Appendix DD

Economic assessment

REGIS RESOURCES LTD

McPhillamys Gold Project
Economic Assessment

Final Report

Prepared for

EMM

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

BOXES

EXECUTIVE SUMMARY

The McPhillamys Gold Project (the Project) involves the development and operation of an open-cut gold mine located in the Blayney - Kings Plains district of Central West New South Wales, approximately 8 kilometres from the town of Blayney.

This Economic Assessment for the Project has been prepared for EMM Consulting Pty Ltd (EMM) on behalf of LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited, to form part of a Development Application to support an application for State Significant Development Consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Project.

Specifically, the Economic Assessment provides:

- A cost benefit analysis (CBA) which is the primary way that economists evaluate the net benefits of projects and policies, provide economic justification for a project and address the public interest;

- A local effects analysis (LEA) using a methodology developed by the NSW Government (2015), to assess some of the impacts of the Project in the locality, specifically:

    - net employment to existing residents;
    - non-labour project expenditure; and
    - environmental and social impacts on the local community.

- A supplementary LEA, using traditional input-output (IO) analysis to assess the broader economic activity project footprint in relation to output, value-added, income and employment.

Cost Benefit Analysis

A CBA of the Project indicated that it would have net production benefits to NSW of $143M, present value at 7% discount rate. Provided the residual environmental, social and cultural impacts of the Project that accrue to NSW are considered to be valued at less than $143M, the Project can be considered to provide an improvement in economic efficiency and hence relative to the “without Project” scenario is justified on economic grounds.

Adverse uncompensated environmental, social and cultural impacts of the Project have been minimised through project design and mitigation, offset and compensation measures. The cost of implementing these measures has already been incorporated into the estimate of net production benefits, including the cost of using land and water resources, noise and visual mitigation, provision of biodiversity offsets and the cost of a Project site access upgrade. Expert technical investigations indicate no material impacts are envisaged in relation to air quality, public infrastructure or loss of surplus to other industries. Impacts that were quantified included greenhouse gas generation and on historic heritage. However, these are minor compared to the estimated net production benefits of the Project. Aboriginal heritage impacts remained unquantified.

There may also be some market and non-market benefits of employment provided by the Project which are estimated to be in the order of $92M, present value at 7% discount rate. Overall, the Project is estimated to have net social benefits to NSW of $141M to $232M, present value at 7% discount rate and hence relative to the “without Project” scenario is desirable and justified from an economic efficiency perspective.

While the main environmental, cultural and social impacts have been quantified and included in the Project CBA, any other residual environmental, cultural or social impacts that remain unquantified would

need to be valued at greater than $141M to $232M (present value) for the Project to be questionable from a NSW economic efficiency perspective.

The key driver of the net social benefits to NSW is revenue (reflecting production levels, the value of gold in USD and the AUD/USD exchange rate). Forecasts suggest that revenue estimates may be conservative and hence estimates of net social benefits may be conservative. The estimates are less sensitive to assumptions about land opportunity costs, development costs, operating costs, mitigation, offset and compensation costs or effective company tax rates.

The relative magnitude of net production benefits and residual environmental, cultural and social impacts indicates that even with large changes to the assumed gold price, the net production benefits of the Project to NSW are likely to still far outweigh any residual impacts of the Project.

Local Effects Analysis

While the Project will provide direct employment for an average of 260 people over its operational life, the net impact on local employment will depend on prevailing levels of unemployment and labour force participation rates, as well as the scope for in-migration of labour. One scenario, under the LEA, assumes full regional employment[1] and no in-migration of labour. These are very restrictive assumptions that will serve to understate actual project employment benefits to the local area.

Nevertheless, the impact of the Project under these assumptions is reported in Table ES1, while the impacts under less restrictive assumptions are reported in a supplementary LEA.

Based on the restrictive assumptions of the LEA, the Project is estimated to contribute 136 net direct local jobs ($12M in income) to existing residents of the region during the peak year of construction and 89 net direct local jobs ($8M in income) annually during operation.

With multiplier effects included, the peak year of construction will contribute up to 337 in regional jobs and $24M in regional income to existing residents, and the Project operation will contribute up to 263 regional jobs and $18M in regional net income to existing residents.

Supplementary Local Effects Analysis

The supplementary LEA, using IO analysis, relaxes the restrictive assumptions of the LEA and allows for divergence from full employment, job chains effects and in-migration of labour to the region.

Using this approach, the total annual impact of the peak year of construction on the regional economy is estimated at up to:

- $531M in annual direct and indirect regional output or business turnover;
- $218M in annual direct and indirect regional value added;
- $114M in annual direct and indirect household income; and
- 1,289 direct and indirect jobs.

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

- $492M in annual direct and indirect regional output or business turnover;
- $272M in annual direct and indirect regional value-added;
- $67M in annual direct and indirect household income; and

[1] Where the region is defined as the local government areas of Orange, Blayney, Cabonne and Bathurst.

- 788 direct and indirect jobs.

The actual regional impact of the Project operation is likely to lie between that assessed in the LEA and the Supplementary LEA.

Table ES1 - Summary of Local Effects

	Project Direct	Project Direct: Local	Net Direct Effect	Total Net Effect (with multiplier)
Construction (Peak Year)				
Employment	520[2]	296	136	337
Net income (M)			$12	$24
Operation (Average Annual)				
Employment	260	195	89	263
Net income (M)			$8	$18
Net non-labour expenditure (M)	$56 Mpa			
Second round and flow-on effects	Refer to Section 6			
Contraction in other sectors	No material impact			
Displaced activities	No material impact			
Wage impacts	No material impact			
Housing impacts	No material impact			
Externality impacts	**Incidence of Impacts**	**Magnitude of Impact**		
Agricultural impacts	Farmers whose land is required for the Project	Impacted farmers compensated via purchase of land. No material residual impact		
Surface water	Local surface water users who hold WALs	Willing sellers compensated via purchase of WALs. No material residual impact		
Groundwater	Local groundwater users who hold WALs	Willing sellers compensated via purchase of WALs. No material residual impact		
Air quality impacts	Adjoining landholders	No properties impacted by exceedances. No material residual impact		
Noise impacts	Adjoining landholders	Impacted by any residual effects after mitigation		
Ecology and biodiversity	Local and NSW households	Some loss of nonuse values but offset by provision of biodiversity offsets		
Aboriginal heritage	Aboriginal people and other local and NSW households	Some loss of values to those who value Aboriginal heritage		
Historic heritage impacts	Local and NSW households	Some loss of values to those who value Historic heritage		
Transport and traffic	Local residents	No material impacts		
Visual amenity	Adjoining landholders	Impacted by any residual effects after mitigation		

[2] This relates to average annual full-time employment in construction sectors of the economy.

1 INTRODUCTION

1.1 Introduction

Gillespie Economics has been engaged by EMM Consulting Pty Ltd (EMM) on behalf of LFB Resources NL to complete an Economic Assessment for the McPhillamys Gold Project (the Project). The purpose of the Economic Assessment is to form part of a Development Application being prepared by EMM to support an application for State Significant Development Consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Project. LFB Resources NL is a 100% owned subsidiary of Regis Resources Limited (Regis).

1.2 Legislative Context and Guidelines

This Economic Assessment has been carried out in accordance with:

- the Environmental Assessment Requirements (EARs) issued by the Department of Planning and Environment for the Project that relate to economics i.e:

  - an assessment of the likely economic impacts of the development, paying particular attention to:
    - the significance of the resource - assessed separately in Environmental Impact Statement (EIS);
    - economic benefits of the project for the State and region - assessed in Chapters 4,5 and 6 of this report;
    - the demand for the provision of local infrastructure and services - assessed separately in the Social Impact Assessment; and
    - consideration of the need for a Voluntary Planning Agreement in relation to the demand for the provision of local infrastructure and services - assessed separately in the EIS.

- Clause 7(1)(f) of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* which requires environmental impact statements to provide "the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations…" Note to Clause 7 (1) (f) states that "A cost benefit analysis may be submitted or referred to in the reasons justifying the carrying out of the development, activity or infrastructure."

- Section 4.15 of the EP&A Act which requires the following two matters to be taken into consideration by the consent authority in determining a development application:

  - the public interest (taken as the collective public interest of households in NSW); and
  - the likely impacts of the development, including environmental impacts on both the natural and built environments, and social and ***economic impacts in the locality***.

- the following standards, guidelines and policies:

  - NSW Government (2015) *Guideline for the economic assessment of mining and coal seam gas proposals*;
  - NSW Government (2018) *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*; and
  - NSW Treasury (2017) *NSW Government Guide to Cost-Benefit Analysis*.[3]

[3] Refer to Attachment 1 for the legislative context for economic methods in Environmental Impact Assessment (EIA) in NSW.

To meet the above requirements two primary types of analysis are needed:

- a cost benefit analysis (CBA) which is the primary way that economists evaluate the net benefits of projects and policies, provide economic justification for a project and address the public interest;

- a local effects analysis (LEA) to assess the impacts of the Project in the locality, specifically:

    - effects relating to local employment;
    - effects relating to non-labour project expenditure; and
    - environmental and social impacts on the local community.[4]

Economic analysis tools such as CBA and LEA are not mechanised decision-making tools, but rather a means of analysis that provides useful information for decision-makers to consider alongside the performance of a project in meeting other government goals and objectives.

1.3 Report Outline

Section 2 outlines the scope of the Project, the proposed economic impact mitigation measures, and key economic assumptions. This is the information on which the Economic Assessment is based. Section 3 provides an overview of the CBA and LEA approach used in this study. Section 4 and 5 document the CBA and LEA of the Project, respectively. Section 6 provides a supplementary LEA using Input-Output (IO) analysis. Conclusions are provided in Section 7.

[4] Refer to Attachment 2 for an introduction to economic methods.

2 PROJECT DESCRIPTION

2.1 Project Overview

LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis), is seeking development consent for the construction and operation of the McPhillamys Gold Project (the Project), a greenfield open cut gold mine and water supply pipeline in the Central West of New South Wales (NSW).

The project comprises two key components:

- the mine site where the ore will be extracted, processed and distributed to market (herein referred to as the mine development); and
- an associated water pipeline which will enable the supply of water from near Lithgow to the mine site (the pipeline development).

The mine development component of the project (mine development) is approximately 8 km north-east of Blayney within the Blayney and Cabonne local government areas (LGAs). The mine development project boundary (herein referred to as the project area) covers the mining lease (ML) application area for the Project as well as the parts of the project that do not require an ML.

Water will be supplied to the mine via a pipeline approximately 90 km long, transferring surplus water from Centennial's Angus Place Colliery (Angus Place) and Springvale Coal Services Operations (SCSO), and Energy Australia's (EA) Mt Piper Power Station (MPPS) near Lithgow, to the mine. The supply of water from Angus Place, SCSO and MPPS will enable a beneficial use of otherwise surplus water and provide a reliable water source for the Project.

2.2 Project Description

A full project description is provided in Chapter 2 of the EIS (EMM 2019). A summary of the key components of the Project are as follows:

- Development and operation of an open-cut gold mine, comprising approximately one to two years of construction, approximately 10 years of mining and processing, and a closure period (including the final rehabilitation phase) of approximately three to four years, noting there may be some overlap of these phases. The total Project life for which approval is sought is 15 years.
- Development and operation of a single circular open-cut mine with a maximum diameter of approximately 1,050 metres (m) at the surface and a final depth of approximately 460 m, developed by conventional open-cut mining methods encompassing drill, blast, load and haul operations. Up to 8.5 million tonnes per annum (Mtpa) of ore will be extracted during the Project life.
- Construction and use of a conventional carbon-in-leach processing facility with an approximate processing rate of 7 Mtpa to produce approximately 200,000 ounces, and up to 250,000 ounces, per annum of product gold. The processing facility will comprise a run-of-mine (ROM) pad and crushing, grinding, gravity, leaching, gold recovery, tailings thickening, cyanide destruction and tailings management circuits. Product gold will be taken off-site to customers via road transport.
- Placement of waste rock into a waste rock emplacement which will include encapsulation of material with the potential to produce a low pH leachate. A portion of the waste rock emplacement will be constructed and rehabilitated early in the Project life to act as an amenity bund.
- Construction and use of an engineered tailings storage facility to store tailings material.
- Construction and operation of associated mine infrastructure, including:

  - administration buildings and bathhouse;
  - workshop and stores facilities, including associated plant parking, laydown and hardstand areas, vehicle washdown facilities, and fuel and lubricant storage;
  - internal road network;
  - explosives magazine and ammonium nitrate emulsion (ANE) storage;
  - topsoil, subsoil and capping stockpiles;
  - ancillary facilities, including fences, access roads, car parking areas and communications infrastructure; and
  - on-site laboratory.
- Establishment and use of a site access road, and an intersection with the Mid Western Highway.
- Construction and operation of water management infrastructure, including a raw water storage dam, clean water and process water diversions and storages, and sediment control infrastructure.
- A peak construction workforce of approximately 710 full-time equivalent (FTE) workers. During operations, an average workforce of around 260 FTE employees will be required, peaking at approximately 320 FTEs in around years four and five of the Project.
- Construction and operation of a water supply pipeline (approximately 90 km long) from Centennial Coal's Angus Place and SCSO and EA's MPPS operations near Lithgow to the mine Project area. The pipeline development will include approximately four pumping station facilities, a pressure-reducing system and a communication system. Approximately 13 megalitres per day (ML/day), up to a maximum of 15.6 ML/day, will be transferred for mining and processing operations.
- Installation and use of environmental management and monitoring equipment.
- Progressive rehabilitation throughout the mine life. At the end of mining, the mine infrastructure will be decommissioned, and disturbed areas will be rehabilitated to integrate with natural landforms as far as practicable. The final landform, apart from the final void, will support land uses similar to current land uses, or land uses which are consistent with the land-use strategies of the relevant LGAs.

2.3 Environmental, Social and Cultural Impacts and Mitigation Measures

Assessment of the environmental, social and cultural impacts of the Project, together with a range of measures to mitigate, offset and compensate for potential impacts of the Project, is provided in the technical assessment reports and summarised in the EIS.

In addition to the mitigation measures identified in other technical assessment reports and the EIS, Regis proposes to work in partnership with local government and the local community to maximise the regional economic benefits of the Project and to minimise any adverse impacts, as far as possible. In this respect, Regis is proposing a number of specific economic impact mitigation measures including:

Local employment, training and engagement

- Regis will ensure that preference is given to local employees.
- Regis will provide ongoing training and certification opportunities for local community members to ensure they have the necessary skills to work in mining.
- Regis will actively engage with the local community and affected individuals and groups and address any complaints and feedback on mining operations.

Potential Business Impacts

- Regis will collaborate with Council, economic development organisations, local chambers of commerce and State Government to:

  - Inform local business of the goods and services required of the project, service provision opportunities and compliance requirements of business to secure contracts.
  - Collaborate with local business and encourage local business to meet the requirements of the Project for supply contracts.
  - Develop relevant networks to assist qualified local and regional businesses tender for provision of goods and services to support the Project.

2.4 Key Assumptions

The Economic Assessment was based on year by year financial and employment data provided by Regis. This year by year data is commercial-in-confidence but key assumptions are summarised in Table 2.1. It should be noted that economic costs and benefits are discounted to today's (2019) values. Estimates of net production benefits are not equivalent to estimates of pre-tax financial net present value of the Project due to difference in timing, exclusion of royalties as a cost and inclusion of opportunity cost of land and capital equipment.

Table 2.1 Key Assumptions Underpinning the Economic Assessment

Item	Assumption
Mining Methods	Conventional load and haul, drill and blast open cut covering an area of approximately 70 ha
Resources and Reserves	Mineral Resource Estimate (indicated + inferred) - 68.9Mt@1.04g/t gold for 2.3M ounces Ore Reserve Estimate (probable) - 60.1Mt@1.05g/t gold for 2.0M ounces
Mining Extraction	Up to 8.5Mt of ore per annum
Processing Rate	Up to 7Mt of ore per annum
Saleable Product	1.7M ounces @ up to 250,000 ounces per annum
Life of Analysis	17 years comprising: 2 years pre construction 15 years project life
Workforce	*Construction* • Average annual construction workforce 520[5] FTE in first year (710 FTE at peak) *Operations* • Average annual operational workforce - 260 • Maximum average annual workforce - 320
Gold Price	USD1,320/ounce
AUD:USD Exchange Rate	0.75
Capital Expenditure	Life of Project capital expenditure, including sustaining capital and mining fleet - $500M
Average annual operating costs (net of royalties)	AUD159M
Royalties	4% ex-mine value (value less allowable deductions)

[5] This relates to average annual full-time employment in construction sectors of the economy.

2.5 Assessment of Externalities

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

Where impacts are compensated, offset or mitigated so as to have immaterial residual impacts, there are no externality impacts for consideration in the CBA. The biophysical assessments undertaken for the EIS are considered in economic terms in Section 4.4.2.

3 ECONOMIC ASSESSMENT METHODS

3.1 Introduction

The economic methods used to assess the Project and its impacts (as summarised in Section 2) are outlined below.

3.2 Cost Benefit Analysis

3.2.1 Background

Economic assessment is primarily concerned with identifying changes in aggregate community welfare, associated with alternative resource use patterns. CBA is the standard technique applied to estimate these wealth changes.

CBA has its theoretical underpinnings in neoclassical welfare economics. CBA applications in NSW are guided by these theoretical foundations as well as NSW Treasury (2017). CBA applications within the NSW Environmental Impact Assessment (EIA) framework are further guided by the NSW Government (2015) *Guidelines for the economic assessment of mining and coal seam gas proposals and* NSW Government (2018) *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*.

CBA is concerned with a single objective of the 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 benefits and costs 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), a project is considered to improve the well-being of society and hence relative to the 'without project' scenario is desirable from an economic efficiency perspective.

3.2.2 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.

The most inclusive definition of society includes all people, no matter where they live or to which government they owe allegiance too (Boardman et al. 2001). However, in practice most analysts define society at the national level based on the notion that the citizens of a country share a common constitution that sets out fundamental values and rules for making collective choices and that the citizens of other countries have their own constitutions that make them distinct societies (Boardman et al. 2001).

While most applications of CBA are performed at the national level, "to incorporate national distinctions in a CBA is far easier said than done. Thus many CBAs end up estimating the net benefits for global society, if only implicitly" (Bureau of Transport Economics 1999, p. 2).

With respect to the application of CBA in relation to mining and coal seam gas proposals, NSW Government (2015) guidelines define the public interest, and hence society, as the households of NSW. NSW Treasury (2017) also makes it clear that a CBA should focus on impacts (costs and benefits) to the NSW community. The EARs for the Project also refer to the requirement to provide consideration of the economic benefits of the Project for the State.

Consequently, the CBA is initially 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 and NSW.

3.2.3 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 mining projects, typically only the costs and benefits from mining and delivery to port or domestic customers, are relevant.

Mine products are intermediate goods i.e. are inputs to other production processes. However, these other production processes themselves require approval and, in CBA, would be assessed as separate projects (NSW Treasury 2007; NSW Treasury 2017). The definition of the Project is therefore as summarised in Section 2.1 and includes mining and domestic delivery, as well as all mitigation, offset and compensation measures.

3.2.4 Net Production Benefits

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

- The net production benefits of a project to society including royalties, company tax and net producer surplus and any economic benefits to existing landholders, workers, and suppliers; and
- The environmental, social and cultural impacts including net public infrastructure costs.

Net production benefits can be estimated based on market data on the projected financial[6] value of the resource less the capital and operating costs of projects, including opportunity costs of capital and land already in the ownership of the proponent. This is normally based on commercial-in-confidence data provided by the proponent. Production costs and benefits over time are discounted to a present value.

3.2.5 Environmental, Social and Cultural Impacts

The consideration of externality impacts in CBA relies on the assessment of other experts contributing information on the biophysical impacts. The EIA 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 EIS), 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.

At the next level of analysis, attempts may be made to value some of the environmental, social and cultural impacts. 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 valued (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.

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

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 addition to biophysical externalities, payments to landholders or workers over and above their opportunity cost can represent an economic benefit to landholders and workers, respectively. Where this occurs it can be estimated using market data on payments to be made and opportunity costs.

Where a project imposes a cost on public infrastructure in excess of payments made for that infrastructure, there is an additional social cost for inclusion in CBA. These costs can potentially be estimated based on analysis of infrastructure costs and payments.

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). NSW Government (2012) suggests that values that are less than 5% of the quantified net present value of a project are unlikely to be material. Where benefits and costs cannot be quantified, these items should be included in the analysis in a qualitative manner (NSW Treasury, 2007; NSW Government, 2015).

The principle of proportionality also applies to CBA, and so the scope of Economic Assessment will need to be tailored to reflect the scale of a project.

3.2.6 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 or experiencing visual impacts, the costs of providing ecological offsets, the cost of purchasing groundwater and surface water entitlements in the water market and the costs of public infrastructure impacts. Including these costs in the capital and operating costs of a project effectively internalises the non-monetary environmental, social and cultural costs of a project, because by including these costs, often larger social costs are minimised or avoided. 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 EIS), 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[7] can also be considered using the threshold value approach. The costs of these unquantified environmental,

[7] Including potential impacts that were unknown at the time of the preparation of the EIS or arise during the EIA process due to differences in technical opinions.

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.

3.2.7 Consideration of the Distribution of Costs and Benefits

While CBA, undertaken at different scales, 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 intra and intergenerational equity are subjective and are therefore left to decision-makers.

Nevertheless, it should be noted that the costs and benefits in CBA are defined and valued based on the values held by individuals in the current generation. There is no way to measure the value that future generations hold for impacts of current day projects as they are not here to express it. However, as identified by Boardman *et al.,* (2001) this is not considered a serious problem for CBA because:

- Few policies involve impacts that only appear in the far future. Consequently, the willingness to pay of people alive today can be used to predict how future generations will value them;
- Most people alive today care about the well-being of their children, grandchildren and great grandchildren, whether or not they have yet been born. They are therefore likely to include the interests of these generations to some extent in their own valuations of impacts. Because people cannot predict with certainty the place that their future offspring will hold in society, they are likely to take a very broad view of future impacts; and
- Discounting used in CBA also reduces the influence of costs and benefits that occur a long way into the future.

Furthermore, increased wealth (e.g. royalties and taxes) generated by projects that have a net benefit to the current society can be used to improve the services (e.g. health, school and community services) and environment (e.g. protected areas) that are passed on to future generations.

As identified by the Productivity Commission (2006), a policy option that provides the highest net benefit, as indicated by CBA, would also be consistent with the principles of ecologically sustainable development.

3.2.8 Consideration of other Objectives of Government

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 policy more widely.

3.2.9 Key steps in Cost Benefit Analysis

The key steps in CBA are summarised in Box 1.

Box 1: Key steps in a CBA
Step 1: Establish the base case against which to assess the potential economic, social and environmental impacts of changes due to the project.
Step 2: Define the project including all significant inputs required to achieve the project's objectives.
Step 3: Quantify the changes from the base case resulting from the project. This will focus on the incremental changes to a range of factors (for example, environmental, economic, social) resulting from the project.
Step 4: Estimate the monetary value of these changes and aggregate these values in a consistent manner to assess the outcomes. Where market prices exist, they are a starting point for valuations of both outputs and of inputs used for production. For non-market goods, as for many environmental impacts and some social impacts, the aim is to value them as they would be valued in monetary terms by the individuals who experience them.
Step 5: Estimate the Net Present Value (NPV) of the project's future net benefits, using an appropriate discount rate.
Step 6: Undertake sensitivity analysis on the key range of variables, particularly given the uncertainties related to specific benefits and costs.
Step 7: Assess the distribution of costs and benefits across different groups.
Step 8: Report CBA results, including all major unquantified impacts so the appraisal addresses and incorporates all material relevant to the decision maker**.**

Source: NSW Government (2015)

Section 4 reports on the CBA of the Project based on the financial, technical and environmental advice provided by Regis and its' specialist consultants.

3.3 Local Effects Analysis

3.3.1 Introduction

LEA aims to address the consequences of the proposal in its "locality" as required by Section 4.15 of the EP&A Act. It is intended to complement CBA by translating effects at the NSW level to impacts on the communities located near the project site. It also provides additional information to describe changes that are anticipated within a locality, such as employment changes. LEA is intended to inform the scale of change rather than being representative of costs and benefits to the local community.

For the purpose of a LEA the locality is defined as the Local Government Area(s)[8] (LGAs) that contains the proposed project. The relevant population group is defined as those people ordinarily resident in the locality at the time of the proposal.

The local effects required to be analysed in a LEA are:

- local employment and income effects
- other local industry effects, for example on suppliers; and
- environmental and social change in the local community.

3.3.2 Direct Effects Relating to Local Employment

[8] In this case the Orange, Blayney, Cabonne and Bathurst LGAs have been chosen to represent the locality. This is the region that will primarily be the source of labour and non-labour inputs to the Project.

The Guidelines (NSW Government 2015) prescribe that only employment of people ordinarily resident in the region at the time of the proposal should be included in the initial estimation of direct local employment increases.[9]

The Guidelines assume that these people would otherwise be employed in the region and so the increased disposable wages for the region as a result of a project is the difference between the average net income of these people in the mining industry and the average net income in other industries.[10]

The incremental full time equivalent direct employment from a project to the locality is estimated as the increase in net income divided by the average net income in the mining industry.

The aim of this approach is to gauge the incremental impacts for existing residents of the locality. However, as a direct measure of regional employment and wages for existing residents, LEA is likely to understate effects because it assumes that:

- existing local residents employed by a project are already employed in the region i.e. they are not unemployed or coming from new participants in the labour force;
- jobs vacancies in the region created by those filling the positions in a project remain unfilled for the duration of the project i.e. it essentially assumes that the regional economy and the wider Australian economy is at full employment. Refer to Attachment 3 for a discussion of the job chain effect and a comparison to IO analysis.

From a regional economy perspective (rather than focused on existing residents) it is also likely to understate effects since it does not take into account the income spending of those who migrate into the region and are employed by the project.

3.3.3 Estimating Effects Related to Non-labour Project Expenditure

In addition to the incremental direct regional employment and wages generated by a project, the other major economic effect will be expenditure in the region on other, non-labour inputs. These can be estimated for construction and operation phases of a project. Identified local expenditure may not all accrue to the region, particularly for margin sectors such as wholesale and retail trade purchases where only the margin would accrue to the regional business entities unless products are also manufactured locally.

3.3.4 Second Round/Flow-on Effects

The Guidelines (NSW Government 2015) identify that flow-on effects can also be extremely important for local communities and should therefore also be considered either qualitatively or using techniques such as IO analysis or computable general equilibrium (CGE) modelling (suitable for larger projects), provided the assumptions and limitations of the methods are identified. As well as being supported in the NSW Government Guidelines (2015) for *Economic assessment of mining and coal seam gas proposals*, IO analysis is identified by the World Bank economist Mustafa Dinc (2015) as providing a solid framework to analyse the interdependence of industries in an economy and one of the most widely used tools in regional economic analysis. The method is further supported by independent peer reviews (commissioned by the NSW Department of Planning and Environment) of economic assessments of mining proposals. A comparison of IO analysis and CGE modelling is provided in Attachment 4. This Attachment also provides a detailed response to the criticisms that have been inappropriately levelled against the IO methodology.

[9] Employment filled by those migrating into a region to live are excluded as are jobs filled by those who reside outside the region.
[10] Wages paid to those migrating into a region to live are excluded as a wages benefit to the region.

3.3.5 Effects on Other Local Industries

The LEA should also give consideration to potential impacts such as:

- displacement of other land uses, where the mining project uses land that would otherwise be used for other purposes;
- where the mining project affects choices of external parties, particularly tourism and business travel; and
- where the mining project creates temporary effects on other industries that cause short run market adjustments in the cost of living for local residents, particularly food and housing markets.

3.3.6 Environmental and Social Impacts on the Local Community (Externalities)

Finally, every LEA should assess positive and negative externalities created by the proposed project on the locality, with a focus on material, unmitigated effects. This information is available from the EIS and summarised in the CBA.

3.3.7 Input-output Analysis

Section 5 undertakes a LEA as identified above and consistent with the NSW Government Guidelines (2015). In addition, an IO analysis (refer to Attachment 4) of the Project is undertaken in Section 6 to identify the gross incremental regional economic activity that the Project will provide to the region. As identified in Attachment 3, incorporation of consideration of the "job chain" effect means that the direct incremental employment and income to a region approximates the total income of those employed in the region who already reside in the region or migrate into the region to live i.e. the gross footprint of economic activity estimated using IO analysis is also an indicator of the net effect.

IO analysis essentially involves two steps:

- Construction of an appropriate IO table (regional transaction table) that can be used to identify the economic structure of the region and multipliers for each sector of the economy; and
- Identification of the initial impact or stimulus of the project (construction and/or operation) in a form that is compatible with the IO equations so that the IO multipliers and flow-on effects can then be estimated (West, 1993).

The IO method is based on a number of assumptions that are outlined in Attachment 5. Most notably IO analysis assumes that the regional economy has access to sufficient labour and capital resources (from both inside and outside the region) so that an individual project does not result in any regional price changes e.g. wages in other industries or house rentals, which would lead to contractions (“crowding out”) of economic activity in other sectors in the same region. Any "crowding" out is assumed to occur outside the region where the Project is concentrated and the regional impact analysis is focused. A dynamic CGE approach may overcome the limitation of IO analysis but is unlikely to be warranted at local or regional scale or with small scale impacts.

The consequence of the assumptions of IO analysis, is that IO modelling results provide an upper bound economic activity impact estimate.

IO analysis identifies the economic activity of a project on the economy in terms of four main indicators:

- Gross regional output – the gross value of business turnover;
- Value-added – the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services bought in to produce the gross regional output. These costs exclude income costs;
- Income – the wages paid to employees including imputed wages for self employed and business owners; and

- Employment – the number of people employed (including self-employed, full-time and part-time).

These indicators of economic activity are not equivalent to the economic measures of consumer and producer surplus that are relevant in the CBA framework.

Gross regional output is a measure of total revenue or turnover. All costs of production would need to be subtracted to make it approximate the measure of producer surplus. Value-added is an indicator of net value to producers, but unlike the producer surplus measure, it does not take account of all production costs – only non-labour costs are subtracted from revenue. Income or wages paid to employees is a cost to the producer in the CBA framework and is one of the costs subtracted from revenue or output to calculate the producer surplus or net benefit to producers. Employment is a non-financial indicator identifying the physical number of jobs associated with an activity.

Unlike CBA there are no decision rules to identify whether an increase or decrease in economic activity is desirable, although it is often implicitly assumed that more economic activity is good and less economic activity is bad. However, not all economic activity is desirable from a community welfare perspective since it may be associated with, for example, environmental degradation, crime, etc.

As well as providing an indication of gross economic activity in a region, economic activity analysis can have important links to social impact assessment since changes in income and employment levels can impact population levels and their ability to maintain community infrastructure (schools, hospitals, housing etc), broader community and cultural value systems and inter-relationships.

4 COST BENEFIT ANALYSIS OF THE PROJECT

4.1 Introduction

This Section reports on a CBA of the Project based on financial, technical and environmental advice provided by Regis and its specialist consultants.

4.2 Identification of the Base Case and Project

Identification of the “base case” or “without Project” scenario is required to facilitate the identification and measurement of the incremental economic benefits and costs of the Project.

In this Economic Assessment, the base case or “without Project” scenario involves the continuation of existing rural production. In contrast to the “base case”, the Project is as outlined in Section 2.

CBA is primarily concerned with the evaluation of a Project relative to the counterfactual of the “without Project” scenario. Where there are a number of alternatives to a project, these can also be evaluated using CBA. However, alternatives need to be feasible to the proponent and to this end a number of alternatives to the Project were considered by Regis in the development of the current Project. The EIS provides more detail on the alternatives considered.

The Project assessed in the EIS and evaluated in the CBA is considered by Regis to be a feasible alternative for minimising environmental, cultural and social impacts whilst maximising resource recovery and operational efficiency. It is therefore this alternative that is proposed by Regis and was subject to detailed economic analysis.

4.3 Identification of Benefits and Costs

Relative to the base case or “without Project” scenario, the Project may have the potential incremental economic benefits and costs shown in Table 4.1. The main potential economic benefit is the producer surplus (net production benefits) generated by the Project and any wage benefits to employment, nonmarket benefits to employment, economic benefits to existing landholders or benefits to suppliers, while the main potential economic costs relate to any environmental, social and cultural costs, including any net public infrastructure costs and loss of surpluses to other industries.

Table 4.1
Potential Economic Benefits and Costs of the Project

Category	Costs	Benefits
Net production benefits	• Opportunity costs of capital equipment • Opportunity cost of land • Development costs including labour, capital equipment, sustaining capital, and acquisition costs for impacted properties and biodiversity offsets[1] • Operating costs, including administration, mining, processing, transportation to port, labour costs and mitigation, offsetting and compensation measures • Decommissioning and rehabilitation costs at cessation of the Project	• Value of gold • Residual value of capital and land at the cessation of the Project
Potential environmental, social and cultural impacts	• Surface water • Flooding impacts • Groundwater impacts • Air quality impacts • Noise and vibration impacts • Ecology and biodiversity impacts • Aboriginal heritage impacts • Historic heritage impacts • Traffic and transport impacts • Visual amenity impacts • Greenhouse gas generation • Agricultural impacts • Net public infrastructure costs • Loss of surplus to other industries	• Wage benefits to employment • Non-market benefits of employment • Economic benefits to existing landholders • Economic benefits to suppliers

[1] The value of foregone agricultural production is included in the value of land.

Framed in another but equivalent way the potential incremental costs and benefits of the Project are as per Table 4.2.

Table 4.2
Alternative Frame of Potential Economic Benefits and Costs of the Project

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

It should be noted that the potential environmental, social and cultural costs listed in Table 4.1 and Table 4.2 are only economic costs to the extent that they affect individual and community well-being. If the potential impacts do not occur or are mitigated, compensated or offset to the extent where community wellbeing is insignificantly affected (i.e. costs are borne by the proponent), then no environmental, social or cultural economic costs should be included in the Project CBA apart from the mitigation, compensation or offsetting costs.

4.4 Quantification/Valuation of Benefits and Costs

Consistent with NSW Government (2015) and NSW Treasury (2017) the analysis was undertaken in 2019 real values, with discounting at 7 percent (%) and sensitivity testing at 4% and 10%.

The analysis period is 17 years, coinciding with the Project life of 15 years (plus two years pre-Project commencement). 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.

An attempt has also been made to estimate environmental, cultural and social impacts using market data and benefit transfer[11] and incorporate them into an estimate of the net social benefit of the Project. This estimated net social benefit of the Project provides another threshold value that any residual or non-quantified economic costs would need to exceed to make the Project questionable from an economic efficiency perspective.

4.4.1 Production Costs and Benefits[12]

Production Costs

Opportunity Cost of Capital

In the order of $1M of capital equipment already owned by Regis will be applied to the Project. There is an opportunity cost of carrying this equipment forward into the Project rather than sale. This opportunity cost is included in year 3 of the analysis i.e. the first year of the Project life.

Opportunity Cost of Land

The majority of the land required for the Project is already in Regis ownership. There is an opportunity cost associated with using land that is already in Regis ownership for the Project instead of its next best use (e.g. agricultural production). An indication of the opportunity cost of the land can be gained from the land's market value. This is estimated by Regis at $37 million based on the land acquisition costs.

Development Cost of the Project

The development costs of the Project include capital equipment, mining fleet, mine development, processing infrastructure, water pipeline, associated minor infrastructure, sustaining capital, mitigation measures and for biodiversity offsets. These capital costs over the life of the Project are estimated by Regis at in the order of $500M. These costs are included in the economic analysis in the years that they are expected to occur.

Annual Operating Costs of the Project

The annual operating costs of the Project include those associated with mining, environmental management and monitoring, gold processing, water transfer, administration and gold transport. Average annual operating costs of the Project (excluding royalties) are estimated at $159M.

While royalties are a cost to Regis, they are part of the overall producer surplus benefit of the Project that is paid to and then redistributed by government. Royalties are therefore not included in the calculation of the resource costs of operating the Project. Nevertheless, it should be noted that the

[11] Benefit transfer refers to transferring economic values that have been determined for other study sites.
[12] All values reported in this section are undiscounted Australian dollars unless otherwise specified.

Project would generate total royalties over its life in the order of $79.9M, or $46.7M in present value terms (at 7% discount rate).

Decommissioning and Rehabilitation Costs of Facilities

Rehabilitation would be progressive of the life of the Project with rehabilitation costs ramping up towards the end of the Project life and final decommissioning and rehabilitation occurring in the final years of the Project. The costs of decommissioned and rehabilitation of the site are estimated at $32M. Notwithstanding, it should be noted that Regis is required to pay a rehabilitation security deposit to the NSW Department of Planning and Environment – Division of Resources and Energy (DP&E-DRE). Since decommissioning and rehabilitation costs would occur mainly towards the end of the Project life, discounting reduces their significance on the outcome of the CBA.

Production Benefits

Value of Gold

The main economic benefit of the Project is the market value of the gold that is produced. This reflects the production and processing profile, gold price which is quoted in USD and the USD/AUD exchange rate.

Total gold production is estimated at 1.7 M ounces, with average annual production of 190,000 ounces over an approximate 9 year mining period.

The gold price over the life of the Project is assumed to be USD1,320 per ounce (in 2019 values) with an AUD:USD exchange rate of 0.75.

Residual Value at End of the Evaluation Period

At the end of the Project, capital equipment and land (excluding environmental offsets) will have an estimated undiscounted residual value of $20M and $37M, respectively.

4.4.2 Environmental Social and Cultural Costs and Benefits

Agricultural Production

The present value of foregone agricultural production is reflected in land prices. The value of foregone agricultural production, as a result of the Project infrastructure, disturbance areas and offsets, has therefore been incorporated in the CBA through inclusion of its market value in the opportunity cost of land already in Regis Ownership ($37M) as well as the development cost ($500M) which includes an allowance for mitigation measures.

Surface Water

The Surface Water Assessment identifies that no water access licences (WALs) will be required for the project. However, should WALs be required, a cost of around $200,000 is included in the capital costs of the Project.

Groundwater

The Groundwater Assessment found that the Project would have insignificant impacts on to existing water quantity or quality for third-party users, groundwater level drawdown affecting flow of the Belubula River, access to the water table for Mountain Gum and spring flows. It also found that insignificant impacts from potential seepage from the tailings storage facility, waste emplacement and the storage of hazardous goods storage.

Notwithstanding, the Project will result in a peak groundwater inflow to the open cut void of 905ML/yr. Regis have secured 400 shares in the Lachlan Fold Belt Murray Darling Basin Groundwater Source to licence this inflow and will source an additional 505ML. An indicative opportunity cost of already held entitlements and an indicative cost of those yet to be purchased (i.e. total cost of $588,000) are included in the capital costs of the Project.

Air Quality

Residual air quality impacts, after mitigation, can potentially be estimated via the partial property value impacts using hedonic pricing or the damage cost method that looks at health and amenity impacts as a result of pollution.

Four specific periods of the project's development — year 1, year 2, year 4 and year 8 — were the focus of emissions quantification and dispersion modelling. Emissions of total suspended particulates (TSP), particulate matter less than 10 micrometres (μm) in aerodynamic diameter (PM_{10}), particulate matter less than 2.5 μm in aerodynamic diameter ($PM_{2.5}$), oxides of nitrogen (NOx), hydrogen cyanide (HCN) and assorted metals and metalloids were estimated and modelled.

The atmospheric dispersion of air pollutant emissions for each mine development scenario was simulated using the AERMOD model.

The results of the modelling show that, for all assessed stages of the project development and operation, the predicted concentrations and deposition rates for particulate matter (TSP, PM_{10}, $PM_{2.5}$, dust deposition, metals and metalloids) and gaseous pollutants (NO_2 and HCN) are below the applicable impact assessment criteria at neighbouring sensitive receptors. Cumulative impacts were assessed by combining modelled project impacts with recorded ambient background levels. The cumulative results also demonstrated compliance with applicable impact assessment criteria, despite a range of conservative assumptions in the emission calculations and dispersion modelling techniques. The applicable impact assessment criteria are set at levels to protect against health effects and nuisance dust effects and hence the Project will not have any material air quality impacts.

The design of the Project will incorporate a range of dust mitigation and management measures. A best practice dust control measures review was undertaken for the Project, and this identified that the proposed mitigation and management measures will be in accordance with accepted industry best practice for dust control.

Despite air quality criteria being met, potential impacts to the community can still occur. Current research into the health effects of particulate matter has not identified a known threshold for health effects, for example, PAEHolmes (2013) states:

"The current approach to air quality management in Australia focuses on reducing exceedances of ambient air quality standards at specific locations. The standards are designed to protect health. However, for PM_{10} and $PM_{2.5}$ there is no evidence of threshold concentrations below which adverse health effects are not observed."

PAE Holmes (2013) estimated the cost of $PM_{2.5}$ emissions outside any 'significant urban area' as $360 per tonne. Using this cost per tonne estimate, the health cost of air pollution over the Project is around $173 in present value terms (using a 7 per cent discount rate).

Consequently, no economic implications associated with air quality have therefore been identified for inclusion in the CBA.

Noise and Vibration

Impacts of the Project potentially arise from construction, operation and road traffic noise as well as vibration. The Noise and Vibration Impact Assessment found that:

- Predicted noise levels from construction activities are expected to comply with the relevant criteria (ie Noise Management Levels (NMLs) in accordance with the *Interim Construction Noise Guideline (DECC 2009))* at all receivers except at one where noise levels may exceed the NMLs by up to 5dB during the initial construction of the access road from the Mid Western Highway.

- Noise levels from typical operations are expected to exceed the Project Noise Trigger Levels (PNTLs) by up to 2dB at several receivers in the nearest catchments to the project over the first four years of the project life. Exceedances of the PNTLs of up to 2dB are considered negligible[13] and would not be discernible by most receivers relative to the compliant emission level of 35dB LAeq(15min).

- Nine receivers (R17, R25-R31, R33) in the Kings Plains catchment and three receivers (R19, R23, R24) in the Walkom Road catchment are predicted to experience Marginal (2-5dB above PNTL) impacts during the operation of the Project and it is recommended that the appropriate mitigation rights be made available to these receivers.

- There will be a temporary noticeable increase in road traffic noise during the overlap of construction and operations during Year 1, although the calculated noise level will be within the relevant Road Noise Policy (DECCW 2009) criteria.

- Airblast overpressure and vibration levels are predicted to meet the relevant ANZEC criteria at all assessed receivers for blasts up to 300kg maximum instantaneous charge (MIC).

Noise impacts can potentially be estimated via the partial property value impacts using hedonic pricing. However, where properties are predicted to be moderately impacted by noise impacts i.e. a 3 to 5 dB exceedance of noise criteria, a condition of contemporary development consents is for at-receiver noise mitigation on request by the landholder. For noise impacts, this can include planting of trees, double glazing of windows and installation of air conditioning units. To the extent that these measures mitigate noise then affected properties are no worse off than they were before and no material externality costs arise that warrant inclusion in a CBA. It is recognised that to the extent that any residual noise impacts occur, after mitigation, these externality costs of a project would not all be mitigated. For the purpose of the analysis, an average allowance of $20,000 per impacted property has been included in the capital costs of the Project i.e. a total of $240,000.

Ecology and Biodiversity

Following the implementation of avoidance and minimisation measures, the Project will remove 132.36 ha of native vegetation, 129.3 ha of which comprises habitat for native fauna, including habitat for the Koala and Squirrel Glider. The project will remove 44.22 ha of vegetation that represents White Box Yellow Box Blakely's Red Gum Woodland endangered (EEC) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act); 18.5 ha of which also represents White Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). There will also be some impacts associated with the water pipeline.

The impacted vegetation and associated fauna is likely to have non-use values to the community that can potentially be estimated using non-market valuation methods. Similarly, the provision of offsets is also likely to have non-use values to the community. The cost of providing offsets is included in the capital cost of the Project i.e. an allowance of $20.5M for purchase of land and purchase of credits. To

[13]In accordance with the significance assessment in the NSW Governments *Voluntary Land Acquisition and Mitigation Policy* (2018).

the extent that the offsets provide community values that are equivalent to the values lost from clearing, there will be no net loss in community values.

Sensitivity testing of these costs in Section 4.8 is sufficient to incorporate substantial changes in the costs of offsets.

No material impacts on GDEs are predicted.

Aboriginal Heritage

Twenty-three Aboriginal cultural heritage sites are located within the proposed direct disturbance footprint for the Project. A further eight Aboriginal cultural heritage sites may be subject to indirect disturbance or inadvertent direct disturbance due to their proximity to proposed mine components. The Aboriginal cultural heritage sites are all small scatters or isolated finds of stone artefacts. In addition, the water pipeline will impact seven Aboriginal sites.

Any impacts on Aboriginal heritage sites may impact the well-being of the Aboriginal community. However, monetisation of these impacts is problematic and so these impacts are best left to consideration as part of the preparation of the Aboriginal Heritage Impact Assessment.

Impacts on highly significant Aboriginal heritage sites have also been shown to affect the well-being of the broader community (Gillespie Economics 2009a, 2009b, 2010). However, no Aboriginal heritage sites of high scientific or cultural significance are predicted to be directly or indirectly impacted by the Project. Consequently, no economic implications associated with heritage have been included in the CBA.

Historic Heritage

Eight locally-significant historical cultural heritage sites (one of which has potential to be assessed at a higher level of significance) are located within the proposed direct disturbance footprint of the Project and four locally-significant historical cultural heritage sites may be subject to indirect disturbance or inadvertent direct disturbance due to their proximity to proposed mine components. However, the Project would have no impacts on highly important cultural heritage.

No specific non-market valuation study has been undertaken in relation to the 12 heritage items impacted by the Project. However, Allens Consulting Pty Ltd (2005) found that respondent utility is increased by an increase in the number of heritage places protected — average household willingness to pay across Australia for the protection of additional places from loss was estimated to be $5.53 per person (household) each year for every 1,000 places protected. Indexing this value to 2019 and aggregating it to 79% of the Australian, NSW and Mid-Western Regional LGA households (as reflected by the survey response rate) and converting to a present value using a 7% discount rate gives a non-use economic value of $580,000 per place for the Australian population, $185,000 per place for the NSW population and $2,650 for the population of the region (Orange, Blayney, Cabonne and Bathurst LGAs).[14]

The impacts of the impacted heritage items are therefore estimated at $7.0M for the Australian population, $2.2M for the NSW population and $0.03M for the regional population. To the extent that some of these impacts are mitigated e.g. via detailed archival recording in accordance with the Heritage Management Plan, this may overstate heritage impacts in relation to items that will be demolished.

[14] It is recognised that there may be a distance decay relationship where households located closure to the impacted heritage items have higher values than those located further away. However, the study referred to for benefit transfer values did not investigate this issue.

Traffic and Transport

The Traffic and Transport Assessment found that the Project would not impose any adverse impacts on the surrounding road network as a result of the increased traffic associated with construction and operational activities for the mine site or water pipeline.

As part of the Project it is proposed that Dungeon Road will be closed at the Project Area boundaries. The road closures will occur approximately 1,800m north of the Mid Western Highway at the southern end and approximately 1.2km south of Vittoria Road at the northern end. There are two rural properties with dwellings that have access from Dungeon Road at the southern end. The road closure is expected to have no impact on these properties as their access to Blayney or Bathurst via the Mid Western Highway will remain unchanged. At the northern end of Dungeon Road, Regis has acquired all properties that have access from Dungeon Road. Access for these properties west towards Bathurst will remain unchanged however, access to the south towards Blayney may be impacted. An alternative route with a similar travel time is available via Vittoria Road and Guyong Road. The alternative route is via sealed roads whereas Dungeon Road is unsealed.

No additional economic costs associated with traffic and transport have been included in the CBA, apart from the costs of the Project access intersection located on the Mid Western Highway, which is included in the capital cost of the Project.

Visual Amenity

The Visual Impact Assessment identified adverse visual impacts for 69 houses. Visual impacts can potentially be estimated via the partial property value impacts using hedonic pricing. However, adverse effects can be mitigated via planting of vegetation screens on-site, along exposed roads and at sensitive receptors, and the appropriate colouring of infrastructure and equipment. The costs of varying degrees of visual mitigation treatments at 69 houses has been included in the capital costs of the Project i.e. a total cost of $850,000. To the extent that these measures mitigate visual impacts then affected properties are no worse off than they were before and no material externality costs arise that warrant inclusion in a CBA. It is recognised that to the extent that any residual visual impacts occur, after mitigation, these externality costs of the Project would not all be mitigated.

Greenhouse Gas Generation

The Project will generate in the order of 364,000 tonnes (t) of Scope 1 emissions and 1,205,729 t of Scope 2 emissions over the life of the Project.[15]

To place an economic value on CO_2-e emissions, a shadow price of CO_2-e is required. Three shadow prices were used, the Forecast European Union Emission Allowance Units price, the Australian Treasury Clean Energy Future Policy Scenario and the US EPA Social Cost of Carbon. Under these shadow prices the present value of greenhouse gas emission cost is between $11M and $45M dollars, present value. This is a 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 Assessment this has been undertaken using Australia's share of the global population (around 0.3%) and NSWs share of the Australian population (32%). NSW DP&E has previously supported this approach (NSW DP&E 2017).

[15] It should be noted that greenhouse gas generation associated with Scope 3 emissions is considered to be outside of the scope of the CBA of the Project, as they relate to downstream processing and are part of a separate project that has its own set of costs and benefits..

On this basis the present value of the cost of greenhouse gas emissions from the Project to Australia is estimated at between $36,000 and $142,000 dollars (present value). The cost of greenhouse gas emissions to NSW is estimated at between $11,000 and $45,000 dollars (present value).

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). This approach assumes labour markets clear, with no involuntary unemployment i.e. full employment, and no other distortions (Bartik, 2012). However, where there is involuntary unemployment a Project may result in a wage benefit to workers. Workers who transfer to the mining sector and earn higher wages are in effect increasing their productivity. The value of their output for given work hours is increasing i.e. the marginal value product of labour. The real benefit for the worker is the difference between the wage that workers are paid in mining and their minimum reservation wage (i.e. the minimum wage they would accept) for working in the mining sector (which reflects their relative occupational preference) (NSW Government, 2012, p. 7).

The NSW Guidelines (2017) identifies that:

"Although a zero wage premium is a useful starting assumption, the appropriateness of this assumption must be assessed on a case by case basis. This is because ***benefits to workers can be one of the major economic benefits from a project.*** *If a proponent considers that a project will generate positive benefits for workers, the economic assessment should clearly explain the reasons for this conclusion and present evidence in support of the valuation that has been adopted."*

The fundamental justification for inclusion of wage benefits in a CBA is that the economy is rarely at full employment and even if it is temporarily, there is a constant stream of new entrants to the labour market that are looking for jobs i.e. the market for labour is dynamic. A mining project can directly employ people from unemployment pool, new entrants to the labour force or already employed people e.g. in mining, agriculture, construction, manufacturing etc. All these potential sources of labour are reflected on the labour supply curve for a project. The labour supply curve represents the lowest wage rate (allowing for risks and disutility) at which workers would be willing to accept a job in the mining sector. The labour supply curve is upward sloping. For those people at the margin, say those already employed in the mining sector, their reservation wage is likely to be similar to the wage that they receive in the new project. However, for infra-marginal labour there would be a wage benefit, with a larger wage benefits to people sourced from the involuntary unemployment pool i.e. lower down the labour supply curve. The wage benefit for otherwise unemployment people can be even greater when search and retraining costs, scarring, stigma and physical and mental health effects of unemployment are taken into account (Haveman and Weimer 2015). For people already employed in other sectors the direct wage benefit would likely be between those of the unemployed and those already in the mining sector. However, even the direct wage benefit for those employed from the mining sector or other sectors but may be larger than the estimated direct wage benefits, due to job chain effects and occupational upgrading i.e. where a person is employed from another job, which creates a vacant job for others to upgrade their employment, which creates a further vacancy to be filled, and so on (Bartik, 2012). With job chain effects what is important is not the reservation wage of those immediately hired by the project, but the reservation wage of those at the end of the job chain (Bartik, 2012).

Any estimation of the potential economic value of employment from the Project requires a number of assumptions such as what proportion of the Project 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 general approach of Streeting and Hamilton (1991)[16] if it were assumed that 10% of the direct workforce of the Project[17] (27 out of a total of 268 jobs) would otherwise be unemployed for three years and that the reservation wage for these people was $53,500[18] compared to a mining wage of $120,000, then the market employment benefit in terms of income would be $5M present value, at a 7% discount rate. Values at alternate discount rates and percentages of unemployed are provided in the following table. These calculations exclude any consideration of search and retraining costs, scarring, stigma and physical and mental health effects of unemployment (Haveman and Weimer 2015).

Table 4.3
Potential Economic Benefits to Workers ($M)

	Discount Rate		
% Unemployed for 3 years	**4%**	**7%**	**10%**
Scenario 1 - 5% UE	$3.2	$2.5	$2.2
Scenario 2 - 10% UE	$6.5	$4.9	$4.4
Scenario 3 - 15% UE	$9.7	$7.4	$6.7
Wage premium benefit for Rest of Employment			
Scenario 1 - 5% UE	$37.5	$28.6	$25.7
Scenario 2 - 10% UE	$35.5	$27.1	$24.3
Scenario 3 - 15% UE	$33.5	$25.6	$23.0
Total Wage Benefit			
Scenario 1 - 5% UE	$40.7	$31.1	$27.9
Scenario 2 - 10% UE	$42.0	$32.1	$28.8
Scenario 3 - 15% UE	$43.2	$33.0	$29.6

This estimate makes no allowance for the wage benefits to already employed workers and job chain effects. Assuming, the remaining workers, after job chain effects, are evenly located along the labour supply curve, the average wage in NSW ($64,500[19]) gives an indication of a potential average reservation wage. Further, assuming a 10% increase in average reservation wage is required to reflect any disutility in the mining sector, and that these wage benefits are only obtained for 3 years, then the additional wage benefits associated with the 90% of workers who would otherwise be employed in other jobs is estimated at $27M present value, at a 7% discount rate. Values at alternate discount rates and percentages of already employed people are provided in the Table 4.3.

Based on these assumptions the potential market based benefits of employment are in the order of $32M present value at 7% discount rate.

Non-market Value of Employment

The above treatment of employment in CBA relate to the impacts on the unemployed individuals themselves. However, there may also be spillover effects and externalities to third parties. These are public good values. Spill-over effects referred to in the literature relate to empathy based losses to family or friends (close associates) of impacted workers because of the workers being unemployed and increased crime and community dislocation (Haveman and Weimer 2015: Streeting and Hamilton 1991). Empathy based impacts may also spill over more broadly into the existence values of others in the community who feel sympathy for the unemployed. As identified by Portney (1994), the concept of existence values should be interpreted more broadly than just relating to environmental resources and

[16] Streeting and Hamilton (1991) *An Economic Analysis of the Forests of South-Eastern Australia*, Resource Assessment Commission, Research Paper Number 5.
[17] All sourced from NSW.
[18] 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).
[19] Average NSW personal income in 2016 (ABS Estimates of Personal Income for Small Areas, 2011-2016).

may also apply to the employment of others. Refer to Attachment 7 for further discussion on non-market values of employment.

Empirical evidence for these values was found in three choice modelling studies of mining projects in NSW. In a study of the Metropolitan Colliery in the NSW Southern Coalfields, Gillespie Economics (2008) estimated the value the community would hold for the 320 jobs provided over 23 years at $756M (present value). In a similar study of the Bulli Seam Operations, Gillespie Economics (2009a) estimated the value the community would hold for the 1,170 jobs provided over 30 years at $870M (present value). In a study of for the Warkworth Mine extension, Gillespie Economics (2009b) estimated the value the community would hold for 951 jobs from 2022 to 2031 at $286M (present value). These studies are considered reasonable for benefit transfer since they relate to resource extraction in NSW with the population sampled being NSW households.

The Project will provide an average annual 260 direct jobs during operations, for approximately 9 years. Using the more conservative Bulli Seam Operation employment value gives an estimated $60M for the employment benefits of the Project. There is some political contention around these values, even though they have a solid foundation in theoretical and applied economics. Consequently, the results have conservatively been reported "with" and "without" employment benefits.

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. Land required for the Project is already owned by the proponent and has been for some time. The market value of land owned by Regis is included in the CBA as an opportunity cost. To the extent that the purchase price exceeded the opportunity cost of the land and the consumer surplus of the owner, then resource costs of the Project may be overstated and some benefits may accrue to the current landholder. However, conservatively these potential benefits are excluded from the CBA.

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. Conservatively, this convention is adopted and hence no secondary benefits to the economic are included.

Net Public Infrastructure Impacts

Potential impacts of the Project on public infrastructure include the use of utilities. However, the use of utilities will be paid for by user fees which are included in the Project operating costs. Consequently, no net infrastructure costs to government are envisaged as a result of the Project.

Loss of Surplus to Other Industries

The land that is the proposed site of the Project is currently used for agricultural production. There is a producer surplus associated with this use which will be foregone when the land is used for mining. However, as identified above the value of this surplus is reflected in the market value of the land which is included as an opportunity cost of the Project. This opportunity cost is borne by Regis, as owner of the land. Consistent with the partial equilibrium nature of CBA and the general approach of not including secondary costs and benefits in CBA no other impacts on other industries are included in the analysis.

4.5 Consolidation of Value Estimates

4.5.1 Global results

The present value of costs and benefits, using a 7% discount rate, is provided in Table 4.4. The top half of the table identifies production costs and benefits of the Project, which includes capital and operating costs associated with the mitigation, offset and compensation of environmental, social and cultural impacts. The bottom of the table summarises the residual environmental, social and cultural impacts of the Project after mitigation, offsetting and compensation. Specific mitigation, offsetting and compensation costs are a very small proportion of the capital and operating costs of the Project and even substantive changes in them have only modest impacts on the Project. Sensitivity testing of overall capital and operating costs in provided in Section 4.8.

The Project is estimated to have total net production benefits of $355M (present value at 7% discount rate). Residual environmental, cultural and social impacts of the Project are estimated at $23M present value (mainly global social damage costs of greenhouse gas emissions and historic heritage impacts). In addition, there are potential employment benefits of $92M. In total, the Project is estimated to have net social benefits of between $331M and $423M.

4.5.1 National results

Not all of the identified net social benefits accrue to Australia. Regis is 4% foreign owned and hence the net production benefits that accrue to Australia are limited to royalties, company tax, and 96% of residual producer surplus. Royalties are estimated based on 4% of the gold ex-mine value, where the ex-mine value includes allowable deductions for processing and treatment. Company tax from the Project was estimated based on estimation of taxable income (revenue less depreciation, operating costs, royalties), a notional 50% debt funding on first two years net costs (i.e. until net revenue of the Project is positive) and the application of a 30% tax rate to estimated taxable income.

On this basis, the net production benefits that accrue to Australia are estimated at $347M (present value at 7% discount rate), comprising $47M in royalties, $98M in company tax and $202M in residual producer surplus.

The estimated net production benefits that accrue to Australia can be used as a minimum threshold value or reference value against which the relative value of the residual environmental impacts of the Project, after mitigation, compensation and offsetting, may be assessed. It is a minimum threshold value as it conservatively omits potential employment benefits of the Project. This minimum threshold value is the opportunity cost to Australia of not proceeding with the Project.

For the Project to be questionable from an Australian economic efficiency perspective, all incremental residual environmental, social and cultural impacts from the Project, that impact Australia[20], would need to be valued by the community at greater than the estimate of the Australian net production benefits i.e. greater than $347M in present value terms.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to quantitatively consider the environmental, social and cultural impacts of the Project. From Table 4.4 it can be seen that most of the potential impacts are internalised into the capital and operating costs of the proponent via mitigation, offset or compensation, and hence are incorporated into the estimate of net production benefits. Other quantified impacts to Australia are estimated at $2M, considerably less than the estimated $347M net production benefits of the Project to Australia.

[20] 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.

Overall, the Project is estimated to have net social benefits to Australia of between $345M and $437M (the latter incorporating the benefits of employment), and hence relative to the "without Project" scenario is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Project CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than between $345M and $437M for the Project to be questionable from an Australian economic perspective.

Table 4.4
Global and National Cost Benefit Analysis Results of the Project (Present Values @7% discount rate)

	Costs	**$M**	**Benefits**	**$M**
Production	Opportunity cost of land	$30	Sale value of gold	$1,759
	Opportunity cost of capital	$1	Residual value of land	$14
	Development costs	$396	Residual value of capital	$8
	Operating costs ex royalties	$986		
	Rehabilitation and decommissioning costs	$14		
	Production Sub-total	***$1,427***		***$1,782***
	Net Production Benefit			**$355 ($347)**
Externalities	Agriculture	Reflected in land costs which are included in opportunity costs of land and development costs	Wage benefits of employment	$32
	Surface water	WAL cost included in development costs. No material residual impacts	Non-market benefits of employment	$60
	Groundwater	WAL cost included in development costs. No material residual impacts	Economic benefits to existing landholders	Not quantified
	Air quality	No material impacts	Economic benefits to suppliers	No material impacts
	Noise and vibration	At receiver mitigation costs included in development costs. No material residual impacts		
	Ecology and biodiversity	Some loss of values but offset. Cost of offset included in development costs		
	Aboriginal heritage	32 sites of stone artefacts impacted. Not quantified		
	Historic heritage	$7($2)		
	Transport and traffic	No material impacts. Costs of access upgrade included in development costs		
	Visual amenity	Cost of mitigation measures for impacted properties included in development costs		
	Greenhouse gas	$16 ($0*)		
	Net public infrastructure costs	No material impacts		
	Loss of surplus to other industries	No material impacts		
	Externality sub-total	***$23 ($2)***		***$92***
NET SOCIAL BENEFITS – including employment benefits				**$423 ($437)**
NET SOCIAL BENEFITS – excluding employment benefits				**$331 ($345)**

Note: totals may have minor discrepancies due to rounding. When impacts accrue globally, the numbers in brackets relates to the level of impact estimated to accrue to Australia
"No material impacts" 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 Project (NSW Government, 2012).
*The value is estimated at $0.09M but is rounded down.

4.6 NSW Costs and Benefits

The NSW Government (2015) guidelines have a particular focus on the costs and benefits to NSW. Table 4.5 identifies the costs and benefits to NSW. Impacts that have a national or global dimension are apportioned to NSW, in particular:

- 32% of the estimated company tax generated from the Project is attributed to NSW (NSW Guidelines 2015);
- 32% of the Australian residual net producer surplus is attributed to NSW (NSW Guidelines 2015);
- 100% of potential wages benefits are attributable to NSW based on an assumption that all incremental employment will be filled by NSW residents;
- 100% of the potential nonmarket values of employment are attributable to NSW based on benefit transfer from a study that surveyed the willingness to pay of NSW households;
- greenhouse gas impacts (which accrue globally) are attributed to NSW based on NSW's share of the global population;
- 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 Project to NSW are summarised in Table 4.5. The estimated Net Social Benefits of the Project to NSW are $141M and $232M, present value at 7% discount rate (the latter including employment benefits). Consequently, as well as resulting in net benefits to Australia, the Project would also result in net benefits to NSW.

Any unquantified residual impacts of the Project to NSW after mitigation, offsetting and compensation would need to be valued at greater than $141M and $232M, present value for the Project to be questionable from a NSW economic efficiency perspective.

Table 4.5
NSW Cost Benefit Analysis Results of the Project (Present Values @7% discount rate)

COSTS	VALUE ($M)	BENEFITS	VALUE ($M)
Environmental, social and cultural impacts		***Share of Net Production Benefits***	
Agriculture	Reflected in land costs which are included in opportunity costs of land and development costs	Royalties	$47
Surface water	WAL cost included in development costs. No material residual impacts	Company tax	$31
Groundwater	WAL cost included in development costs. No material residual impacts	Net producer surplus**	$65
Air quality	No material impacts	Contributions not linked to demand	
Noise and vibration	At receiver mitigation costs included in development costs. No material residual impacts	***Sub-total***	***$143***
Ecology and biodiversity	Some loss of values but offset. Cost of offset included in development costs	***Additional benefits***	
Aboriginal heritage	32 sites of stone artefacts impacted. Not quantified	Wage benefits to employment	$32
Historic heritage	$2	Non-market benefits of employment	$60
Transport and traffic	No material impacts. Costs of access upgrade included in development costs	Economic benefits to existing landholders	
Visual amenity	Cost of mitigation measures for impacted properties included in development costs	Economic benefits to suppliers	
Greenhouse gas	$0***		
Net public infrastructure costs	No material impacts		
Loss of surplus to other industries	No material impacts		
Total	**$2**	***Sub-total***	***$92***
NET SOCIAL BENEFITS – including employment benefits			**$232**
NET SOCIAL BENEFITS – excluding employment benefits			**$141**

* "No material impacts" 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 Project (NSW Government, 2012).
Errors in total are due to rounding.
**It should be noted that this is not equivalent to profit and hence should not be used to infer profitability of the Project. It is a residual amount after royalties and company tax are subtracted from the estimated total producer surplus of the Project. Company tax payable by Regis was estimated based on the Projects projected yearly taxable income. The estimation of taxable income uses accounting principles and is different to the estimation of net production benefits. In particular, taxable income includes the depreciation of capital rather than actual capital costs when they occur.
*** The value for NSW is estimated at $0.03M but is rounded down.

4.7 Distribution of NSW Costs and Benefits

As identified in Section 3, CBA is only 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 Project to NSW are potentially distributed among a range of stakeholders as identified in Table 4.6.

Table 4.6
Incidence of NSW Costs and Benefits

BENEFITS AND COSTS	INCIDENCE OF COSTS AND BENEFITS	MAGNITUDE OF IMPACT ($M)
Share of Net Production Benefits		
Royalties	NSW Government and NSW households	$47
Company tax	NSW Government and NSW households	$31
Residual producer surplus	Regis NSW Shareholders	$65
Additional benefits		
Wage benefits to employment	Some of the local and NSW labour force	$32
Non-market benefits of employment	NSW households	$60
Economic benefits to existing landholders	Local landholders who sell land required for Project including buffer land	Not quantified
Economic benefits to suppliers	Regional and State suppliers of inputs to production	Not quantified
Environmental, social and cultural costs*		
Agricultural impacts	Impacted farmers but compensated via purchase	No material residual impact
Surface water	Local surface water users but compensated via purchase of WALs	No material residual impact
Groundwater	Local groundwater users but compensated via purchase of WALs	No material residual impact
Air quality impacts	Adjoining landholders	No properties impacted by exceedances
Noise impacts	Adjoining landholders	Mitigation measures included in capital costs. Potentially impacted by any residual effects.
Ecology and biodiversity	Local and NSW households	Some loss of values but offset by provision of biodiversity offsets
Aboriginal heritage	Aboriginal people and other local and NSW households	Not quantified
Historic heritage impacts	Local and NSW households	$2
Transport and traffic	Local residents	No material impacts. Costs of access upgrade included in development costs
Visual amenity	Adjoining landholders	Mitigation measures included in capital and operating costs. Potentially impacted by any residual effects.
Greenhouse gas impacts	Local and NSW households	$0
Net public infrastructure costs	NSW Government and NSW households	No material impacts
Loss of surplus to other industries	Local industries adversely impacted by the Project	No material impacts

* 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.

It is evident from Table 4.6 that the potential costs and benefits of the Project accrue to different groups within the community. Local residents and adjoining landholders primarily bear any residual environmental impacts associated with noise and visual amenity. While any residual impacts are unlikely to be material from an aggregate CBA perspective, they would accrue to a small group of adjoining and nearby residents.

4.8 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;

- other environmental, social and cultural impacts 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 Regis would invest in the Project if it were not financially viable. However, any risk that the Project may commence and then cease operation for financial reasons leaving unmet rehabilitation liabilities is mitigated by the fact that Regis is required to pay a rehabilitation security deposit to the NSW Department of Planning and Environment – Division of Resources and Energy (DPE-DRE) as the holder of a mining authority under the Mining Act. This security deposit is held by DPE-DRE 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 DPE-DRE 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, and will be committed to prior to the commencement of the Project.

There is some risk associated with the estimation of environmental, social and cultural impacts of the Project 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 worst case scenarios 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 Project to NSW (presented in Table 4.5) 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[21].

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:

- Opportunity costs of land;
- Development costs;
- Operating costs;
- Value of gold i.e. USD price/exchange rate ;
- Residual externality costs.

Results are reported in Tables 4.7. 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 AUD/USD exchange rate). This is because the net benefit of the Project to NSW includes a large royalty component which is based on the Project revenue and is unaffected by assumptions regarding land opportunity costs, development costs, operating costs and mitigation, offsetting and compensation costs. Variations in these costs impact company tax estimates and net producer surplus, only a portion of which accrue to NSW.

[21] 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.

With respect to revenue, it should be noted that the estimated revenue from the Project is based on an assumed gold price over the life of the Project of USD1,320 and an AUD:USD exchange rate of 0.75. This is less than the USD gold price at the time this report was prepared and less than some market forecasts (e.g. https://longforecast.com/gold-price-today-forecast-2017-2018-2019-2020-2021-ounce-gram). The assumed exchange rate is also higher than the current rate with forecasts suggesting continuation of a lower rate (https://longforecast.com/australian-dollar-aud-to-usd-forecast-2017-2018-2019-2020-2021). To the extent these forecasts prevail the net production benefits may be considerably greater than estimated.

The sensitivity analysis indicated that the CBA results are not sensitive to changes in capital costs, opportunity costs of land and capital equipment or environmental costs that have not already been internalised into production costs, such as greenhouse gas and heritage impacts. Since mitigation, offset and compensation costs are a small component (4%) of the capital costs of the Project, it is unlikely that large changes in these cost levels would have any significant impact on the CBA results. The analysis is most sensitive to revenue estimates i.e. USD price of gold and the AUD:USD exchange rate and operating costs. As identified above, revenue estimates are likely to be understated.

Under all scenarios examined, except the unlikely scenario of a 20% decrease in gold price and a 10% discount rate, the Project has net social benefits to NSW.

Table 4.7
NSW CBA Sensitivity Testing (Present Value $Millions) (Excluding Employment Benefits)

	4% Discount Rate	7% Discount Rate	10% Discount Rate
CENTRAL ANALYSIS	**$206**	**$141**	**$93**
INCREASE			
Opportunity cost of land - 20%	$204	$139	$92
Development costs - 20%	$179	$116	$71
Operating costs - 20%	$131	$79	$42
Value of gold - 20%	$351	$257	$187
Externality impacts	$205	$140	$93

	4% Discount Rate	7% Discount Rate	10% Discount Rate
DECREASE			
Opportunity cost of land - 20%	$208	$142	$95
Development costs - 20%	$233	$165	$116
Operating costs or production levels - 20%	$281	$202	$144
Value of gold - 20%	$61	$24	-$1
Externality impacts	$206	$141	$94

5 LOCAL EFFECTS ANALYSIS

5.1 Introduction

The CBA in Section 4 is concerned with whether the incremental benefits of the Project exceed the incremental costs and therefore whether the community would, in aggregate, be better off 'with' the Project compared to 'without' it. This section and Section 6 examines local effects using two different methods.

The Local Area is defined as the LGAs of Orange, Blayney, Cabonne and Bathurst, within which the Project is located and is the region considered likely to be the main source of labour and non-labour inputs for the Project.

5.2 Direct Effects Related to Employment

The Project will provide:

- an average annual construction workforce of 520 during the peak year of construction, with 57% assumed to already reside in the local area; and
- an average annual operational workforce of 260 per year over the life of the Project, with 75% sourced from the local region.

Assuming that future employees residing in the local area are already employed and that job vacancies created by these people filling the construction and mining positions remain unfilled, the incremental disposable wages accruing to the region is $4.8M during the peak year of construction and between $7.6M and $12.9M during Project operations. This is equivalent to 136 direct full time equivalent (FTE) jobs during the peak year of construction and between 89 direct FTE jobs per annum during operations. This is a minimum estimate as it assumes full employment and no in-migration of labour.

Table 5.1
Analysis of Net Income Increase and FTE Job Increase

	Construction	Operations
a) Direct employment during operations phase	520	260
Number that already reside in the region	296	195
b) Average net income in construction and mining	$87,653	$87,653
c) Average net income in other industries*	$47,428	$47,428
d) Average increase in net income per job (b-c)	$40,225	$40,225
e) Increase in net income per year due to direct employment	$11,922,787	$7,843,939
f) FTE (e/b)	136	89

*This information is not available from the ABS and hence average income across all sectors is used.

5.3 Direct Effects Related to Non-labour Expenditure

The total annual non-labour expenditure (operating costs of the Project after subtraction of wages to employees) is in the order of $144M per annum.

However, not all of this expenditure will accrue to the local area. From the location quotient analysis and allocation of margins and taxes undertaken by Gillespie Economics for Section 6, $56M pa of non-labour Project expenditure is estimated to accrue to the regional economy.

5.4 Second Round and Flow-on Effects

The incremental expenditure by employees and non-labour expenditure that is captured by the local area provides flow-on economic activity to the local economy, which can be estimated in terms of economic activity indicators of output, value-added, income and employment. Section 6 provides a full assessment of flow-on effects arising from both labour expenditure and non-labour expenditure. From this analysis, the adjusted Type 11A employment and income multiplier for incremental impacts construction and operation impacts were identified. Applying these multipliers to the direct net employment and net income effects calculated above in accordance with the NSW Guideline (2015) results in the peak year of construction contributing up to 337 in regional jobs and $24M in regional income and the Project operation contributing up to 263 regional jobs and $18M in regional net income.

Table 5.2
Flow-on Effects Associated with Net Direct Employment and Income

	Net Direct	Flow-on	Total
Construction			
Employment	136	201	337
Net income (M)	$12	$12	$24
Operation			
Employment	89	174	263
Net income (M)	$8	$10	$18
Net non-labour expenditure (M)	**$56**		

5.5 Effects on Other Industries

5.5.1 Regional Economic Impacts of Displaced Agriculture

The Project could potentially result in a reduction in regional economic activity associated with a reduction in land available for agricultural activity - from the disturbance area, biodiversity offset area and the purchase of surface water and groundwater WALs - and hence a reduction demand for inputs to agricultural production.

The key impact of the Project on agricultural resources will be the removal of grazing livestock from the Project disturbance area during the life of the Project. The Agricultural Impact Statement (SSM 2019) estimated that the carrying capacity of the Project Area will be reduced by 10,064 Dry Sheep Equivalent during the life of the mine. This is equivalent to a reduction in total income of $406,202/pa.

This level of reduction in output was modelled using the Sheep, Grains, Beef and Dairy Cattle sector of the input-output model of the regional economy. A reduction in $406,202 per annum is estimated to have the direct and indirect impacts of the order of magnitude indicated in Table 5.3.

Table 5.3
Impact of a Reduction in Agricultural Activity from the Disturbance Area

	Direct	Production induced	Consumption induced	Total Flow on*	TOTAL EFFECT*
OUTPUT ($M)	0.4	0.2	0.1	0.3	0.7
Type 11A Ratio	1.00	0.59	0.25	0.84	1.84
VALUE ADDED ($M)	0.2	0.1	0.1	0.2	0.3
Type 11A Ratio	1.00	0.71	0.39	1.10	2.10
INCOME ($M)	0.1	0.0	0.0	0.1	0.1
Type 11A Ratio	1.00	0.95	0.48	1.43	2.43
EMPL. (No.)	1	1	0	1	2
Type 11A Ratio	1.00	0.52	0.32	0.84	1.84

The magnitude of these impacts is very small and inconsequential to the regional economy and agricultural support industries.

5.5.2 Wage Impacts

In the short-run, increased regional demand for labour as a result of the Project (relative to the "without Project" scenario) could potentially result in some increased pressure on wages in other sectors of the economy. The magnitude and duration of this upward wages pressure would depend on the level of demand for labour, the availability of labour resources in the region and the availability and mobility of labour from outside the region. The incremental direct employment and income impacts of the Project operation, as estimated in Section 6, will contribute in the order of 1.8% and 2.1% of direct regional employment and direct regional wages, respectively. The contribution is smaller using the LEA approach above. As shown in Figure 6.6, the main employment sectors in the regional economy have on average 7% of their labour residing outside the region, reflecting the mobility of labour. Wage impacts are therefore not likely to be significant. Where upward pressure on regional wages occurs, it represents an economic transfer between employers and owners of skills and would attract skilled labour to the region leading to downward pressure on wages.

5.5.3 Housing Impacts

The Project will generate some migration of workers and their families into the local area and hence increase demand for housing. However, the level of increased demand is modest in comparison to the existing population and forecast growth in population over time. Consequently, the impact on housing prices across the region is expected to be negligible.

5.7 Environmental and Social Impacts on the Local Community (Externalities)

Externalities that potentially accrue to the local area are summarised in Table 5.4. The main potential residual impacts after mitigation, compensation and offsets relate to noise and visual impact on adjoining residents.

Table 5.4
Main Potential Environmental and Social Impacts on the Local Community

ENVIRONMENTAL, SOCIAL AND CULTURAL COSTS	INCIDENCE OF COSTS AND BENEFITS	COMMENT
Agricultural impacts	Farmers whose land is required for the Project	Impacted farmers compensated via purchase of land. No material residual impact
Surface water	Local surface water users who hold WALs	Willing sellers compensated via purchase of WALs. No material residual impact
Groundwater	Local groundwater users who hold WALs	Willing sellers compensated via purchase of WALs. No material residual impact
Air quality impacts	Adjoining landholders	No properties impacted by exceedances. No material residual impact
Noise impacts	Adjoining landholders	Impacted by any residual effects after mitigation
Ecology and biodiversity	Local and NSW households	Some loss of nonuse values but offset by provision of biodiversity offsets
Aboriginal heritage	Aboriginal people and other local and NSW households	Some loss of values to those who value Aboriginal heritage
Historic heritage impacts	Local and NSW households	Some loss of values to those who value heritage
Transport and traffic	Local residents	No material impacts.
Visual amenity	Adjoining landholders	Impacted by any residual effects after mitigation

5.8 Summary of Local Effects

A summary of local effects of the Project is provided in Table 5.5.

Table 5.5
Summary of Local Effects

	Project Direct	Project Direct: Local	Net Direct Effect	Total Net Effect (with multiplier)
Construction (Peak Year)				
Employment	520	296	136	337
Net income (M)			$12	$24
Operation (Average Annual)				
Employment	260	195	89	263
Net income (M)			$8	$18
Net non-labour expenditure (M)	$56 Mpa			
Second round and flow-on effects	Refer to Section 6			
Contraction in other sectors	No material impact			
Displaced activities	No material impact			
Wage impacts	No material impact			
Housing impacts	No material impact			
Externality impacts	**Incidence of Impacts**	**Magnitude of Impact**		
Agricultural impacts	Farmers whose land is required for the Project	Impacted farmers compensated via purchase of land. No material residual impact		
Surface water	Local surface water users who hold WALs	Willing sellers compensated via purchase of WALs. No material residual impact		
Groundwater	Local groundwater users who hold WALs	Willing sellers compensated via purchase of WALs. No material residual impact		
Air quality impacts	Adjoining landholders	No properties impacted by exceedances. No material residual impact		
Noise impacts	Adjoining landholders	Impacted by any residual effects after mitigation		
Ecology and biodiversity	Local and NSW households	Some loss of nonuse values but offset by provision of biodiversity offsets		
Aboriginal heritage	Aboriginal people and other local and NSW households	Some loss of values to those who value Aboriginal heritage		
Historic heritage impacts	Local and NSW households	Some loss of values to those who value heritage		
Transport and traffic	Local residents	No material impacts.		
Visual amenity	Adjoining landholders	Impacted by any residual effects after mitigation		

6 SUPPLEMENTARY LOCAL EFFECTS ANALYSIS

6.1 Introduction

This section uses IO analysis to identify the gross economic activity footprint associated with the Project on the local economy. While Section 5 assumes full employment in the region (and nation) and no in-migration of labour, IO analysis assumes there is not full employment, allows for job chain effects and in-migration of labour to the region.

6.2 Structure of the Local Economy

For the purpose of the analysis, the local economy is defined as comprising the Orange, Blayney, Cabonne and Bathurst Regional LGAs. This is the region where the Project is located and the majority of the Project operational workforce is expected to reside.

A 2016 IO table of the regional economy was developed using the Generation of Input-Output Tables (GRIT) procedure (Attachment 8), using a 2015-16 IO table of the Australian economy (ABS Cat. 5209.0.55.001 Australian National Accounts: Input-Output Tables - 2015-16) as the parent table and 2016 Census employment by industry data for NSW and the region. The 114 sector IO table of the regional economy was aggregated to 50 sectors and 8 sectors for the purpose of describing the economy.

A highly aggregated 2016 IO table for the regional economy is provided in Table 6.1. The rows of this table indicates how the gross regional output of an industry is allocated as sales to other industries, to households, to exports and other final demands (OFD - which includes stock changes, capital expenditure and government expenditure). For example, the mining sector in the region sells $1M worth of output to the agriculture, forestry and fishing sector of the regional economy, $30M worth of output to the mining sector of the regional economy etc. It also sells $1M of output directly to households and exports $965M worth of output from the region.

The corresponding column shows the sources of inputs to produce that gross regional output. These include purchases of intermediate inputs from other industries, the use of labour (household income), the returns to capital or other value-added (OVA - which includes gross operating surplus and net indirect taxes and subsidies) and goods and services imported from outside the region. The number of people employed in each industry is also indicated in the final row. For the mining sector to produce $1,210M worth of output, it purchases $2M of inputs from the agriculture, forestry and fishing sector of the regional economy, $30M of inputs from the mining sector of the regional economy etc. It also imports $361M of inputs from outside the region, generates $266M in other value added, employs 1,495 people and pays $182M in wages and salaries.

Output for the regional economy is estimated at $21,904M. Value-added for the regional economy is estimated at $6,121M, comprising $3,180M to households as wages and salaries and $2,941M in OVA.

The total employment in the regional economy was 43,612 jobs.

The economic structure of the regional economy can be compared with that for NSW through a comparison of results from the respective IO models (Figures 6.1 and 6.2). This reveals that the agriculture/forest/fishing, mining and public personal services sectors in the regional economy are of greater relative importance than they are to the NSW economy, while business services sectors are of less relative importance than they are to the NSW economy.

Figures 6.3 to 6.5 provide a more expansive sectoral distribution of gross regional output, employment, household income, value-added, exports and imports, and can be used to provide some more detail in the description of the economic structure of the regional economy. From these figures, it is evident that in terms of gross regional output, other mining, food manufacturing and construction trade services are the most significant sectors (Figure 6.3). In terms of value-added, Ownership of dwellings, other mining

and education are the most significant sectors (Figure 6.3). The retail trade, education and health sectors are the most significant sector in terms of regional employment (Figure 6.4) while the education, health, public administration and community care services sectors are the most significant sectors in terms of income (Figure 6.4). Major importing and exporting sectors are the other mining and food manufacturing sectors (Figure 6.5).

Table 6.1
Aggregated Transactions Table: Regional Economy 2016 ($M)

	Ag, forestry, fishing	Mining	Manuf.	Utilities	Building	Trade/ Accom	Bus. Srvcs	Public/ Pers. Srvcs	*TOTAL*	Household Expenditure	OFD	Exports	Total
Ag, forestry, fishing	120	2	212	0	1	17	3	3	***359***	23	90	304	**776**
Mining	1	30	42	0	5	1	1	1	***80***	1	164	965	**1,210**
Manuf.	30	53	132	3	117	49	18	33	***436***	147	142	809	**1,534**
Utilities	14	23	19	116	9	14	26	27	***247***	61	122	7	**437**
Building	24	77	9	12	327	17	68	34	***569***	5	762	6	**1,342**
Trade/Accom	27	47	60	5	41	45	52	59	***336***	642	86	168	**1,232**
Bus.Srvcs	61	109	117	31	101	165	381	203	***1,168***	875	409	306	**2,757**
Public/Pers Srvcs	7	60	14	5	16	12	61	77	***253***	533	1,469	114	**2,368**
TOTAL	***284***	***401***	***606***	***172***	***618***	***319***	***610***	***438***	***3,448***	***2,287***	***3,245***	***2,678***	**11,657**
Household Income	112	182	258	55	263	437	616	1,257	***3,180***	-	-	-	**3,180**
OVA	218	266	208	136	154	242	1,001	281	***2,506***	266	168	2	**2,941**
Imports	163	361	462	74	307	234	531	391	***2,524***	1,168	336	98	**4,126**
TOTAL	**776**	**1,210**	**1,534**	**437**	**1,342**	**1,232**	**2,757**	**2,368**	**11,657**	**3,721**	**3,749**	**2,777**	**21,904**
Employment	**2,462**	**1,495**	**3,114**	**518**	**3,044**	**8,805**	**6,308**	**17,865**	**43,612**				

Figure 6.1
Summary of Aggregated Sectors: Regional Economy (2016)

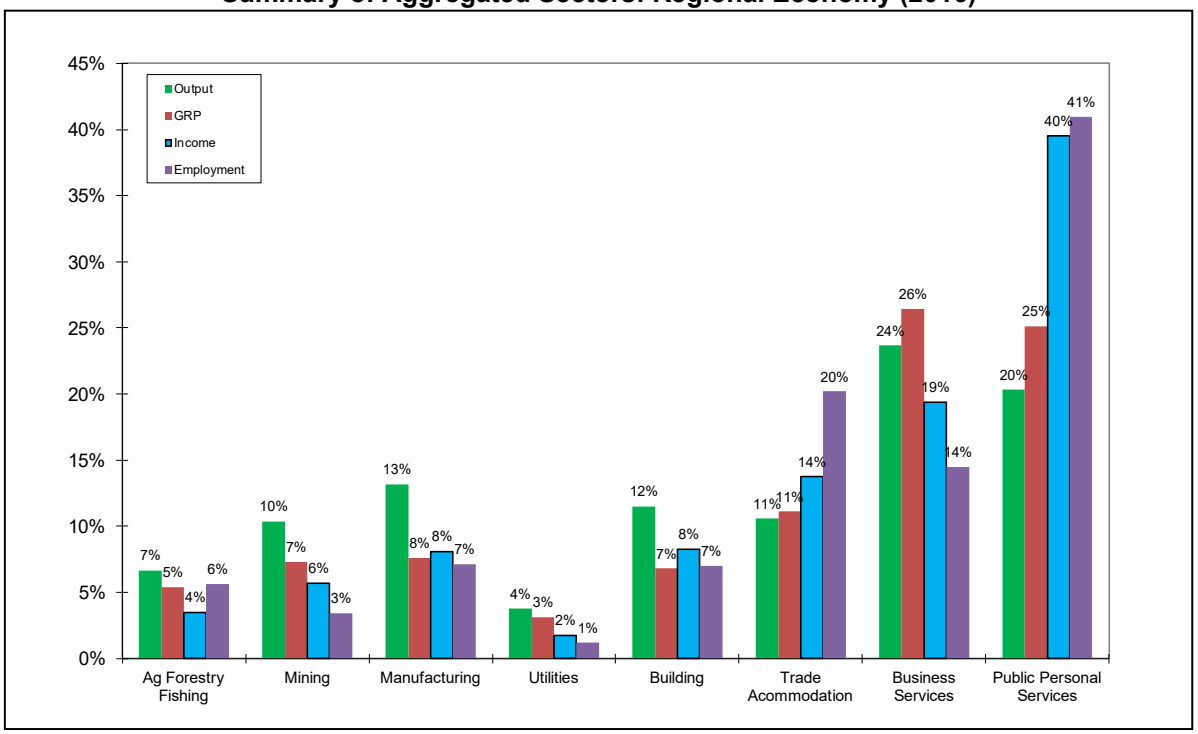


Figure 6.2
Summary of Aggregated Sectors: NSW Economy (2016)

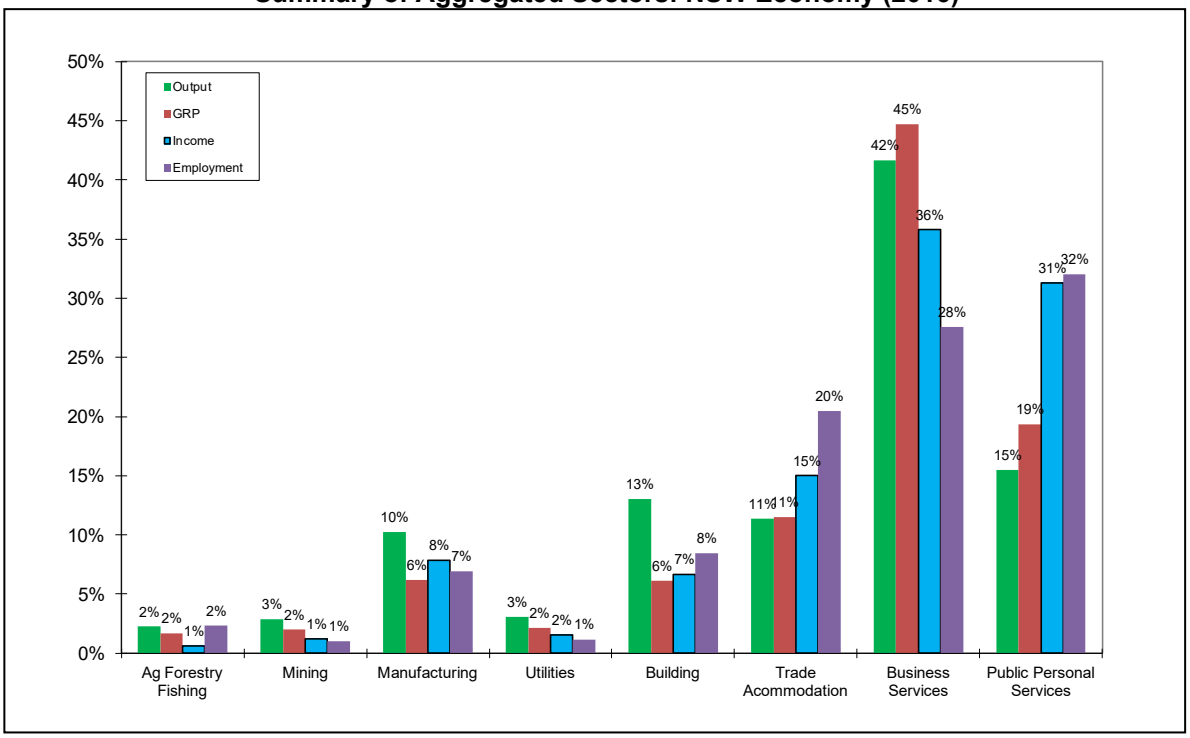


Figure 6.3 Sectoral Distribution of Gross Regional Output and Value Added ($M)

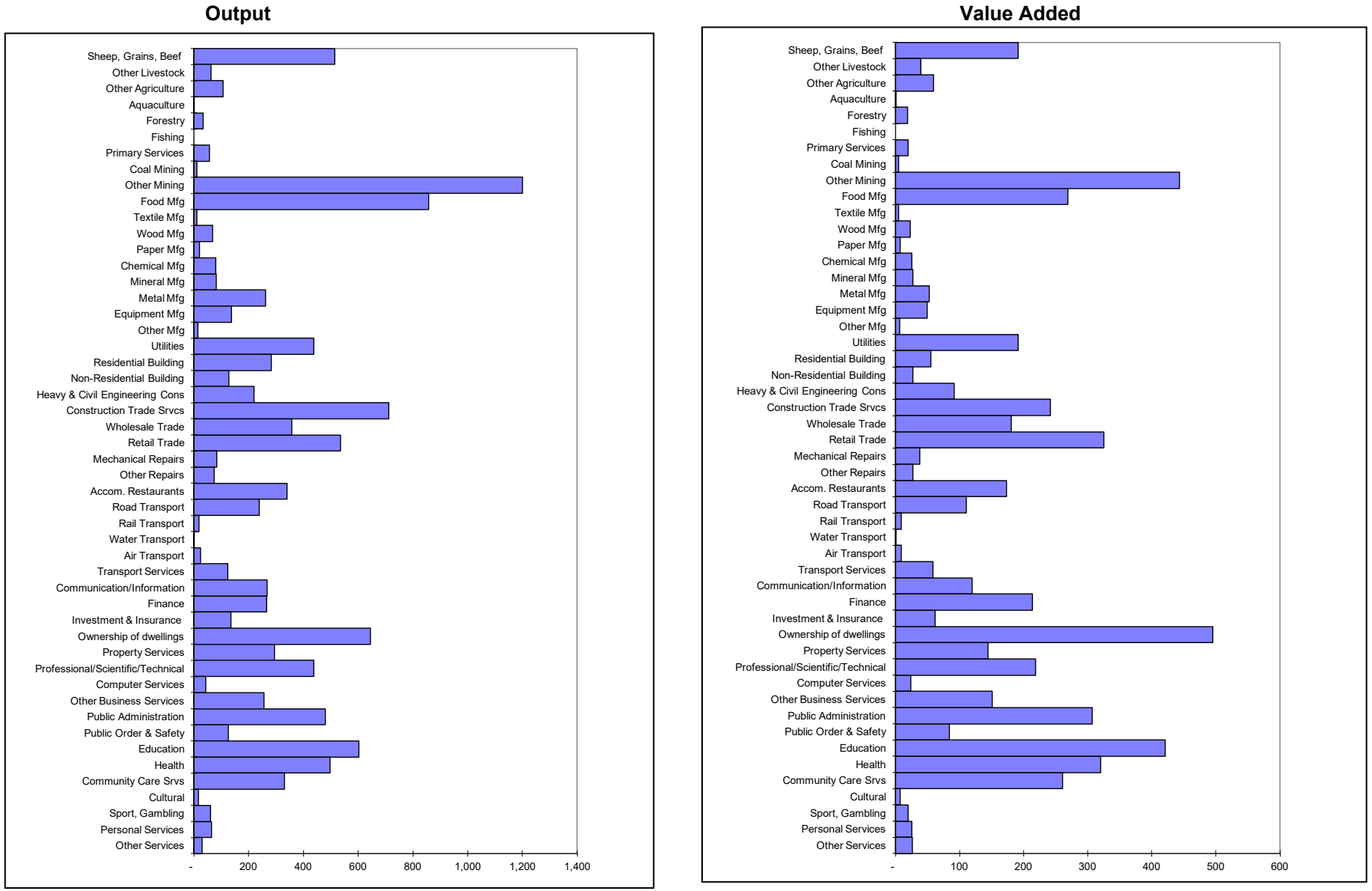


Figure 6.4 Sectoral Distribution of Income ($M) and Employment (No.)

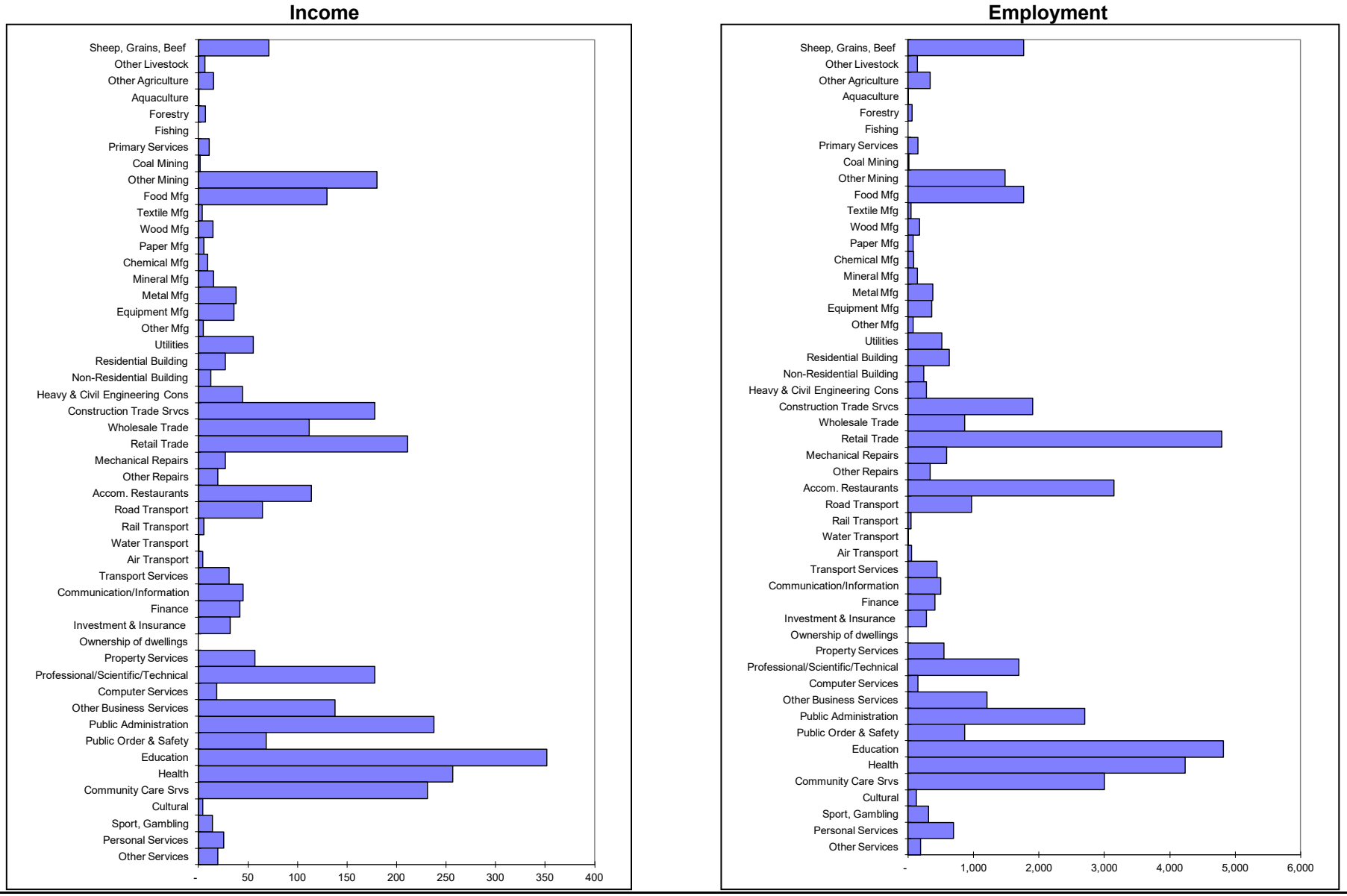


Figure 6.5 Sectoral Distribution of Imports and Exports ($M)

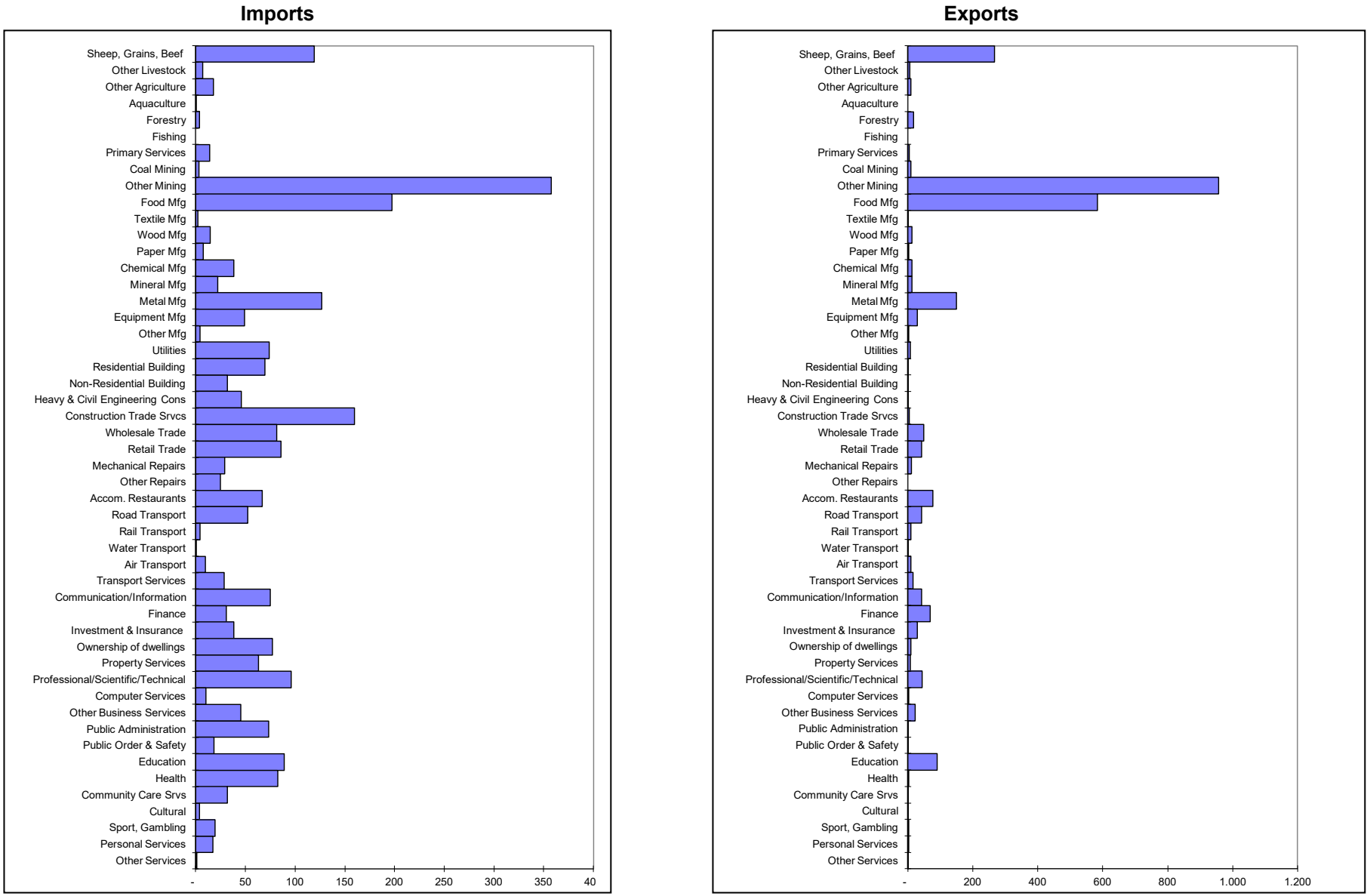
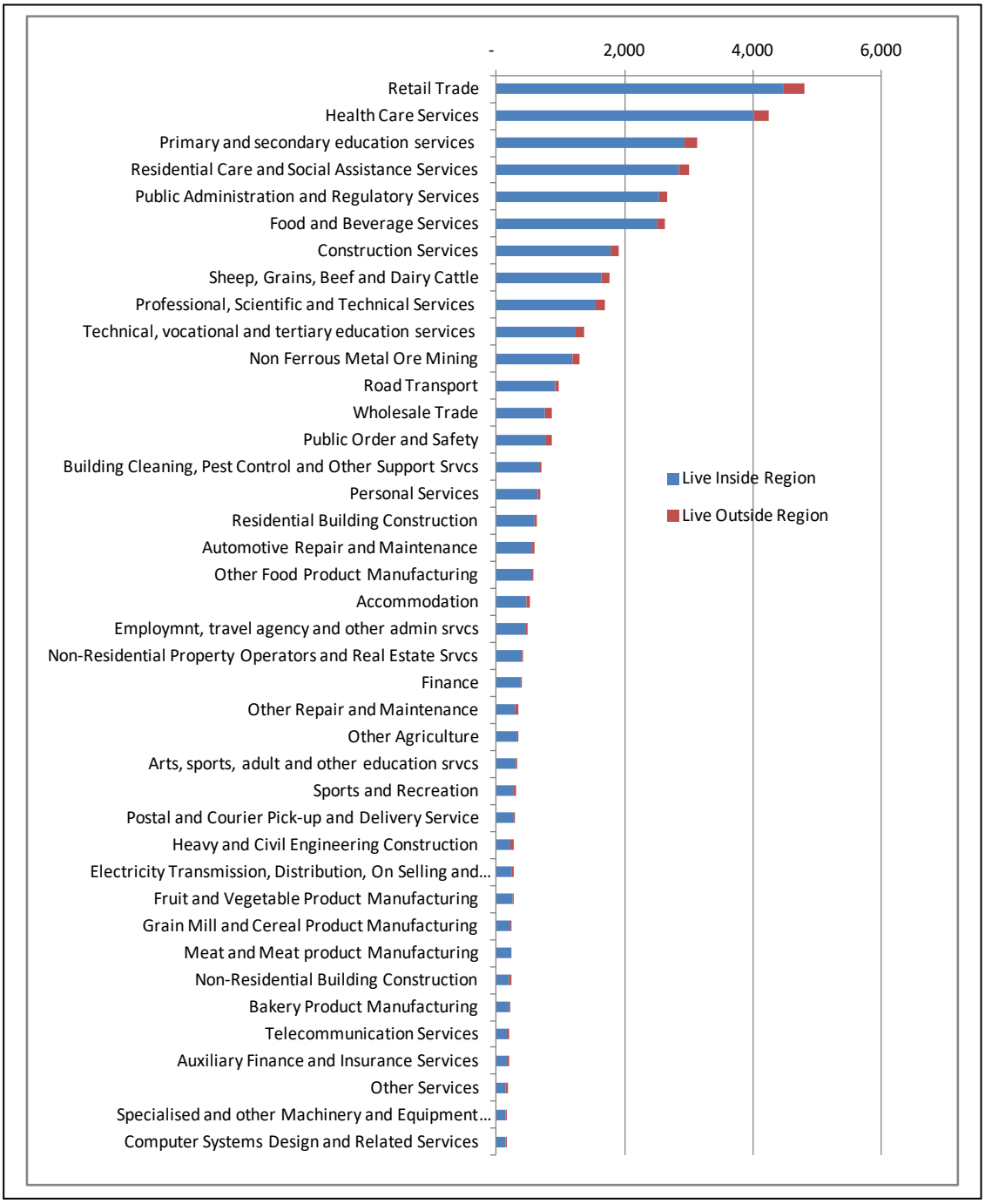


Figure 6.6 shows the top 40 individual industry sectors by employment number for the region. The five most significant employment providers in the region are the retail trade sector, health care services sector, primary and secondary education services sector, residential care and public administration and regulatory services sector. In the top 40 individual industry sectors by employment, 7% of the workforce resides outside the region.

Figure 6.6
Main Employment Sectors in the Region (Job Numbers)



Source: Generated from ABS 2016 census 4 digit employment by industry by place of usual residence data.

6.3 Expenditure During Mining Operation

6.3.1 Introduction

Mining projects provide direct economic activity to regional economies i.e. the output, value-added, income and employment associated with the quarrying operation. All other things being equal, the economic activity arising from a project will depend on:

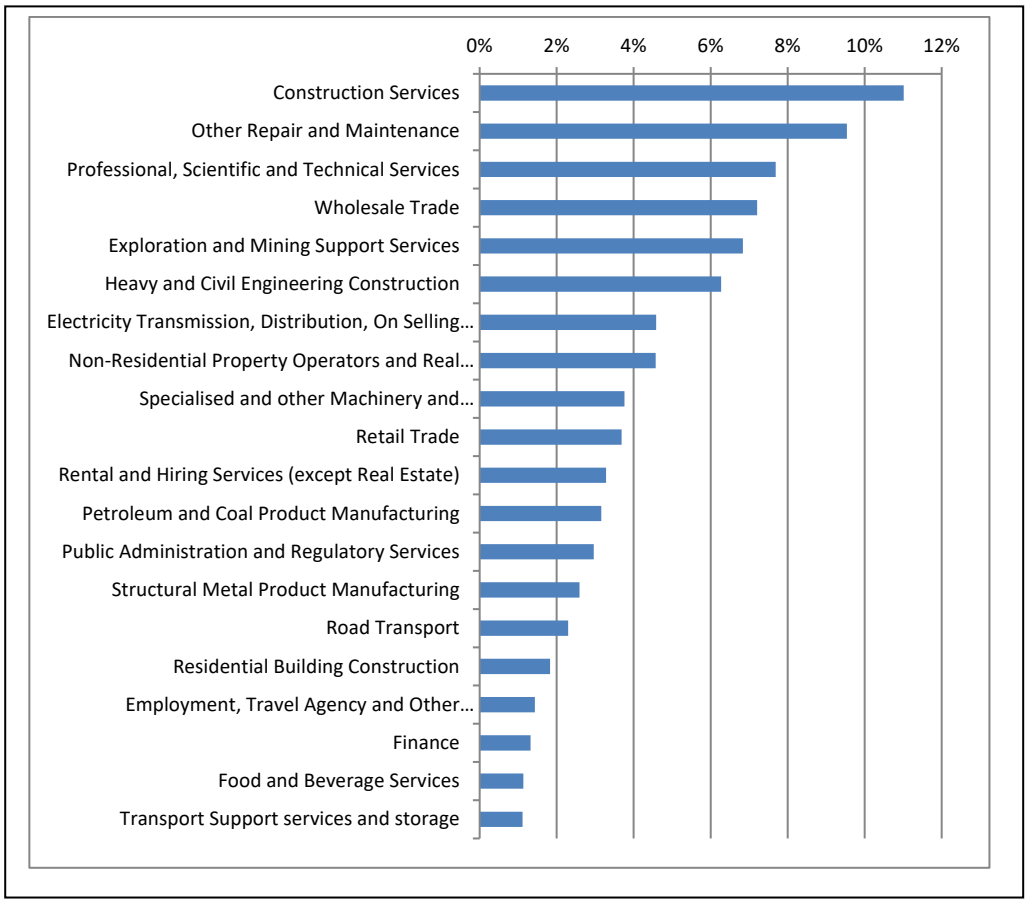
- the expenditure profile in the regional economy that is associated with the project;
- the expenditure profile and residential location of the workforce; and
- the size of the regional economy and the ability of local businesses to supply inputs to production demanded by mine proponents and the workforce.

6.3.2 Mining Operation Expenditure

The Project is a new development. Some indication of the main sectors of the regional economy that may directly benefit from the Project operation can be obtained by examining the regional expenditure pattern of the Non Ferrous Metal Ore Mining sector in regional IO table. This has been developed based on the expenditure pattern of the Non Ferrous Metal Ore Mining in a National IO table and the application of NSW and then regional location quotients[22] to assess the ability of sectors in the regional economy to supply the goods and services demanded. Based on this approach, the main sectors in the regional economy to benefit from direct operational expenditure are shown in Figure 6.7. The main sectors benefitting are Construction Services, Other Repairs and Maintenance, Professional, Scientific and Technical Services, Wholesale Trade, Exploration and Mining Support Services and Heavy and Civil Engineering Construction.

[22] Location quotients are a way of quantifying how “concentrated” an industry is in a region compared to a larger geographic area, in this case NSW. They are calculated by comparing the industry’s share of regional employment with its share of NSW employment. A LQ of one indicates that the concentration of an industry's employment in a region is the same as for the state. A LQ of greater than one indicates the region has a greater concentration of employment in an industry compared to NSW and hence the likelihood of this sector in a region being able to provide the goods and services demanded by a project are greater than where the concentration is less than one.

Figure 6.7
Percentage of Operational Expenditure in the Region by Sector

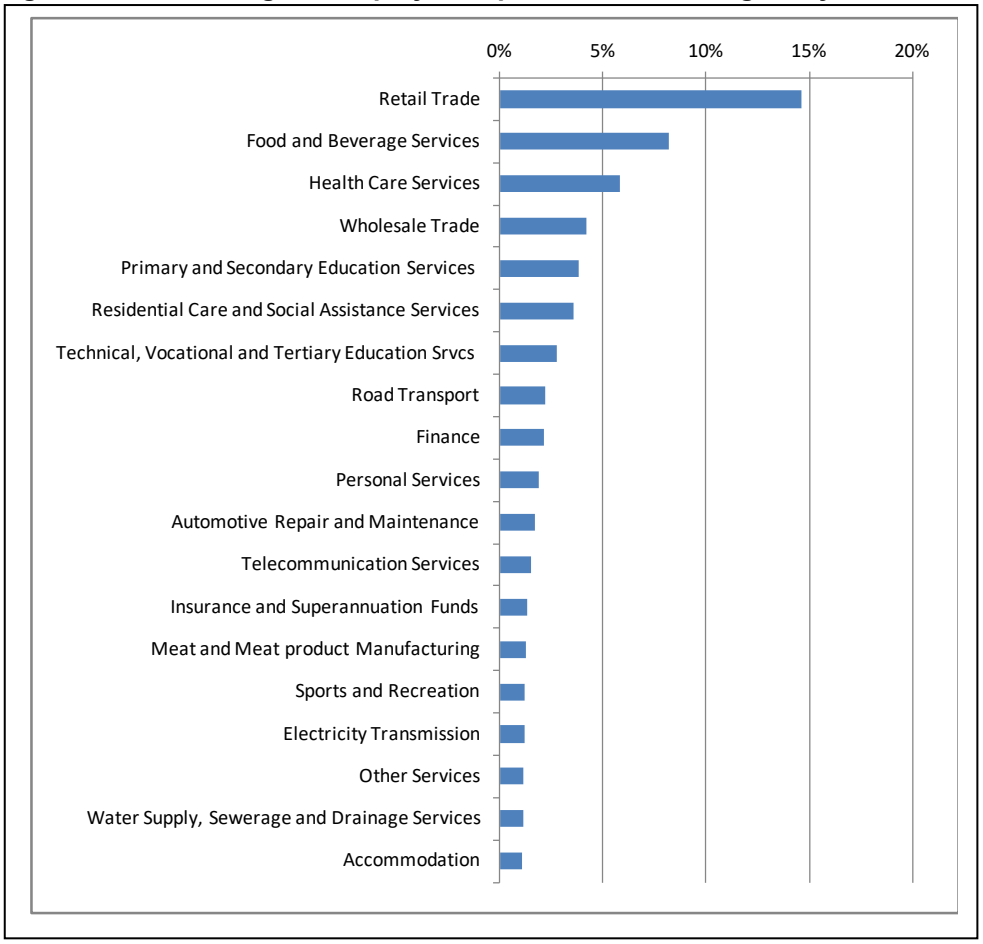


6.3.3 Mine Employee Expenditure

Economic activity in the region will also arise from the expenditure of the Project's workforce in the region. It is estimated that the Project will provide direct regional operation employment for up to 260 people. Ninety percent are estimated to live in the region[23]. An indication of the main sectors of the regional economy that may benefit from employee expenditure can be obtained by examining the expenditure pattern of the household sector in the National IO table adjusted to the region using location quotients. Based on this approach the main sectors in the regional economy to benefit from direct expenditure of wages in the regional economy are shown in Figure 6.8. The main sectors benefitting from workforce expenditure are retail trade, food and beverage services, health care services, wholesale trade and primary and secondary education services.

[23] This includes local hires plus those migrating into the region.

Figure 6.8 - Percentage of Employee Expenditure in the Region by Sector



6.4 Regional Impact of the Project

The revenue, expenditure and employment associated with the construction and operation phases of the Project would stimulate economic activity for the regional economy, as described in this section.

6.4.1 Construction Phase

Introduction

Economic activity associated with the Project construction is estimated to mainly occur within three sectors of the economy:

- the *heavy and civil engineering construction sector* which includes businesses involved in the mine sites;
- the *construction services sector* which includes businesses involved in site preparation services, plumbing, electrical, and other trades; and
- the *specialised and other machinery and equipment manufacturing sector which includes the manufacturing of mining machinery and equipment*.

Given the largely specialist nature of capital equipment and the relatively small size of the regional economy for the purpose of this analysis an assumption is made that all such purchases and the leasing of machinery are made outside the regional economy.

Impact on Regional Economy

The average annual Project construction workforce[24] is estimated at 520 in the first year of construction and 100 in the second year of construction.

To support 520 construction workers (Year 1), reference to the input-output coefficients for the region shows that approximately $290M of capital expenditure would be required in the *heavy and civil engineering construction sector* and *construction services sector.* The direct and indirect regional economic impact of this level of expenditure in the regional economy is reported in Table 6.2.

Impacts

Table 6.2
Economic Impacts of the Construction Workforce on the Regional Economy (Year 1)

	Direct	Production induced	Consumption induced	Total Flow on*	TOTAL EFFECT*	Adjusted Total for Non Local Hires
OUTPUT ($M)	290	184	100	284	574	531
Type 11A Ratio	1.00	0.63	0.35	0.98	1.98	1.83
VALUE ADDED ($M)	111	73	58	131	243	218
Type 11A Ratio	1.00	0.66	0.52	1.18	2.18	1.96
INCOME ($M)	56	44	24	68	124	114
Type 11A Ratio	1.00	0.79	0.44	1.22	2.22	2.03
EMPL. (No.)	520	529	421	950	1,470	1,289
Type 11A Ratio	1.00	1.02	0.81	1.83	2.83	2.48

Note: Totals may have minor discrepancies due to rounding.

In estimating the total regional impacts, it is important to separate the flow-on effects that are associated with firms buying goods and services from each other (production-induced effects) and the flow-on effects that are associated with employing people who subsequently buy goods and services as households (consumption-induced effects). This is because these two effects operate in different ways and have different spatial impacts.

Production-induced effects occur in a near-proportional way within a region, whereas the consumption-induced flow-on effects only occur in a proportional way if workers and their families are located in the region or migrate into the region. Where workers commute from outside the region some of the consumption-induced flow-on effects leak from the region. For the purpose of this analysis it is conservatively assumed that 57% of the construction workforce are sourced from the region and that the remainder who relocate to the region or commute from outside the region do not expend any significant amount of their income in the region. On this basis the total regional economic impact during construction comprises the direct effects, production-induced effect and 57% of the consumption-induced effect identified in Table 6.2. That is, total annual impact of peak year of construction on the regional economy is estimated at up to:

- $531M in annual direct and indirect regional output or business turnover;
- $218M in annual direct and indirect regional value added;
- $114M in annual direct and indirect household income; and
- 1,289 direct and indirect jobs.

Proportionally less impact would be felt in Year 2 of the construction phase of the Project.

[24] Those working construction sectors of the economy in year 1 of the Project.

Multipliers

Multipliers are summary measures used for predicting the total impact on all industries in an economy from changes in the demand for the output of any one industry (ABS, 1995). There are many types of multipliers that can be generated from input-output analysis (refer to Attachment 5). Type 11A ratio multipliers summarise the total impact on all industries in an economy in relation to the initial own sector effect e.g. total income effect from an initial income effect and total employment effect from an initial employment effect, etc.

The Type 11A ratio multipliers for the construction phase of the Project range from 1.83 for output up to 2.48 for employment.

Main Sectors Affected

The input-output analysis indicates that construction is most likely to directly impact the heavy and civil engineering construction sector and construction services sector. Flow-on impacts from the construction of the Project are likely to affect a number of different sectors of the regional economy. The sectors most impacted by output, value-added, income and employment flow-ons are likely to be construction services, wholesale and retail trade, professional, scientific and technical services, road transport and food and beverage services.

6.4.2 Operation Phase

Impact on the Regional Economy

Introduction

For the analysis of the Project, a Project sector was inserted into the regional IO table[25] reflecting average annual production levels for the Project, during years of mineral extraction. The revenue, expenditure and employment data for this new sector was obtained from financial information provided by Regis. For this new sector:

- the estimated gross annual revenue of the Project was allocated to the o*utput* row;
- the estimated wage bill of employees residing in the region was allocated to the *household wages* row with the remainder allocated to a secondary household wages row that does not get incorporated into flow-on effects;
- non-wage local expenditure was initially allocated across the relevant *intermediate sectors* in the economy and *imports* based on ratios in the regional input-output table;
- the difference between total revenue and total costs was allocated to the *other value-added* row*;* and
- direct employment in the Project was allocated to the *employment* row.

Impacts

The total and disaggregated annual impacts of the average operation of the Project on the regional economy in terms of output, value-added, income and employment (in 2019 dollars) are shown in Table 6.3.

[25] Inflated to 2019

Table 6.3
Annual Regional Economic Impacts of the Project

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT	Adjusted Total for Non Local Hires
OUTPUT ($M)	335	107	55	163	498	492
Type 11A Ratio	1.00	0.32	0.17	0.49	1.49	1.47
VALUE ADDED ($M)	196	48	32	79	275	272
Type 11A Ratio	1.00	0.24	0.16	0.41	1.41	1.39
INCOME ($M)	30	26	13	39	69	67
Type 11A Ratio	1.00	0.87	0.46	1.32	2.32	2.27
EMPL. (No.)	268	312	232	543	811	788
Type 11A Ratio	1.00	1.16	0.87	2.03	3.03	2.94

Note: Totals may have minor discrepancies due to rounding.

Again regional economic impacts are separated out between production-induced effects and consumption-induced effects. Production-induced effects occur in a near-proportional way within a region. Where workers commute from outside the region (assumed to be 10%) some of the consumption-induced flow-on effects (10%) leak from the region. Where workers are already located in the region i.e. unemployed or employed, some of the consumption-induced flow-ons in the region may already be occurring through expenditure of their current wage or unemployment benefits.

The Project is estimated to make up to the following contribution to the regional economy (Table 6.3):

- $492M in annual direct and indirect regional output or business turnover;
- $272M in annual direct and indirect regional value-added;
- $67M in annual direct and indirect household income; and
- 788 direct and indirect jobs.

Multipliers

Type 11A ratio multipliers for the Project range from 1.39 for value-added up to 2.94 for employment.

Capital intensive industries tend to have a high level of linkages with other sectors in an economy thus contributing substantial flow-on employment while at the same time only having a lower level of direct employment (relative to output levels). This tends to lead to relatively high ratio multipliers for employment. A lower ratio multiplier for income (compared to employment) also generally occurs as a result of comparatively higher wage levels in the mining sectors compared to incomes in the sectors that would experience flow-on effects from the Project.

Capital intensive mining projects also typically have a relatively low ratio multiplier for value-added, reflecting the relatively high direct value-added for the Project compared to that in flow-on sectors. The low output ratio multiplier largely reflects the high direct output value of the Project compared to the sectors that experience flow-on effects from the Project.

Main Sectors Affected

Flow-on impacts from the Project are likely to affect a number of different sectors of the regional economy. The sectors most impacted by output, value-added and income flow-ons are likely to be the:

- Construction Services;
- Professional, Scientific and Technical Services Sector;

- Retail Trade Sector;
- Wholesale Trade Sector;
- Other Repair and Maintenance Sector;
- Exploration and Mining Support Services Sector;
- Food and Beverage Services Sector;
- Employment, Travel Agency and Other Administrative Services; and
- Non-Residential Property Operators and Real Estate Services.

Examination of the estimated direct and flow-on employment impacts gives an indication of the sectors in which employment opportunities would be generated by the Project operation (Table 6.4).

Table 6.4
Sectoral Distribution of Total Regional Employment Impacts of the Project

Sector	Average Direct Effects	Production Induced	Consumption Induced	Total
Primary	0	3	5	8
Mining	268	8	0	276
Manufacturing	0	25	9	35
Utilities	0	8	2	10
Wholesale/Retail	0	48	56	104
Accommodation, cafes, restaurants	0	14	33	47
Building/Construction	0	46	4	49
Transport	0	18	7	25
Services	0	141	92	234
Total	**268**	**312**	**208**	**788**

Note: Totals may have minor discrepancies due to rounding.

Table 6.4 indicates that direct, production-induced and consumption-induced employment impacts of the Project on the regional economy are likely to have different distributions across sectors. Production-induced flow-on employment would occur mainly in the *services*, *wholesale/retail, and manufacturing* sectors, while consumption induced flow-on employment would be mainly in the *services, wholesale/retail trade and accommodation/cafes/restaurants* sectors (Table 6.4).

Businesses that can provide the inputs to the production process required by the Project and/or the products and services required by employees would directly benefit from the Project by way of an increase in economic activity. However, because of the inter-linkages between sectors, many indirect businesses would also benefit.

6.5 Potential Contraction in Other Sectors

Economic impacts for regional economies modelled using IO analysis represent only the gross or positive economic activity associated with the Project. Where employed and unemployed labour resources in the region are limited and the mobility of in-migrating or commuting labour from outside the region is restricted, there may be competition for regional labour resources as a result of the individual project that drives up regional wages. In these situations, there may be some 'crowding out' of economic activity in other sectors of the regional economy.

'Crowding out' would be most prevalent if the regional economy was at full employment and it was a closed economy with no potential to use labour and other resources that currently reside outside the region. However, the regional economy is not at full employment and is an open economy with access

to external labour resources. Consequently, ‘crowding out’ of economic activity in other sectors as a result of the Project would not be expected to be significant.

However, even where there is some ‘crowding out’ of other economic activities this does not indicate losses of jobs but the shifting of labour resources to higher valued economic activities. This reflects the operation of the market system where scarce resources are reallocated to where they are most highly valued and where society would benefit the most from them. This reallocation of resources is therefore considered a positive outcome for the economy not a negative.

6.6 Mine Cessation

As outlined in Section 6.4, the Project would provide direct and indirect economic activity in the regional economy for approximately 11 years. Conversely, the cessation of the mining operations in the future would result in a contraction in regional economic activity.

The magnitude of the regional economic impacts of cessation of the Project would depend on a number of interrelated factors at the time, including:

- the movements of workers and their families;
- alternative development opportunities; and
- economic structure and trends in the regional economy at the time.

Ignoring all other influences, the impact of Project cessation on the regional economy would depend on whether the workers and their families affected would leave the area. If it is assumed that some or all of the workers remain in the region, then the impacts of Project cessation would not be as severe compared to a greater number leaving the region. This is because the consumption-induced flow-ons of the decline would be reduced through the continued consumption expenditure of those who stay (Economic and Planning Impact Consultants, 1989). Under this assumption, the regional economic impacts of Project cessation would approximate the direct and production-induced effects in Table 6.3. However, if displaced workers and their families leave the region then impacts would be greater and begin to approximate the total effects in Table 6.3.

The decision by workers, on cessation of the Project, to move or stay would be affected by a number of factors including the prospects of gaining employment in the regional economy compared to other regions, the likely loss or gain from homeowners selling, and the extent of "attachment" to the regional area (Economic and Planning Impact Consultants, 1989).

Ultimately, the significance of the economic impacts of cessation of the Project would depend on the economic structure and trends in the regional economy at the time. For example, if the Project cessation takes place in a declining economy, the impacts might be significant. Alternatively, if Project cessation takes place in a growing diversified economy where there are other development opportunities, the ultimate cessation of the Project may have little impact.

Nevertheless, given the uncertainty about the future prospects in the regional economy, it is not possible to predict the likely circumstances within which Project cessation would occur.

7 CONCLUSION

A CBA of the Project indicated that it would have net production benefits to NSW of $143M, present value at 7% discount rate. Provided the residual environmental, social and cultural impacts of the Project that accrue to NSW are considered to be valued at less than $143M, the Project can be considered to provide an improvement in economic efficiency and hence relative to the "without Project" scenario is justified on economic grounds.

Adverse uncompensated environmental, social and cultural impacts of the Project have been minimised through project design and mitigation, offset and compensation measures. The cost of implementing these measures have already been incorporated into the estimate of net production benefits, including the cost of using land and water resources, noise and visual mitigation, provision of biodiversity offsets and the cost of a Project site access upgrade. Expert technical investigations indicate no material impacts are envisaged in relation to air quality, public infrastructure or loss of surplus to other industries. Impacts that were quantified included greenhouse gas generation and historic heritage. However these are minor compared to the estimated net production benefits of the Project. Aboriginal heritage impacts remained unquantified.

There may also be some market and non-market benefits of employment provided by the Project which are estimated to be in the order of $92M, present value at 7% discount rate. Overall, the Project is estimated to have net social benefits to NSW of $141M to $232M, present value at 7% discount rate and hence relative to the "without Project" scenario is desirable and justified from an economic efficiency perspective.

While the main environmental, cultural and social impacts have been quantified and included in the Project CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $141M to $232M (present value) for the Project to be questionable from a NSW economic efficiency perspective.

The key driver of the net social benefits to NSW is revenue (reflecting production levels, the value of gold in USD and the AUD/USD exchange rate). Forecasts suggest that revenue estimates may be conservative and hence estimates of net social benefits may be conservative. The estimates are less sensitive to assumptions about land opportunity costs, development costs, operating costs and mitigation, offset and compensation costs.

The relative magnitude of net production benefits and residual environmental, cultural and social impacts indicates that even with large changes to the assumed gold price, the net production benefits of the Project to NSW are likely to still far outweigh any residual impacts of the Project.

Local Effects Analysis

Under the strict LEA assumptions of full regional employment and no in-migration of labour, the Project is estimated to contribute 136 net direct local jobs ($12M in income) to existing residents of the region during the peak year of construction and 89 net direct local jobs ($8M in income) annually during operation.

Including multiplier effects the annual direct net local impact of the Project is estimated at:

- 337 local jobs ($24M income) during the peak year of construction; and
- 263 local jobs ($18M income) annually during operation.

Supplementary Local Effects Analysis using Input-Output Analysis

A supplementary LEA was undertaken using IO analysis. This method relaxes the restrictive assumptions of the LEA and allows for divergence from full employment, job chains effects and in-migration of labour to the region.

Using this approach, the total annual impact of peak year of construction on the regional economy is estimated at up to:

- $531M in annual direct and indirect regional output or business turnover;
- $218M in annual direct and indirect regional value added;
- $114M in annual direct and indirect household income; and
- 1,289 direct and indirect jobs.

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

- $492M in annual direct and indirect regional output or business turnover;
- $272M in annual direct and indirect regional value-added;
- $67M in annual direct and indirect household income; and
- 788 direct and indirect jobs.

The actual regional impact of the Project operation is likely to lie between that assessed in the LEA and the Supplementary LEA.

8 REFERENCES

Allens Consulting Pty Ltd (2005) *Valuing the Priceless: The Value of Historic Heritage in Australia,* prepared for the Heritage Chairs and Officials of Australia and New Zealand

Australian Bureau of Statistics (1995) *Information Paper Australian National Accounts Introduction to Input-Output Multipliers*. Cat. No. 5246.0.

Australia Bureau of Statistics (2016) *Census of Population and Housing.*

Bartik, T. (2012) Including Jobs in Benefit-Cost Analysis, *Annual Review of Resource Economics*, 2012, 4:55–73.

Boardman, A., Greenberg, D., Vining, A. and Weimer, D. (2001) *Cost-Benefit Analysis: Concepts and Practice*, Prentice Hall, USA.

Bureau of Industry Economics (1994) *Regional Development: Patterns and Policy Implications*. AGPS, Canberra.

Bureau of Transport Economics (1999) *Facts and furphies in Benefit Cost Analysis: transport*, Commonwealth of Australia.

Department of Employment (2015) Small Area Labour Markets, December Quarter 2019, http://employment.gov.au/small-area-labour-markets-publication.

Dinc, M. (2015) *Introduction to Regional Economic Development: Major Theories and Basic Analytical Tools*, Edward Elgar Publishers.

Economic and Planning Impact Consultants (1989) *The Economic Impact of the Woodchipping Industry in South Eastern NSW.* Report to the Wilderness Society.

Gillespie Economics (2008) *Managing the Impacts of a Mine in the Southern Coalfield: A Survey of Community Attitudes*. Prepared for Helensburgh Coal Pty Ltd.

Gillespie Economics (2009a) *Socio-economic assessment: Bulli Seam Operations*. Prepared for BHP Billiton Pty Ltd.

Gillespie Economics (2009b) *Economic Assessment of the Warkworth Project*. Prepared for Coal and Allied Pty Ltd.

Haveman, R. and Weimer, D. (2015) Public Policy Induced Changes in Employment: Valuation Issues for Benefit-Cost Analysis, *Journal of Benefit Cost Analysis*, 6(1), p. 112-153.

James, D. and Gillespie, R. (2002) *Guidelines for Economic Effects and Evaluation in EIA*. Prepared for NSW Department of Urban Affairs and Planning.

Jensen, R. and West, G. (1986) *Input-output for Practitioners: Theory and Applications*. Prepared for Department of Local Government and Administrative Services, Local Government and Regional Development Division, Australian Government Publishing Service.

NSW Government (2012) *Guideline for the use of Cost Benefit Analysis in mining and coal seam gas proposals*.

NSW Government (2014) *Voluntary Land Acquisition and Mitigation Policy: For State Significant Mining, Petroleum and Extractive Industry Developments*.

NSW Government (2015) *Guideline for the economic assessment of mining and coal seam gas proposals*

NSW Government (2015b) *Guideline for the economic assessment of mining and coal seam gas proposals: Draft for consultation.*

NSW Government (2018) *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals.*

NSW Treasury (2007) *NSW Government Guidelines for Economic Appraisal.*

NSW Treasury (2017) NSW Government Guide to Cost Benefit Analysis.

PAEHolmes (2013) *Methodology for valuing the health impacts of changes in particle emissions – final report*.

Portney, P. (1994) The Contingent Valuation Debate: Why Economists Should Care. *Journal of Economic Perspectives* 8:4, 3-18.

Productivity Commission (2006) *Waste Management*, Productivity Commission Inquiry Report No. 38, Commonwealth of Australia

Sustainable Soils Management Pty Ltd (2019) *McPhillamys Gold Project Agricultural Impact Statement*, prepared for Regis Resources Ltd.

Streeting, M. and Hamilton, C. (1991) *Economic analysis of the forests of south-eastern Australia*. Prepared for the Resource Assessment Commission.

West, G. (1993) *Input-Output Analysis for Practitioners, Version 7.1, User's Guide*.

ATTACHMENT 1 – LEGISLATIVE CONTEXT FOR ECONOMIC ANALYSIS IN EIA

Environmental Planning and Assessment Act 1979 and Environmental Planning and Assessment Regulation 2000

- The basis for economic analysis under the *Environmental Planning and Assessment* (EP&A) *Act 1979* emanates from:
  - the definition of the term "environment" in the EP&A Act which is broad and includes the social and **economic** environment, as well as the biophysical environment;
  - the "objects" of the EP&A Act which includes *"to promote the social and **economic welfare** of the community"*; and
  - Clause 7(1)(f) of Schedule 2 of the EP&A Regulations which requires environmental assessment to provide "*the reasons **justifying** the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, **economic** and social considerations…"*
  - *Section 4.15 of the EP&A Act requires the following two matters to be taken into consideration by the consent authority in determining a development application:*
    - the public interest (taken as the collective public interest of households in NSW); and
    - the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and ***economic impacts in the locality***.
- Objects of promoting economic welfare and requirements to justify a project having regard to economic considerations are consistent with the use of CBA. A note to Clause 7 (1) (f) states that "A cost benefit analysis may be submitted or referred to in the reasons justifying the carrying out of the development, activity or infrastructure."
- A cost benefit analysis is consistent with the consideration of the public interest, although the limitation of public interest to NSW households requires consideration of the costs and benefits to NSW households, whereas CBA would normally be undertaken at the National level.
- Elements of CBA can provide information on the economic impacts in the locality, although CBA should not be undertaken at the local level. This can be supplemented by other forms of analysis to examine economic impacts in the locality such as the consideration of:
  - effects relating to local employment;
  - effects relating to non-labour project expenditure; and
  - environmental and social impacts on the local community.

Secretary's Environmental Assessment Requirements

- The Project EARs include a requirement for:
  - an assessment of the likely economic impacts of the development, paying particular attention to:
    - the significance of the resource;

- economic benefits of the project for the State and region;
- the demand for the provision of local infrastructure and services; and
- consideration of the need for a Voluntary Planning Agreement in relation to the demand for the provision of local infrastructure and services.

Other Economic Guidelines

- In 2015 the NSW Government prepared *Guidelines for the economic assessment of mining and coal seam gas proposals*. This provides an outline of how to undertake a CBA and local effects analysis of mining and coal seam gas proposals.

- In 2018 the NSW Government prepared *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals.* This provides supporting information on how to conduct a CBA of mining and coal seam gas proposals.

- NSW Treasury (2017) *NSW Government Guide to Cost-Benefit Analysis*, provides guidance for Government agencies on how to undertake CBA of significant spending proposals, including proposed capital works, projects and new programs across all public sector agencies. However, many of the principles have broader application.

ATTACHMENT 2 – INTRODUCTION TO ECONOMIC METHODS

Cost Benefit Analysis

- Cost Benefit Analysis (CBA) is the primary way that economists evaluate projects and policies.

- CBA evaluates whether the well-being (**economic welfare**) of the community is in aggregate improved by a project. It does this by comparing the costs and benefits of a project to the community.

- The community whose welfare is included is broadly defined as anyone who bears significant costs and benefits of a project. However, in practice most CBA is undertaken at a national level. CBA at a sub-national level is not recommended however if undertaken at this level should provide decision-makers with estimates of all significant effects, including those to non-residents of the sub-national region.

- It is not possible to justify a project on economic grounds without doing a CBA.

Economic Activity Analysis

- Economists also often provide information to decision-makers on the **economic activity** that a project will provide to the regional, state or national economy. This is particularly relevant at the regional level since many regions and towns are experiencing long term decline as a result of structural change in the economy. Additional economic activity can help the prosperity of these regions.

- **Direct** economic activity provided by a project can be estimated from financial and labour estimates for a project. Methods that can be used to estimate **direct** and **indirect** economic activity include IO analysis and CGE modelling. Refer to Attachment 3 for a comparison of these methods and their assumptions.

- While economic activity measures from IO analysis and CGE modelling e.g. direct and indirect output, value-added and income, are generally not measures of benefits and costs relevant to a CBA this information can be of interest to decision-makers[26].

Economic Analysis and Decision-Making

- CBA and local effects analysis (including IO/CGE analysis) are not mechanised decision-making tools, but rather means of analysis that provide useful information to decision-makers.

- Decision-making is multi-dimensional. CBA is concerned with the single objective of **economic efficiency** (economic welfare) while IO analysis and CGE are concerned with the objective of **economic activity** (growth). They do not address equity and other objectives of government. Decision-makers therefore need to consider the economic efficiency and economic activity implications of a project, as indicated by CBA and IO/CGE analysis respectively, alongside the performance of a project in meeting other, often conflicting, government goals and objectives.

[26] It should be noted that it is possible to analyse industry benefits and costs within a general equilibrium framework where impacts are of a sufficient scale that they flow through into multiple sectors in the economy. However, for individual projects a partial equilibrium framework is the preferred approach for the estimation of costs and benefits (US EPA (2010) Guidelines for Preparing Economic Analyses, US EPA).

ATTACHMENT 3 – COMPARISON OF INPUT-OUTPUT ANALYSIS AND THE LEA METHOD

IO analysis begins with identification of the direct gross regional economic activity footprint of a project for the region. If a project provides 100 jobs at the mine site then all these jobs are counted in IO analysis as a direct effect i.e. direct employment in the region, because the jobs are located in the region. However, in IO analysis only the income of employees living in the region are counted as direct income effects since it is only wages expenditure of those living in the region that flows through the regional economy. In IO analysis, if 40% of a projects jobs are filled by people who already reside in the region then the **total** wages of these people is counted as a direct regional income effect of the project. Similarly, if 40% of the new jobs are taken by people who migrate into the region this is also counted as direct income for the region, as it is income that will accrue to people living in the region even though they are new residents. In IO analysis, the income of those residing outside the region is excluded as most of their income will be taken home after shift and spent where they live or elsewhere.

These direct employment and income effects for the region are those **associated** with the project i.e. the gross footprint, rather than specifically an assessment of **incremental** effects. This is partly because assessment of incremental effects becomes highly contentious and difficult. However, as will be shown below, these gross direct effects associated with a project can also be a reasonable approximation of incremental effects when "trickle down" or "job chain" effects are considered.

However, first is a comparison between how IO analysis treats direct employment and income effects (as explained above) and that of LEA in the NSW (2015) guideline.

The guideline splits labour into those ordinarily resident in the region and those not ordinarily resident in the locality. For those ordinarily resident in the region the guideline suggests calculation of incremental income as the difference between a mining income and the average level of income in other industries in the region. Incremental direct employment is then calculated by dividing this incremental income by the average wage in mining.

The guideline ignores workers who migrate into the region to work. However, using the rationale of the guideline, workers who migrate into the region to take jobs in a project provide a greater level of incremental income and spending in the region than those that to take jobs in a project and who already reside in the region. The entire wage of those migrating into the region is additive to regional income in comparison to wage increments for those already residing in the region.

Table 1 provides an example of incremental wages using the guideline method and when income from those migrating into the region is counted. If only the incremental wages of those who already reside in the region are counted the incremental impact is $1.4M in annual wages. However, if the incremental wages to the region from those who migrate into the region are included, this increases to $5.4M.

Table 1 - Incremental Income when Immigrating Workforce is Included

Categories of Workers	Direct Empl	Current Wages @$65k	New Wages @$100k	Incremental New Wages for Workers	Incremental New Wages to the Region
Already Live in Region	40	2,600,000	4,000,000	1,400,000	1,400,000
Migrate into Region to Live	40	2,600,000	4,000,000	1,400,000	4,000,000
Commute from outside	20	1,300,000	2,000,000	700,000	0
Total Direct Empl	**100**	**6,500,000**	**10,000,000**	**3,500,000**	**5,400,000**

Even for those already living in the region who are already employed, the incremental income estimated using the guideline will substantially understate additional regional income effects. This is because new jobs in a region create a chain of job opportunities (referred to in the literature as the "trickle down" effect, "job chain" or "occupational upgrading"- see Persky et al, 2004 What are jobs worth?, Employment Research Vol. 11 , p. 3).

An already employed person in the region moving into a mining job, creates a job vacancy, which can be filled by those in the region (already employed, unemployed or attracted into the labour force) or by in-migration. Where this job is filled by those already employed in the region this in turn creates another vacancy etc. Following the entire chain through, the cumulative increase in wages to a region would approach the wages of the total direct mining jobs. It would only be discounted if the chain ends with employment of those from local residents in the unemployment pool (who are receiving an allowance and hence already are spending income in the region) or if jobs remain unfilled. In periods of higher unemployment rates, jobs along the job chain remaining unfilled is unlikely. If the chain ends with in-migrating employment or employment of those in the region that are new to the workforce then the incremental wages is equal to the total wages of the new jobs.

Table 2 demonstrates the "job chain" effect in relation to 40 new mining jobs filled by already employed local workers. It shows that the total annual wages of the new mining jobs is $4M. Under the trickle down approach where all jobs are backfilled including ultimately by 40 local residents from the unemployment pool the incremental wages to the region are $3.5M. If some of these jobs filled from the unemployment pool are ultimately filled by in-migration the difference between the incremental wages to the region and the total annual mining jobs wages will lessen.

The guideline does not take account of the "job chain" effect and essentially assumes that the previous jobs of "job movers" in the region remain vacant for the life of the project.

Incorporation of consideration of the "job chain" effect means that the direct incremental income to a region approximates that assumed in IO analysis (i.e. the gross footprint of economic activity estimated using IO analysis is also an indicator of the net effect).

Table 2 - Demonstration of the Job Chain Effect for 40 Jobs Filled by Locals Who are Already Employed in the Region

	Total wages	Increment Wages Gain to Region
1. New mining wage for 40 workers @$100k	$4,000,000	$1,400,000 (1-2)
2. Current Wages for 40 workers @$65k	$2,600,000	$1,000,000 (2-3)
3. Wage of people filling above 40 positions @$40k	$1,600,000	$800,000 (3-4)
4. Wage of people filling above 40 positions @$20k	$800,000	$ 255,664 (4-5)
5. Wages of the unemployed filling above 40 positions (Newstart - single no children)	$544,336	
Total		**$3,455,664**

ATTACHMENT 4 – INPUT-OUTPUT ANALYSIS AND COMPUTABLE GENERAL EQUILIBRIUM ANALYSIS

Input-Output Analysis

- IO analysis is a cost effective and simple method for estimating the gross market economic activity i.e. financial transactions and employment, in a specified region that is associated with a project.
- IO analysis is the most widely used model for regional impact assessment (West and Jackson 2005).
- IO analysis can be undertaken at the LGA or aggregation of LGAs level.
- IO analysis can provide disaggregation of economic activity impacts across many sectors – 111 sectors based on current National IO tables.
- Data specific to a projects revenue, expenditure and employment profile can be inserted into an IO table and analysed.
- IO analysis was developed by Wassily Leontief for which he received the Nobel Prize in Economics.
- IO analysis is a static analysis that looks at economic activity impacts in a particular year e.g. a typical year of a projects operation.
- IO analysis has historically been applied at the regional level to assess the economic activity impacts of individual projects.
- IO analysis involves the development of an IO table representing the buying and selling of goods and services in the economy. These fixed average ratios are used to estimate the direct and indirect impacts of a change in expenditure in a region.
- IO analysis identifies the gross direct and indirect additional (positive) regional economic activity associated with a project in terms of a number of indicators of economic activity – output, income, value-added[27] and employment.
- Economic activity measures used in IO are not measures of benefits and costs relevant to a CBA.
- IO analysis does not attempt to examine non-market environmental, social or cultural impacts.
- IO analysis does not depend on the assumption *"that there is a ghost pool of highly skilled yet unemployed people"* in a region as suggested by a Land and Environment Court Judgement.
- The estimation of economic activity impacts in IO analysis are based on a number of simplifying assumptions – most notable is that the regional economy has **access to** sufficient labour and capital resources (from both **inside** and **outside** the region) so that an individual project does not result in any regional price changes e.g. wages in other industries or house rentals, which would lead to contractions ("crowding out") of economic activity in other sectors in the region.
- For the assessment of the impacts of individual projects on small open regional economies, this is a reasonable assumption.
- Nevertheless, the results of IO modelling can be seen as representing an upper bound for the net economic activity associated with a project.

Computable General Equilibrium Modelling

- CGE modelling is an alternative more expensive, complicated but theoretically more sophisticated method for estimating the economic activity associated with a project.

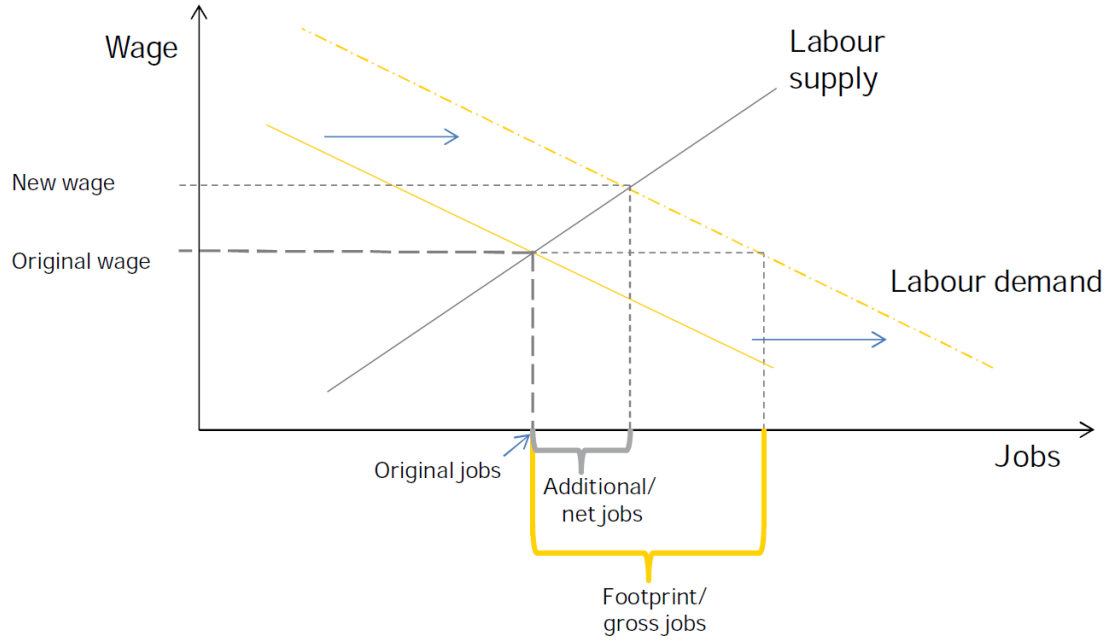
[27] Value-added is the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services bought in to produce the gross regional output.

- CGE modelling can be dynamic or comparative static[28] and has historically been applied at the State and National level for determining the potential economic activity associated with the introduction of major government policy changes and investment in large infrastructure projects.
- CGE modelling can also be undertaken at a regional level but normally at no finer scale than the Statistical Subdivision level.
- Modelling of the impact of a project uses the production function of the model for that sector, rather than project specific production function.
- CGE modelling estimates the additional net (positive and negative) economic activity associated with a project in terms of a number of economic indicators – including value-added and employment – but also real income, government tax revenue and components of value-added.
- Economic activity measures used in CGE modelling are not generally measures of benefits and costs relevant to a CBA, although CGE modelling can also be used to estimate market costs or market benefits, as part of a CBA, where the magnitude of a project will affect a large number of sectors and the effects will be spread more broadly throughout the economy.
- Economic activity impacts can be disaggregated by sector but this is not normally as disaggregated as in IO analysis.
- CGE modelling does not attempt to examine non-market environmental, social or cultural impacts.
- CGE modelling is underpinned by an IO database as well as a system of interdependent behaviour and accounting equations which are based on economic theory (but mostly without econometric backing at the regional level).
- The equations in CGE models ensure that any change in demand in a region, no matter how small, translates into some change in prices and hence there is always some 'crowding out' of other economic activity in the region.
- At the regional level, CGE results can be very sensitive to changes in these behavioural assumptions.
- 'Crowding out' of other economic activities estimated via CGE modelling does not reflect losses of jobs but the shifting of labour resources to higher valued economic activities.

[28] Comparative static models compare one equilibrium point with another but do not trace the impact path along the way. Dynamic models give year by year impacts of a shock.

Comparison of IO Analysis and CGE Modelling

Figure A4.1 – Comparison of Employment Estimates in IO Analysis and CGE Modelling



Source: Ernst Young (2014) Capital Metro Job Creation Analysis, p. 30.

- Figure A4.1 illustrates the difference between the output of IO analysis and the output of CGE with respect to employment. IO analysis estimates the employment footprint or gross jobs from a project. It can also be taken as an indicator of net jobs from a project where there is no or little upward pressure on wages for the region in question as a result of the individual project and hence no or little crowding out of other economic activity[29]. CGE modelling assumes upward pressure on wages and hence some crowding out of other economic activity in the region. Under this assumption CGE estimates additional net jobs as being less than the employment footprint/gross jobs.
- Which modelling approach best represents the true situation depends on whether and to what extent price changes occur at a regional level as a result of individual projects. This is an empirical issue and would depend on the migration of labour into the region, commuting of labour and timely management of land releases by Councils. Few studies exist that examine this issue.
- IO analysis provides decision-makers with information on the relative employment footprint/gross jobs of different projects, without going to the second and more complicated stage of trying to model wage rises and "crowding out" across all other sectors in the economy.
- Regional economic activity, estimated by IO analysis or CGE modelling, is just one piece of information that decision-makers may take into account in considering a project.

Guidelines

- Both IO analysis and CGE modelling are identified in the DP&I's *draft Guideline for Economic Effects and Evaluation in EIA* (James and Gillespie 2002) as appropriate methods for examining regional economic impacts i.e. impacts on economic activity – the size and structure of an economy.
- Other guidelines to recognise the role of IO analysis include:
  - US Environment Protection Agency (2010) *Guidelines for Preparing Economic Analyses*;

[29] This is akin to the marginal assumption in CBA.

- Australian Bureau of Rural Science (2005) *Socio-economic Impact Assessment Toolkit: A guide to assessing the socio-economic impacts of Marine Protected Areas in Australia*.

- NSW Treasury (2007) identify that IO analysis is commonly used to assess the regional impacts of a project. However, IO analysis is concerned with measuring economic activity, and is not a tool for the evaluation of projects (in the way that CBA is).
- NSW Treasury (2009) *Guidelines for estimating employment supported by the actions, programs and policies of the NSW Government*, identifies IO analysis as an appropriate method for estimating the number of jobs that may be supported by the actions, programs and policies of the NSW Government.
- Mustafa Dinc an economist with the World Bank has recently release a publication titled *Introduction to Regional Economic Development: Major Theories and Basic Analytical Tools*. This publication recognises IO analysis as one of the most widely used models around the world to undertake regional economic analysis and a solid framework to analyse the interdependence of industries in an economy.

Government Applications of IO Analysis

- Applications of IO analysis commissioned by Government agencies include:
  - Department of Sustainability, Environment, Water, Population and Communities (2011) *Assessing the Socio-Economic Impacts of Sustainable Diversion Limits and Water for the Future Investments: An Assessment of the Short-Term Impacts at a Local Scale*
  - NSW Natural Resources Commission (2009) *River Red Gum Assessment: Socio-economic impact assessment*;
  - Victorian Environmental Assessment Council (2007) *River Red Gum Forests Investigation – Socio-Economic Assessment.*
  - Resource and Conservation Division of the NSW Department of Urban Affairs and Planning (1999) Regional Impact Assessments as part of the NSW Comprehensive Regional Assessments under the National Forestry Policy.
  - Reserve Bank of Australia (2012) *Industry Dimensions of the Resource Boom: An Input-Output Analysis.*
  - DECCW (2009) Economic benefits of national parks and other reserves in New South Wales - Summary report, reports the results of numerous studies it and its' predecessors have commissioned on the regional economic impacts of national parks and protected areas.
  - DECCW (2006) *Socio Economic Assessment of the Batemans Bay Marine National Park*
  - DECCW (2006) *Socio Economic Assessment of the Port Stephens – Great Lakes Marine Park*
  - National Parks Service, US Department of the Interior (2014) *2012 National Parks Visitor Spending Effects: Economic Contribution to Local Communities, States and the Nation*.

Criticisms Misrepresented

- The main concern that economists e.g. the Productivity Commission, NSW Treasury and ABS (as quoted by The Australia Institute in numerous submissions to mining projects in NSW) have with IO is its use as a substitute for CBA, not its use for estimating direct and indirect regional economic activity impacts.

  - NSW Treasury (2009) "*Model based economic impact assessment [such as IO analysis] is not a substitute for a thorough economic analysis of a policy. The appropriate method for analysing policy alternatives is benefit cost analysis (CBA)".*

- The main “abuse” reported by the Productivity Commission is using IO analysis to *“make the case for government intervention”* when CBA is the appropriate method for doing this.

- ABS’s concerns with IO being “*biased*” refer to it being a “*biased estimator of the benefits or costs of a project”*. IO does not estimate benefits and costs but economic activity.

- Concerns of the Warkworth Judgement with IO analysis being “deficient” related to the data (industry data from surveys undertaken in 2001 and assumptions used (see next dot point)), but more fundamentally for not *“assisting in weighing the economic factors relative to the various environmental and social factors, or in balancing economic, social and environmental factors”.* This is an inappropriate criticism of the IO method, since it does not pretend to do this.

- IO analysis does not depend on the assumption *“that there is a ghost pool of highly skilled yet unemployed people”* in a region as suggested in the Warkworth Judgement. It allows for labour to come from within or outside the region.

Reviews of IO

- CIE (2015, p.28) *Peer review of economic assessment: Bylong Coal project,* identified that:

"The IO methodology is reasonable but should be considered an upper bound of the regional effects."

ATTACHMENT 5 – UNDERLYING ASSUMPTIONS AND INTERPRETATIONS OF INPUT-OUTPUT ANALYSIS AND MULTIPLIERS

1. "The *basic assumptions* in IO analysis include the following:

- there is a fixed input structure in each industry, described by fixed technological coefficients (evidence from comparisons between IO tables for the same country over time have indicated that material input requirements tend to be stable and change but slowly; however, requirements for primary factors of production, that is labour and capital, are probably less constant);
- all products of an industry are identical or are made in fixed proportions to each other;
- each industry exhibits constant returns to scale in production;
- unlimited labour and capital are available at fixed prices; that is, any change in the demand for productive factors will not induce any change in their cost (in reality, constraints such as limited skilled labour or investment funds lead to competition for resources among industries, which in turn raises the prices of these scarce factors of production and of industry output generally in the face of strong demand); and
- there are no other constraints, such as the balance of payments or the actions of government, on the response of each industry to a stimulus.

2. The multipliers therefore describe *average effects, not marginal effects*, and thus do not take account of economies of scale, unused capacity or technological change. Generally, average effects are expected to be higher than the marginal effects.

3. The IO tables underlying multiplier analysis only take account of one form of *interdependence,* namely the sales and purchase links between industries. Other interdependence such as collective competition for factors of production, changes in commodity prices which induce producers and consumers to alter the mix of their purchases and other constraints which operate on the economy as a whole are not generally taken into account.

4. The combination of the assumptions used and the excluded interdependence means that IO multipliers are higher than would realistically be the case. In other words, they tend to *overstate* the potential impact of final demand stimulus. The overstatement is potentially more serious when large changes in demand and production are considered.

5. The multipliers also do not account for some important pre-existing conditions. This is especially true of Type II multipliers, in which employment generated and income earned induce further increases in demand. The implicit assumption is that those taken into employment were previously unemployed and were previously consuming nothing. In reality, however, not all 'new' employment would be drawn from the ranks of the unemployed; and to the extent that it was, those previously unemployed would presumably have consumed out of income support measures and personal savings. Employment, output and income responses are therefore overstated by the multipliers for these additional reasons.

6. The most *appropriate interpretation* of multipliers is that they provide a relative measure (to be compared with other industries) of the interdependence between one industry and the rest of the economy which arises solely from purchases and sales of industry output based on estimates of transactions occurring over a (recent) historical period. Progressive departure from these conditions would progressively reduce the precision of multipliers as predictive device" (ABS 1995, p.24).

Multipliers indicate the total impact of changes in demand for the output of any one industry on all industries in an economy (ABS, 1995). Conventional output, employment, value-added and income multipliers show the output, employment, value-added and income responses to an initial output stimulus (Jensen and West, 1986).

Components of the conventional output multiplier are as follows:

Initial effect - which is the initial output stimulus, usually a $1 change in output from a particular industry (Powell and Chalmers, 1995; ABS, 1995).

First round effects - the amount of output from all intermediate sectors of the economy required to produce the initial $1 change in output from the particular industry (Powell and Chalmers, 1995; ABS, 1995).

Industrial support effects - the subsequent or induced extra output from intermediate sectors arising from the first round effects (Powell and Chalmers, 1995; ABS, 1995).

Production induced effects - the sum of the first round effects and industrial support effects (i.e. the total amount of output from all industries in the economy required to produce the initial $1 change in output) (Powell and Chalmers, 1995; ABS, 1995).

Consumption induced effects - the spending by households of the extra income they derive from the production of the extra $1 of output and production induced effects. This spending in turn generates further production by industries (Powell and Chalmers, 1995; ABS, 1995).

The *simple multiplier* is the initial effect plus the production induced effects.

The *total multiplier* is the sum of the initial effect plus the production-induced effect and consumption-induced effect.

Conventional employment, value-added and income multipliers have similar components to the output multiplier, however, through conversion using the respective coefficients show the employment, value-added and income responses to an initial output stimulus (Jensen and West, 1986).

For employment, value-added and income, it is also possible to derive relationships between the initial or own sector effect and flow-on effects. For example, the flow-on income effects from an initial income effect or the flow-on employment effects from an initial employment effect, etc. These own sector relationships are referred to as ratio multipliers, although they are not technically multipliers because there is no direct line of causation between the elements of the multiplier. For instance, it is not the initial change in income that leads to income flow-on effects, both are the result of an output stimulus (Jensen and West, 1986).

A description of the different ratio multipliers is given below.

$$\text{Type 1A Ratio Multiplier} = \frac{\text{Initial + First Round Effects}}{\text{Initial Effects}}$$

$$\text{Type 1B Ratio Multiplier} = \frac{\text{Initial + Production Induced Effects}}{\text{Initial Effects}}$$

$$\text{Type 11A Ratio Multiplier} = \frac{\text{Initial + Production Induced + Consumption Induced Effects}}{\text{Initial Effects}}$$

$$\text{Type 11B Ratio Multiplier} = \frac{\text{Flow-on Effects}}{\text{Initial Effects}}$$

Source: Centre for Farm Planning and Land Management (1989).

REFERENCES

Australian Bureau of Statistics (1995) Information Paper Australian National Accounts Introduction to Input-Output Multipliers. Cat. No. 5246.0.

Centre for Farm Planning and Land Management (1989) *Consultants report to State plantations impact study.* CFPLM, University of Melbourne.

Jensen, R. and West, G. (1986) *Input-output for Practitioners: Theory and Applications*. Prepared for Department of Local Government and Administrative Services, Local Government and Regional Development Division, Australian Government Publishing Service.

Powell, R. and Chalmers, L. (1995) *The Regional Economic Impact of Gibraltar Range and Dorrigo National Park*. A Report for the NSW National Parks and Wildlife Service.

ATTACHMENT 6 – CBA AND ASSESSMENT OF EXTERNALITIES

Consideration of Externalities in the Economic Assessment

Introduction

- The "perfect" CBA is an ideal. Different situations call for different styles and depths of analysis.
- Valuation of all environmental impacts is neither practical nor necessary.
- In attempting to value impacts, there is 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). The guideline gives an example of impacts of less than $1M being immaterial for a project with an estimated net present value of $20M.
- The CBA of the Project took three approaches to the consideration of environmental costs:
  - Threshold value analysis;
  - Qualitative consideration of impacts and valuation of the main impacts based on market data (e.g. purchase costs, offset costs, mitigation costs etc) and benefit transfer (e.g. from nonmarket valuation studies); and
  - Additional threshold value analysis to recognise that some impacts may not have been fully valued and incorporated into the analysis.

Threshold Value Analysis

- The first approach used to consider the environmental impacts of the Project was the threshold value method.
- Threshold value analysis is a recognised approach to CBA where it is not possible or pragmatic to attempt to value potential external impacts.
- Threshold value analysis was developed by Krutilla and Fisher (1975)[30]. It is specifically referred to as an appropriate approach in the DP&I's (2002) *Draft Guideline for Economic Effects and Evaluation in EIA,* and is a widely recognised approach.
- Threshold value analysis avoids the sometimes contentious matter of physically quantifying environmental impacts and then placing dollar values on them.
- Threshold value analysis leaves the trade-off between quantified economic benefits and unquantified environmental costs for the decision-maker.
- In the Economic Assessment of the Project, the estimated net production benefits provides a threshold value or reference value against which the relative value of the residual environmental, social and cultural impacts of the Project, after mitigation, offset and compensation, may be assessed. The threshold value indicates the price that the community must value any residual environmental impacts of the Project (be willing to pay) to justify in economic efficiency terms the 'no development' option.

[30] Krutilla, J.V. and A.C. Fisher (1975) *The Economics of Natural Environments*, Johns Hopkins University Press, Baltimore.

Qualitative consideration of impacts and valuation of the main impacts based on market data and benefit transfer

- The second approach used was to qualitatively consider, and where possible value, the main environmental, cultural and social impacts of the Project for the well-being of people.

- Qualitative consideration of potential impacts and any subsequent valuation of impacts relied on the assessment of biophysical impacts provided in the Project EIS and by technical specialists.

- The approach to valuing environmental impacts in the Economic Assessment of the Project is summarised in Table A6.1.

Table A6.1 – Method for Valuing Environmental Impacts in the Economic Assessment of the Project

Impact	Potential Valuation Method	Comment
Greenhouse gas emissions	Damage cost method	Estimate of global social damage cost of carbon from literature and govt policy, adjusted to Australian and NSW damage cost.
Agricultural impacts	Property valuation method	Foregone agricultural production is reflected in land values. So opportunity costs of land reflect, among other things, foregone agriculture.
Noise impacts		
Significant	Property valuation method	Cost of acquiring properties encompasses property value impacts due to noise. No significant impacts identified.
Moderate	Defensive expenditure	Noise mitigation costs included in capital costs of project.
Significant air quality impacts	Property valuation method	Cost of acquiring properties encompasses property value impacts due to air quality impacts. However, no properties impacted by exceedances. Health impacts assessed as negligible.
Use of surface water	Market value of water	Cost of Water Access Licences reflects marginal value product of water. Included in CBA.
Use of groundwater	Market value of water	Cost of Water Access Licences reflects marginal value product of water. Included in CBA
Groundwater drawdown	Defensive expenditure	No material impacts on private bores predicted.
Water discharges		Regulated under the Protection of Environment Operations Act 1997.
Flora and fauna	Replacement cost	Capital and operating costs of offsets included in capital costs. Assumes that offsets levels are sufficient to compensate the community for values lost. This is a requirement of Govt. Policy.
Road transport impacts	Defensive expenditure	Cost of road investment required as a result of the Project included in capital costs of project.
Aboriginal heritage	Defensive expenditure or Stated Preference technicques	Not quantified
Historic heritage	Benefit transfer	Value of impacts from national choice modelling study
Visual	Defensive expenditure	Costs of mitigation measures included in the economic analysis.

Additional Threshold Value Analysis

- To the extent that there may be some disagreement about the estimated economic values of the environmental impacts of the Project, the estimated net benefits of the Project provides another threshold value that the residual environmental impacts of the Project after mitigation, compensation and offset would need to exceed to make the Project questionable form and economic efficiency perspective. This again allows the decision-maker to consider any material impacts that it identifies in the course of its consideration that were not valued in the Economic Assessment.

ATTACHMENT 7 – NON-MARKET BENEFITS OF EMPLOYMENT

- 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[31]). 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. The analysis included consideration of the magnitude of these additional benefits under a number of scenarios but conservatively excludes them from the core analysis. Ceteris paribus these estimates are conservative since they ignore any consideration of search and retraining costs, scarring, stigma and physical and mental health effects of unemployment (Haveman and Weimer 2015).

- These treatments of employment in CBA relate to the market value or opportunity cost of labour resources.

- The above treatment of employment in CBA relate to the impacts on the unemployed individuals themselves. However, there may also be spillover effects and externalities to third parties. These are public good values. Spill-over effects referred to in the literature relate to empathy based losses to family or friends (close associates) of impacted workers because of the workers being unemployed and increased crime and community dislocation (Haveman and Weimer 2015: Streeting and Hamilton 1991). Empathy based impacts may also spill over more broadly into the existence values of others in the community who feel sympathy for the unemployed.

- These are non-market values i.e. the values that individuals in a community hold for things even though they are not traded in markets. For example, people have been shown to value environmental resources even though they may never use the resource. These are referred to as existence values and are underpinned by the view in neoclassical welfare economics that individuals are the best judge of what has value to them.

- As identified by Portney (1994[32]), the concept of existence values should be interpreted more broadly than just relating to environmental resources.

  "If I derive some utility from the mere existence of certain natural environments I never intend to see (which I do), might I not also derive some satisfaction from knowing that refineries provide well-paying jobs for hard-working people, even though neither I nor anyone I know will ever have such a job?. I believe I do. Thus, any policy change that "destroys" those jobs imposes a cost on me – a cost that, in principle, could be estimated using the contingent valuation method.... Since regulatory programs will always impose costs on someone – taking the form of higher prices, job losses, or reduced shareholder earnings – lost existence values may figure every bit as prominently on the cost side of the ledger as the benefit side (Portney 1994, p. 13).

- The utility (welfare) of individuals may therefore be affected by changes in their own well-being as well as changes in the well-being of others (Rolfe and Bennett 2004[33]). This is consistent with the observed behaviour of altruism (Freeman III 2003[34]).

[31] Boardman, A., Greenberg, D., Vining, A. and Weimer, D. (2001) *Cost-benefit analysis: concepts and practice*, Prentice Hall, New Jersey.
[32] Portney, P. (1994) The Contingent Valuation Debate: Why Economists Should Care, *Journal of Economic Perspectives* 8:4, 3-18.
[33] Rolfe and Bennett (2004) *Assessing Social Values for Water Allocation with the Contingent Valuation Method,* Valuing Floodplain Development in the Fitzroy Basin Research Reports, Research Report No. 11, Central Queensland University, Emerald.
[34] Freeman III, A. Myrick. (2003) *Economic Valuation: What and Why*. In A Primer on Non-market Valuation, Eds Champ, P., Boyle, K. and Brown, T. Kluwer Academic Publishers, London.

- Whether people have existence values for the employment of others, as hypothesised by Portney, is an empirical issue. A number of non-market valuation studies have found evidence that people hold existence values for the employment of others:

  - Johnson, F. and Desvouges, W. (1997) Estimating Stated Preferences with Rated-Pair Data: Environmental, Health and Employment Effects of Energy Programs. Journal of Environmental Economics and Management, 34, 75-99, estimated the non-market value of employment effects of energy programs.
  - Adamowicz, W., Boxall, P., Williams, M. and Louviere, J. (1998) Stated Preference Approaches to Measuring Passive Use Values: Choice Experiments Versus Contingent Valuation, American Journal of Agricultural and Economics, 80, 64-75, in a study on the protection of old growth forests included an attribute for forest industry employment losses.
  - Morrison, M., Bennett, J. and Blamey, R. (1999) Valuing improved wetland quality using choice modelling, Water Resources Research (Vol. 35, No. 9, pp. 2805-2814) valued irrigation related employment losses as a result of wetland protection.
  - Blamey, R., Rolfe, J., Bennett, J., and Morrison, M., (2000) Valuing remnant vegetation in Central Queensland using choice modelling, The Australian Journal of Agricultural and Resource Economics(44(3): 439-56) in a study of broadscale tree clearing in the Desert Uplands of Queensland, Australia included an attribute for jobs lost to the region.
  - Do, T.N. and Bennett, J. (2007) Estimating Wetland Biodiversity Values: A Choice Modeling Application in Vietnam's Mekong River Delta, Australian National University, Economics and Environmental Network Working Paper estimated values for the number of farmers affected by a change in wetland management of Tram Chim.
  - Othman, J., Bennett, J., Blamey, R. (2004) Environmental values and resource management options: a choice modelling experience in Malaysia, Environ. Dev. Econ. 9, 803–824, valued local employment losses from different conservation management strategies for the Matang Mangrove Wetlands in Perak State, Malaysia.
  - Marsh, D. (2010) Water Resource Management in New Zealand: Jobs or Algal Blooms? Presented at the Conference of the New Zealand Association of Economists Auckland 2 July 2010, valued employment losses as a result of improvements in water quality in a dairy catchment in Waikato region of New Zealand the catchment.
  - Longo A, Markandya A, Petrucci M (2008) The Internalization of Externalities in the Production of Electricity: Willingness to Pay for the Attributes of a Policy for Renewable Energy, Ecological Economics 67:140-152, in the context of renewable energy projects valued additional electricity sector jobs.
  - Colombo, S., Hanley, N., and Requena, J.C. (2005) Designing Policy for Reducing the Off-farm Effects of Soil Erosion Using Choice Experiments, Journal of Agricultural Economics, 56(1), 81-96, valued local employment generated from watershed policies to reduce soil erosion.
  - Caparrós A, Oviedo JL, Campos P (2008) Would you choose your preferred option? Comparing choice and recoded ranking experiments. Am J Agricult Econ 90(3):843–855, valued increases in local employment from a NP reforestation program.
  - Windle, J. and Rolfe, J. (2014) Assessing the trade-offs of increased mining activity in the Surat Basin, Queensland: preferences of Brisbane residents using non-market valuation techniques, Australian Journal of Agricultural and Resource Economics, 58, pp. 111-129, valued jobs generated by mining developments in the Surat Basin, as well as social impacts of mining developments such as increased housing prices and increase wages in non-mining sectors.

- Three non-market valuation studies have found evidence that people in NSW hold existence values for the employment of others in mining projects:

- Gillespie, R. (2009) Bulli Seam Operations Socio-Economic Assessment, prepared for Illawarra Coal Holdings Pty Ltd.
- Gillespie, R. and Kragt, M. (2012) Accounting for non-market impacts in a benefit-cost analysis of underground coal mining in New South Wales, Australia, Journal of Benefit Cost Analysis, 3(2): article 4.
- Gillespie, R. and Bennett, J. (2012) Valuing the Environmental, Cultural and Social Impacts of Open Cut Coal Mining in the Hunter Valley of NSW, Australia, Journal of Environmental Economics and Policy, Volume 1, Issue 3, 1-13.

- The values from these studies are summarised in Table A7.1.

Table A7.1 – Existence Values for Mine Employment

	Mean Implicit Price ($) (95% CI)	Aggregate Willingness to Pay per Job Year ($) (95% CI)	Coal Mine	Reference
WTP per household per year for 20 years for each year the mine provides 320 jobs	$5.94 $4.96 to $7.22	$8,157 $3,659 to $5,326	Metropolitan Colliery	Gillespie (2009)
WTP per household (once-off) for each year the mine provides 1,170 jobs	$36.21 $29.89 to $43.97	$1,299 $1,037 to $1,578	Bulli Seam Operations	Gillespie and Kragt (2012)
WTP per household (once-off) for each year the mine provides 975 jobs	$27.45 $17.52 to $36.95	$3,546 $2,263 to $4,773	Warkworth	Gillespie and Bennett (2012)

*Implicit prices are aggregated to 50% of NSW households.

- These values are public good values i.e. they are the sum of values held by individual households in NSW. Comparison of public good values to private good values such as wages are meaningless.

- The motivation behind people's willingness to pay (WTP) for the employment of others is unknown. Split sample analysis undertaken by Gillespie (2009) providing different information to survey respondents on the re-employment prospects of impacted workers did not impact household willingness to pay for the employment provided by the mine. It is possible that respondents were not concerned so much with the prospects of re-employment elsewhere in the economy or net employment impacts but with the 'forced' change to other people's employment. However, further investigation is required to unpack respondent motivations in relation to attributes representing employment.

- Notwithstanding the above justification for the inclusion of non-market employment values in CBA, it is recognised that some people view this as contentious and so the results of the CBA for the Project are reported "with" and "without" the non-use values for employment being included.

ATTACHMENT 8 – THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES

The Generation of Regional Input-Output Tables (GRIT) system was designed to:

- combine the benefits of survey based tables (accuracy and understanding of the economic structure) with those of non-survey tables (speed and low cost);
- enable the tables to be compiled from other recently compiled tables;
- allow tables to be constructed for any region for which certain minimum amounts of data were available;
- develop regional tables from national tables using available region-specific data;
- produce tables consistent with the national tables in terms of sector classification and accounting conventions;
- proceed in a number of clearly defined stages; and
- provide for the possibility of ready updates of the tables.

The resultant GRIT procedure has a number of well-defined steps. Of particular significance are those that involve the analyst incorporating region-specific data and information specific to the objectives of the study. The analyst has to be satisfied about the accuracy of the information used for the important sectors; in this case the other mining sector. The method allows the analyst to allocate available research resources to improving the data for those sectors of the economy that are most important for the study.

An important characteristic of GRIT-produced tables relates to their accuracy. In the past, survey-based tables involved gathering data for every cell in the table, thereby building up a table with considerable accuracy. A fundamental principle of the GRIT method is that not all cells in the table are equally important. Some are not important because they are of very small value and, therefore, have no possibility of having a significant effect on the estimates of multipliers and economic impacts. Others are not important because of the lack of linkages that relate to the particular sectors that are being studied. Therefore, the GRIT procedure involves determining those sectors and, in some cases, cells that are of particular significance for the analysis. These represent the main targets for the allocation of research resources in data gathering. For the remainder of the table, the aim is for it to be 'holistically' accurate (Jensen, 1980). This means a generally accurate representation of the economy is provided by the table, but does not guarantee the accuracy of any particular cell. A summary of the steps involved in the GRIT process is shown in Table A8.1 (Powell and Chalmers, 1995).

Table A8.1
The GRIT Method

Phase	Step	Action
PHASE I		ADJUSTMENTS TO NATIONAL TABLE
	1	Selection of national input-output table (106-sector table with direct allocation of all imports, in basic values).
	2	Adjustment of national table for updating.
	3	Adjustment for international trade.
PHASE II		ADJUSTMENTS FOR REGIONAL IMPORTS
		(*Steps 4-14 apply to each region for which input-output tables are required*)
	4	Calculation of 'non-existent' sectors.
	5	Calculation of remaining imports.
PHASE III		DEFINITION OF REGIONAL SECTORS
	6	Insertion of disaggregated superior data.
	7	Aggregation of sectors.
	8	Insertion of aggregated superior data.
PHASE IV		DERIVATION OF PROTOTYPE TRANSACTIONS TABLES
	9	Derivation of transactions values.
	10	Adjustments to complete the prototype tables.
	11	Derivation of inverses and multipliers for prototype tables.
PHASE V		DERIVATION OF FINAL TRANSACTIONS TABLES
	12	Final superior data insertions and other adjustments.
	13	Derivation of final transactions tables.
	14	Derivation of inverses and multipliers for final tables.

Source: Bayne and West (1988).

REFERENCES

Bayne, B. and West, G. (1988) *GRIT – Generation of Regional Input-Output Tables: Users Reference Manual*. Australian Regional Developments No. 15, Office of Local Government, Department of Immigration, Local Government and Ethnic Affairs, AGPS.

Jensen, G. (1980) The concept of accuracy in regional input-output models. *International Regional Science Review*, 5:2, pp.139-54.

Powell, R. and Chalmers, L. (1995) *The Regional Economic Impact of Gibraltar Range and Dorrigo National Park*. A Report for the NSW National Parks and Wildlife Service.

ATTACHMENT 9 – COMPANY TAX RATES AND DISTRIBUTION AMONG STATES

Effective Tax Rates for Mining Companies in Australia

- Company taxes represent part of the producer surplus benefit of mining projects that accrue to Australia.

- The current Australian Tax Office (ATO) corporate tax rate is 30% of taxable income.

- NSW Treasury (2007) *Commercial Policy Framework: Guidelines for Financial Appraisal* requires the use of the prevailing corporate tax rate for government agencies and businesses.

- Financial Appraisal text books such as Mott (1997) *Investment Appraisal*, recommend the use of the full corporate tax rate.

- An analysis of ATO data by Dr Sinclair Davidson[35], Professor of Institutional Economics at RMIT University and a Senior Fellow at the Institute of Public Affairs found that the Australian mining industry pays corporate tax at a rate close to 30% of its **taxable income**.

- Taxable income is revenues - operating costs - royalties - depreciation. There are generally two components to the depreciation associated with a mining project:

  - depreciation of assets - capital equipment - over the asset life; and
  - depreciation of the project pool (non-asset capital expenditure) over the project life.

  Because assessments are normally undertaken on a standalone project basis - losses in any particular year are carried forward and hence tax does not apply until taxable income in a particular year (with losses in previous years carried forward) is positive.

- The procedure in the NSW Government (2015) *Guidelines for the economic assessment of mining and coal seam gas proposal*, for estimating company tax is the application of a 30% of company tax rate to earnings before interest and tax (year i.e. revenue - capital costs - operating costs - royalties) in each year.

  This is a simplified approach to the estimation of company tax which treats capital costs as and when they occur and results in negative company tax in early years where capital investment occurs and positive company tax in later years. It understates company tax generated from a Project.

- Submissions to previous mining projects have questioned the use of the company tax rate when estimating the company tax generated from mining projects. One of the studies referred to in these submissions that purports to show an effective tax rate of less than 30% e.g. Richardson and Denniss (2011)[36] calculates the effective tax rate for the mining sector in relation to Gross Operating Surplus (GOS) NOT taxable income. GOS does not consider the costs of production such as consumption of fixed capital, interest, royalties, land rent payments and direct taxes payable on inputs.

- The Australian Treasury[37] has rejected GOS as an appropriate denominator for estimating effective tax rates.

[35] Davidson, S. (2014) *Mining Taxes and Subsidies: Official evidence*, A Minerals Council of Australia Background Paper.
[36] Richardson, D. and Denniss, R. (2011) *Mining the truth: The rhetoric and reality of the commodities boom*, prepared for The Australia Institute.
[37] Clark, J., B. Pridmore and N. Stoney. 2007. 'Trends in aggregate measures of Australia's corporate tax level', *Economic Roundup*, Winter, pp 1 – 28)

- The other study referred to in submissions to previous mining projects to support the claim for effective tax rates of less than 30% is Markle and Shackelford (2009[38]). In response to the inappropriate quoting of this working paper the authors have issued a press release that states, among other things, that:

  - The purpose of the study was not to precisely calculate rates of tax paid but to provide a broad comparison of effective tax rates across countries. All numbers are appropriately interpreted on a relative – rather than absolute basis.
  - The version of the paper cited is a draft that has not been through a peer review process;
  - It is possible that the data for Australia represents average data for as few as four companies over a five year period. As such we reach no conclusion nor make any comments about individual industries in individual countries. Our purpose in producing the table was to make relative comparisons only;
  - The most recent draft of the report uses a different data source which did not have enough observations to include a number for the mining industry in Australia;
  - We have read the analysis of Professor Sinclair Davison and do not disagree with his conclusions.

Distribution of Company Tax to NSW

- In Australia the Commonwealth Government collects over 80% of tax revenue but it is responsible for only half of government direct expenditure (Abelson 2012, p. 598[39]).

- State and territory governments raise about 15% of tax revenue but account for some 45% of government direct expenditure (Abelson 2012, p. 598).

- This Vertical Fiscal Imbalance is addressed via intergovernmental grants.

- In 2014/15 Taxation revenue estimate was $368,814M. The source of revenue is provided in Table A9.1.

Table A9.1 - Commonwealth Taxation Revenue by Source ($M)

Taxation Revenue Source	2014/15	%
Income and capital gains levied on individuals	188,050	51.0%
Income and capital gains levied on enterprises (including company tax)	83,140	22.5%
Taxes on employers payroll and labour	738	0.2%
Sales/goods and services tax	58,120	15.8%
Excises and levies	26,939	7.3%
Taxes on international trade	9,270	2.5%
Other sale of goods and services	2,557	0.7%
Total	**368,814**	**100.0%**

Source: Australian Government (2014) Budget 2014-15, http://www.budget.gov.au/2014-15/index.htm.

- The category of Income and capital gains tax levied on enterprises (in Table A9.1) includes company tax, FBT, superannuation taxes, MRRT and the Petroleum resource rent tax. In 2012/13, when these items were reported separately in the Commonwealth Budget Papers, 84% of this category of revenue was from company tax. These proportions are relatively stable over time (refer to Figure 10 in 2012/13 Budget Papers).

[38] Markle, K. and Shackelford, D. (2009) Do Multinationals or Domestic Firms Face Higher Effective Tax Rates? National Bureau Of Economic Research, Working Paper Series.
[39] Abelson, P. (2012) Public Economics: Principles and Practice, McGraw Hill, Australia.

- The Commonwealth provides funding to the States and Territories, in key sectors such as health, education, community services and affordable housing, and deliver productivity-enhancing projects and reforms in sectors including infrastructure, and skills and workforce development (Budget papers). In 2014-15, the Commonwealth proposed to provide the States and Territories with payments totalling $101.1B comprising:

  - $46.3B in payments for specific purposes; and
  - $54.9 in general revenue assistance, comprising GST payments of $53.7B and other general revenue assistance of $1.2B.

Table A9.2 – Commonwealth Payments to the States (2014-15)

$million	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Total
2014-15									
Payments for specific purposes(a)	13,654	11,166	9,792	5,313	3,171	1,039	755	1,041	46,285
General revenue assistance(b)	16,808	11,853	11,736	2,310	4,956	1,911	1,137	3,166	54,861
Total payments to the States	30,462	23,019	21,527	7,623	8,128	2,950	1,892	4,207	101,147

(a) As State allocations for a small number of programmes have yet to be determined, these payments are not reflected in State totals. As such, total payments for specific purposes will not equal the sum of State totals.

(b) As State allocations for royalties are not published due to commercial sensitivities, these payments are not reflected in State totals. As such, total general revenue assistance will not equal the sum of the State totals.

Source: Australian Government (2014) Budget 2014-15, http://www.budget.gov.au/2014-15/index.htm.

- Payments for specific purposes are funded from revenue sources other than GST. Company tax makes up 22% of this remaining revenue. NSW share of total Commonwealth payments for specific purposes is 13,654/46285 = 29%, so an estimate of company tax redistributed to NSW is 22%*29% i.e. 7%.

- This is a conservative estimate. A higher proportion occurs if it is assumed that all payments for special purposes arise from company tax revenue alone rather than the pool of revenue after adjustment for GST.

- The NSW Government (2015) *Guideline for the economic assessment of mining and coal seam gas proposals*, suggests that the proportion of company tax attributable to NSW should be estimated by applying the proportion of Australia's population based in NSW, equivalent to 32 per cent.