impacts on both agriculture and the tourism sector. State government requires that the impact on agriculture be specifically addressed. This issue is covered in a separate report as is tourism.

Development of the noise and visual bund will improve the appearance of the Project and enhance the local tourism industry.

5.14 Stakeholders

The key beneficiaries of a mine extension are:

- Employees and contractors
- Local, regional and State businesses benefiting from the workforce expenditure
- The company and its shareholders
- The company financiers and service providers
- Goods and services suppliers
- Accommodation and hospitality services
- Government at all levels – Local, State and Commonwealth

Organisations and individuals disadvantage by the Project and its investment

- Adjacent landowners from 2018 to 2035
- Farmers and other businesses in the region affected by the demand for labour and the potentially higher wages and salaries
- Potentially all finance borrowers impacted by any increase in interest rates and exchange rates as a consequence of the boost in the economy

The environmental and social impacts of the Project are primarily local in nature while the benefits are far more widely spread. This is the nature of any regional development Project.

Governments at all levels benefit from the investment and employment created by the Project. Local Government benefits from a higher rate base through the establishment of industrial work sites and the additional housing associated with the operating workforce. The Project will also make a development contribution to Singleton Council in accordance with *Environmental Planning and Assessment Act 1979* requirements.

The State Government receives payroll tax, royalties and stamp duties. Royalties on the coal are estimated at an average of $76 million a year over the eighteen year life of the Project for a total of over $1,760 million.

Payroll tax will be paid to the State government while the Commonwealth Government will receive custom duties on imported plant and equipment, PAYE tax on employees, GST on the purchase of goods and services, emission payments and company tax on profits from the Project. Payments for emission permits alone are forecast to be $450 million.

Appendix 1: Multiplier analysis

Multiplier analysis is a standard tool of economic analysis used to assess the flow-on effects on income, investment and employment of a proposed increase in investment or production. The multiplier effect operates because the initial activity requires the purchase of labour, goods and other services and these purchases generate further flow-on expenditure. At each round of investment and expenditure the effect diminishes until a final total increase in the economy can be calculated. It is the ratio of the value of the final impact across the economy to the initial investment that is termed the multiplier.

In a similar vein to the multiplier effects of investment expenditure, there are multiplier effects of ongoing expenditure on operations. Operations and maintenance expenditure will call forth an increase in production from local firms, and these firms in turn will need to purchase more inputs and services, and there will be a flow of ripple effects through the economy.

The actual mechanics of deriving multipliers is based on the use of transactions tables. These have been developed at national, state and local levels by a number of different agencies, and it is these tables that are used in the analyses in this report. The transaction tables show the linkages between industries in terms of the purchases of goods and services by each, from each other industry of the economy.

The size of the multiplier ratio depends on several factors including the ability of the economy to supply the goods needed. If a large proportion of goods are imported from outside of the region, the multiplier will be reduced. Multipliers can be estimated for a local area economy, a regional economy, a State or a national economy. The size of the multipliers will always increase as the analysis moves from local to state to national simply because this shift will increase the capacity of the defined economy to supply the goods, and there will be fewer imports from outside the economy.

The multipliers used in this report represent the impacts in terms of economic output and employment. The output multipliers represent the increase in goods and services produced throughout the economy, and are a sum of the materials and services needed by the project, their flow-on requirements, and the goods purchased with the increased wages and salaries generated by the project. The employment multiplier is similar and indicates the way in which the project generates jobs throughout the wider economy as well as within the specific mining operations.

The approach to the development of multipliers for this study involved an evaluation of past work by Economics Consulting Services and other analyses, for example those undertaken by the Australian Bureau of Statistics at a National level and by the Illawarra Regional Information Service (University of Wollongong) and by the Hunter Valley Research Foundation at a regional level. Economics Consulting Services has undertaken multiplier analyses for a number of industries in Western Australia as well as for the coal mining industry in the Hunter Region in 2009. The main point of difference between our analysis for Ulan West in 2009 and these other studies is in the regional employment multipliers estimated by IRIS Research and the Hunter Valley Research Foundation for coal operations. Their estimates, at 5.87 and

4.25 respectively, are well above all other estimates of employment multipliers for the Australian economy – when it would be logical for them to be considerably less. The differences have were discussed with researchers at the University of Wollongong, and it was decided to continue with the Economics Consulting Services estimates as they were more consistent with other published data.

Multipliers have been estimated in this analysis for the coal mining and construction activities, and for the expenditures by employees (Table 27).

Table 27: Ulan Coal multipliers*

Area	Construction		Operations		Employee expenditure
	Output	Employment	Output	Employment	
Region	1.928	2.717	1.928	1.820	2.103
State	2.258	3.927	1.893	2.731	2.320
Australia	2.763	4.062	2.362	3.515	2.771

*** Source: Ulan Coal economic impact, Economics Consulting Services, 2009**

A conservative approach was adopted for the BCC Project with lower multipliers to ensure that the local benefits in particular were not overstated. Particularly low multipliers were used for the local area given the very small economy and lack of labour and business services (Table 28). The State multipliers use higher levels as it is assumed New South Wales can supply all of the labour and coal mine services and there is little input from other States.

Table 28: BCC multipliers*

Area	Construction output	Operations output	Employee expenditure
Local	1.2	1.2	1.3
Region	1.6	1.5	1.5
State	2.4	2.1	2.2

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