Evolution MINING

APPENDIX I

Socio-Economic Assessment

COWAL GOLD OPERATIONS PROCESSING RATE MODIFICATION

Environmental Assessment
2018

Resource Strategies

Cowal Gold Operations
Modification 14
Socio-Economic Assessment

Prepared for

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EXECUTIVE SUMMARY

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the Cowal Gold Operations (CGO) located approximately 38 kilometres (km) north-east of West Wyalong in New South Wales (NSW).

Recent feasibility studies have identified potential opportunities to maximize the ore processing capacity of the CGO's existing processing plant. On this basis, Evolution proposes to modify Development Consent DA 14/98 under Section 75W of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) to increase the CGO's approved ore processing rate of 7.5 million tonnes per annum (Mtpa) to 9.8 Mtpa (herein referred to as the Modification).

From a socio-economic perspective there are three important aspects of the Modification that can be considered:

- its economic efficiency (i.e. consideration of the economic costs and benefits of the Modification);
- its regional economic impacts (i.e. the economic stimulus that the Modification would provide to the regional economy); and
- the distribution of impacts between stakeholder groups (i.e. the equity or social impact considerations) often considered in terms of the impacts on employment, population and community infrastructure.

A Cost-Benefit Analysis (CBA) of the Modification indicated that it would have net production benefits to Australia of $62 Million (M) and net production benefits to NSW of $27M. Provided the residual environmental, social and cultural impacts of the Modification that accrue to Australia are considered to be valued at less than $62M, or those that accrue to NSW are considered to be valued at less than $27M, the Modification can be considered to provide an improvement in economic efficiency and hence is justified on economic grounds.

Instead of leaving the environmental, cultural and social impacts unquantified, an attempt was made to quantify them. The opportunity cost, capital and operating costs of biodiversity offsets, and costs of purchasing additional temporary Water Access Licences were included as direct costs to Evolution. The main quantifiable environmental impacts of the Modification, which have not already been incorporated into the estimate of net production benefits, relate to greenhouse gas emissions. These impacts to Australia and NSW are estimated at $0.4M and $0.1M, respectively, considerably less than the estimated net production benefits of the Modification. There are also indirect benefits of the Modification to workers and suppliers.

Overall, the Modification is estimated to have net social benefits to Australia and NSW of $101M and $60M, respectively, and hence is desirable and justified from an Australian and NSW economic efficiency perspective.

While the main environmental, cultural and social impacts have been quantified and included in the Modification CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $101M and $60M for the Modification to be questionable from an Australian and NSW economic efficiency perspective, respectively.

The regional economy, comprising Lachlan, Forbes and Bland Local Government Areas (LGAs), has declined in population since 2006, at the same time that employment in the region has grown. Location quotient analysis shows the region has a strong specialisation in Agriculture, Forestry and Fishing, and Mining. This reflects the regions land capability and mineral endowments. The NSW Government has identified that it is specialisation sectors, which have a reliance on local endowments and are traded outside the region (i.e. exported), that are the engines of growth for regional economies. These are the sectors that should be the focus of strategies to enhance the economic development of regions. Hence, the CGO is an important driver of the regional economy.

Regional economic activity associated with the CGO arises from:

- the CGO operation itself being located within the region and the direct economic activity that it brings including direct employment and wages;
- expenditure by the CGO on inputs to production that can be sourced from the region such as repairs and maintenance etc.; and
- expenditure of employee wages in the regional economy.

The Modification will not extend the life of the CGO. However, it will have five main potential impacts for the regional economy:

- Increase the profitability of the CGO and hence its resilience to external shocks such as declines in gold prices. This increases the certainty around the CGO continuing to provide economic activity to the region.
- Increases the non-labour operating costs of the CGO by on average $22M per annum. To the extent that some of this can be captured by regional suppliers, there will be increased economic activity in the regional economy.
- Increase in permanent employment and wages in the region. The average workforce employed at the CGO is currently approximately 385 people (including Evolution staff and on-site contractor's personnel). During peak periods, the CGO employs up to 435 people. The Modification will result in a minor increase to the average and peak workforce employed at the CGO (approximately 10 people). Provided these jobs are filled by the local workforce or people migrating into the region, it will add to the economic activity in the region.
- Increase in short term employment and economic activity in the region during construction. In 2019 there will be a short term construction period involving up to 100 people for the road and pipeline construction. While the majority of the workforce are likely to only temporarily locate in the region, accommodation and other expenditure of these workers will add to the economic activity in the region.
- A small loss in economic activity as agricultural land is preserved as an offset.

Any changes in the workforce and populations of regions and towns may have implications in relation to access to community infrastructure and human services, which includes for example housing, health and education facilities. The Modification will result in ten additional direct jobs which may be associated with a potential direct population increase of 24 people. The region, and particularly Lachlan and Bland LGAs, has been experiencing long term population decline. This is likely to have resulted in some spare capacity in community infrastructure and services. Consequently, any additional minor population gain in the region is unlikely to place any strain on existing community infrastructure. In contrast, it may slow the decline of the regional population and hence slow any overall decline in the provision of community infrastructure and services to the region. Temporary employment during construction will likely increase demand for temporary accommodation but is unlikely to have any significant implications for community infrastructure and human services.

1 INTRODUCTION

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the Cowal Gold Operations (CGO) located approximately 38 kilometres (km) north-east of West Wyalong in New South Wales (NSW).

Recent feasibility studies have identified potential opportunities to maximize the ore processing capacity of the CGO's existing processing plant. On this basis, Evolution proposes to modify Development Consent DA 14/98 under Section 75W of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) to increase the CGO's approved ore processing rate of 7.5 million tonnes per annum (Mtpa) to 9.8 Mtpa (herein referred to as the Modification).

The socio-economic assessment requirements for the Modification arise from the Department of Planning and Environment, Secretary's environmental assessment requirements (SEARs) for the Modification. These require:

- *the reasons why the development should be approved having regard to:*
  - *the environmental, economic and social costs and benefits of the development;*
- *an assessment of the likely social and economic impacts of the proposed Modification, paying attention to:*

  …
  - *the costs and benefits of the project for the State.*

No Environmental Planning Instruments, Policies, Guidelines & Plans relating to socio-economic assessment are referred to in Attachment 1 of the SEARs. However, the NSW Government (2015) *Guideline for the economic assessment of mining and coal seam gas proposals*, identifies that:

- cost benefit analysis (CBA) is used to assess the 'public interest' head of consideration under Section 79C of the EP&A Act, by estimating the net present value of the project to the NSW community;
- Local Effects Analysis (LEA) is used to assess the 'economic impacts in the locality' head of consideration under Section 79C of the EP&A Act. The NSW Government (2015) Guideline identifies a specific method for assessing the direct local effects of a mining project. However, it also states that "*a range of techniques are available for estimating second round or flow-on effects. These include CGE (computable general equilibrium) modelling, Input-Output (I-O) or multiplier analysis.*"

Having regard to the scale of the Modification it is considered that the above SEARs can be met through the following socio-economic assessment components:

Economics

- Preparation of a CBA of the Modification which considers the net production benefits of the Modification to the State, as well as the environmental and cultural impacts based on specialist assessments undertaken for the Environmental Assessment (EA) - Section 2.
- Consideration of the significance of the existing CGO to the locality - defined here to be the regional economy of Bland, Lachlan and Forbes Local Government Areas (LGAs) - Section 3.
- A mainly qualitative assessment of the additional regional economic impacts of the Modification - Section 4.

Social

- A brief assessment of potential additional population and community infrastructure impacts - Section 4.

Conclusions are provided in Section 5.

2 COST BENEFIT ANALYSIS

2.1 INTRODUCTION

CBA of the Modification involves the following key steps:

- identification of the "with" and "without" Modification scenarios;
- identification and valuation of the incremental benefits and costs;
- consolidation of value estimates using discounting to account for temporal differences;
- application of decision criteria;
- sensitivity testing; and
- consideration of non-quantified benefits and costs.

What follows is a CBA of the Modification based on the production schedule proposed by Evolution, and financial, technical and environmental advice provided by Evolution and its specialist consultants. An explanation of CBA is provided in Attachment 1.

2.2 IDENTIFICATION OF THE "WITH" AND "WITHOUT" MODIFICATION SCENARIOS

Identification of the "with" or "without" Modification scenario is required in order to facilitate the identification and measurement of the incremental economic benefits and costs of the Modification.

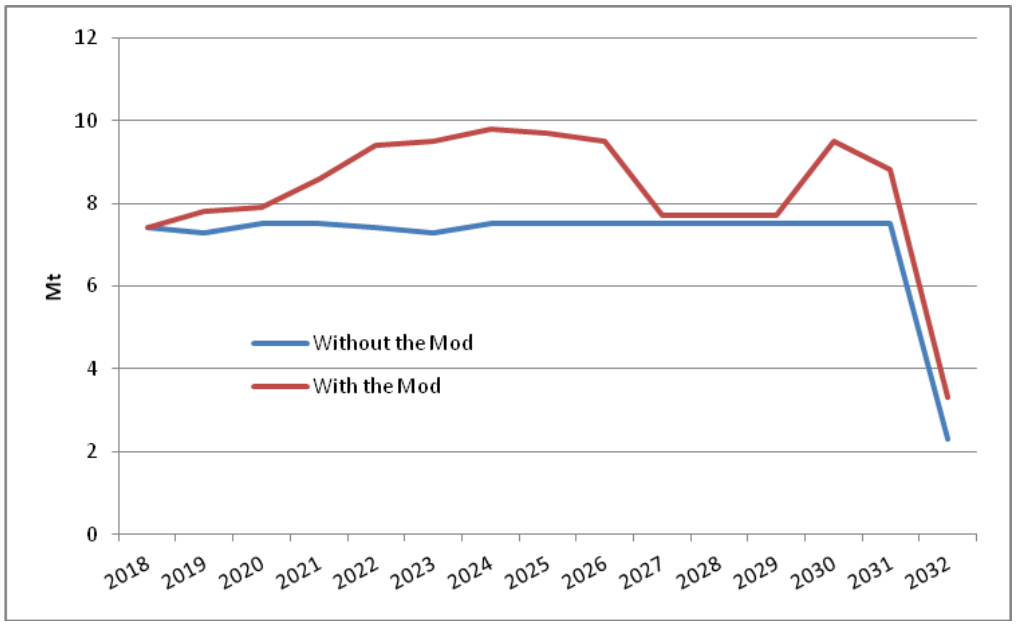
The CGO was granted Development Consent (DA 14/98) by the NSW Minister for Urban Affairs and Planning on 26 February 1999. This Development Consent has been modified on 13 occasions. The base case (i.e. approved CGO), or without Modification, scenario incorporates the approved Modification 13 (Mine Life Modification) and involves cessation of mining in 2024 and cessation of ore processing activity in 2032, with associated decommissioning and rehabilitation.

In comparison to the existing approved CGO, the Modification would involve:

- increasing the ore processing rate from 7.5 Mtpa to 9.8 Mtpa;
- modification of the existing Tailings Storage Facilities (TSFs) to form one larger TSF, which would also accommodate mine waste rock (herein referred to as the Integrated Waste Landform [IWL]);
- relocation of water management infrastructure (i.e. the Up-Catchment Diversion System and approved location for contained water storage D10) and other ancillary infrastructure (e.g. internal roads and soil and ore stockpiles) elsewhere within Mining Lease (ML) 1535 and Mining Lease Application (MLA) 1;
- installation of a secondary crushing circuit within the existing process plant area;
- duplication of the existing water supply pipeline across Lake Cowal;
- increased annual extraction of water from the CGO's external water supply sources;
- increased consumption of process reagents (including cyanide) and other process consumables;
- an increase in the average and peak workforce employed at the CGO;
- relocation of a travelling stock reserve (TSR) and Lake Cowal Road; and
- provision of crushed rock material to local councils to assist with road base supplies.

The Modification would not extend the life of the CGO. Figure 2.1 summarises the Total Ore Processed "with" and "without" the Modification.

Figure 2.1
Total Ore Processed "With" and "Without" the Modification



Evolution's alternatives for the CGO are essentially limited to different scales, designs, technologies, processes and timing. However, these alternatives could be considered to be variants of the preferred proposal rather than distinct alternatives. Consequently, this CBA focuses on Evolution's preferred proposal (the Modification) compared to the base case (i.e. approved CGO) identified above.

2.3 IDENTIFICATION OF BENEFITS AND COSTS

Relative to the base case, or without Modification scenario, the Modification may have the potential incremental economic benefits and costs shown in Table 2.1.

It should be noted that the potential external costs, listed in Table 2.1, are only economic costs to the extent that they affect individual and community wellbeing through direct use of resources by individuals or non-use. If the potential impacts are mitigated to the extent where community wellbeing is insignificantly affected, then no external economic costs arise.

Table 2.1
Potential Incremental Economic Benefits and Costs of the Modification

Category	Costs	Benefits
Production	• Opportunity cost of land • Opportunity cost of capital • Development costs • Operating costs, including administration, mining, ore processing, transportation, mitigation measures and offsets (but excluding royalties) • Decommissioning costs at cessation of the CGO	• Revenue from ore • Residual value of capital and land at the cessation of the Modification
Externalities	• Greenhouse gas generation • Operational noise impacts • Road transport impacts • Road transport noise impacts • Blasting impacts • Air quality impacts • Surface water impacts • Groundwater impacts • Terrestrial flora and fauna impacts • Aquatic ecology impacts • Aboriginal heritage impacts • Non-Aboriginal heritage impacts • Visual impacts • Net public infrastructure costs • Loss of surplus to other industries	• Wage benefits to employment • Economic benefits to existing landholders • Economic benefits to suppliers

Framed in another but equivalent way the potential incremental costs and benefits of the Modification are as per Table 2.2

Table 2.2
Alternative Frame of Potential Economic Benefits and Costs of the Modification

Costs	Benefits
Direct costs	***Direct benefits***
Nil	Net production benefits • *Royalties* • *Company tax* • *Net producer surplus*
Indirect costs	***Indirect benefits***
Net environmental, social, cultural and transport related costs	Wage benefits to employment
Net public infrastructure costs	Non-market benefits of employment
Loss of surplus to other industries	Economic benefits to existing landholders
	Economic benefits to suppliers

2.4 QUANTIFICATION/VALUATION OF BENEFITS AND COSTS

Consistent with NSW Government (2015) and NSW Treasury (2017), the CBA was undertaken in 2018 real values, with discounting at 7 percent (%) and sensitivity testing at 4% and 10%.

The analysis period is 15 years, coinciding with the approved life of the CGO. Any impacts that occur after this period are included in the final year of the analysis as a terminal value.

Where competitive market prices are available, they have generally been used as an indicator of economic values. Environmental, cultural and social impacts have initially been left unquantified and interpreted using the threshold value method.[1]

An attempt has also been made to estimate environmental, cultural and social impacts using market data and benefit transfer[2] and incorporate them into an estimate of the net social benefit of the Modification. This estimated net social benefit of the Modification provides another threshold value that any residual or non-quantified economic costs would need to exceed to make the Modification questionable from an economic efficiency perspective.

2.4.1 Production Costs and Benefits[3]

Economic Costs

Opportunity Cost of Land and Capital

Under the base case, the CGO would be decommissioned in 2032 and residual land and capital value would be realised. With the Modification this remains unchanged. Hence, there is no opportunity cost of land and capital associated with the Modification.

Capital Cost of the Modification

The Modification would require additional capital expenditure associated with construction of the IWL, installation of a secondary crushing circuit, relocation of infrastructure and duplication of the existing water supply pipeline. However, from 2023 it will also result in significant capital cost savings as additional TSF construction (i.e. annual lifts of the existing northern and southern TSFs) would no longer be required. Overall, the Modification results in a capital cost saving relative to the "without" Modification case.

Annual Operating Costs of the Mine

Incremental operating costs are associated with increased mining and ore processing to 2024 and increased ore processing from 2025 to 2032. Incremental operating costs include administration and transport costs. The incremental operating costs of the Modification average approximately $24M per annum over the approved life of the mine.

While royalties are a cost to Evolution they are part of the overall net production benefit of the mining activity that is redistributed by government. Royalties are therefore not included in the calculation of the resource costs of operating the Modification. Nevertheless, it should be noted that the Modification would generate total royalties in the order of $10M present value, at 7% discount rate.

Depreciation has also been omitted from the estimation of operating costs since depreciation is an accounting means of allocating the cost of a capital asset over the years of its estimated useful life. The economic capital costs are included in the years in which they occur.

[1]The threshold value method uses the value of quantified net production benefits as the amount that unquantified environmental, social and cultural costs would need to exceed to make a project questionable from an economic efficiency perspective.

[2] Benefit transfer refers to transferring economic values that have been determined for other study sites.

[3] All values reported in this section are undiscounted unless specified.

Decommissioning and Rehabilitation Costs

The timing of decommissioning and rehabilitation of the Modification is unchanged from the base case. Any additional decommissioning and rehabilitation costs associated with the Modification are included in the capital cost estimates above.

Economic Benefits

Revenues

Incremental revenues associated with the expected production profile are estimated at approximately $27M per annum (on average) over the approved life of the mine. There is obviously considerable uncertainty around future gold prices in United States Dollars (USD) and the USD/Australian Dollar (AUD) exchange rate and hence the value of incremental CGO revenue has been subjected to sensitivity analysis (Section 2.7).

Residual Value at End of the Evaluation Period

At the end of the Modification, the additional capital equipment required for the Modification may have some residual value that could be realised by sale. However, for the purpose of this analysis, the incremental residual value has been assumed to be negligible and excluded from the analysis. No additional land is required to be purchased for the Modification and hence no additional land residual value is included in the analysis.

2.4.2 External Costs and Benefits

Greenhouse Gases

The Modification is predicted to generate in the order 0.29 Mt per annum of carbon dioxide equivalent (CO2-e) emissions (Scopes 1 and 2) over the life of the Modification (Appendix F of the EA). This estimate includes emissions associated with the currently approved CGO, however is considered to provide a conservative basis for estimating economic costs. To place an economic value on CO2-e emissions, a shadow price of CO2-e is required. Three shadow prices were initially used, the Forecast European Union Emission Allowance Units price, the Australian Treasury Clean Energy Future Policy Scenario and the US Environmental Protection Agency (EPA) Social Cost of Carbon. However, these represent the global damage cost of carbon (i.e. the cost of carbon emissions to the population of the whole world).

Consistent with the Guidelines (NSW Government 2015), the focus of this CBA of mining projects is on costs and benefits to the population of NSW. In the absence of any studies that have focused on the social damage cost of carbon emissions to NSW residents, some means of apportioning global damage costs borne by Australians is required. For the purpose of the Economic Impact Assessment, this has been undertaken using Australia's share of the global population (around 0.3%) and NSWs share of the Australian population (32%).

On this basis, the present value of the cost of greenhouse gas emissions from the Modification to Australia and NSW is estimated at between $0.4M and $0.1 M, and $0.1 and $0.0M (present value), respectively.

Operational Noise

The CGO Development Consent (14/98) includes noise limits at privately-owned receivers, as well as conditions regarding rights for relevant landowners to request acquisition and/or noise mitigation. The Modification will not result in any additional landholders being impacted by the CGO or any changes in acquisition and/or noise mitigation rights (Appendix E of the EA). Hence there are no economic impacts for inclusion in the analysis.

Road Transport

The Modification would increase the existing operational workforce by 10 full time equivalents and would result in some additional traffic movements associated with increased ore processing and gravel transport from the CGO by Councils or the Roads and Maritime Services. In addition, a short construction phase would generate additional traffic movements, which would be limited by the use of buses. Overall, these additional traffic movements are considered to be modest and no significant road capacity or road safety issues would arise as a result of the Modification (Appendix H of the EA), subject to consideration of some minor road treatments, signage and intersection modifications. The costs of these are included in the capital costs of the Modification. Hence, no economic effects have been identified in the CBA with respect to road transport movements.

Road Transport Noise

No exceedance of the NSW Road Noise Policy daytime criteria is predicted (Appendix E of the EA). Hence, no material economic effects have been identified in the CBA with respect to road traffic noise.

Blasting

Blasting at the CGO has the potential to cause structural damage or human discomfort at properties surrounding the CGO. The assessment of potential impacts of blast overpressure and vibration associated with the Modification (Appendix E of the EA) concluded that, consistent with existing operations, the Modification could operate in compliance with relevant building damage and human comfort criteria at all nearby private receivers. Hence, no material economic effects have been identified in the CBA with respect to blasting impacts.

Air Quality

Potential air quality impacts may occur at nearby residences as a result of dust generation at the Modification from activities such as ore and waste rock handling, emissions from stockpiles, haul roads, and blasting. The assessment of potential air quality impacts for the Modification (Appendix F of the EA) indicates that, consistent with existing operations, no nearby private receiver would experience exceedances of relevant air quality criteria. Hence, no material economic effects have been identified in the CBA with respect to air quality effects.

Groundwater

The potential impacts of the Modification during operation and post closure have been considered in the Hydrogeological Assessment (Appendix A of the EA).

The Modification would not change currently approved daily or annual rates of licensed extraction of groundwater or existing groundwater contingency measures. In addition, no material change to pit inflows is predicted (Appendix A of the EA).

Groundwater drawdown due to open pit mining and dewatering would generally remain within ML 1535. The equivalent average annual groundwater take to the end of mine life is approximately 235 ML/year (Appendix A of the EA) and would continue to be licensed.

The Hydrogeological Assessment prepared for the Modification concluded that groundwater quality would not change significantly during the operation of the CGO (incorporating the Modification) or post-closure, with the open pit continuing to act as a localised groundwater sink.

As the existing Groundwater Contingency Strategy, developed in consultation with Crown Lands & Water and other groundwater users, would be maintained for the Modification, and given there would be no change to currently approved daily or annual extraction limits from the Bland Creek Palaeochannel Borefield, no additional impacts to other users of the Bland Creek Palaeochannel are predicted (Appendix A of the EA).

As no additional groundwater impacts are expected due to the Modification, there is considered to be no groundwater impacts as a result of the Modification that are sufficiently significant they would warrant inclusion in the CBA.

Notwithstanding, Evolution holds 3,650 ML per annum in Water Access Licenses (WALs) associated with use of the Bland Creek Palaeochannel Borefield. There is an opportunity cost associated with the holding of these licences. However, since there is no change in mine life with the Modification, this opportunity cost is a common cost between the "with" Modification scenario and the "without" Modification scenario.

Surface Water

No change to the existing lake isolation system that currently separates the CGO open pit from Lake Cowal (Appendix B of the EA) is required for the Modification.

A revised site water balance for the CGO incorporating the Modification has been prepared and considered the changes in catchment areas associated with the Modification (e.g. for the IWL) and proposed changes to the CGO water management infrastructure (Appendix B of the EA). No spills from contained water storages were predicted for the revised site water balance (Appendix B), including for contained water storages D1 and D4, which capture runoff from the outer batters of the northern and southern waste rock emplacements (Appendix B of the EA).

No causal link between the existing operations at the CGO and water quality in Lake Cowal has been identified (Appendix B of the EA). The Modification would not change the existing lake isolation system, or design objectives of the Internal Catchment Drainage System. Minor alterations to the Up-catchment Diversion System would occur to cater for the IWL. The soil stockpiles located to the north of ML 1535 (within MLA1) would have a dedicated sediment control system. Given the above, no impacts to surface water quality are predicted due to the Modification (Appendix B of the EA).

In comparison to the existing CGO, the only change to the existing catchment of Lake Cowal would be associated with the IWL development and the soil stockpile area located within MLA1. The catchment of the soil stockpile area is negligible (9,500 m2) of the 9,500 km^2 catchment area of Bland Creek (i.e. the main tributary to Lake Cowal). Runoff from the soil stockpile area would be released into local drainages ultimately reporting to Lake Cowal following settling of sediment in a sediment basin (Appendix B of the EA). Therefore, negligible impacts to the catchment or hydrology of Lake Cowal are predicted due to the Modification (Appendix B of the EA).

As no additional surface water impacts are expected due to the Modification, there is considered to be no surface water impacts as a result of the Modification that are sufficiently significant they would warrant inclusion in the CBA.

Notwithstanding, CGO water demand would continue to be met (in part) by sourcing water from the Lachlan River regulated flows. Evolution currently holds 80 ML per annum in high security WALs for surface water extraction from the Lachlan River and these would continue to be held with the Modification. However, with the Modification these WALs would be augmented by the purchase of temporary water on the Lachlan River of an additional 431 ML per annum. This is an additional economic cost of the Modification and has been included in the analysis by applying a value of temporary water from the Lachlan River of $120ML/a (http://www.wilkswater.com.au/temporary-water#LachlanValley).

Biodiversity

The Modification would result in the direct disturbance of approximately 287 ha of land associated with the IWL , Lake Cowal road realignment and duplication of the pipeline, including an area of an endangered ecological community (EEC) mapped to be within ML 1535 (Appendix C of the EA).

A biodiversity offset area of approximately 486 ha is proposed for the Modification. This proposed offset area is located on Evolution-owned land and forms part of an area of approximately 1,000 ha of Evolution-owned land that is periodically used for sheep and cattle grazing.

There is an opportunity cost associated with using this land for the biodiversity offset instead of continued grazing. An indicative estimate of the foregone agriculture production is provided by a typical farm budget for sheep production which indicates a gross margin per dry sheep equivalent (DSE) of between $37.92 and $58.50[4]. Assuming an indicative carrying capacity of 2.5 DSE per ha, the foregone gross margin from the offset land ranges from $48,350 to $74,600, per annum. Using a 7% discount rate the present value of foregone agriculture from the offset land, in perpetuity, is $0.7M to $1.1M.

In addition, there are capital and operating costs associated with establishment and management of the offset. These are estimated at $4,500 per ha in establishment costs and $53/ha/yr in management costs[5].

Because the offset land is owned by Evolution all the offsets costs have been added to the capital and operating costs of the Modification.

[4] E.g. NSW DPI Sheep Gross Margins Merino Ewes (18 micron) – Terminal Rams, NSW DPI Sheep Gross Margins Merino Ewes (20 micron) – Terminal Rams, NSW DPI Sheep Gross Margins Merino Ewes (218 micron) – Merino Rams, NSW DPI Sheep Gross Margins Merino Ewes (20 micron) – Merino Rams, NSW DPI Sheep Gross Margins Merino Wethers (20 micron), NSW DPI Sheep Gross Margins Merino Wethers (18 micron).

[5] NSW Forest Products Association (2014) *Submission on NSW Biodiversity Offsets Fund for Major Projects*.

The impacted vegetation, and associated fauna, is likely to have non-use values to the community that would be lost as a result of the Modification. These values could potentially be estimated using non-market valuation methods. Similarly, the provision of offsets is also likely to have non-use values to the community that would be gained as a result of the Modification. Provided the values held by the community for the offsets are equal or greater than values that would be lost then no additional economic costs warrant inclusion in the CBA. In this respect, it is noted that the biodiversity offset is required to improve or at least maintain biodiversity values.

It is recognised that to the extent that any residual biodiversity impacts occur after mitigation, biodiversity costs of the Modification included in the CBA will be understated. However, it is unlikely that any residual impacts would be material from an aggregate economic welfare perspective.

Aquatic Ecology

To date there have been no detectable adverse impacts on the ecology (vertebrates, invertebrates and flora) of Lake Cowal attributed to the CGO, based on long-term wetland bird monitoring and other fauna surveys such as fish monitoring (Appendix C of the EA).

Surface water monitoring indicates that site water is not affecting Lake Cowal and that there is also no obvious causal link between the mining operations and water quality in Lake Cowal (Appendix B of the EA).

Given the above, there are considered to be no aquatic ecology impacts as a result of the Modification that are sufficiently significant that they would warrant inclusion in the CBA.

Aboriginal Heritage

The Modification has the potential to impact Aboriginal heritage sites within Modification land disturbance areas (Appendix G of the EA). There is a continuous background scatter of stone artefacts and heat retainers in the vicinity of Lake Cowal, including the Modification area (Appendix D of the EA). Consequently, no new Aboriginal site types were found for the Modification and no economic impacts are included in the CBA.

Measures to avoid and minimise potential impacts to Aboriginal heritage are described in Section 4.4 of the EA. To the extent that any residual Aboriginal heritage impacts occur after mitigation, Aboriginal heritage costs of the Modification will be understated. However, it is unlikely that any residual impacts would be material from an aggregate economic welfare perspective.

Historical Heritage

The Modification would not impact any items of historical heritage and hence no impacts are included in the CBA.

Visual Impacts

Locations with potential views of the Modification landforms primarily include those that already have views of the CGO mine landforms (e.g. northern and southern waste rock emplacements).

Visual impacts of the Modification would be associated with the change to existing visual landscape (which includes the existing CGO) due to the expansion of CGO landforms, as well as continued use of night-lighting.

Visual impacts associated with mine landforms would decrease over time due the rehabilitation of the CGO with native grass, shrub and/or tree species consistent with those found in other elevated landforms in the region (i.e. which would reduce visual contrast with the surrounding landforms). The use of night-lighting would cease at mine closure.

Visual impacts would be most appreciable at the nearest privately owned dwellings with views of the Modification waste rock emplacements and IWL, noting that the maximum elevation of the IWL (245 m Relative Level [RL]) would be less than the approved northern and southern TSFs (264 and 272 m RL, respectively).

The potential impacts at the nearest private dwellings have been assessed as being low to moderate during the later years of the Modification and following rehabilitation, residual impacts would be low (Section 4.8 of the EA). Given this, there are considered to be no visual impacts that are sufficiently significant that they would warrant inclusion in the CBA.

It is recognised that to the extent that any residual visual impacts occur after mitigation, visual impacts of the Modification will be understated. However, it is unlikely that any residual impacts would be material from an aggregate economic welfare perspective.

Market Benefits to Workers

In standard CBA, the wages associated with employment are considered an economic cost of production with this cost included in the calculation of net production benefits (producer surplus). Where labour resources used in a project would otherwise be employed at a lower wage or would be unemployed a shadow price of labour is included in the estimation of producer surplus rather than the actual wage (Boardman et al. 2005). The shadow price of labour is lower than the actual wage and has the effect of increasing the magnitude of the producer surplus benefit of a project.

Estimation of this economic value of employment from the Modification requires a number of assumptions such as what proportion of the Modification workforce that would otherwise be unemployed or underemployed, the duration of time that this would occur and the opportunity cost of labour in an unemployed or underemployed state (i.e. the reservation wage rate).

Some indication of the potential magnitude of these benefits can be gained by making a number of assumptions. Following the approach of Streeting and Hamilton (1991), if it were assumed that 50% of the additional direct workforce of the Modification[6] (5 out of a total of 10 jobs) would otherwise be unemployed for three years and that the reservation wage for these people was $47,500[7] compared to a mining wage of $120,000, then the market employment benefit in terms of income would be $1M present value, at a 7% discount rate. Values at alternate discount rates and percentages of unemployed are provided in Table 2.3.

[6] All jobs sourced from NSW.

[7] As estimated by the unemployment benefits plus income tax payable on a mining wage, following the reservation wage rate approach used by Streeting and Hamilton (1991).

Table 2.3
Potential Economic Benefits to Workers Under Alternative Assumptions ($M)

	Discount Rate		
% Unemployed for 3 years	**4%**	**7%**	**10%**
50%	1.0	1.0	0.9
25%	0.5	0.5	0.5
75%	1.5	1.4	1.4
Wage premium benefit	**8.5**	**6.9**	**5.8**

If alternatively the economic benefit to workers is taken as the difference between the average wage in the region[8] $43,900 (ABS 2016) and the wage in the Modification i.e. $120,000 pa, over the life of the Modification, then the potential economic benefit to workers would be $6.9M, present value at 7% discount rate. These calculations exclude any consideration of search and retraining costs, scarring, stigma and physical and mental health effects of unemployment (Haveman and Weimer 2015).

Economic Benefits to Existing Landholders

Payments by the proponent for the purchase of land, that exceed the opportunity cost of the land, are an economic benefit to the landholder. However, no additional land needs to be purchased for the Modification and hence no additional benefits accrue to landholders. While historic land purchase costs may have been in excess of opportunity costs these can be considered "sunk" and do not vary with or without the Modification.

Economic Benefits to Suppliers

The focus of CBA is generally on primary costs and benefits i.e. first round impacts. Secondary net benefits that accrue to firms that sell to or buy from a project are ignored. This is because in a competitive market, all resources are assumed to be fully employed, and so increases in the production of goods and services required as inputs to the project will withdraw labour and raw materials from other industries. The additional net benefits (surpluses) to suppliers to the Modification will be offset by decreases in net benefits in other industries and so there is no net secondary benefit to the economy as a whole.

However, where the economy is not at full employment some benefits to suppliers may accrue. It is estimated that the Modification will result in average annual additional non-labour operating costs of $22M. Based on ratios for the Non Metallic Mineral Sector in the National Input-Output table and NSW Input-Output table, 87% and 70% of non-labour mining expenditure is captured within the National and NSW economies, respectively. Assuming a ratio of producer surplus to output of 20%[9] for industries supplying non-labour inputs, the indirect economic benefits to Australian and NSW suppliers would be in the order of $32M and $26M present value at 7% discount rate, respectively.

[8] ABS does not publish data on average wages by industry sector and therefore it is not possible to estimate the average wage of those not in the mining or quarrying industry.

[9] For all intermediate sectors in the NSW economy the ratio of gross operating surplus to output is 21%.

Net Public Infrastructure Impacts

All additional infrastructure requirements for the Modification relate directly to the mining operation and will be funded by Evolution. Potential impacts of the Modification on infrastructure include incremental impacts on road infrastructure and the use of utilities. The existing agreement with Councils includes annual contributions for local roads and community infrastructure impacted by the mine. The use of utilities will be paid for by user fees which are included in the Modification operating costs. Consequently, no net infrastructure costs to government are envisaged as a result of the Modification.

Loss of Surplus to Other Industries

No loss of surplus to other industries will occur as a result of the Modification, apart from a loss of producer surplus to Evolution from the use of 486 ha of land as an offset rather than for agricultural production. This economic cost has already been discussed above and included in the CBA.

2.5 CONSOLIDATION OF VALUE ESTIMATES

2.5.1 National Results

The present value of costs and benefits, using a 7% discount rate, is provided in Table 2.4. The main decision criterion for assessing the economic desirability of a project to society is its net present value (NPV). NPV is the present value of benefits less the present value of costs. A positive NPV indicates that it would be desirable from an economic perspective for society to allocate resources to the project, because the community as a whole would obtain net benefits from the project.

The Modification is estimated to have total net production benefits of $83M (present value at 7% discount rate). Evolution is an Australian gold miner that, based on shareholder analysis, is approximately 60% Australian owned. Hence, the components of the net production benefits that accrue to Australia are royalties, company tax (assuming a 30% company tax rate) and 60% of the residual net production benefits. On this basis, the net production benefits that accrue to Australia are estimated at $62M (present value at 7% discount rate).

The estimated net production benefits that accrue to Australia can be used as a threshold value or reference value against which the relative value of the residual environmental impacts of the Modification, after mitigation, may be assessed. This threshold value is the opportunity cost to society of not proceeding with the Modification. The threshold value indicates the price that the community must value any residual environmental impacts of the Modification (be willing to pay) to justify in economic efficiency terms the no development option.

For the Modification to be questionable from an economic efficiency perspective, all incremental residual environmental impacts from the Modification, that impact Australia[10], would need to be valued by the community at greater than the estimate of the Australian net production benefits i.e. greater than $62M. This is equivalent to each household in the Region i.e. local government areas (LGAs) of Forbes, Lachlan and Bland, valuing residual environmental impacts at $6,900. The equivalent figure for NSW and Australian households is $22 and $7, respectively.

[10] Consistent with the approach to considering net production benefits, environmental impacts that occur outside Australia would be excluded from the analysis. This is mainly relevant to the consideration of greenhouse gas impacts.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to qualitatively consider and where possible quantify the main environmental, cultural and social impacts. From Section 2.4 it is evident that the main potential impacts of the Modification are internalised into the production costs of the Modification through mitigation measures, offsets (biodiversity) and water allocation costs (temporary WAL allocation transfers or purchase of WALs). Other costs not already included in the production costs of the Modification are associated with greenhouse gas costs, although from Table 2.4 it is evident that these impacts to Australia are small, considerably less than the estimated net production benefits of the Modification to Australia. There may also be wage benefits to employment and benefits to suppliers.

Overall, the Modification is estimated to have net social benefits to Australia of $101M and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Modification CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $101M for the Modification to be questionable from an Australian economic efficiency perspective.

Table 2.4
CBA Results of the Modification (Present Values at 7% Discount Rate) - Australia

	COSTS	$M*	BENEFITS	$M*
Production[1]	Opportunity cost of land	$0		
	Opportunity cost of capital	$0	Revenue	$258
	Capital cost	-$36	Additional residual value of land and capital	$0
	Operating costs (ex royalties)	$212		
	Additional decommissioning costs at cessation of the Modification	$0		
	Production Sub-total	***$175***	-	***$258***
	Total Net Production Benefits	-	-	***$83***
	Australian Net Production Benefits			***$62***
Australian Externalities	Greenhouse gas emissions	$0.4	Wage benefits to employment	$7
	Operational noise	Negligible*	Economic benefits to existing landholders	$0
	Road transport	Negligible*	Economic benefits to suppliers	$32
	Road transport noise	Negligible*		
	Blasting	Negligible*	-	-
	Air quality	Negligible*	-	-
	Surface water and groundwater	Additional WALs (or temporary transfers). Cost included in operating costs	-	-
	Flora and fauna	Some loss of values but offset. Cost of offset included in capital and operating cost	-	-
	Aquatic ecology	Negligible*		
	Aboriginal heritage	Negligible*	-	-
	Non-Aboriginal heritage	Negligible*	-	-
	Visual impacts	Negligible*	-	-
	Net public infrastructure costs	NA		
	Loss of surplus to other industries	Agricultural impacts of offsets, included as a cost to Evolution		
	Externalities sub-total	***$0.4***	-	***$39***
AUSTRALIAN NET SOCIAL BENEFITS				**$101**

[1] Production costs and benefits in accordance with data provided by Evolution.
* From an aggregate economic efficiency perspective
** Totals may have minor discrepancies due to rounding.

2.5.2 New South Wales Costs and Benefits

The NSW Government (2015) guidelines have a particular focus on the costs and benefits to NSW. Table 2.5 identifies the costs and benefits to NSW. Impacts that have a national dimension are apportioned to NSW, in particular:

- 32% of the estimated company tax generated from the Modification is attributed to NSW based on NSW's share of the Australian population (NSW Guidelines 2015);
- 32% of the residual net producer surplus to Australia i.e. net production benefits minus company tax minus royalties, is attributed to NSW based on NSW's share of the Australian population;
- 100% of potential wages benefits are attributable to NSW based on an assumption that all incremental employment will be filled by NSW residents;
- 80% of benefits to suppliers is attributed to NSW, based on input-output analysis of the Non Metallic Mineral Mining sector for Australia and NSW. This shows that 87% of non-labour inputs for the Australian Non Metallic Mineral sector are sourced from Australia and that 70% of the non-labour inputs for the NSW Non Metallic Mineral sector are sourced from NSW. NSW's share of the Australian benefits to suppliers is 70%/87% i.e. 80%;
- 32% of Australian greenhouse gas impacts are attributed to NSW based on NSW's share of the Australian population; and
- all other potential environmental, social and cultural impacts would accrue to NSW households. However, in accordance with Government policy and regulation these impacts are largely mitigated, compensated or offset by the proponent.

On this basis, the costs and the benefits of the Modification to NSW are summarised in Table 2.5. The estimated Net Social Benefits of the Modification to NSW are $60M, present value at 7% discount rate. Consequently, as well as resulting in net benefits to Australia, the Modification would also result in net benefits to NSW.

Any unquantified residual impacts of the Modification to NSW after mitigation, offsetting and compensation would need to be valued at greater than $60M, present value for the Modification to be questionable from a NSW economic efficiency perspective.

Table 2.5
NSW Cost Benefit Analysis Results of the Modification (Present Values at7% discount rate)

COSTS	NPV	BENEFITS	NPV
Direct costs		**Net direct benefits**	
		Net producer surplus	10
		Royalties	10
		Company tax	7
Total direct costs	**-**	***Total direct benefits***	***27***
Indirect costs		**Indirect benefits**	
Greenhouse gas emissions	0.1	Net economic benefits to landholders	0
Operational noise	Negligible*	Net economic benefits to workers	7
Road transport	Negligible*	Net economic benefits to suppliers	26
Road transport noise	Negligible*		
Blasting	Negligible*		
Air quality	Negligible*		
Surface water and groundwater	Additional WALs or temporary transfers. Cost included in operating costs		
Flora and fauna	Some loss of values but offset. Cost of offset included in capital and operating cost		
Aquatic ecology	Negligible*		
Aboriginal heritage	Negligible*		
Non-Aboriginal heritage	Negligible*		
Visual impacts	Negligible*		
Net public infrastructure costs	NA		
Loss of surplus to other industries	Agricultural impacts of offsets, included as a cost to Evolution		
Total indirect costs	***0.1***	***Total indirect benefits***	***33***
Total costs	**0.1**	**Total benefits**	**60**
		NSW Net social benefits	**60**

* "Negligible" does not mean that there will be no impacts but impacts are not likely to amount to more than 5% of the quantified net production benefits of the Modification.

2.6 DISTRIBUTION OF NSW COSTS AND BENEFITS

CBA is primarily concerned with the single objective of economic efficiency. CBA and welfare economics provide no guidance on what is a fair, equitable or preferable distribution of costs and benefits. Nevertheless, CBA can provide qualitative and quantitative information for the decision-maker on how economic efficiency costs and benefits are distributed.

The costs and benefits of the Modification to NSW are potentially distributed among a range of stakeholders as identified in Table 2.6.

Table 2.6
Incidence of NSW Costs and Benefits

BENEFITS AND COSTS	INCIDENCE OF COSTS AND BENEFITS	MAGNITUDE OF IMPACT ($M)
Share of Net Production Benefits		
Net producer surplus	Evolution Mining NSW shareholders	$10
Royalties	NSW Government and NSW households	$10
Company tax	NSW Government and NSW households	$7
Additional benefits		
Wage benefits to employment	Some of the local and NSW labour force	$7
Economic benefits to existing landholders	Local landholders who sell land required for the Modification including buffer land	$0
Economic benefits to suppliers	Regional and State suppliers of inputs to production	$26
Environmental, social and cultural costs*		
Greenhouse gas impacts	Local and NSW households	$0.1
Operational noise	Adjoining landholders	Negligible
Road transport	Local residents	Negligible
Road transport noise	Local residents	Negligible
Blasting	Adjoining landholders	Negligible
Air quality	Adjoining landholders	Negligible
Surface water and groundwater	Local surface water users but compensated via purchase of WALs or payment for temporary transfers	Cost included in operating costs
Flora and fauna	Local and NSW households	Some loss of values but offset by provision of biodiversity offsets
Aquatic ecology	Local and NSW households	Negligible
Aboriginal heritage	Aboriginal people and other local and NSW households	Negligible
Non-Aboriginal heritage	Local and NSW households	Negligible
Visual amenity	Adjoining landholders	Negligible
Net public infrastructure costs	NSW Government and NSW households	Negligible
Loss of surplus to other industries	Evolution Mining NSW shareholders as agricultural production on its land is displaced for offsets	Cost included in operating cost

* NSW regulations require many impacts to be borne by the proponent via mitigation, offset and compensation. Where these measures perfectly mitigate, offset or compensate then no residual impacts occur and all impacts are borne by the proponent. This table identifies who bears residual impacts where mitigation, offset and compensation is imperfect.

2.7 RISK AND SENSITIVITY ANALYSIS

The main areas of environmental risks associated with mining projects relate to:

- the financial viability of a project from unexpected downturns in prices and any consequent environmental impacts from premature cessation of operations;
- ecological risk associated with whether the biodiversity offsets will adequately compensate for the direct ecological impacts; and
- other environmental, social and cultural impact estimations and required mitigation measures.

The NSW Department of Planning and Environment has previously identified that the financial viability of projects is a risk assumed by the project owners. Nevertheless, it should be noted that it is highly unlikely that Evolution would invest in the Modification if it were not financial viable. However, any risk that the Modification may commence and then cease operation for financial reasons leaving unmet rehabilitation liabilities is mitigated by the fact that Evolution is required to pay a rehabilitation security deposit to the Division of Resources and Geosciences (DRG) as the holder of a mining authority under the *Mining Act, 1992*. This security deposit is held by DRG to ensure that the legal obligations in relation to rehabilitation and safety of the site can be met following mine closure. If rehabilitation obligations are not met to the satisfaction of the Minister, then the security funds would be used by DRG to meet the relevant requirements.

The provision of biodiversity offsets can be associated with a number risks, including in relation to the biodiversity benefits of additional management of offsets, success in reconstruction of ecological communities, time-lags between impacts and provision of offsets as well as between management actions and achievement of ecological outcomes. These risks are mitigated through offset ratio requirements in the provision of offsets and commitment to the offset actions prior to the commencement of works under approval. The biodiversity offset package, with an appropriate offset ratio to account for ecological risks is being developed in consultation with the NSW Office of Environment and Heritage.

There is some risk associated with the estimation of environmental, social and cultural impacts of the Modification and the level of mitigation measures proposed. However, it should be noted that impacts have generally been assessed based on the maximum annual levels of production and hence are likely to be overstated. Ongoing monitoring will ensure that appropriate mitigation measures are implemented as required.

The net present value of the Modification to NSW (presented in Table 2.5) is based on a range of assumptions around which there is some level of uncertainty. Uncertainty in a CBA can be dealt with through changing the values of critical variables in the analysis (James and Gillespie 2002) to determine the effect on the NPV[11].

In this sensitivity analysis, the CBA results for NSW were tested for changes to the following variables at a 4%, 7% and 10% discount rate:

- operating costs;
- capital costs;
- revenue;
- production levels;
- greenhouse costs;
- benefits to workers; and
- benefits to suppliers.

[11] Quantitative risk analysis could also potentially be undertaken. However, this requires information on the probability distributions for input variables in the analysis. This information is not available and so the sensitivity testing is limited to uncertainty analysis.

Results are reported in Tables 2.7. What this analysis indicates is that CBA is most sensitive to changes in revenue (reflecting production levels, the value of gold in USD and the USD/ AUD exchange rate) and operating costs. This is because the net benefit of the Modification to NSW is dominated by the components of net production benefits i.e. net producer surplus, royalties and company tax, which are based on the net revenue of the Modification. Variations in net revenues impact company tax estimates, only a portion of which accrue to NSW, the residual net producer surplus which accrues to Evolution and its shareholders, and royalties which accrue to the NSW Government.

The sensitivity analysis indicated that the CBA results are not sensitive to changes in capital costs, or environmental costs that have not already been internalised into production costs, such as greenhouse gas. Since mitigation, offset and compensation costs are a small component of the capital and operating costs of the Modification, it is unlikely that large changes in these cost levels would have any significant impact on the CBA results. Benefits to suppliers is a significant benefit of the Modification and so changes do significantly impact the results.

Under all scenarios examined, the Modification has net social benefits to NSW.

Table 2.7
NSW CBA Sensitivity Testing (Present Value $M)

	4% Discount Rate	7% Discount Rate	10% Discount Rate
CENTRAL ANALYSIS	**71**	**60**	**51**
INCREASE			
Capital costs - 20%	73	61	52
Operating costs or production levels - 20%	58	50	43
Revenue - 20%	86	73	62
Greenhouse gas costs - 20%	71	60	51
Benefit to suppliers - 20%	77	65	55
Benefits to workers - 20%	72	61	52

	4% Discount Rate	7% Discount Rate	10% Discount Rate
DECREASE			
Capital costs - 20%	68	58	50
Operating costs or production levels - 20%	83	69	59
Revenue - 20%	55	46	39
Greenhouse gas costs - 20%	71	60	51
Benefit to suppliers - 20%	64	54	47
Benefits to workers - 20%	69	58	50

3 REGIONAL ECONOMIC IMPACT ASSESSMENT

3.1 INTRODUCTION

The CBA in Section 2 is concerned with whether the incremental benefits of the Modification exceed the incremental costs and therefore whether the community would, in aggregate, be better off 'with' the Modification compared to 'without' it. In contrast, the focus of the regional economic impact assessment is to assess:

- the significance of the CGO to the regional economy; and
- the additional regional economic impacts of the Modification.

3.2 THE REGIONAL ECONOMY

The role of regions in national economies has changed significantly as a result of globalization and associated structural adjustment. The resultant trends in regional economies of NSW include:

- loss of significant industries such as abattoirs and timber mills from many rural areas;
- increased mechanisation of agriculture and aggregation of properties, resulting in loss of employment opportunities in this industry;
- growth of regional centres, at the expense of smaller towns;
- preference of Australians for coastal living, particularly for retirement; and
- preference of many of today's fastest growing industries for locating in large cities (Collits 2001).

The result is that there has been:

- Declining population in 28 out of 79 rural LGAs that are located in non-coastal areas in NSW (ABS 1410.0 - Data by Region 2011-16). There has also been a decline in the population of smaller towns even in regions where the population has been growing.
- A narrowing and deepening of regional industrial activity i.e. production of fewer different types of goods and services and devotion of a greater proportion of the workforce to the region's specialisations.
- Regional specialisations based on physical (agricultural land, minerals, amenity, location), institutional (governance, leadership, cultural), labour (skills, quantity, price, interactions) or technology (Research & Development, spillovers) endowments.

The regional economy of importance to the CGO comprises the LGAs of Lachlan, Forbes and Bland. The population of this region has declined since 2006 - refer to Table 3.1. Only the Forbes LGA has experience population growth between 2006 and 2016. Notwithstanding, Bland LGA also experienced population growth between 2011 to 2016.

Table 3.1
Regional Population Growth

	2006	2011	2016	Growth 2006 - 2016	Growth 2011 - 2016
Forbes	9,361	9,169	9,587	226	418
Lachlan	6,672	6,477	6,194	-478	-283
Bland	6,098	5,862	5,955	-143	93
Total Region	**22,131**	**21,508**	**21,736**	**-395**	**228**

At the same time the number of employed usual residents of the region has declined, including in all LGAs except Forbes - refer to Table 3.2.

Table 3.2
Regional Employment Growth of Usual Residents

	2006	2011	2016	Growth 2006 - 2016	Growth 2011 - 2016
Forbes	3,837	3,885	3,944	107	59
Lachlan	2,838	2,854	2,472	-366	-382
Bland	2,796	2,695	2,541	-255	-154
Total Region	**9,471**	**9,434**	**8,957**	**-514**	**-477**

Employment working in the region has grown between 2011 and 2016 although employment in the Lachlan LGA has declined - refer to Table 3.3.

Table 3.3
Regional Employment Growth in the Region

	2011	2016	Growth 2011 to 2016
Forbes	3,443	3,855	412
Lachlan	2,553	2,347	-206
Bland	2,548	2,599	51
Total Region	**8,544**	**8,801**	**257**

Employment by Australian and New Zealand Standard Industry Classification (ANZSIC, 2006) industries for the region is shown in Figure 3.1. This shows:

- the significance of Agriculture, Forestry and Fishing to the all LGAs in the region;
- the significance of Education and Training, Health Care and Social Assistance, and Retail to the region, particularly to the Forbes LGA; and
- the significance of Mining employment to the Bland LGA.

This understates the significance of the mining sector to the region as mining is labour intensive and hence its significance to the region in terms of other economic indicators such as wages and value-added would be greater than represented in Figure 3.1.

Figure 3.1
Employment in the Region by Industry Sector

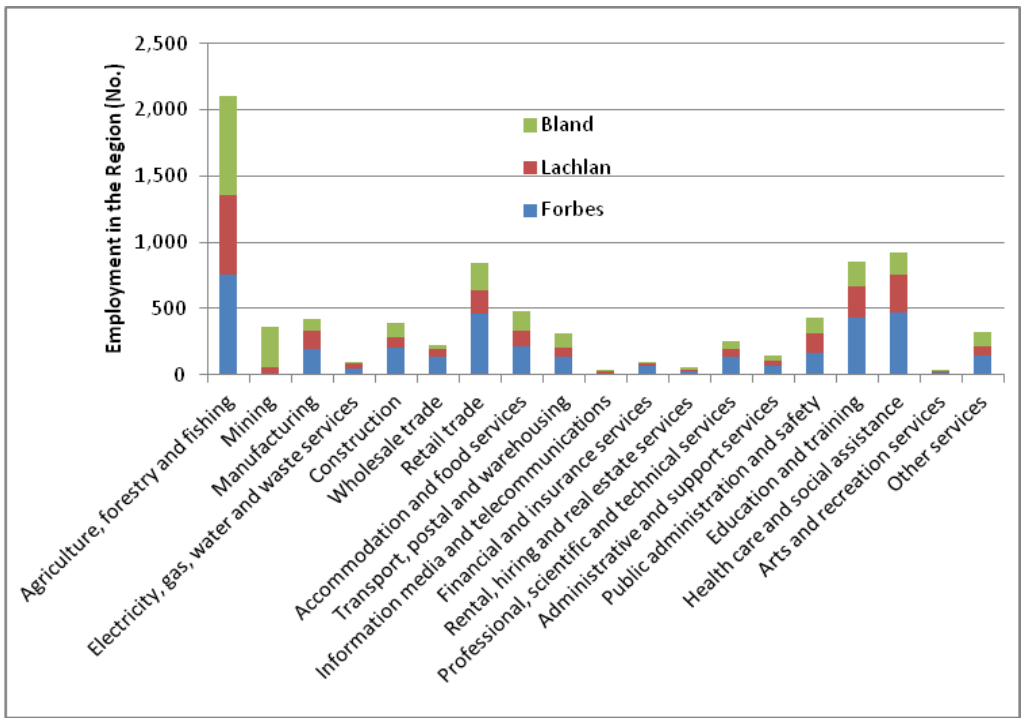
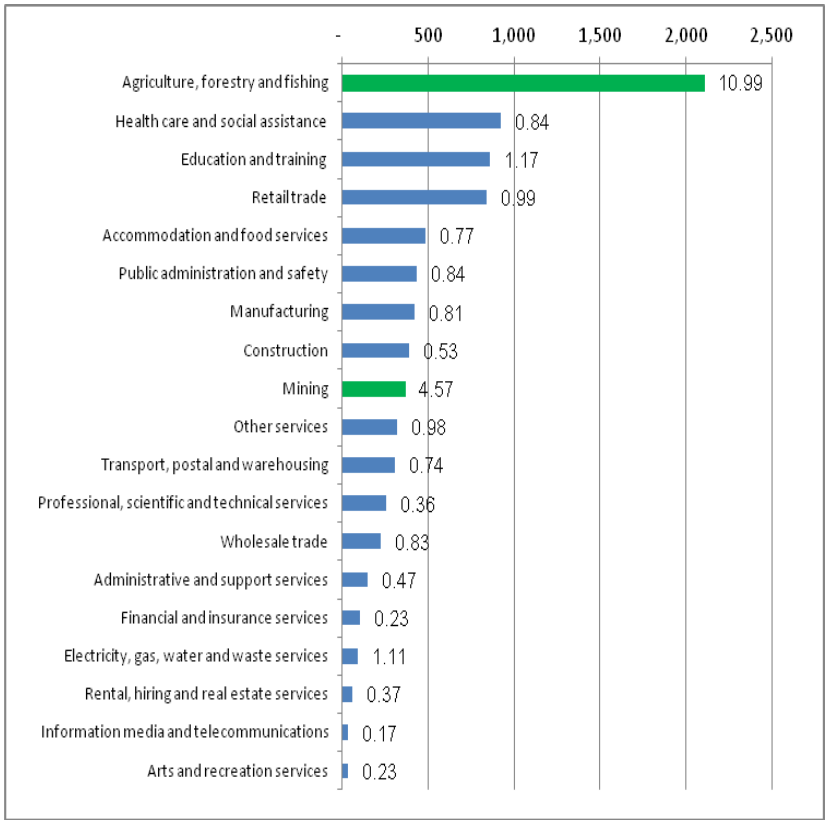


Figure 3.2 ranks employment in the region by ANZSIC industry sectors and shows the growth of these sectors between 2011 and 2016 and the regional location quotients (LQs) of the sectors. Location quotients provide an indication of employment concentration in industry sectors in the regional economy compared with the same industry sectors across NSW. The higher the LQ, the more specialised a region is in that industry relative to the rest of NSW. A LQ of greater than 1.25 is considered to indicate a regional industry specialisation. The NSW Government in the development of regional economic development strategies has identified that it is specialisation sectors, which have a reliance on local endowments and are traded outside the region (i.e. exported), that are the engines of growth for regional economies. These are the sectors that should be the focus of strategies to enhance the economic development of regions.

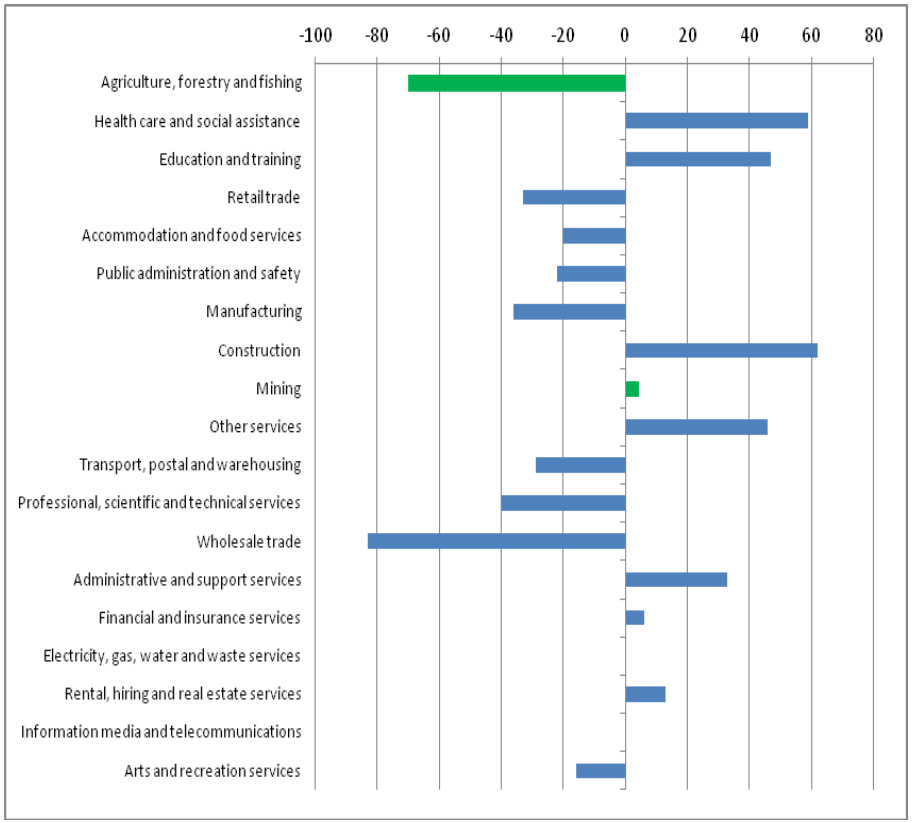
Figure 3.2 indicates the significance of the Agriculture, Forestry and Fishing sector for employment in the region. Notwithstanding, this sector has contracted from 2011 to 2016. Growth sectors in the regional economy between 2011 and 2016 include Health Care and Social Assistance, Education and Training, Construction, Mining, Other Services, Administrative and Support Services, Financial and Insurance Services and Rental, Hiring and Real Estate Services. Construction and Rental, Hiring and Real Estate Services may partly also reflect mining activity in the region, as these are normal input sectors to mining activity. The analysis indicates that at the One Digit ANZSIC level, the region has a strong specialisation in Agriculture, Forestry and Fishing, and Mining. This reflects the regions land capability and mineral endowments.

Figure 3.2 Employment in the Region by Industry, Growth Between 2011 and 2016 and Industry Location Quotient

Employment by Sector and Location Quotients 2016



Employment Growth 2011 to 2016



3.3 REGIONAL ECONOMIC IMPACT OF THE MODIFICATION

Regional economic activity can be measured in terms of a range of economic indicators such as business turnover, value-added, wages and employment. Regional economic activity associated with the CGO arise from:

- the CGO itself being located within the region and the direct economic activity that it brings including direct employment and wages;
- expenditure by the CGO on inputs to production that can be sourced from the region such as repairs and maintenance etc.; and
- expenditure of employee wages in the regional economy.

The Modification will not extend the life of the CGO. However, it will have five main potential impacts for the regional economy:

- Increase the profitability of the CGO and hence its resilience to external shocks such as declines in gold prices. This increases the certainty around the CGO continuing to provide economic activity to the region.
- Increases the non-labour operating costs of the CGO by on average $22M per annum. To the extent that some of this can be captured by regional suppliers, there will be increased economic activity in the regional economy.
- Increase in permanent employment and wages in the region. The average workforce employed at the CGO is currently approximately 385 people (including Evolution staff and on-site contractor's personnel). During peak periods, the CGO employs up to 435 people. The Modification will result in a minor increase (approximately 10 people) to the average and peak workforce employed at the CGO. Provided these jobs are filled by the local workforce or people migrating into the region, it will add to the economic activity in the region.
- Increase in short term employment and economic activity in the region during construction. In 2019 there will be a short term construction period involving up to 100 people for the road and pipeline construction. While the majority of the workforce are likely to only temporarily locate in the region, accommodation and other expenditure of these workers will add to the economic activity in the region.
- A small loss in economic activity as agricultural land is preserved as an offset.

3.4 REGIONAL ECONOMIC IMPACT OF THE MODIFICATION CESSATION

Cessation of mining operations can have adverse regional economic impacts, as wages and expenditure are withdrawn from the local and regional economy. The Modification will not change the timing of CGO cessation, but the Modification will increase the wages and expenditure in the local and regional economy and hence the magnitude of the impacts of cessation would be greater than under the base case. Consistent with the existing CGO Development Consent (DA 14/98), prior to closure of the CGO, it is recommended that Evolution works with local shire councils and the community to prepare a workforce phase-out plan to minimise potential impacts associated with CGO employment cessation.

4 EMPLOYMENT, POPULATION AND COMMUNITY INFRASTRUCTURE ASSESSMENT

Changes in the workforce and population of a region may well have implications in relation to access to community infrastructure and human services, which includes for example housing, health and education facilities. This may include the number of services that are available to be used and the accessibility of the population to these services.

Additional employment associated with the Modification may be sourced from:

- the local region either from:
  - the unemployment pool; or
  - workers from other industries; and/or
- in-migration or commuters.

Sourcing labour from the local region has minimal direct impact on local community infrastructure and services since it results in no changes to the regional population and hence demand for services. It may, however, have an indirect impact on some local community infrastructure and services where changes in employment status or income result in changes in demand for some particular services (e.g. health services).

Whether local labour is sourced from the unemployment pool or from other industries, it can reduce unemployment levels - directly in the case of employing unemployed people and indirectly via the job chain effect[12] where labour is sourced from other industries.

The impact of commuter workers will depend on the extent to which they spend money in the regional economy, however, is likely to be modest.

In-migration, resulting in population change is likely to have the greatest potential impact on demand for community services and infrastructure with this impact dependent on the new residential location of the migrating workforce and their families and the capacity of the local region to provide the services required.

As well as direct employment and population changes, mining projects may also generate indirect labour demand through expenditure by employees in the local region and expenditure by mines in the local region on other inputs to production. This induced demand for labour may also have consequences for population change and demand for community infrastructure and services.

Average household size in the region is 2.4. Ten additional direct permanent jobs may be associated with a potential direct population increase of 24 people. In addition, there may be population change linked to induced demand for labour. However, this maximum potential population change should be considered within the context of recent population changes to the region.

[12] The job chain effect refers to the situation where labour is sourced from other industries in the region making jobs available in those industries which are subsequently filled by people either from the unemployment pool or other industries with the latter making jobs available in that industry, etc.

The region, and particularly Lachlan and Bland LGAs, has been experiencing long term population decline. Between 2006 and 2016, the population of the region declined by 395 people, with a decline in population of 478 and 143 for the LGAs of Lachlan and Bland, respectively. This is likely to have resulted in some spare capacity in community infrastructure and services. Consequently, any additional minor population gain in the region is unlikely to place any strain on existing community infrastructure. In contrast, it may slow the decline of the regional population and hence slow any overall decline in the provision of community infrastructure and services to the region.

In 2019, there will be a short-term construction period involving up to 100 people for the road and pipeline construction. The majority of these workforce are likely to only temporarily locate in the region. This will increase demand for temporary accommodation but is unlikely to have any significant implications for community infrastructure and human services.

Consistent with the existing CGO Development Consent (DA 14/98), prior to closure of the CGO, it is recommended that Evolution works with local shire councils and the community to prepare a workforce phase-out plan to minimise potential impacts associated with CGO employment cessation.

5 CONCLUSION

A CBA of the Modification indicated that it would have net production benefits to Australia of $62M and net production benefits to NSW of $27M. Provided the residual environmental, social and cultural impacts of the Modification that accrue to Australia are considered to be valued at less than $62M, or those that accrue to NSW are considered to be valued at less than $27M, the Modification can be considered to provide an improvement in economic efficiency and hence is justified on economic grounds.

Instead of leaving the environmental, cultural and social impacts unquantified an attempt was made to quantify them. The opportunity cost, capital and operating costs of biodiversity offsets, and costs of purchasing additional WALs or temporary transfers were included as direct costs to Evolution. The main quantifiable environmental impacts of the Modification, which have not already been incorporated into the estimate of net production benefits, relate to greenhouse gas emissions. These impacts to Australia and NSW are estimated at $0.4M and $0.1M, respectively, considerably less than the estimated net production benefits of the Modification. There are also indirect benefits of the Modification to workers and suppliers.

Overall, the Modification is estimated to have net social benefits to Australia and NSW of $101M and $60M, respectively, and hence is desirable and justified from an Australian and NSW economic efficiency perspective.

While the main environmental, cultural and social impacts have been quantified and included in the Modification CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $101M and $60M for the Modification to be questionable from an Australian and NSW economic efficiency perspective, respectively.

The regional economy, comprising Lachlan, Forbes and Bland LGAs, has declined in population since 2006, at the same time that employment in the region has grown. Location quotient analysis shows that the region has a strong specialisation in Agriculture, Forestry and Fishing, and Mining. This reflects the regions land capability and mineral endowments. The NSW Government has identified that it is specialisation sectors, which have a reliance on local endowments and are traded outside the region i.e. exported, that are the engines of growth for regional economies. These are the sectors that should be the focus of strategies to enhance the economic development of regions. Hence, the CGO is an important driver of the regional economy.

Regional economic activity associated with the CGO arise from:

- the CGO operation itself being located within the region and the direct economic activity that it brings including direct employment and wages;
- expenditure by the CGO on inputs to production that can be sourced from the region such as repairs and maintenance etc.; and
- expenditure of employee wages in the regional economy.

The Modification will not extend the life of the CGO. However, it will have five main potential impacts for the regional economy:

- Increase the profitability of the CGO and hence its resilience to external shocks such as declines in gold prices. This increases the certainty around the CGO continuing to provide economic activity to the region.

- Increases the non-labour operating costs of the CGO by on average $22M per annum. To the extent that some of this can be captured by regional suppliers, there will be increased economic activity in the regional economy.
- Increase in permanent employment and wages in the region. The average workforce employed at the CGO is currently approximately 385 people (including Evolution staff and on-site contractor's personnel). During peak periods, the CGO employs up to 435 people. The Modification will result in a minor increase (approximately 10 people) to the average and peak workforce employed at the CGO. Provided these jobs are filled by the local workforce or people migrating into the region, it will add to the economic activity in the region.
- Increase in short term employment and economic activity in the region during construction. In 2019 there will be a short term construction period involving up to 100 people for the road and pipeline construction. While the a majority of the workforce are likely to only temporarily locate in the region, accommodation and other expenditure of these workers will add to the economic activity in the region.
- A small loss in economic activity as agricultural land is preserved as an offset.

Any changes in the workforce and populations of regions and towns may have implications in relation to access to community infrastructure and human services, which includes for example housing, health and education facilities. The Modification will result in ten additional direct jobs which may be associated with a potential direct population increase of 24 people. The region, and particularly Lachlan and Bland LGAs, has been experiencing long term population decline. This is likely to have resulted in some spare capacity in community infrastructure and services. Consequently, any additional minor population gain in the region is unlikely to place any strain on existing community infrastructure. In contrast, it may slow the decline of the regional population and hence slow any overall decline in the provision of community infrastructure and services to the region. Temporary employment during construction will likely increase demand for temporary accommodation but is unlikely to have any significant implications for community infrastructure and human services.

Consistent with the existing CGO Development Consent (DA 14/98), prior to closure of the CGO, it is recommended that Evolution works with local shire councils and the community to prepare a workforce phase-out plan to minimise potential impacts associated with CGO employment cessation.

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ATTACHMENT 1 - COST BENEFIT ANALYSIS

Introduction to CBA

Cost Benefit Analysis (CBA) has its theoretical underpinnings in neoclassical welfare economics. Applications in New South Wales (NSW) are guided by these theoretical foundations as well as the NSW Treasury (2017). CBA applications within the NSW environmental assessment framework are further guided by the NSW Government (2015) *Guidelines for the economic assessment of mining and coal seam gas projects*. .

CBA is concerned with a single objective of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and governments i.e. economic efficiency. It provides a comparison of the present value of aggregate benefits to society, as a result of a project, policy or program, with the present value of the aggregate costs. These costs and benefits are defined and valued based on the microeconomic underpinnings of CBA. In particular, it is the values held by individuals in the society that are relevant, including both financial and non-financial values. Provided the present value of aggregate benefits to society exceed the present value of aggregate costs (i.e. a net present value of greater than zero), the project is considered to improve the well-being of society and hence is desirable from an economic efficiency perspective.

While CBA can provide qualitative and quantitative information on how costs and benefits are distributed, welfare economics and CBA are explicitly neutral on intra and intergenerational distribution of costs and benefits. There is no welfare criterion in economics for determining what constitutes a fair and equitable distribution of costs and benefits. Judgements about equity are subjective are therefore left to decision-makers.

Similarly CBA does not address other objectives of the EP&A Act and governments. Decision-makers therefore need to consider the economic efficiency implications of a project, as indicated by CBA, alongside the performance of a project in meeting other conflicting goals and objectives of the EP&A Act and government.

Definition of Society

CBA includes the consideration of costs and benefits to all members of society i.e. consumers, producers and the broader society as represented by the government.

As a tool of investment appraisal for the public sector, CBA can potentially be applied across different definitions of society such as a local area, state, nation or the world. However, most applications of CBA are performed at the national level. This national focus extends the analysis beyond that which is strictly relevant to a NSW government planning authority. However, the interconnected nature of the Australian economy and society creates significant spill-overs between States. These include transfers between States associated with the tax system and the movement of resources over state boundaries.

Nevertheless, "where major impacts spill over national borders, then CBA should be undertaken from the global as well as the national perspective" (Boardman *et al.,* 2001). For mining projects, impacts that spill over national borders include greenhouse gas costs and benefits to foreign owners.

CBA at a sub-national perspective is not recommended as it results in a range of costs and benefits from a project being excluded, making CBA a less valuable tool for decision-makers (Boardman *et al*., 2001).

CBAs of mining projects are therefore often undertaken from a global perspective i.e. including all the costs and benefits of a project, no matter who they accrue to, and then truncated to assess whether there are net benefits to Australia. A consideration of the distribution of costs and benefits can then be undertaken to identify the benefits and costs that accrue to NSW and other regions.

However, a project is considered to improve the well-being of society if it results in net benefits to the nation, even if it results in net costs to the local area.

Definition of the Project Scope

The definition of the project for which approval is being sought has important implications for the identification of the costs and benefits of a project. Even when a CBA is undertaken from a global perspective, and includes costs and benefits of a project that accrue outside the national border, only the costs and benefits associated with the defined project are relevant. For coal mining projects, typically only the costs and benefits from mining the coal and delivering it to Port or domestic users, are relevant.

Coal is an intermediate good i.e. it is an input to other production processes such as production of electricity and steel making. However, these other production processes themselves require approval and, in CBA, would be assessed as separate projects.

Net Production Benefits

CBA of mining proposals invariably involves a trade-off between:

- the net production benefits of a project; and
- the environmental, social and cultural impacts (most of which are costs of mining but some of which may be benefits).

Net production benefits can be estimated based on market data on the projected financial[13] value of coal less the capital and operating costs of projects, including opportunity costs of capital and land already in the ownership of mining companies. This is normally commercial in confidence data provided by the proponent. Production costs and benefits over time are discounted to a present value.

Environmental, Social and Cultural Impacts

The consideration of non-market impacts in CBA relies on the assessment of other experts contributing information on the biophysical impacts. The environmental impact assessment process results in detailed (non-monetary) consideration of the environmental, social and cultural impacts of a project and the proposed means of mitigating the impacts.

At its simplest level, CBA may summarise the consequences of the environmental, social and cultural impacts of a project (based on the assessments in the relevant assessment document), for people's well-being. These qualitatively described impacts can then be considered alongside the quantified net production benefits, providing important information to the decision-maker about the economic efficiency trade-offs involved with a project.

[13] In limited cases the financial value may not reflect the economic value and therefore it is necessary to determine a shadow price for the coal.

These environmental, social and cultural impacts generally fall into three categories, those which:

- can be readily identified, measured in physical terms and valued in monetary terms;
- can be identified and measured in physical terms but cannot easily be valued in money terms; and
- are known to exist but cannot be precisely identified, measured or value (NSW Treasury, 2007).

Impacts in the first and second category can potentially be valued in monetary terms using benefit transfer or, subject to available resources, primary non-market valuation methods. Benefit transfer involves using information on the physical magnitude of impacts and applying per unit value estimates obtained from non-market valuation studies undertaken in other contexts.

Primary non-market valuation methods include choice modelling and the contingent valuation method where a sample of the community is surveyed to ascertain their willingness to pay to avoid a unit change in the level of a biophysical attribute. Other methods include the property valuation approach where changes in environmental quality may result in changes in property value.

In attempting to value the impacts of a project on the well-being of people there is also the practical principle of materiality. Only those impacts which are likely to have a material bearing on the decision need to be considered in CBA (NSW Government, 2012).

Where benefits and costs cannot be quantified these items should be included in the analysis in a qualitative manner (NSW Treasury, 2007).

Consideration of Net Social Benefits

The consideration of the net social benefits of a project combines the value estimate of net production benefits and the qualitative and quantitative estimates of the environmental, social and cultural impacts.

In combining these considerations it should be noted that the estimates of net production benefits of a project generally includes accounting for costs aimed at mitigating, offsetting or compensating for the main environmental, social and cultural impacts. This includes the costs of purchasing properties adversely affected by noise and dust, providing mitigation measures for properties moderately impacted by noise and dust, the costs of providing ecological offsets and the cost of purchasing groundwater and surface water entitlements in the water market etc. Including these costs effectively internalises the respective and otherwise, non-monetary environmental, social and cultural costs. To avoid double counting of impacts, only residual impacts, after mitigation, offset and compensation, require additional consideration.

Even when no quantitative valuation is undertaken of the environmental, social and cultural impacts of a project, the threshold value approach can be utilised to inform the decision-maker of the economic efficiency trade-offs. The estimated net production benefits of a project provides the threshold value that the non-quantified environmental, social and cultural impacts of a project (based on the assessments in the relevant assessment document), after mitigation, offset and compensation by the proponent, would need to exceed for them to outweigh the net production benefits.

Where the main environmental, social and cultural impacts of a project are valued in monetary terms, stronger conclusions can be drawn about the economic efficiency of a project i.e. the well-being of society.

Any other residual environmental, cultural or social costs that remain unquantified in the analysis[14] can also be considered using the threshold value approach. The costs of these unquantified environmental, cultural and social impacts would need to be valued by society at greater than the quantified net social benefit of a project to make it questionable from an economic efficiency perspective.

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[14] Including potential impacts that were unknown at the time of the preparation of the relevant assessment document or arise during the Environmental Impact Assessment process due to differences in technical opinions.