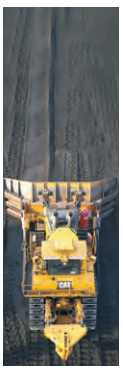
STRATFORDCOAL
Part of the Yancoal Australia Group

Stratford Extension Project
Environmental Impact Statement





APPENDIX P

SOCIO-ECONOMIC ASSESSMENT

On Thursday 28 June 2012, Yancoal Australia Limited was listed on the Australian Stock Exchange and merged with Gloucester Coal Ltd (GCL) under a scheme of agreement on the same date. Stratford Coal Pty Ltd is now a wholly owned subsidiary of Yancoal Australia Limited. Any reference to GCL in this Appendix should be read as Yancoal Australia Limited.

STRATFORD EXTENSION PROJECT

SOCIO-ECONOMIC ASSESSMENT

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EXECUTIVE SUMMARY

The Stratford Mining Complex, comprising the Stratford Coal Mine and Bowens Road North Open Cut, is located approximately 100 kilometres north of Newcastle, New South Wales (NSW) in the Gloucester Basin. The Stratford Mining Complex is owned and operated by Stratford Coal Pty Ltd (SCPL) (a wholly owned subsidiary of Gloucester Coal Ltd [GCL]).

The Stratford Extension Project (the Project) provides for the continuation and extension of open cut mining and processing activities at the Stratford Mining Complex.

The Project requires the preparation of an Environmental Impact Statement (EIS) in accordance with the requirements of the NSW *Environmental Planning and Assessment Act, 1979*. A socio-economic assessment is required as part of the EIS.

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

- the economic efficiency of the Project (i.e. consideration of economic costs and benefits);
- the economic impacts of the Project (i.e. the economic activity that the Project would provide to the regional and State economy); and
- the distribution of impacts between stakeholder groups (i.e. the equity or social impact considerations).

A benefit cost analysis (BCA) of the Project indicated that it would have net production benefits of $215 million (M), with $146M of these accruing to Australia. The estimated net production benefits that accrue to Australia can be used as a threshold value, or reference value, against which the relative value of the residual environmental impacts of the Project, after mitigation, may be assessed. The threshold value indicates the price that the community must value the residual environmental impacts (be willing to pay) to justify in economic efficiency terms, the no further development option. This threshold value is also the opportunity cost to Australia of not proceeding with the Project.

For the Project to be questionable from an economic efficiency perspective, all incremental residual environmental impacts from the Project, that impact Australia[1], would need to be valued by the community at greater than the estimate of the Australian net production benefits i.e. greater than $146M. This is equivalent to each household in the Gloucester and Great Lakes local government areas (LGAs) and in NSW valuing residual environmental impacts at $8,600 and $58, respectively.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to quantify the residual environmental, social and cultural impacts of the Project. The main quantifiable impacts of the Project that have not already been incorporated into the estimate of net production benefits, relate to greenhouse gas emissions and potential impacts on surface water and groundwater resources. These impacts are estimated at $41M in total or $2M to Australia, considerably less than the estimated net production benefits of the Project. There may also be some non-market benefits of employment provided by the Project which are estimated at in the order of $29M.

Overall, the Project is estimated to have net benefits to Australia of between $145M and $174M and hence is desirable and justified from an economic efficiency perspective.

[1] 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.

While BCA is primarily concerned with the aggregate benefits and costs of the Project to Australia, the distribution of costs and benefits may also be of interest to decision-makers.

The total net production benefit is distributed amongst a range of stakeholders including:

- SCPL and its shareholders in the form of after tax profits;
- the Commonwealth Government in the form of any Company tax payable or minerals resource rent tax payable from the Project, which is subsequently used to fund provision of government infrastructure and services across Australia and NSW, including the region;
- the NSW Government via royalties which are subsequently used to fund provision of government infrastructure and services across the State, including the region; and
- the local community in the form of voluntary and/or mandatory contributions to community infrastructure and services.

The environmental, social and cultural costs may potentially accrue to a number of different stakeholder groups at the local, State, National and global level, however, are largely internalised into the productions costs of SCPL.

Greenhouse gas emission costs occur at the National and Global level and would be internalised into the operating costs of the Project through payment of a carbon tax as the Commonwealth Government's carbon tax will be implemented in July 2012 (i.e. before the commencement of the Project). The economic costs associated with a reduction in agricultural production, air quality, vibration, noise and visual impacts are initially borne by affected local landholders. However, GCL has made allowance for the purchase of significantly impacted landholders and/or the estimated management and mitigation costs and hence these costs are internalised into the production costs of the Project. The economic costs associated with the clearing of native vegetation would occur at the State or National level and would be counterbalanced by the biodiversity offset actions proposed by SCPL. The costs of these offset actions are internalised into the production costs of the Project. Other potential environmental externalities would largely occur at the State or Local level and were found to be minor or insignificant. Non-market benefits associated with employment provided by the Project would largely accrue at the Local or State level[2].

An economic impact analysis found that the operation of the Project is estimated to provide up to the following average annual economic activity to the regional economy over the life of the Project:

- $215M in annual direct and indirect output;
- $89M in annual direct and indirect value added;
- $24M in annual direct and indirect household income; and
- 250 direct and indirect jobs.

For the NSW economy, the operation of the Project is estimated to provide up to the following average annual economic activity to the NSW economy over the life of the Project:

- $340M in annual direct and indirect output;
- $175M in annual direct and indirect value added;
- $72M in annual direct and indirect household income; and
- 714 direct and indirect jobs.

[2] It should be noted that the study from which the employment values were transferred surveyed NSW households only.

Any changes in the workforce and populations of regions and towns may have implications in relation to access to community infrastructure and human services, which includes for example housing, health and education facilities.

It is anticipated that during the initial development of the Project an additional 30 people would be required for short periods of time, with in the order of up to 17 of these temporarily migrating into the region. This is expected to have minimal impacts on community infrastructure in the region. However, the cumulative construction workforce across a number of resource development projects have the potential to increase the demand for short-term accommodation that would otherwise be available for tourism to be occupied by construction workers, potentially squeezing out tourists. However, room occupancy rates in Great Lakes LGA accommodation would suggest sufficient capacity to accommodate both sources of demand (i.e. once Gloucester LGA accommodation is full some demand would be expected to flow the Great Lakes LGA) and the provision of construction camps by the approved AGL Gloucester LE Pty Ltd Gloucester Gas Project would significantly reduce the cumulative demand for short-term accommodation.

The operation of the Project has the potential to increase the population of the region by up to 269, with corresponding increased demand for housing, schools, health and community infrastructure. The Gloucester LGA is likely to be most sensitive to any population influx, particularly with regard to demand for housing and pre-school places. From a cumulative impact perspective should the various approved and proposed developments coincide there may be more significant impacts including:

- increased demand for housing potentially leading to increased house prices and rental prices leading to displacement of those on low incomes;
- increased demand for health services;
- pressure on school places;
- increased demand for child care facilities;
- increased demand for recreation facilities and other community infrastructure;
- social division;
- changing sense of place;
- labour – skills shortages and difficulty retaining workers in non-mine sectors; and
- potentially increased crime during construction phases associated with influx of single males.

SCPL would work in partnership with the Gloucester Shire and Great Lakes Councils and the local community so that the benefits of the projected economic growth in the region are maximised and impacts minimised, as far as possible. In this respect, a range of general and specific social impact mitigation and management measures are proposed.

Cessation of the Project after 11 years of operation may lead to a reduction in economic activity. The significance of these Project cessation impacts would depend on:

- The degree to which any displaced workers and their families remain within the region, even if they remain unemployed. This is because continued expenditure by these people in the regional economy (even at reduced levels) contributes to final demand.
- The economic structure and trends in the regional economy at the time. For example, if Project cessation takes place in a declining economy the impacts might be felt more greatly than if it takes place in a growing diversified economy.
- Whether other mining developments or other opportunities in the region arise that allow employment of displaced workers.

Given these uncertainties it is not possible to foresee the likely circumstances within which Project cessation would occur. It is therefore important for regional authorities and leaders to take every advantage from the stimulation to regional economic activity and skills and expertise that the Project brings to the region, to strengthen and broaden the region's economic base.

1 INTRODUCTION

The Stratford Mining Complex, comprising the Stratford Coal Mine and Bowens Road North Open Cut (BRNOC), is an open cut coal operation located approximately 100 kilometres (km) north of Newcastle, New South Wales (NSW) in the Gloucester Basin. Stratford Coal Pty Ltd (SCPL) (a wholly owned subsidiary of Gloucester Coal Ltd [GCL]) is the owner and operator of the Stratford Mining Complex.

The Stratford Extension Project (the Project) provides for the continuation and extension of open cut mining and processing activities at the Stratford Mining Complex.

An Environmental Impact Statement (EIS) has been prepared to accompany a Development Application made for the Project, in accordance with Division 4.1 of Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act). A socio-economic assessment is required as part of the EIS.

The Director General's Requirements for the preparation of the Project EIS require an assessment of:

- potential direct and indirect economic benefits of the Project for local and regional communities and the State;
- potential impacts on local and regional communities, including:
  - increased demand for local and regional infrastructure and services (such as housing, childcare, health, education and emergency services); and
  - impacts on social amenity;
- a detailed description of the measures that would be implemented to minimise the adverse social and economic impacts of the Project, including any infrastructure improvements or contributions and/or voluntary planning agreement or similar mechanism; and
- a detailed assessment of the costs and benefits of the development as a whole, and whether it would result in a net benefit for the NSW community.

In this respect, consideration was given to the relevant aspects of the Department of Planning and Infrastructure's (DP&I) (James and Gillespie, 2002) *Draft Guideline for Economic Effects and Evaluation in EIA* and the Office of Social Policy's (1995) *Techniques for Effective Social Impact Assessment: A Practical Guide*.

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

- the economic efficiency of the Project (i.e. consideration of economic costs and benefits);
- the economic impacts of the Project (i.e. the economic activity that the Project would provide to the regional and State economy); and
- the distribution of impacts between stakeholder groups (i.e. the equity or social impact considerations).

The DP&I's draft guideline (James and Gillespie, 2002) identifies economic efficiency as the key consideration of economic analysis. Benefit Cost Analysis (BCA) is the method used to consider the economic efficiency of proposals. The draft guideline (James and Gillespie, 2002) identifies BCA as essential to undertaking a proper economic evaluation of proposed developments that are likely to have significant environmental impacts.

The draft guideline (James and Gillespie, 2002) indicates that economic impact assessment may provide additional information as an adjunct to the economic efficiency analysis. Economic stimulus to the local economy can be estimated using input-output modelling of the regional economy (regional economic impact assessment).

The draft guidelines also identify the need to consider the distribution of benefits and costs in terms of:

- intra-generational equity effects – the incidence of benefits and costs within the present generation; and
- inter-generational equity effects – the distribution of benefits and cost between present and future generations.

These social impacts are often considered in terms of the impacts on employment, population and community infrastructure and services.

This study relates to the preparation of each of the following types of analyses:

- a BCA of the Project (Section 2);
- a regional economic impact assessment of the Project (Section 3); and
- an Employment, Population and Community Infrastructure Assessment (EPCIA) (Section 4).

A consultation program for the EIS was undertaken by SCPL and is described in Section 3 in the Main Report of the EIS.

2 BENEFIT COST ANALYSIS

2.1 INTRODUCTION

For the Project to be economically desirable from a community perspective, it must be more economically efficient than the base case or "without" Project scenario. Technically, a project is more economically efficient than the "without" Project scenario if the aggregate benefits to society exceed the aggregate costs (James and Gillespie, 2002). For mining projects, the main economic benefit is the producer surplus (net production benefits) generated by the Project and any non-market employment benefits it provides (refer to Portney, 1994), while the main potential economic costs relate to any environmental, social and cultural costs.

While some producer surplus benefits and environmental impacts may accrue internationally, these outcomes are normally excluded from BCA which is focused on surpluses that accrue to the consumers and producers who are the constituents of public policy decision-makers. This national focus extends the analysis beyond that which is strictly relevant to a NSW government planning authority. However, this is considered the correct approach both conceptually and pragmatically given the interconnected nature of the Australian economy and society and the spillovers between states, including those associated with the tax system, provision of community infrastructure and services and the movement of resources over state boundaries.

BCA of the Project involves the following key steps:

- identification of the base case;
- identification of the Project and its implications;
- identification and valuation of the incremental benefits and costs;
- consolidation of value estimates using discounting to account for different timing of costs and benefits;
- application of decision criteria;
- sensitivity testing; and
- consideration of non-quantified benefits and costs.

What follows is a BCA of the Project based on financial, technical and environmental advice provided by SCPL and its' specialist consultants.

2.2 IDENTIFICATION OF THE BASE CASE AND PROJECT

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

Without approval of the Project, mining at the Stratford Mining Complex of up to 1.2 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal would cease in 2013 although processing of coal from Duralie Coal Mine (DCM) at the Stratford Mining Complex would continue under current approvals until 2019. On cessation of mining activities at the Stratford Mining Complex it is assumed that the residual value of some capital equipment and land would be able to be realised through sale or alternate use. However, the residual value of capital equipment and land required for the continued operation of the Coal Handling and Preparation Plant (CHPP) would not be able to be realised until 2019.

In contrast to the "base case", the main activities associated with the development of the Project include:

- ROM coal production up to 2.6 Mtpa for an additional 11 years (commencing approximately 1 July 2013 or upon the grant of all required approvals), including mining operations associated with:
  - completion of the BRNOC;
  - extension of the existing Roseville West Pit; and
  - development of the new Avon North and Stratford East Open Cuts;
- exploration activities;
- progressive backfilling of mine voids with waste rock behind the advancing open cut mining operations;
- continued and expanded placement of waste rock in the Stratford Waste Emplacement and Northern Waste Emplacement;
- progressive development of new haul roads and internal roads;
- coal processing at the existing CHPP including Project ROM coal, sized ROM coal received and unloaded from the DCM and material recovered periodically from the western co-disposal area;
- stockpiling and loading of product coal to trains for transport on the North Coast Railway to Newcastle;
- disposal of CHPP rejects via pipeline to the existing co-disposal area in the Stratford Main Pit and, later in the Project life, the Avon North Open Cut void;
- realignments of Wheatleys Lane, Bowens Road, and Wenham Cox/Bowens Road;
- realignment of a 132 kilovolt power line for the Stratford East Open Cut;
- continued use of existing contained water storages/dams and progressive development of additional sediment dams, pumps, pipelines, irrigation infrastructure and other water management equipment and structures;
- development of soil stockpiles, laydown areas and gravel/borrow areas, including modifications and alterations to existing infrastructure as required;
- monitoring and rehabilitation;
- all activities approved under DA 23-98/99 and DA 39-02-01; and
- other associated minor infrastructure, plant, equipment and activities, including minor modifications and alterations to existing infrastructure as required.

At the end of the Project it is assumed that the surface infrastructure would be decommissioned and surface areas rehabilitated, and it is assumed that the residual value of capital equipment and land would be realised through sale or alternative use.

The incremental coal production facilitated by the Project is provided in Table 2.1.

BCA is primarily concerned with the evaluation of a project relative to the counterfactual (base case) of no project. Where there are a number of alternatives to a project then these can also be evaluated using BCA. However, alternatives need to be feasible to the proponent and to this end a number of alternatives to the Project were considered by SCPL in the development of the Project description. Section 6.9.2 in the Main Report of the EIS provides more detail on the consideration of Project alternatives.

Table 2.1
Indicative Incremental Production Schedule

Financial Year Commencing	Project Year	Stratford Mining Complex ROM Coal (Mt)	Western Co-disposal Area Coal Recovery (Mt)	Total ROM Coal (Mt)	Total Product Coal (Mt)
2013	1	1.8	0.1	1.9	1.1
2014	2	1.7	0.1	1.8	1.1
2015	3	1.7	0.2	1.9	1.1
2016	4	1.7	0.2	1.9	1.1
2017	5	2.0	0.1	2.1	1.2
2018	6	1.8	0.2	2.0	1.1
2019	7	2.1	0.2	2.3	1.2
2020	8	2.2	0.2	2.4	1.3
2021	9	2.4	0.0	2.4	1.3
2022	10	2.6	0.0	2.6	1.4
2023	11	1.5	0.0	1.5	0.8

Mt = million tonnes

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

2.3 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 2.2.

Table 2.2
Potential Incremental Economic Benefits and Costs of the Project

Category	Costs	Benefits
Production	• Opportunity cost of land (Years 2013 and 2019) • Opportunity cost of capital equipment (Years 2013 and 2019) • Capital costs of development including an allowance for land acquisitions for noise, dust and biodiversity offsets • Operating costs (ex royalties), including administration, mining, coal handling, transportation to Port and loading • Decommissioning and rehabilitation costs at cessation of the Project in 2023	• Avoided decommissioning and rehabilitation (Year 2013 and 2019) • Value of product coal • Residual value of capital equipment and land at the cessation of the Project
Potential environmental, social and cultural impacts	• Greenhouse gas generation • Lost agricultural production • Operational noise impacts • Air quality impacts • Surface water impacts • Groundwater impacts • Flora and fauna impacts • Road transport impacts • Aboriginal heritage impacts • Non-Aboriginal heritage impacts • Visual impacts	• Any non-market benefits of employment

It should be noted that the potential environmental, social and cultural impacts of the Project, listed in Table 2.2, are only economic costs to the extent that they affect individual and community wellbeing through direct use of resources by individuals or non-use. If the potential impacts are mitigated to the extent where community wellbeing is insignificantly affected, then no external economic costs arise.

2.4 QUANTIFICATION/VALUATION OF BENEFITS AND COSTS

Consistent with NSW Treasury (2007) guidelines, the analysis has been undertaken in real values with discounting at 7 percent (%) and sensitivity testing at 4% and 10%. Where competitive market prices are available, they have generally been used as an indicator of economic values. Environmental, cultural and social values have been estimated, where relevant, using market data and benefit transfer. Where impacts have been left unquantified the threshold value method is used to interpret them.

2.4.1 Incremental Production Costs and Benefits[3]

Economic Costs

Opportunity Cost of Land and Capital Equipment

Under the base case or "without" Project scenario the existing Stratford Mining Complex would cease mining operations in approximately 2013 and the CHPP would cease operation in 2019. The residual value of capital equipment and land at the Stratford Mining Complex mining and CHPP operations is estimated at approximately $12 million (M) and $31M, respectively that could be realised through alternate use or sale. There is an opportunity cost associated with continuing to use the capital equipment and land for the Project instead of realising its residual value.

Capital Cost of the Project

Capital costs of the Project include capital equipment; mine development; road and power line realignments; development of additional water management equipment and structures; ongoing exploration; other associated minor infrastructure, plant and equipment; and an allowance for land acquisitions of properties impacted by noise and dust or required for biodiversity offsets. These incremental capital costs over the life of the Project are estimated at $47M. These costs are included in the economic analysis in the years that they are expected to occur.

Annual Operating Costs of the Mine

The annual operating costs of the Project include those associated with mining, environmental management and monitoring, ROM coal processing, administration, rail transport to port and port charges. Average annual incremental operating costs of the Project (excluding royalties) are estimated at $128M.

While royalties are a cost to SCPL they are part of the overall producer surplus benefit of the mining and processing activity that is 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 Project would generate total royalties over the life of the Project in the order of $130M, or $84M in present value terms at 7% discount rate.

Decommissioning and Rehabilitation Costs

With the Project, mining activities and CHPP operations would cease in 2023 with associated decommissioning and rehabilitation costs, estimated at $9M.

[3] All values reported in this section are undiscounted Australian Dollars (AUD$) unless otherwise specified.

Economic Benefits

Value of Product Coal

The main economic benefit of the Project is the value of the product coal exported. This can be estimated from the increased thermal coal and coking coal volumes that would be produced, together with assumed export prices of coal and exchange rate. For the purpose of the analysis the export coal price is assumed to average AUD$178 per tonne (/t) for metallurgical coal and AUD$111/t for thermal coal.

There is obviously considerable future uncertainty around the economic value of coal. Consequently, variations in the assumed economic value of coal from the Project have been included in the sensitivity analysis in Section 2.6.

Avoided Decommissioning and Rehabilitation Costs

Under the base case or "without" Project scenario the existing Stratford Mining Complex would cease mining operations in approximately 2013 and the CHPP would cease operation in 2019 with associated decommissioning and rehabilitation costs estimated at approximately $2.9M and $6.2M, respectively. With the Project these costs would be avoided.

Residual Value at End of the Evaluation Period

At the end of the Project, capital equipment and land (excluding biodiversity offsets) may have some residual value that could be realised by sale or alternative use. The residual value of capital and land at the end of the Project life is assumed to be $31M.

2.4.2 Environmental, Social and Cultural Costs and Benefits

Greenhouse Gases

The Project is predicted to generate in the order of 1.6 Mt of direct greenhouse gas emissions associated with mining (Scope 1 emissions) over the lifetime of the Project (Appendix D of the EIS). Approximately 0.3 Mt of indirect (Scope 2) emissions associated with on-site electricity consumption and 0.1 Mt of indirect (Scope 3) emissions associated with the transport of product coal to Newcastle and on-site diesel and electricity use would also be generated over the lifetime of the Project. The economic analysis has included these emissions as a potential environmental cost of the Project.

In addition, the Project would result in the loss of carbon sequestration benefits from the clearing of vegetation (300 hectares [ha]). It is considered that the loss of carbon sequestration benefits associated with the clearance of this vegetation would be offset by the revegetation of approximately 350 ha at the Project site and approximately 435 ha in the biodiversity offset areas.

To place an economic value on carbon dioxide equivalent (CO_2-e) emissions, a shadow price of CO_2-e is required that reflects its social costs. The social cost of CO_2-e is the present value of additional economic damages now and in the future caused by an additional tonne of CO_2-e emissions. There is great uncertainty around the social cost of CO_2-e with a wide range of estimated damage costs reported in the literature. An alternative method to trying to estimate the damage costs of CO_2-e is to examine the price of CO_2-e credits/taxes. Again, however, there is a wide range of prices. For this analysis, a shadow price of AUD$30/t CO_2-e was used, with sensitivity testing from AUD$8/t CO_2-e to AUD$40/t CO_2-e (refer to Attachment 1).

The greenhouse gas costs associated with the burning of the thermal coal or downstream manufacturing that uses coking coal are omitted. Traditional and continuing practice in BCA is to undertake the analysis from a National perspective. This is based on pragmatic grounds as well as the view that projects should be assessed from the view point of the nation which undertakes the projects, incurs the costs and is responsible for decision-making. In the BCA above, production benefits (value of coal) and costs are valued up to the National boundary (e.g. coal is valued at the Newcastle Port [free-on-board], and costs up to and including loading the coal at Newcastle Port have been included).

After coal leaves port it becomes an input into different production processes. In the case of thermal coal the production process is concerned with the burning of coal in developing and developed countries to generate electricity. This production process requires approval of the states/countries purchasing the coal and generating the electricity and has its own set of costs and benefits. Costs of coal fired power generation in other states/countries include the costs of coal, labour, land and capital inputs, electricity distribution costs and externality costs, such as greenhouse gas generation. Benefits include the financial value of electricity as well as the willingness to pay of the community for electricity above and beyond what they have to pay (i.e. consumer surplus). There may also be social benefits of electricity for economic development, education, and medical care. All of these costs and benefits are relevant to a consideration of this next stage of the production process, not just the greenhouse gas costs.

The production process typically relevant to the coking coal is steel production. As with the thermal coal production process, this production process requires approval of the states/countries purchasing the coal and has its own set of costs and benefits. Costs of steel production in other states/countries include the costs of iron ore, coal, labour, land and capital inputs and environmental costs, such as greenhouse gas generation. Benefits include the financial value of steel as well as any associated consumer surplus. As with the thermal coal production process, all of these costs and benefits are relevant to a consideration of this next stage of the production process.

Overseas production processes are not subject to the NSW development approval process and decisions by the NSW Government about whether to supply additional coal for export are likely to have modest consequences for decisions other states/countries take with regard to coal fired electricity generation and steel production. While NSW is well placed to supply some of the projected additional world demand for coal, 75% of growth in coal production is expected to come from China (United States Energy Information Administration, 2010), and with NSW containing approximately 1% of total recoverable coal reserves in the world there are significant coal supply substitution possibilities[4].

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, has therefore been incorporated in the BCA through inclusion of the full land value (opportunity cost) of affected properties. This allowance included in the BCA is considered conservative as it is greater than a detailed estimate of the present value of the forgone agricultural production presented in Attachment 2.

Operational Noise

As described in the Noise and Blasting Impact Assessment (Appendix C of the EIS), the Stratford Mining Complex contributes to the existing noise environment at nearby private rural residences.

[4] United State Energy Information Administration (2010) identifies that the total recoverable reserves of coal around the world is 909 billion tonnes and NSW Department of Primary Industries (2010) identifies 11.52 billion tonnes of recoverable reserves of coal in NSW.

Fourteen residences and one vacant property have been identified in Appendix C of the EIS as being in the Project noise management zone, where marginal to moderate exceedances of applicable noise criteria are predicted. Contemporary Development Consent conditions for residences in the moderate noise management zone typically require proponents to provide at receiver noise mitigation on request.

In addition, 11 rural residences and four vacant properties have been identified in Appendix C of the EIS as being in the Project noise affectation zone (i.e. greater than 5 A-weighted decibels [dBA] above applicable noise criteria). The impacts on these properties can potentially be valued using the property value method, where the change in property value as a result of the noise is estimated. It is expected that the owners of the properties located within the Project noise affection zone would be granted the opportunity to be acquired by SCPL via conditions of the Development Consent.

Instead of incorporating the partial property value impact on these properties, conservatively, the full cost of acquiring these noise affected residences/properties has been incorporated into the capital costs associated with the Project[5].

Road Transport Noise

The potential impact of increased Project road traffic on noise levels was also assessed. It was concluded that the Project would have a minor impact on traffic noise on public roads in the vicinity of the Project (Appendix C of the EIS), and therefore does not warrant inclusion in the BCA.

Rail Transport Noise

Project product coal would be transported via rail from the Stratford Mining Complex rail loop to the Port of Newcastle for export.

Appendix C of the EIS concluded that the Project rail movements would marginally increase rail noise levels (i.e. the compliance distance from the track to meet the relevant rail noise criteria would at maximum increase by a negligible 9 metres). Consideration of the above indicates that no significant economic effects would arise with respect to Project rail noise that would warrant inclusion in the BCA.

Blasting Overpressure and Vibration

Blasting at the Project has the potential to cause structural damage or human discomfort at properties surrounding the Project. The potential impacts of blast vibration were assessed in Appendix C of the EIS. The assessment concluded that with the implementation of management measures two private receivers would be above the building damage and human comfort criteria and a further two private receivers would be above the human comfort criteria.

The receivers where Project blasts are predicted to exceed the building damage criteria are also partly located within the operational noise affectation zone.

Allowance for acquisition of these properties has been incorporated into the capital costs of the Project.

[5] It is noted that there may also be some consumer surplus losses to these property owners above and beyond changes in property values. However, inclusion of the full cost of acquisition is considered likely to more than allow for these consumer surplus losses. Sensitivity testing on capital cost assumptions is also undertaken to determine the impact of changes in assumptions.

Air Quality

Potential air quality impacts may occur at nearby residences as a result of dust generation at the Project from activities such as coal and waste rock handling, emissions from stockpiles and haul roads, and blasting.

The Air Quality and Greenhouse Gas Assessment for the Project (Appendix D of the EIS) indicates that one nearby private receiver would be impacted by air quality emissions above relevant criteria. This affected property is also in the noise affectation zone and hence an allowance for acquisition has been included in the capital costs of the Project, as described above.

Surface Water

The Project would result in changes to flows in local creeks due to the progressive extension of the open cut mining operations and associated subsequent capture and re-use of drainage from operational catchment areas.

Changes to groundwater baseflow contributions to local creeks were also identified as a potential impact of the Project. The Groundwater Assessment (Appendix A of the EIS) concluded that potential impacts on baseflow contributions to Dog Trap Creek and Avondale Creek would be negligible and therefore the downstream potential impacts on the Avon River would be negligible.

Compared to the existing/approved total catchment area excised by the Stratford Mining Complex, the Project is not expected to result in a measurable change to downstream flows in Avondale Creek, Dog Trap Creek or the Avon River. Specifically for licensed surface water users on the Avon River and Dog Trap Creek (there are no licensed surface water users on Avondale Creek), this is estimated to be a small reduction in average flows of the order of 4% to 5% (Appendix B of the EIS). The opportunity cost of this water and existing surface water licences has been included in the BCA.

The Project water management system is to be operated with the objective to achieve no contained water storage overflow. The risk of a contained water overflow (i.e. spill) from the Project was evaluated as part of a detailed site water balance and the results demonstrate there is a very low risk of spill occurring from the contained water storages over the life of the Project life to Avondale Creek (Appendix B of the EIS).

With implementation of management strategies and monitoring, the risks of elevated dissolved solids and other contaminants impacting downstream waters is considered to be low. The risk of increased suspended sediment migration downstream from erosion associated with up-catchment diversions is also considered low due to the proposed erosion control measures that both have been used in the past and are proposed for future diversions (Appendix B of the EIS).

Based on the above, no economic effects have been identified in the BCA with respect to water quality impacts.

Groundwater

Based on the review of the available groundwater data, two groundwater systems were identified (Appendix A of the EIS):

- Fractured rock groundwater system – including shallow rock aquifer and coal measures; and
- Alluvial groundwater system – including alluvial (narrow channel) sediments associated with Dog Trap Creek, Avondale Creek and the Avon River.

The groundwater model predicts average pit inflows (combined) over the life of the Project to be about 1.1 megalitres (ML) per day, with all but approximately 1.5% derived from the fractured rock groundwater system (Appendix A of the EIS). SCPL currently holds a combined total of 1,021 ML volumetric licence allocation under Part 5 of the *Water Act, 1912* for the operations at the Stratford Mining Complex which is greater than the predicted maximum for all Project open cut mining areas combined (i.e. approximately 600 ML). The opportunity cost of relevant groundwater licences has been included in the BCA.

The groundwater model also predicts:

- negligible drawdown in the aquifers of the alluvial groundwater system; and
- negligible impact on groundwater levels or groundwater yield for groundwater users with privately owned bores in the alluvial groundwater system.

Locally there is little reliance on groundwater bores as a source of water, as agricultural enterprises predominantly rely on surface water sources which are more abundant and generally better quality. Therefore, no economic effects have been identified in the BCA with respect to impacts on groundwater users.

The Groundwater Assessment concluded that there is expected to be negligible change in groundwater quality as a result of mining in the short-term. Further, it is expected that groundwater quality would not be impacted by final void water quality post-mining, and there would be no deleterious effect on the beneficial uses of any groundwater sources, as the final voids would remain groundwater sinks (Appendix A of the EIS). Based on the above, no economic effects have been identified in the BCA with respect to groundwater quality impacts.

Flora and Fauna

An assessment of the impacts of the Project on flora, fauna and aquatic ecology has been undertaken as part of the EIS (Appendices E, F and G of the EIS). The additional surface disturbance associated with the Project would involve the clearance of approximately 300 ha of native vegetation types, approximately 195 ha of cleared land with a small portion containing planted native trees (approximately 1.3 ha) (Appendix E of the EIS). Although this vegetation does not represent a threatened ecological community, it is known to provide habitat for some threatened fauna species (Appendix F of the EIS). The aquatic ecology assessment identifies potential impacts on aquatic habitat (Appendix G of the EIS).

A range of measures to avoid, mitigate and offset impacts on biodiversity are proposed (Appendices E, F and G of the EIS). Of particular note, the Project incorporates progressive rehabilitation of disturbance areas and a biodiversity offset comprising some 935 ha. The conservation of the proposed biodiversity offset areas would be secured in perpetuity through one of a selection of mechanisms being considered. With the implementation of the progressive rehabilitation of Project disturbance areas and mine landforms and implementation of the biodiversity offset proposal, it is considered that the potential impacts of the Project on terrestrial fauna and flora would largely be offset and hence no significant economic cost would arise that would warrant inclusion in the BCA. Land opportunity costs and operational expenditure associated with the biodiversity offset areas have been included in the BCA.

Road Transport

The potential impacts of increased road traffic that would arise due to the Project on local traffic conditions and road safety have been considered in Appendix N of the EIS. It was concluded that no significant impacts on the performance, capacity, efficiency and safety of the local road network are expected as a result of the Project, and no specific monitoring or mitigation measures are considered warranted (Appendix N of the EIS). Hence, no economic effects have been identified in the BCA with respect to the predicted road transport movements associated with the Project.

Aboriginal Heritage

The Project has the potential to impact Aboriginal heritage sites in Project land disturbance areas. Of the 15 known Aboriginal heritage sites located within the study area, 10 would be subject to direct disturbance and five may be subject to indirect disturbance (Appendix I of the EIS). However, these are of low to moderate archaeological significance. The potential economic non-use values of these sites have not been estimated in this analysis, but are assumed to be minor.

Non-Aboriginal Heritage

Five items identified in the site survey were assessed as having local heritage significance, *viz*. the Stratford Timber Railway (cutting and routes 1 and 2), the Glen Timber Railway, the Stratford Cemetery and the Craven Village (Appendix J of the EIS). These items are all located outside of the Project disturbance area (Appendix J of the EIS).

There is some limited potential for indirect blasting related impacts (i.e. associated with blast vibration) on the Stratford Cemetery and buildings within Craven Village. However, blast vibration resulting from the proposed Project would be less than the relevant building damage criteria at Stratford Cemetery and all relevant buildings within Craven Village (Appendix C of the EIS).

Therefore no significant economic effects would arise with respect to non-Aboriginal heritage that would warrant inclusion in the BCA.

Visual Impacts

Potential views of the Project landforms would be available from the following locations (Appendix O of the EIS):

- rural residences to the north-east, north, west and south of the Project;
- local roads; and
- other areas such as private roads and paddocks.

Visual impacts of the Project would include new and/or increased views of the waste rock emplacements and open cuts from local viewpoints. Modification of topographic features and additional clearance or disturbance of vegetation within the Project area would also result in visual impacts. Visual impacts associated with mine landforms would decrease over time due to progressive rehabilitation (Appendix O of the EIS).

Continuation and extension of night-lighting would also be associated with the Project (Appendix O of the EIS). The use of night-lighting would cease at mine closure.

Visual intrusion can potentially impact the property value[6] of affected households and the consumer surplus of visitors. Visual impacts would be most appreciable at the nearest privately owned dwellings with views of the Project landforms. The potential impacts at the nearest private dwellings have been assessed as being low to high and following rehabilitation, residual impacts would be very low to moderate (Appendix O of the EIS). Those privately owned dwellings assessed as being most impacted are also in the noise affectation zone and hence an allowance for acquisition has been included in the BCA as described above

There are considered to be no additional visual impacts that are sufficiently significant that they would warrant inclusion in the BCA.

Non-market Value of Employment

Historically the employment benefits of projects have tended to be omitted from BCA on the implicit assumption that labour resources used in a Project would otherwise be employed elsewhere. Where this is not the case, Streeting and Hamilton (1991) and Bennett (1996) outline that otherwise unemployed labour resources utilised in a project should be valued in a BCA at their opportunity cost (wages less social security payments and income tax) rather than the wage rate which has the effect of increasing the net production benefits of the Project. In addition, there may be social costs of unemployment that require the estimation of people's willingness to pay to avoid the trauma created by unemployment. These are non-market values.

It has also been recognised that the broader community may hold non-environmental, non-market values (Portney, 1994) for social outcomes such as employment (Johnson and Desvouges, 1997) and the viability of rural communities (Bennett *et al*., 2004).

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).

The existing Stratford Mining Complex employs some 125 staff and on-site contractors. The Project would provide an average of 250 direct jobs per year for 11 years from mid-2013, with 128 being direct employees and 122 being on-site contractors. Without approval of the Project mining operations at the Stratford Mining Complex would cease, however, 34 direct jobs would be required for the processing of coal from DCM at the Stratford Mining Complex until 2019 under current approvals. The Project would therefore result in 94 incremental direct jobs until 2019 and 128 incremental direct jobs for the remaining four years.

Applying the more conservative Bulli Seam Operation employment value to the estimated incremental direct employment[7] gives an estimated $29M for the employment benefits of the Project. This value has been included in the BCA. In the context of a fully employed economy there may be some contention about the inclusion of this value, particularly as it requires benefit transfer from a study of an existing mining operation in another region of NSW. Consequently, sensitivity testing that excludes this value has also been undertaken.

[6] And potentially consumer surplus.

[7] This is consistent with the non-market valuation studies which focused on direct employment.

2.5 CONSOLIDATION OF VALUE ESTIMATES

2.5.1 Aggregate Costs and Benefits

The present value of incremental costs and benefits, using a 7% discount rate, is provided in Table 2.3. The main decision criterion for assessing the economic desirability of a project to society is its net present value (NPV). NPV is the present value of benefits less the present value of costs. A positive NPV indicates that it would be desirable from an economic perspective for society to allocate resources to the Project, because the community as a whole would obtain net benefits from the Project.

The Project is estimated to have net production benefits of $215M, with $146M of these accruing to Australia. The estimated net production benefits that accrue to Australia can be used as a threshold value or reference value against which the relative value of the residual environmental impacts of the Project, after mitigation, may be assessed. The threshold value indicates the price that the community must value the residual environmental impacts (be willing to pay) to justify in economic efficiency terms the no further development option.

For the Project to be questionable from an economic efficiency perspective, all incremental residual environmental impacts from the Project, that impact Australia[8], would need to be valued by the community at greater than the estimate of the Australian net production benefits i.e. greater than $146M. This is equivalent to each household in the Gloucester and Great Lakes Local Government Areas (LGAs) and in NSW valuing residual environmental impacts at $8,600 and $58, respectively.

The threshold value may also be interpreted as the opportunity cost to Australia of not proceeding with the Project.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to quantify the residual environmental, social and cultural impacts of the Project. From Table 2.2 the main quantifiable impacts of the Project that have not already been incorporated into the estimate of net production benefits, relate to greenhouse gas emissions and potential impacts on surface water and groundwater resources. These impacts are estimated at $41M in total or $2M to Australia, considerably less than the estimated net production benefits of the Project. There may also be some non-market benefits of employment provided by the Project which are estimated at in the order of $29M.

Overall, the Project is estimated to have net community benefits to Australia of between $145M and $174M and hence is desirable and justified from an economic efficiency perspective.

The present value of the incremental costs and benefits of the Project, using a 7% discount rate are provided in Table 2.3.

[8] Consistent with the approach to considering net production benefits, environmental impacts that occur outside Australia would be excluded from the analysis (Section 2.1). This is mainly relevant to the consideration of greenhouse gas impacts.

Table 2.3
Benefit Cost Analysis Results of the Project ($M Present Values at 7% Discount Rate)

	Costs		Benefits	
	Description	**Value ($M)**	**Description**	**Value ($M)**
Production	Opportunity cost of land and capital equipment	$29	Avoided mine decommissioning and rehabilitation costs	$3
	Capital costs of establishment and construction including ancillary works, land acquisition and sustaining capital	$42	Avoided CHPP decommissioning and rehabilitation costs	$4
	Operating costs, including administration, mining, coal handling, transportation,	$909	Value of coal	$1,180
	Mine decommissioning and rehabilitation costs	$2	Residual value of capital equipment and land	$14
	CHPP decommissioning and rehabilitation costs	$3		
	Production Sub-total	***$985***		***$1,201***
	Net Production Benefits			**$215 ($146)**
Non-market Impacts	Greenhouse gas emissions	$39 ($0.4)	Non-market benefits of employment	$29
	Agricultural production	Reflected in land values and included in capital costs and opportunity cost of land		
	Operational noise	Reflected in land values and included in capital costs		
	Road transport noise	Minor		
	Blasting overpressure and vibration	Reflected in land values and included in capital costs		
	Air quality	Reflected in land values and included in capital costs		
	Surface water	$0.3		
	Groundwater	$1		
	Flora and fauna	Some loss of values but offset. Cost of biodiversity offset included in capital costs		
	Road transport	Insignificant		
	Aboriginal heritage	Minor		
	Non-Aboriginal heritage	Insignificant		
	Visual	Reflected in land values and included in capital costs		
	Non-market impacts sub-total	***$41 ($2)***	-	***$29***
NET BENEFITS – including employment benefits				**$203 ($174)**
NET BENEFITS – excluding employment benefits				**$174 ($145)**

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

2.5.2 Distribution of Costs and Benefits

While BCA is primarily concerned with the aggregate benefits and costs of the Project to Australia, the distribution of costs and benefits may also be of interest to decision-makers.

The total net production benefit is distributed amongst a range of stakeholders including:

- SCPL and its shareholders in the form of after tax profits;
- the Commonwealth Government in the form of any Company tax payable or minerals resource rent tax payable from the Project, which is subsequently used to fund provision of government infrastructure and services across Australia and NSW, including the Gloucester and Great Lakes LGAs;
- the NSW Government via royalties which are subsequently used to fund provision of government infrastructure and services across the State, including the Gloucester and Great Lakes LGAs; and
- the local community in the form of voluntary and/or mandatory contributions to community infrastructure and services.

The environmental, social and cultural costs may potentially accrue to a number of different stakeholder groups at the local, State, National and global level (Table 2.4), however, are largely internalised into the production costs of SCPL.

Greenhouse gas emission costs occur at the National and Global level and would be internalised into the operating costs of the Project through payment of a carbon tax as the Commonwealth Government's carbon tax will be implemented in July 2012 (i.e. before the commencement of the Project). The economic costs associated with a reduction in agricultural production, air quality, vibration, noise and visual impacts are initially borne by affected local landholders. However, GCL has made allowance for the purchase of significantly impacted landholders and/or the estimated management and mitigation costs and hence these costs are internalised into the production costs of the Project. The economic costs associated with the clearing of native vegetation would occur at the State or National level and would be counterbalanced by the biodiversity offset actions proposed by SCPL. The costs of these offset actions are internalised into the production costs of the Project. Other potential environmental externalities would largely occur at the State or Local level and were found to be minor or insignificant. Non-market benefits associated with employment provided by the Project would largely accrue at the Local or State level[9].

[9] It should be noted that the study from which the employment values were transferred surveyed NSW households only.

Table 2.4
Distribution of Benefits and Costs (Present Values at 7% Discount Rate)

Value		Distribution			
		Local	State	National	Global
Net Production Benefits					
Net production benefits to SCPL	$92M	✓	✓	✓	✓
Net production benefits to Commonwealth Government – Company tax	$39M	✓	✓	✓	-
Net production benefits to NSW Government – Royalties	$84M	✓	✓	-	-
Total	***$215M***				
Non-market Costs and Benefits					
Non-market benefit of employment	$29M	✓	✓	-	-
Total	***$29M***				
Costs					
Greenhouse gas emissions rest of the world[1]	$39M	-	-	-	✓
Greenhouse gas emissions Australia[1]	$0.4M	✓	✓	✓	
Agricultural production	Reflected in land values and included in capital costs and opportunity cost of land	✓	-	-	-
Operational noise	Reflected in land values and included in capital costs	✓	-	-	-
Road transport noise	Insignificant	✓	-	-	-
Blasting overpressure and vibration	Reflected in land values and included in capital costs	✓	-	-	-
Air quality	Reflected in land values and included in capital costs	✓	-	-	-
Surface water	$0.3	✓	-	-	-
Groundwater	$1	✓	-	-	-
Flora and fauna	Some loss of values but offset. Cost of biodiversity offset included in capital costs	✓	✓	-	-
Road transport	Insignificant	✓	-	-	-
Aboriginal heritage	Minor	✓	-	-	-
Non-Aboriginal heritage	Insignificant	✓	-	-	-
Visual	Reflected in land values and included in capital costs	✓	-	-	-
Total	***$41M***				
Net Benefits	**$209M**				

Note: Totals may have minor discrepancies due to rounding.

[1] Assuming the global social damage cost of carbon is distributed in accordance with relative share of global gross domestic product.

2.6 SENSITIVITY ANALYSIS

The NPV presented in Table 2.3 is based on a range of assumptions around which there is some level of uncertainty. Uncertainty in a BCA 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.

In this analysis, the net community benefit to Australia (excluding employment benefits) was tested for changes to the following variables:

- opportunity cost of land and capital equipment;
- capital costs;
- operating costs;
- mine and CHPP decommissioning and rehabilitation costs;
- avoided mine and CHPP decommissioning and rehabilitation costs;
- value coal;
- residual value of land and capital equipment;
- foreign ownership;
- greenhouse gas emission costs;
- surface water impacts; and
- groundwater impacts.

This analysis indicated (Attachment 3) that the results of the BCA are not sensitive to reasonable changes in assumptions regarding any of these variables, apart from value of coal and operating costs. A 20% increase in operating costs or a 20% reduction in value of coal results in a significant reduction in net community benefits to Australia.

3 REGIONAL ECONOMIC IMPACTS

3.1 INTRODUCTION

The BCA reported in Section 2 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. In contrast, the focus of regional economic impact assessment is the effect of an impacting agent on an economy in terms of a number of specific indicators of economic activity.

An impacting agent may be an existing activity within an economy or may be a change to a local economy (Powell *et al.,* 1985; Jensen and West, 1986). A number of impacting agents would result from the Project including construction activity and mining operations. These impacts are considered in terms of a number of indicators[10]:

- ***Output*** – is the gross value of business turnover;
- ***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;
- ***Income*** – is the wages paid to employees including imputed wages for self employed and business owners; and
- ***Employment*** – is the number of people employed (including full-time and part-time).

The economy on which the impact is measured can range from a township to the entire nation (Powell *et al.,* 1985) depending on the likely distribution of economic effects from the project in question. In selecting the appropriate economy, regard needs to be had to capturing the local expenditure associated with the project but not making the economy so large that the impact of the project becomes trivial (Powell and Chalmers, 1995).

For this assessment, the impacts of the Project have been estimated for the two regions where the economic effects would mostly occur:

- the Gloucester and Great Lakes LGAs referred to as the regional economy; and
- NSW.

A range of methods can be used to examine the regional economic impacts of an activity on an economy including economic base theory, Keynesian multipliers, econometric models, mathematical programming models and input-output models (Powell *et al.,* 1985). Input-output analysis is used in this study.

Input-output analysis essentially involves two steps:

- construction of an appropriate input-output 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 operation) in a form that is compatible with the input-output equations so that the input-output multipliers and flow-on effects can then be estimated (West, 1993).

[10] These indicators should not be confused with costs and benefits that are considered in the BCA.

The input-output method is based on a number of assumptions that are outlined in Attachment 4, and result in estimated impacts being an upper bound impact estimate.

3.2 INPUT OUTPUT TABLE AND ECONOMIC STRUCTURE OF THE REGION

For this assessment, two input-output tables were used:

- a 2006 input-output table of the NSW economy developed by Monash University and indexed to 2011; and
- a 2006 input-output table of the regional economy, developed by Gillespie Economics using the Generation of Regional Input-output Tables procedure[11] (Bayne and West, 1988) (and the Monash NSW table as the parent table) and indexed to 2011.

The input-output table of the NSW and regional economies were aggregated to 30 sectors and six sectors, for the purpose of describing them.

The resulting six sector 2006 input-output table for the regional economy is provided in Table 3.1. The rows of the table indicate 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, in 2006 the *mining* sector in the regional economy sold $2,000 worth of output to the *agriculture, forestry and fishing* sector of the regional economy, $1,356,000 worth of output to the *mining* sector of the regional economy etc, sold $53,000 of output directly to *households* and *exports* $31,786,000 worth of output from the region.

Table 3.1
Aggregated Transactions Table: Regional Economy 2005-06 ($'000)

	Ag, forestry, fishing	Mining	Manuf.	Utilities	Building	Services	TOTAL	Household Expenditure	OFD	Exports	Total
Ag, forestry, fishing	1,975	6	6,800	2	100	2,285	**11,168**	2,734	55,624	61,497	**131,023**
Mining	2	1,356	1,376	2,863	531	213	**6,342**	53	-312	31,786	**37,869**
Manuf.	4,255	485	18,445	463	22,987	28,494	**75,127**	22,382	14,984	117,943	**230,437**
Utilities	1,123	163	1,819	15,526	1,197	9,742	**29,571**	6,941	2,794	23,379	**62,685**
Building	860	336	536	1,068	67,794	12,549	**83,144**	0	191,054	-834	**273,363**
Services	11,587	2,013	24,849	2,164	26,319	214,825	**281,759**	203,073	307,237	502,849	**1,294,919**
TOTAL	**19,803**	**4,359**	**53,824**	**22,087**	**118,929**	**268,108**	**487,110**	**235,183**	**571,383**	**736,620**	**2,030,296**
Household Income	32,614	4,896	37,014	5,446	55,332	381,622	**516,923**	0	0	0	**516,923**
OVA	27,291	22,613	42,317	16,657	37,003	291,308	**437,189**	33,241	20,203	1,324	**491,958**
Imports	51,314	6,001	97,282	18,495	62,100	353,880	**589,074**	334,035	108,547	52,222	**1,083,877**
TOTAL	**131,023**	**37,869**	**230,437**	**62,685**	**273,363**	**1,294,919**	**2,030,296**	**602,459**	**700,133**	**790,166**	**4,123,054**
Employment	837	85	695	114	946	8,088	**10,766**				

Note: Totals may have minor discrepancies due to rounding.
OVA = other value added

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* (which includes gross operating surplus and depreciation 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 of Table 3.1.

[11] Refer to Appendix 5.

In 2006, for the *mining* sector to produce $37,869,000 worth of output, it purchased $6,000 of inputs from the *agriculture, forestry and fishing* sector of the regional economy, $1,356,000 of inputs from the *mining* sector of the regional economy etc, imported $6,001,000 of inputs from outside the region, generated $22,613,000 in other value added, employed 85 people and paid $4,896,000 in wages and salaries.

Gross regional product (or value-added) for the regional economy in 2006 is estimated at $1,009M, comprising $517M to households as wages and salaries (including payments to self employed persons and employers) and $492M in *other value-added*.

The total employment working in the region in 2006 was 10,766 people.

The economic structure of the regional economy can be compared with that of NSW through a comparison of results from the input-output model (Figures 3.1 and 3.2). This indicates that in the regional economy, the *agriculture, forest and fishing* sectors, *mining* sector (value-added only), and *building* sectors are of greater relative importance than they are in the NSW economy, while the *manufacturing* sectors, *utilities* sectors and *services* sectors are of less relative importance than they are to the NSW economy.

Figure 3.1
Summary of Aggregated Sectors: Regional Economy (2006)

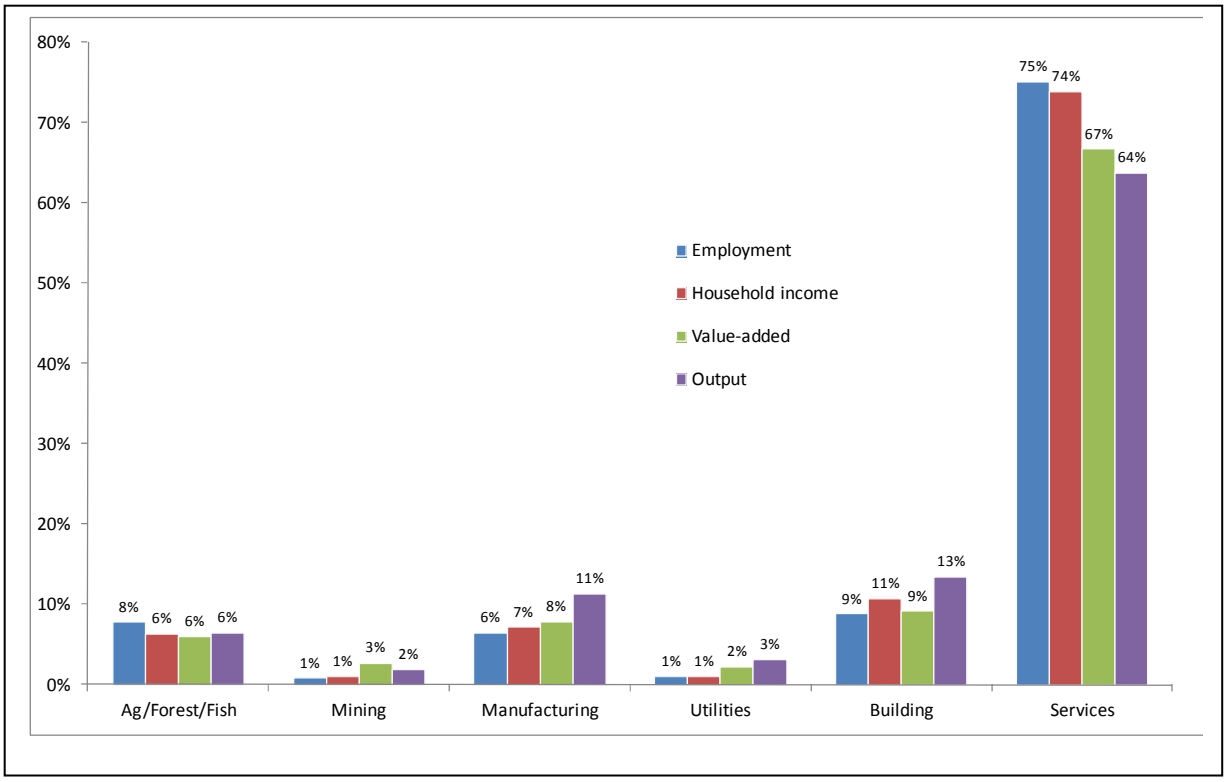
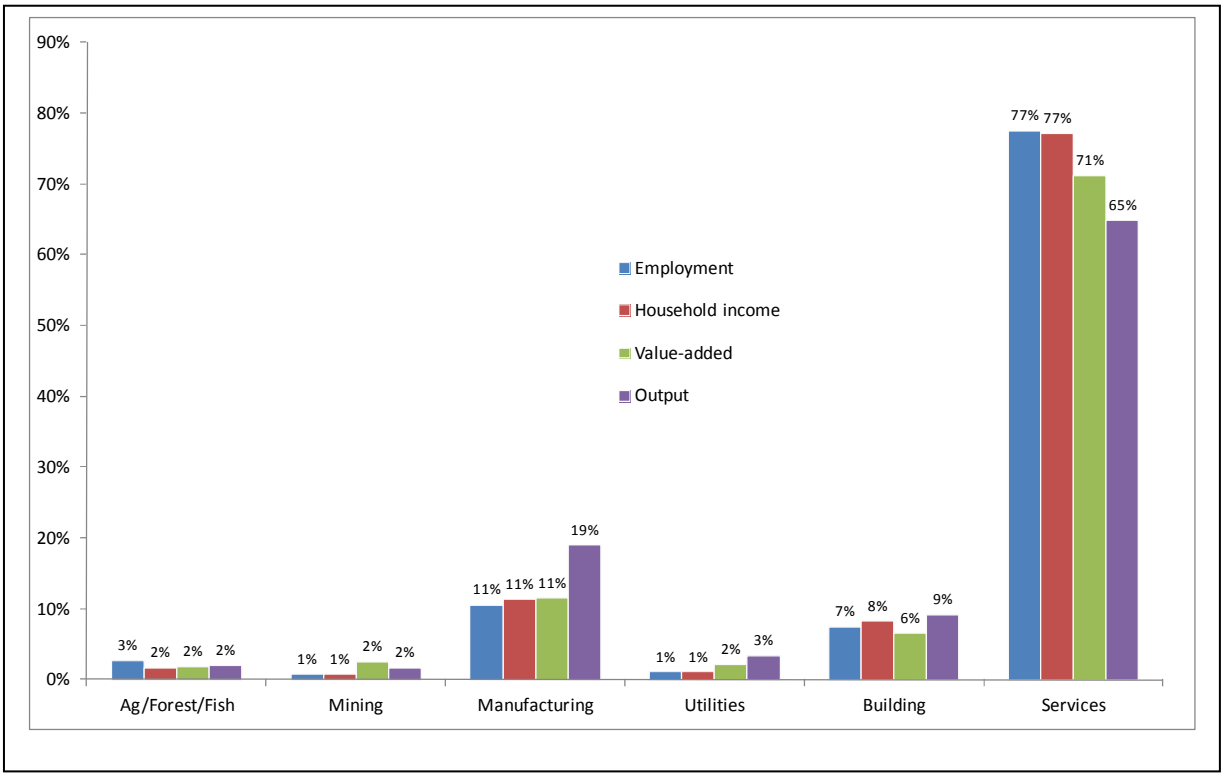


Figure 3.2
Summary of Aggregated Sectors: NSW Economy (2006)

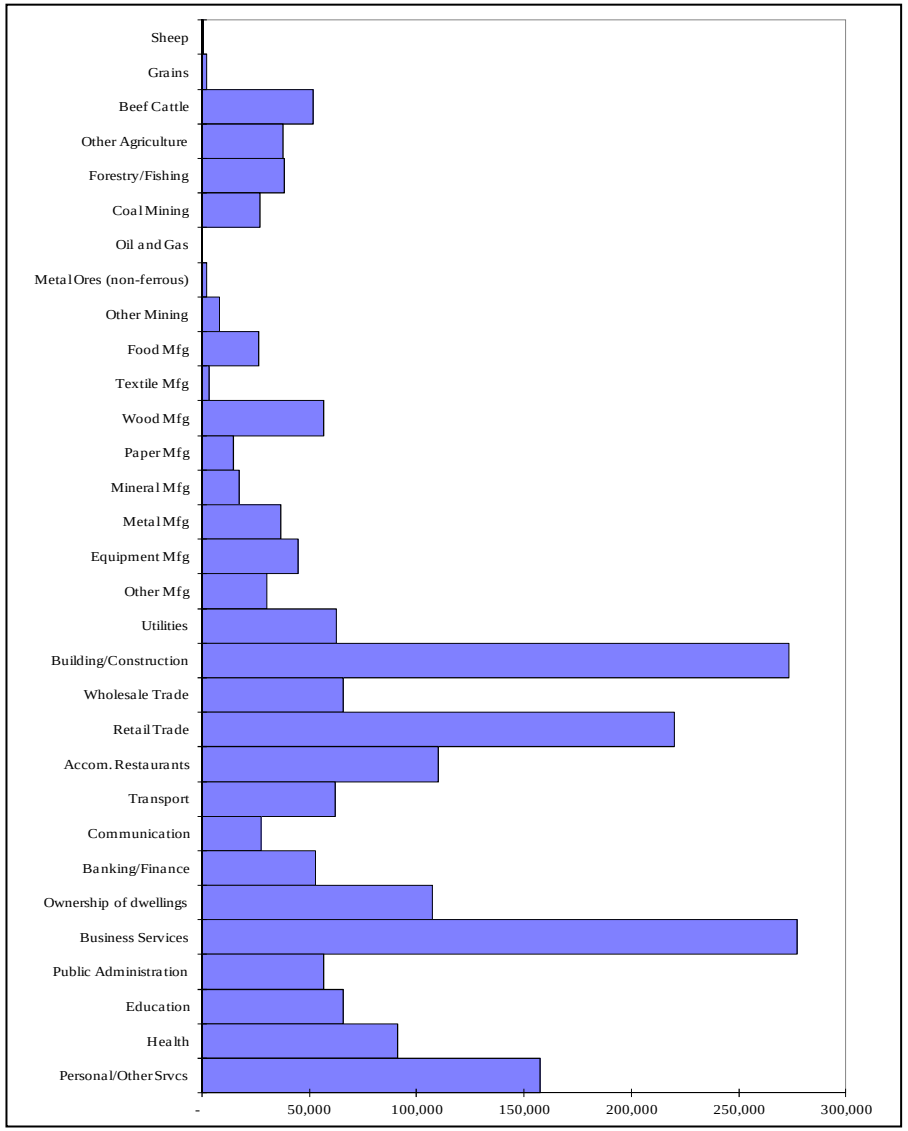


Figures 3.3 to 3.5 provide a more expansive sectoral distribution of gross regional output, gross value-added, gross regional income, employment, imports and exports, and can be used to provide some more detail in the description of the economic structure of the economy.

In terms of gross regional output, gross value-added and income, the *business services* sectors, *building/construction* sectors and *retail trade* sectors are the most significant sectors of the regional economy (Figures 3.3 and 3.4). The *retail trade* sector is the most significant sector for regional employment (Figure 3.4). The *retail trade* sectors, *business services* sectors and *building/construction* sectors and are the most significant sectors of the regional economy for imports while the *retail trade* sectors, *business services* sectors and *ownership of dwellings* sectors are the most significant sectors for exports (Figure 3.5).

Figure 3.3 Sectoral Distribution of Gross Regional Output and Value-Added ($'000)

Gross Regional Output



Gross Value-Added

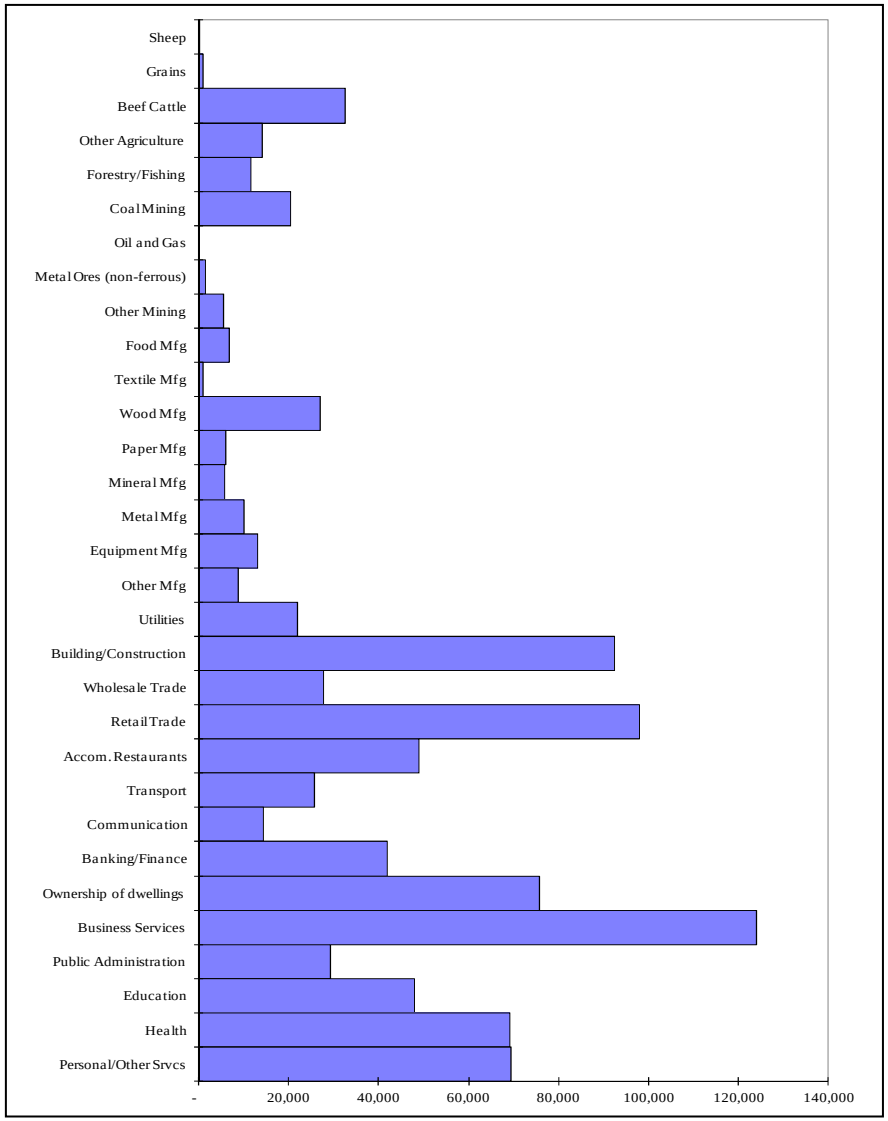
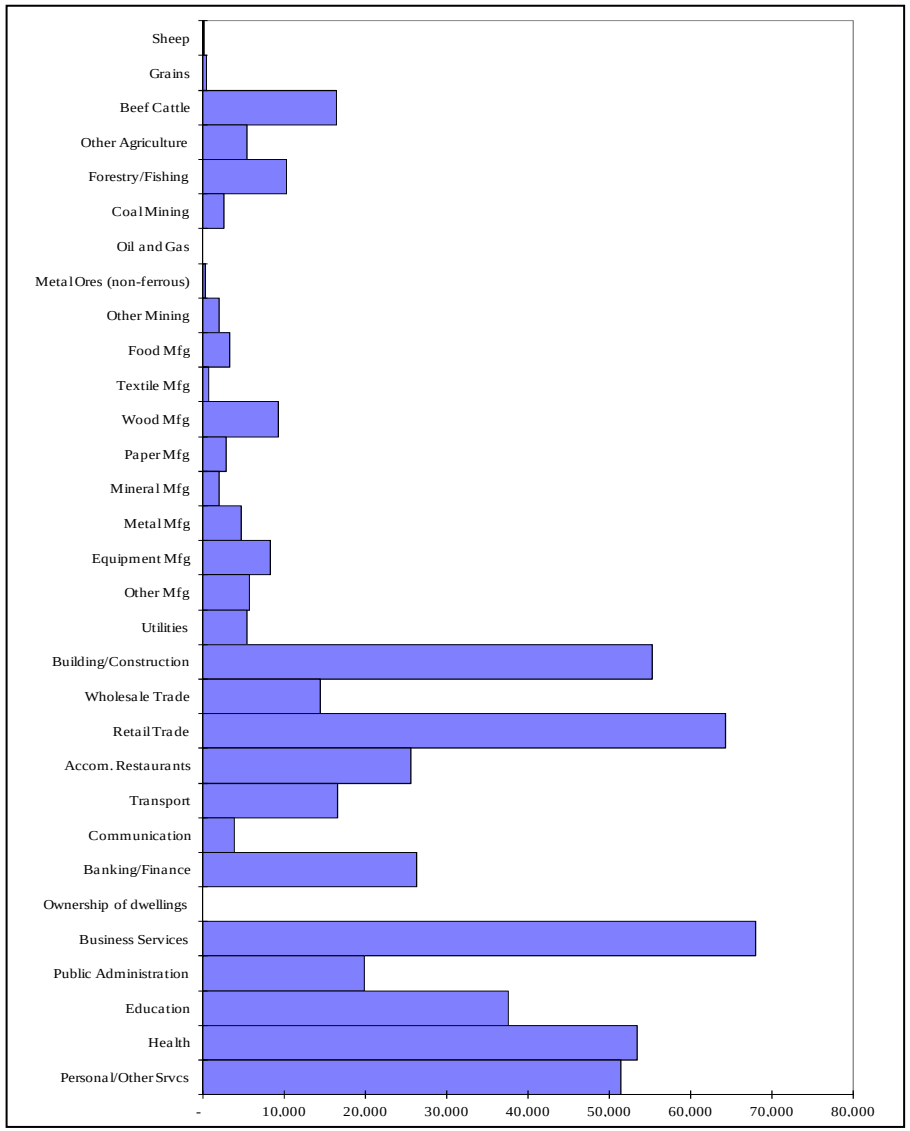


Figure 3.4 Sectoral Distribution of Gross Regional Income ($'000) and Employment (No.)

Gross Regional Income



Gross Regional Employment

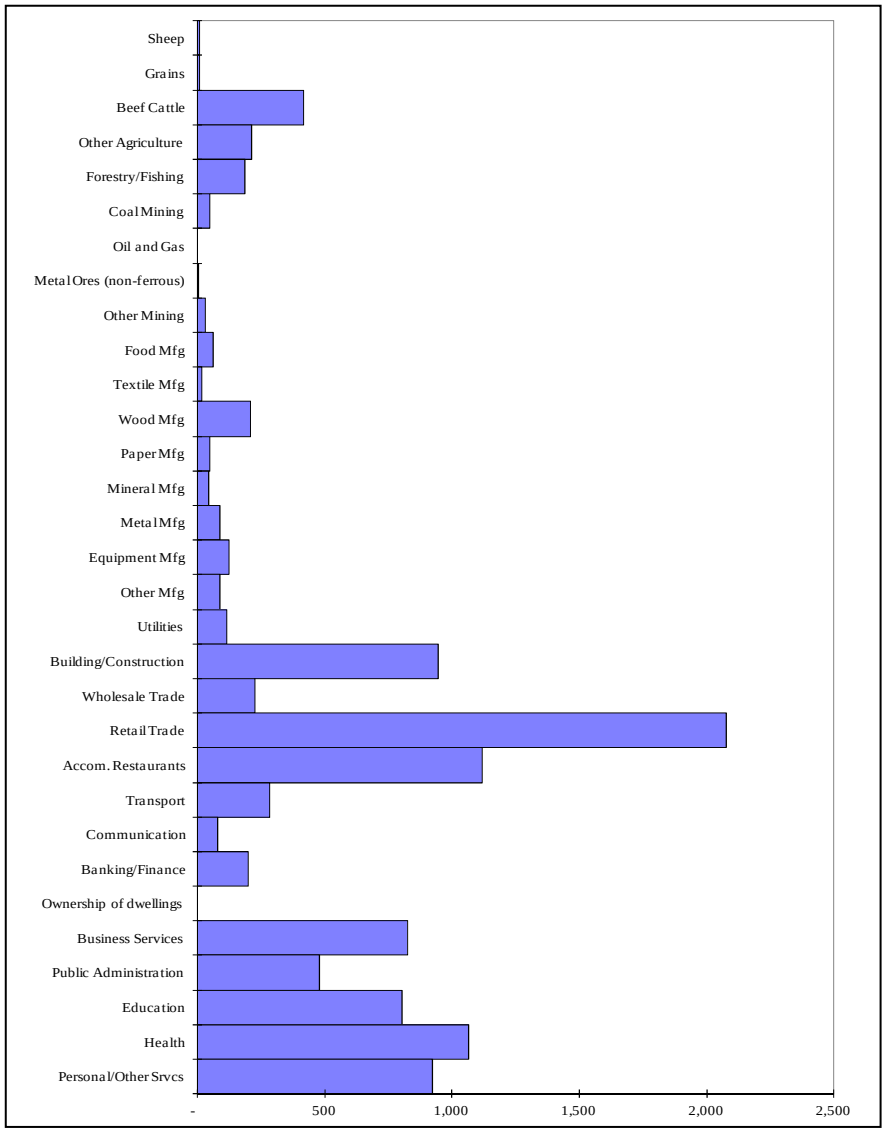
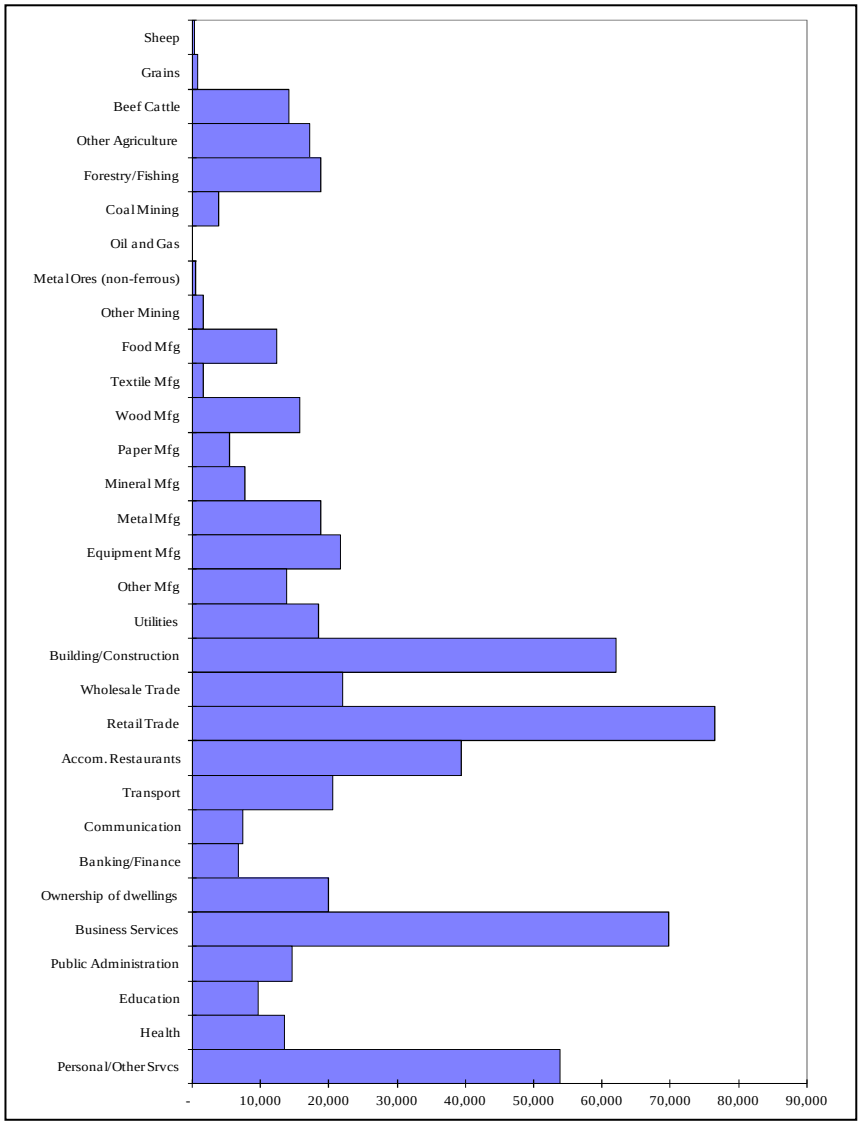
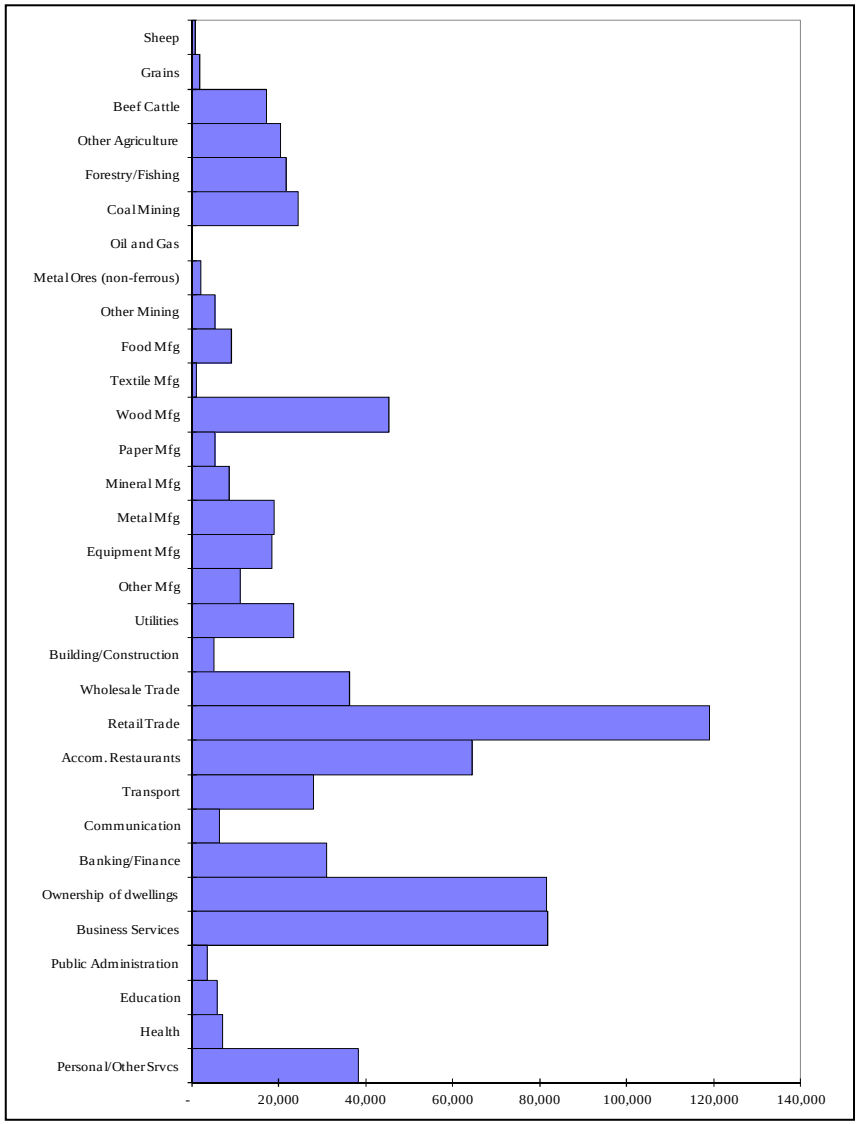


Figure 3.5 Sectoral Distribution of Imports and Exports ($'000)

Regional Imports



Regional Exports



3.3 ECONOMIC IMPACT OF THE PROJECT

The construction phase of the Project would be associated with contractor employment of up to 30 people for short periods of time. This would provide some economic activity to the regional economy from purchase of inputs to the construction phase and expenditure of contractors. However, the main regional economic impact of the Project is associated with the continued operation of the Stratford Mining Complex, albeit at higher than historical production levels.

For the analysis of the Project operation, a Project sector was inserted into the regional input-output table[12] reflecting average annual production and processing levels of 2.1 Mtpa of ROM coal and direct employment of 250 staff and contractors for the Project[13]. The revenue, expenditure and employment data for this new sector was obtained from financial information provided by SCPL. 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 any remainder allocated to *imports*;
- non-wage local expenditure was initially allocated across the relevant *intermediate sectors* in the economy, *imports* and o*ther value-added* based on advice from SCPL;
- allocation was then further made between *intermediate sectors* in the local economy and *imports* based on regional location quotients;
- purchase prices for expenditure in the each sector in the region were adjusted to basic values and margins and taxes and allocated to appropriate sectors using relationships in the National Input-Output Tables;
- the difference between total revenue and total costs was allocated to the *other value-added* row*;*
- direct employment in the Project that resides in the region was allocated to the *employment* row; and
- contractor employment living and working the region and the associated income and value added were relocated from production induced flow-on impacts to direct effects[14].

The major difference between the sectors generated for the regional input-output table and the NSW input-output table was the greater intermediate expenditure that could be captured at the NSW level compared to the regional economy. The former had a greater reliance on imports.

On this basis, the estimated impacts of the operation of the Project were determined for the regional economy and for the NSW economy (Tables 3.2 and 3.3).

[12] Inflated to 2012.

[13] This scenario represents the economic impacts of the Project after 2019. The incremental economic impacts of the up to 2019 would be slightly less as economic activity associated with the processing of DCM ROM coal at the Stratford Mining Complex would continue under current approvals during this period.

[14] Contractor employment is typically placed in production induced employment rather than direct effect employment. The placement of the contractor employment (i.e. in production induced or direct effect) does not however result in any change to the outcomes of the regional economic assessment and has been placed in direct effect employment in this assessment to maintain consistency with the Project employment numbers.

Table 3.2
Annual Economic Impacts of the Operation of the Project on the Regional Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000)	167,936	35,314	11,826	47,140	215,076
Type 11A Ratio	1.00	0.21	0.07	0.28	1.28
VALUE ADDED ($'000)	78,853	4,369	5,719	10,087	88,940
Type 11A Ratio	*1.00*	*0.06*	*0.07*	0.13	1.13
INCOME ($'000)	17,790	2,609	3,647	6,256	24,046
Type 11A Ratio	*1.00*	*0.15*	*0.21*	0.35	1.35
EMPLOYMENT (No.)	145	34	71	105	250
Type 11A Ratio	*1.00*	*0.23*	*0.49*	0.72	1.72

Notes: The total employment for the Project is up to 250 comprising employees and contractors. This assessment is based on average annual production and employment levels i.e. 128 employees and 122 contractors with 58% of employees and contractors residing in the region. Residential location is based on data from the existing Stratford Mining Complex.

Totals may have discrepancies due to rounding.

Table 3.3
Annual Economic Impacts of the Operation of the Project on the NSW Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000)	167,936	88,394	83,491	171,886	339,822
Type 11A Ratio	1.00	0.53	0.50	1.02	2.02
VALUE ADDED ($'000)	114,857	17,965	42,527	60,492	175,349
Type 11A Ratio	*1.00*	*0.16*	*0.37*	0.53	1.53
INCOME ($'000)	33,705	13,946	24,337	38,283	71,988
Type 11A Ratio	*1.00*	*0.41*	*0.72*	1.14	2.14
EMPLOYMENT (No.)	250	139	325	464	714
Type 11A Ratio	*1.00*	*0.56*	*1.30*	1.86	2.86

Note: The total employment for the Project is up to 250 comprising employees and contractors. This assessment is based on average annual production and employment levels i.e. 128 employees and 122 contractors with 100% residing in NSW. Residential location is based on data from the existing Stratford Mining Complex.

Totals may have discrepancies due to rounding.

In total, the operation of the Project is estimated to provide up to the following average annual economic activity to the regional economy over the life of the Project:

- $215M in annual direct and indirect output;
- $89M in annual direct and indirect value added;
- $24M in annual direct and indirect household income; and
- 250 direct and indirect jobs.

For the NSW economy, the operation of the Project is estimated to provide up to the following average annual economic activity to the NSW economy over the life of the Project:

- $340M in annual direct and indirect output;
- $175M in annual direct and indirect value added;
- $72M in annual direct and indirect household income; and
- 714 direct and indirect jobs.

To the extent that SCPL can maximise local procurement, the regional intersectoral linkages reported in this assessment could be increased, with corresponding increases in local economic activity and employment.

Multipliers

The multipliers for any particular sector of a regional economy reflect primarily:

- the magnitude of and relationship between the direct effects, e.g. labour, income and gross profit, to output levels;
- the level of direct intermediate sector expenditures that would be captured within the region; and
- the ability of other sectors in the region to supply production and consumption induced goods and services that are demanded.

The type 11A ratio multipliers for the operation of the Project are provided in Tables 3.2 and 3.3. For the regional economy, the Type 11A ratio multipliers ranged from 1.13 for value-added up to 1.72 for employment. For the larger NSW region Type 11A ratio multipliers ranged from 1.53 for value-added up to 2.86 for employment.

Main Sectors Affected

The input-output analysis indicates that flow-on impacts from the operation of 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:

- *Other property services sector* which includes businesses engaged in machinery and equipment hiring and leasing.
- *Retail trade sector* which consists of business engaged in retail trade.
- *Accommodation, cafes and restaurants sector* which consists of businesses engaged in providing hospitality services in the form of accommodation, meals and drinks.
- *Scientific research, technical and computer services* which includes businesses engaged in scientific research, surveying and consulting engineering services.
- *Health services sector* which includes businesses engaged in providing medical, dental and other health services.

For NSW similar sectors are likely to be the most impacted, however, other sectors also become more significant such as the wholesale trade, ownership of dwellings, other business services and legal, accounting, marketing and business management services sectors.

Tables 3.4 and 3.5 indicate that direct, production-induced and consumption-induced incremental employment impacts of the Project on the regional economy are likely to have different distributions across sectors.

Production-induced employment impacts would generate demand for employment across a range of sectors including *mining*, *manufacturing, wholesale/retail trade and services*. Consumption-induced employment flow-ons would mainly generate demand in the *services sectors*, *wholesale/retail trade sectors, accommodation, cafes and restaurants sectors and manufacturing sectors.*

Table 3.4
Distribution of Flow-on Employment by Industry Sector for the Regional Economy

Sector	Average Direct Effects	Production Induced	Adjusted Consumption-Induced	Total
Primary	0	0	1	1
Mining	145	0	0	145
Manufacturing	0	4	3	7
Utilities	0	0	1	1
Wholesale/Retail	0	4	16	20
Accommodation, cafes, restaurants	0	1	14	15
Building/Construction	0	2	1	3
Transport	0	1	2	3
Services	0	21	35	56
Total	**145**	**33**	**71**	**250**

Note: Totals may have minor discrepancies due to rounding.

Table 3.5
Distribution of Flow-on Employment by Industry Sector for the NSW Economy

Sector	Average Direct Effects	Production Induced	Adjusted Consumption-Induced	Total
Primary	0	0	6	6
Mining	250	1	0	252
Manufacturing	0	20	29	50
Utilities	0	6	4	10
Wholesale/Retail	0	19	71	90
Accommodation, cafes, restaurants	0	4	43	47
Building/Construction	0	6	6	11
Transport	0	6	11	16
Services	0	78	155	232
Total	**250**	**139**	**325**	**714**

Note: Totals may have minor discrepancies due to rounding.

3.4 IMPACT OF CESSATION OF THE PROJECT ON THE REGIONAL ECONOMY

The establishment and operation of the Project would stimulate demand in the regional and NSW economy leading to increased business turnover in a range of sectors and increased employment opportunities. Conversely, cessation of the mining operations 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 would depend on whether the workers and their families affected would leave the region. 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 proportion of employees 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 3.2. However, if displaced workers and their families leave the region then impacts would be greater and begin to approximate the total effects in Table 3.2.

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 local region compared to other regions, the likely loss or gain from homeowners selling, and the extent of "attachment" to the local region (Economic and Planning Impact Consultants, 1989).

To the extent that alternative development opportunities arise in the regional economy, the regional economic impacts associated with Project closure that arise through reduced production, and employment expenditure can be substantially ameliorated and absorbed by the growth of the region. One key factor in the growth potential of a region is a region's capacity to expand its factors of production by attracting investment and labour from outside the region (Bureau of Industry Economics, 1994). This in turn can depend on a region's natural endowments.

The region is a prospective location with a range of coal resources. New mining resource developments in the region would help broaden the region's economic base and buffer against impacts of the cessation of individual projects.

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 Project cessation takes place in a declining economy, the impacts might be more 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 be less significant.

Nevertheless, it is not possible to foresee the likely circumstances within which Project cessation would occur. It is therefore important for regional authorities and leaders to take every advantage from the stimulation to regional economic activity and the skills and expertise that the Project and other mining operations would maintain in the region.

4 EMPLOYMENT, POPULATION AND COMMUNITY INFRASTRUCTURE ASSESSMENT

4.1 INTRODUCTION

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

The objective of this EPCIA is to examine the potential impacts of the Project on existing community infrastructure as a result of employment and population change associated with the Project.

The basic methodology for carrying out the EPCIA was to:

- analyse the existing socio-economic environment of the region potentially impacted by the Project;
- analyse the likely incremental magnitude of the additional Project work force and associated population growth including estimated flow-on employment effects;
- consider the impacts of estimated Project and cumulative employment and population change on community infrastructure; and
- recommend impact mitigation or management measures for any substantive impacts that are identified.

The geographic scope of the EPCIA was determined by the location of Project and the region that would potentially service the Project and its employees. The Project is located approximately 20 km south of Gloucester in the Gloucester Valley. Approximately 58% of current employees live in the Gloucester and Great Lakes LGAs. While these LGAs were combined for the purpose of the regional economic impact assessment, for the EPCIA they are described separately.

The assessment draws on a range of publications and reports as well as data provided by SCPL, the Australian Bureau of Statistics (ABS), and information from Section 3 on the potential regional economic impacts of the Project. While the Project would also be expected to have population and workforce effects at a NSW state level and in other nearby LGAs such as Dungog, Greater Taree, Port Stephens, Maitland and Newcastle, these effects would not be of sufficient magnitude to warrant consideration of potential adverse effects.

4.2 REGIONAL PROFILE

4.2.1 Population

In 2006, the Gloucester LGA had a population of 4,800 and the Great Lakes LGA had a population of 32,764, representing approximately 0.1% and 0.5% of the NSW population, respectively (Table 4.1).

Table 4.1
Gloucester and Great Lakes LGAs and NSW Population and Growth Rates 1996 to 2006

	Year	1996	2001	2006
Gloucester LGA	Population	4,886	4,654	4,800
	Annual Population Growth Rate	-	-0.95%	0.63%
Great Lakes LGA	Population	28,086	30,863	32,764
	Annual Population Growth Rate	-	1.98%	1.23%
NSW	Population	6,006,206	6,270,781	6,549,179
	Annual Population Growth Rate	-	0.88%	0.89%

Source: ABS (2006a; 2006b)

The population of the Great Lakes LGA has been increasing at a greater rate than for NSW while the population of the Gloucester LGA declined between 1996 and 2001 and then increased between 2001 and 2006, albeit it at a lower rate than the NSW growth rate (Table 4.1).

Consistent with the trend for NSW, the proportion of the Gloucester and Great Lakes LGAs populations under the age of 44 has been declining over time while the proportion of the population over the age of 44 has been increasing (Table 4.2). Both the Gloucester and Great Lakes LGAs have a greater proportion of the population aged over 44 compared to NSW (Table 4.2).

Table 4.2
Distribution of the Gloucester and Great Lakes LGAs and NSW Population by Age Group

Proportion of Total Population	Gloucester			Great Lakes			NSW		
	1996	2001	2006	1996	2001	2006	1996	2001	2006
Aged 14 years and younger	22.8%	21.0%	18.2%	19.6%	17.8%	16.1%	21.4%	20.9%	19.8%
Aged 15 years to 44 years	35.5%	32.5%	28.8%	31.3%	29.2%	27.1%	44.7%	43.1%	41.5%
Aged 45 years to 64 years	24.8%	26.7%	30.8%	24.9%	27.9%	29.0%	21.1%	22.9%	24.8%
Aged 65 years and over	17.0%	19.8%	22.2%	24.1%	25.1%	27.8%	12.7%	13.1%	13.8%

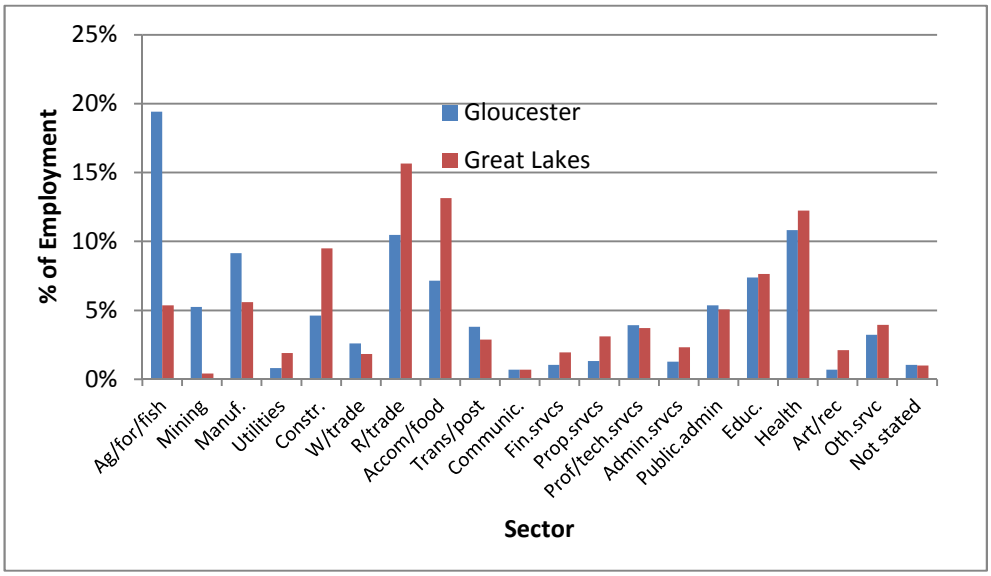
Source: ABS (2006a; 2006b).

Note: Percentages may not add to 100% due to rounding.

4.2.2 Employment

Employment by industry data is presented on Figure 4.1. This figure shows the greater relative importance of *agriculture/forestry/fishing*, *mining* and *manufacturing* in the Gloucester LGA and the greater relative importance of *construction*, *retail trade* and *accommodation/food* sectors in the Great Lakes LGA.

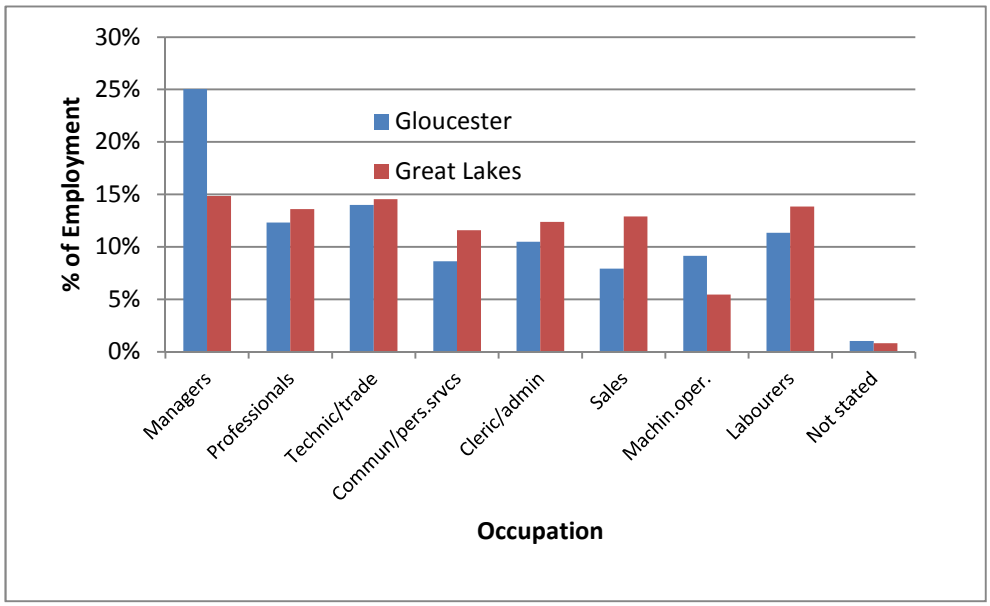
Figure 4.1
Employment by Industry in the Gloucester and Great Lakes LGAs



Source: ABS (2006c; 2006d).

Reflecting the employment by industry data, the Gloucester LGA has a higher relative proportion of *managers* (mainly rural) and *machinery operators* (Figure 4.2). The Great Lakes LGA has a higher relative proportion of all other occupations (Figure 4.2).

Figure 4.2
Occupations in the Gloucester and Great Lakes LGAs



Source: ABS (2006c; 2006d).

The unemployment rate in the Gloucester and Great Lakes LGAs has been declining between censuses (Tables 4.3 and 4.4). However, the unemployment rate for both LGAs has been consistently higher than that for NSW (Tables 4.3 and 4.4). The unemployment rate in the December 2011 quarter was reported as 58 people (2.4%) for the Gloucester LGA and 591 (4.2%) for the Great Lakes LGA, compared to 196,900 (5.2%) for NSW (Commonwealth Department of Education, Employment and Workplace Relations, 2011).

Table 4.3
Unemployment in the Gloucester LGA

	1996	**2001**	**2006**
Total No. in Labour Force	2,015	1,966	2,002
As % of People over 15 Years	41.24%	42.24%	41.71%
Total Employment	1,818	1,819	1,881
Total Unemployment	197	147	121
Unemployment Rate	9.78%	7.48%	6.04%
NSW Unemployment Rate	**8.8%**	**7.2%**	**5.90%**

Source: ABS (2006a; 2006b)

Table 4.4
Unemployment in the Great Lakes LGA

	1996	**2001**	**2006**
Total No. in Labour Force	9,808	10,726	11,731
As % of People over 15 Years	34.92%	34.75%	35.80%
Total Employment	8,306	9,472	10,633
Total Unemployment	1,502	1,254	1,098
Unemployment Rate	15.31%	11.69%	9.36%
NSW Unemployment Rate	**8.8%**	**7.2%**	**5.90%**

Source: ABS (2006a; 2006b)

Average wage and salary income in 2009 in the Gloucester and Great Lakes LGAs was $36,656 and $35,658, respectively, compared to $48,793 for NSW (ABS, 2012a, ABS, 2012b).

4.2.3 Housing

In 2006 there were approximately 1,927 private occupied dwellings in the Gloucester LGA and 13,420 in the Great Lakes LGA, about 0.1% and 0.5% of the State total, respectively (Table 4.5). The Gloucester and Great Lakes LGAs had a higher proportion of separate houses than the State (approximately 93% and 77% respectively, compared with approximately 70% for NSW) and a lower proportion of townhouses/units/flats/apartments (approximately 5% and 20% respectively, compared with 29% in NSW) (Table 4.5).

Table 4.5
Housing Stock in Gloucester and Great Lakes LGAs and NSW
(Occupied Dwellings Only)

Housing Stock	Gloucester LGA			Great Lakes LGA			NSW
	1996	2001	2006	1996	2001	2006	2006
Total Private Dwellings	1,793	1,825	1,927	11,037	12,513	13,420	2,470,452
% Separate Houses	91.0%	92.4%	92.7%	75.1%	74.8%	76.5%	69.7%
% Townhouse, Flat, Unit, Apartment	4.9%	5.2%	5.1%	18.7%	20.2%	20.0%	28.8%
% Other	3.1%	2.5%	2.2%	5.1%	4.3%	3.5%	1.4%
% Not Stated	1.1%	0.0%	0.0%	1.1%	0.7%	0.0%	0.08%

Source: ABS (2006a; 2006b)

Note: Percentages may not add to 100% due to rounding.

At the 2006 Census, there were 392 unoccupied dwellings in the Gloucester LGA and 5,831 unoccupied dwellings in the Great Lakes LGA (Table 4.6).

Table 4.6
Housing Stock in the Gloucester and Great Lakes LGAs (All Dwellings)

Housing Stock	Gloucester (2006)			Great Lakes (2006)		
	Occupied Dwelling	Unoccupied Dwelling	Total Dwelling	Occupied Dwelling	Unoccupied Dwelling	Total Dwelling
Separate house	1,833	348	2,181	10,672	3,515	14,187
Semi-detached, row or terrace house, townhouse	20	6	26	1,637	808	2,445
Flat, unit or apartment	89	24	113	1,380	1,433	2,813
Other dwelling	62	14	76	665	75	740
Dwelling structure not stated	0	0	0	3	0	3
Total	**2,004**	**392**	**2,396**	**14,357**	**5,831**	**20,188**

Source: ABS (2006a; 2006b)

Note: Totals may have minor discrepancies due to rounding.

There were 43 building approvals for private sector houses in Gloucester LGA in 2010. In Great Lakes LGA during the same period there were 145 building approvals for private sector houses (ABS 2012a, ABS 2012b).

There is considerable short stay tourism accommodation available in the Great Lakes LGA with 21 establishments with 5 or more rooms providing 594 rooms and 1,856 beds (Table 4.7). Short stay tourism accommodation in Gloucester is more limited based on ABS (2006a; 2006b) data (Table 4.7). However, the Gloucester Shire Council "Visit Gloucester" website indicates that there is a wide range of short stay establishments in the Gloucester area.

Table 4.7
Gloucester and Great Lakes LGAs - Hotels, Motels and Serviced Apartments with Five or More Rooms (December Quarter 2011)

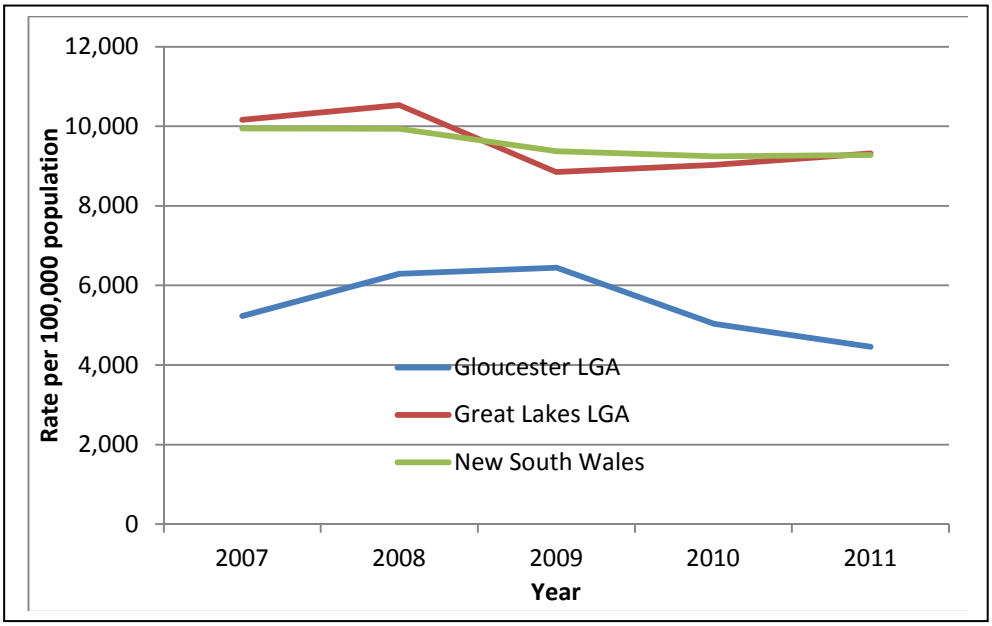
Short Stay Tourism Accommodation	Gloucester	Great Lakes
Establishments	2	21
Rooms	NA	594
Beds	NA	1,856
Guest Nights	NA	54,793
Room Occupancy Rates	NA	48.9%
Bed Occupancy Rate	NA	32.1%
Accommodation Gross Takings ($)	NA	3,493,568

Source: ABS (2012c)

4.2.4 Crime and Safety

NSW Bureau of Crime Statistics and Research indicates that the incidence of crime in the Gloucester and the Great Lakes LGAs per 100,000 head of population is following a general declining trend (Figure 4.3).

Figure 4.3
Gloucester and Great Lakes LGAs and NSW Incidence of Crime per 100,000 Head of Population over Time



Source: NSW Bureau of Crime Statistics and Research (2011).

The overall incidence of crime per capita in the Gloucester LGA was lower than that for the NSW while the incidence of crime in the Great Lakes LGA was similar to NSW (Table 4.8).

It is difficult to specify reasons for the higher overall incidence of crime in the Great Lakes LGA than the Gloucester LGA, and a higher incidence of some categories of crime in the Great Lakes LGA than in the State since causal factors that lead to criminal activity are complex and include many and varied social and economic circumstances and conditions. However, socio-economic characteristics of the Great Lakes LGA that may be relevant include relatively lower income levels and higher unemployment rates.

Table 4.8
Gloucester and Great Lakes LGAs and NSW Incidence of Crime per 100,000 Head of Population, 2011

Offence	Gloucester LGA	Great Lakes LGA	NSW
17 major offences	2,664	5,475	5,203
Other homicide	0	0	1
Other assault	0	33	34
Abduction and kidnapping	0	3	5
Blackmail and extortion	0	0	1
Harassment, threatening behaviour and private nuisance	290	395	407
Other offences against the person	39	22	19
Other theft	386	757	582
Arson	19	111	84
Drug offences	135	610	534
Prohibited and regulated weapons offences	58	75	106
Disorderly conduct	386	476	343
Betting and gaming offences	0	0	2
Liquor offences	58	276	223
Pornography offences	0	3	4
Prostitution offences	0	3	2
Against justice procedures	270	746	733
Transport regulatory offences	0	0	793
Other offences	154	331	196
Total	**4,459**	**9,317**	**9,274**

Source: NSW Bureau of Crime Statistics and Research (2011).
Note: Totals may have minor discrepancies due to rounding.

4.2.5 Community Infrastructure

Education

The NSW Department of Education and Training is the main provider of primary and secondary education in the Gloucester and Great Lakes LGAs, accounting for 83% and 85% of primary school enrolments and 95% and 82% of secondary school enrolments in 2006, respectively (Table 4.9).

In both LGAs there has been declining total enrolments at infants/primary schools with an increasing proportion of enrolments being in private schools (Table 4.9). There is therefore likely to be some spare capacity in the public infants/primary school infrastructure.

Secondary school enrolments in the Gloucester LGA have declined over time (Table 4.9). There is therefore likely to be some spare capacity in the secondary school infrastructure in the Gloucester LGA. Secondary school enrolments in the Great Lakes LGA have increased over time with the proportion accommodated by private schools also increasing over time.

Table 4.9
Education in the Gloucester and Great Lakes LGAs

	Gloucester			Great Lakes		
	1996	**2001**	**2006**	**1996**	**2001**	**2006**
Preschool	71	56	80	465	433	500
Infants/Primary	503	499	388	2,630	2,626	2,301
Public	*87%*	*84%*	*83%*	*87%*	*87%*	*85%*
Private	*13%*	*16%*	*17%*	*13%*	*13%*	*15%*
Secondary	377	353	324	1,663	1,934	2,136
Public	*99%*	*96%*	*95%*	*89%*	*90%*	*82%*
Private	*1%*	*4%*	*5%*	*11%*	*10%*	*18%*
TAFE	53	61	77	475	779	666
University	35	33	24	182	202	250
Other	22	17	23	77	158	110
Not Stated	226	136	313	1,384	1,135	2,531
Total	**1,287**	**1,155**	**1,229**	**6,876**	**7,267**	**8,494**

Source: ABS (2006a; 2006b)

Note: Totals may have minor discrepancies due to rounding.

Health, Arts and Recreation

According to the 2006 population census there were 187 people employed in the health care and social assistance industries in the Gloucester LGA and 1,113 employed in these industries in the Great Lakes LGA (Table 4.10). The proportion of employment in these health care and social assistance sectors in the Great Lakes LGA was higher than in NSW while the proportion in these sectors in the Gloucester LGA was lower than for NSW (Table 4.10).

Table 4.10
Employment in Health, Arts and Recreation Services

	Gloucester		Great Lakes		NSW	
Health Care and Social Assistance						
Health care and social assistance	0	0.0%	30	0.3%	9,400	0.3%
Hospitals	98	5.6%	189	2.1%	94,187	3.4%
Medical and other health care services	55	3.2%	311	3.4%	85,108	3.1%
Residential care services	10	0.6%	362	4.0%	44,648	1.6%
Social assistance services	24	1.4%	221	2.4%	59,618	2.2%
Total	***187***	**10.8%**	***1,113***	**12.2%**	***292,961***	***10.7%***
Arts and Recreation Services	-					
Arts and recreation services	0	0.0%	9	0.1%	1,740	0.1%
Heritage activities	5	0.3%	27	0.3%	4,424	0.2%
Creative and performing arts activities	0	0.0%	4	0.0%	8,122	0.3%
Sports and recreation activities	6	0.3%	147	1.6%	18,873	0.7%
Gambling activities	0	0.0%	4	0.0%	4,799	0.2%
Total	***11***	***0.6%***	***191***	***2.1%***	***37,958***	***1.4%***
TOTAL	**198**	**11.4%**	**1,304**	**14.3%**	**330,919**	**12.0%**
TOTAL EMPLOYMENT	**1,737**	**100.0%**	**9,093**	**100.0%**	**2,748,394**	**100.0%**

Source: ABS (2006e; 2006f)

Note: Totals may have minor discrepancies due to rounding.

The proportion of employment in the Gloucester LGA in arts and recreation services was lower than for NSW while the proportion of employment in the Great Lakes LGA in these sectors was greater than for NSW (Table 4.10).

The main health facility in Gloucester LGA is Gloucester Soldiers Memorial Hospital which offers the following services (Gloucester Shire Council, 2007):

- physiotherapy;
- radiographer;
- catering officer;
- program of aids for the disabled;
- specialist and general nurses;
- paediatric; and
- palliative care.

The Great Lakes LGA is serviced by Forster Private Hospital and Bulahdelah Public Hospital. Forster Private Hospital provides between 50 and 100 beds depending on seasonal demand. Services provided include chemotherapy, elective surgery, hospice care unit and rehabilitation unit. Bulahdelah Public Hospital provides less than 50 beds and services provided include an emergency department and outpatient services (Australian Institute of Health and Welfare, 2012).

While it is outside of the Gloucester and Great Lakes LGAs the Manning Base Hospital located in Taree also services the wider region.

4.3 WORKFORCE AND POPULATION CHANGE

4.3.1 Introduction

The main drivers for impacts on community infrastructure are changes in employment and population and the spatial location of these changes in employment and population. Employment that is directly generated by the Project may be sourced from:

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

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

Whether local labour is sourced from the unemployment pool or from other industries, it can reduce unemployment levels - directly in the case of employing unemployed people and indirectly via the filter effect[15] where labour is sourced from other industries.

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

The impact of commuter workers would depend on the extent to which they integrate into the regional communities, however, for the purpose of this analysis it is assumed that the impact of commuter workers is likely to be modest.

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

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

To facilitate consideration of potential community infrastructure impacts, this section explores the possible direct and indirect employment and population effects of the Project.

4.3.2 Project Construction Workforce and Population Change

It is estimated by SCPL that the construction workforce for the peak construction period would occur in the first year of the Project (i.e. 2013), with a workforce of up to approximately 30 for short periods of time.

Construction generally requires a labour force with highly specialised skills including specialised welders, fitters, electrical contractors, machinery mechanics and construction engineers (Centre for International Economics, 2001). These types of professions are located mainly in the construction sector, wholesale trade sector (mechanics) and to a lesser extent the professional/technical service sector. Examination of the employment by industry data in Section 4.2.2 indicates that the Great Lakes LGA has a higher proportion of construction workers, while Gloucester LGA has a slightly higher proportion of employment in the wholesale trade sector and professional/technical service sector. Estimation of location quotients for the region based on input-output sectors of the economy indicates that the Gloucester and Great Lakes LGAs have a higher concentration of employment in the construction sector (other construction sector and construction trade services sector), wholesale mechanical repairs sector than NSW but a lower concentration of employment in the scientific research, technical and computer services sector than NSW. Consequently, it is likely that much of the workforce required for construction of the Project for short periods of time would either already be located in the region or temporarily migrate into the region for the period that they are required. If it is conservatively assumed that construction employees have the same residential location as employees for the existing Stratford Mining Complex and that any employees located in the region have migrated, then there would be 11 employees migrating into the Gloucester LGA and six into the Great Lakes LGA for short-term durations.

It is anticipated that the majority of non-local construction workers would be single or would not bring their families into the region. This reflects the fact that the construction workforce in the mining industry is generally very mobile and tends not to have accompanying spouses and children.

The direct construction workforce can result in some indirect workforce as a result of production-induced and consumption-induced flow-ons. While any flow-on employment that is generated by Project construction is more likely to exhibit normal family structures, given the temporary nature of the flow-on effects during construction, it is considered unlikely that places would be filled by in-migration but rather by any spare capacity in local businesses or through the employment of locals.

4.3.3 Project Operation Workforce and Population Change

The Project relates to the continuation of an existing activity, albeit at increased rates of ROM coal production. Currently, the total direct workforce at the Stratford Mining Complex is approximately 125 people, with approximately 58% residing within the Gloucester and Great Lakes LGAs. No data is available on the percentage of this local workforce that have migrated into the region. The operational workforce associated with the Project is estimated at 250. Hence, the additional direct workforce from the Project is estimated at 125.

GCL has established a number of programs to aid in the local recruitment of its' workforce including:

- offering apprenticeship opportunities (in conjunction with Hunter Vtec) within electrical and mechanical trades;
- the cleanskin program to introduce people who haven't worked in the mining industry before to the mining industry; and
- a graduate development program.

It is therefore highly likely that some of the additional workforce required for the Project would already reside in the Gloucester and Great Lakes LGAs. For this assessment it has been assumed that the additional workforce is geographically distributed similarly to the existing workforce and that 10% of the additional workforce already reside in the region. On this basis, assuming the same household occupancy as NSW, the additional population in the region would be 176 in the Gloucester LGA and 93 in the Great Lakes LGA (Table 4.11).

Table 4.11
Employment and Population Change in the Region for the Project

LGA	Current Stratford Mining Complex Workforce Residential Location	New Employment Living in the Region			Assumed Household Size	New Population to the Region
		Direct	Flow-on	Total		
Gloucester	38%	39	28	68	2.6	176
Great Lakes	20%	21	15	36	2.6	93
Total	**58%**	**60**	**43**	**103**		**269**

Note: Totals may have minor discrepancies due to rounding.

It is noted that the Project location is such that numerous alternatives to residing in the region exist and within the region there is considerable scope for an increased proportion of workers to locate in the Great Lakes LGA if there is insufficient housing or other facilities in the Gloucester LGA.

4.3.4 Cumulative Workforce and Population Change

There are a number of resource projects that are proposed in the Gloucester LGA. These include the:

- the proposed Rocky Hill Coal Project[16] which includes open cut coal mining activities and the development of associated surface infrastructure, including a rail load-out facility; and

[16] The proposed Rocky Hill Coal Project is a proposal only at this stage. No EIS has been submitted and therefore limited information is available regarding the proposed Rocky Hill Coal Project.

- the approved AGL Gloucester LE Pty Ltd (AGL) Gloucester Gas Project which includes the development of 110 gas wells and associated infrastructure between Gloucester and just south of Stratford, the development of a Central Processing Facility at one of two potential locations and the construction and operation of a high pressure gas transmission pipeline from Stratford to a delivery station at Hexham in NSW.

To enable some consideration of the potential cumulative impacts of the Project it is necessary to estimate the potential incremental employment and population impacts associated with these other resource projects in the region. Table 4.12 summarises the incremental employment of the Project, proposed Rocky Hill Coal Project and the AGL Gloucester Gas Project.

Table 4.12
Incremental Cumulative Employment for the
Project, Proposed Rocky Hill Coal Project and the AGL Gloucester Gas Project

Project	Construction Workforce (Year 1/2013)	Operations Workforce (Year 2/2014 Onwards)
Stratford Extension Project	30 (part year only)	125
Proposed Rocky Hill Coal Project	100	150
AGL Gloucester Gas Project	435 (35)	40
Total	**565 (165)**	**315**

Source: AECOM (2009) and R.W. Corkery & Co (2012)
Note: The increase in the Project operational workforce would commence in Year 1 (2013).
Number in brackets is located outside of construction camps.

The main cumulative construction employment would be associated with the AGL Gloucester Gas Project, although it is noted that this project proposes the development of a construction camp in Gloucester (100 people) and at an unspecified location mid-way along the pipeline between Stratford and Hexham (300 people) (AECOM, 2009) that would accommodate approximately 90% of its projected construction workforce. Aside from the AGL Gloucester Gas Project construction workers accommodated in the construction camps the cumulative construction workforce demand would be approximately 165 (Table 4.12).

If these 165 construction workers were assumed to have the same locational distribution as the Stratford Mining Complex operational workforce and all workers based in the Gloucester and Great Lakes LGAs are conservatively assumed to in-migrate, this would result in some 96 residing in the local region.

Little information is available on the likely percentage of local hires for the proposed Rocky Hill Coal Project and the approved AGL Gloucester Gas Project or the likely residential location of operational employees. However, if it is conservatively assumed that employees have the same residential location as employees for the existing Stratford Mining Complex and that any new employees located in the region have migrated, the resulting potential employment and population changes are summarised in Table 4.13.

Table 4.13
Incremental Cumulative Operation Employment and Population
for the Project, Proposed Rocky Hill Coal Project and the AGL Gloucester Gas Project

LGA	Current Stratford Mining Complex Workforce Residential Location	New Employment Living in the Region			Assumed Household Size	New Population to the Region
		Direct Employment	Flow-on Employment	Total Employment		
Gloucester	38%	112	80	192	2.6	499
Great Lakes	20%	59	42	101	2.6	263
Total	**-**	**171**	**122**	**293**	**-**	**762**

Notes: Totals may have minor discrepancies due to rounding.

The cumulative direct and indirect population impacts identified in Table 4.13 should be considered an upper level estimate as they are underpinned by the inherent assumptions of multipliers (Attachment 4). It should be noted that the proposed Rocky Hill Coal Project is the largest potential contributor to the total cumulative demand (Table 4.12). The Project location is also such that numerous alternatives to residing in the local region exist. There is also considerable scope for an increased proportion of workers to locate in the Great Lakes LGA if there is insufficient housing or other facilities in the Gloucester LGA.

4.4 COMMUNITY INFRASTRUCTURE IMPACT ASSESSMENT

4.4.1 Potential Construction Workforce Impacts

The direct Project construction employment temporarily migrating into the region would overlap with the additional direct operational workforce. However, the construction workforce is likely to have different demands on community infrastructure to the operational workforce and therefore they have not been considered cumulatively. This is largely because they tend to be single or do not bring families to the region.

The key impact associated with any direct construction employment temporarily migrating into the region is increased demand for accommodation. Construction contractors typically use a mix of accommodation including rental houses, apartments, motels, pub hotels and cabins in caravan parks that are located in close proximity to the work site. Consequently, they are unlikely to have any significant or long-term effect on the owner/occupied residential land market through purchase of properties. The impact of the Project on short-term accommodation is also likely to be modest given the small and short-term construction workforce (Table 4.12).

Other than food outlets (hotel, licensed club, etc.) the availability of facilities and services is generally not a major consideration for itinerant workers and hence the implications for other community infrastructure is likely to be minimal apart from perhaps health care services, although the short-term nature of Project construction workforce suggests that any health care demands are likely to be mainly for medical and other health care services for which both Gloucester and Great Lakes LGAs are already well served relative to NSW (Table 4.10).

Any increase in single males during the construction phase, who may only partially integrate into the community, can be associated with increased crime levels (Carrington *et al*., 2010). However, random drug and alcohol testing for onsite workers can minimise this effect. There is also potential for the Project to indirectly result in a decrease in crime rates through the provision of increased employment opportunities to those who are currently unemployed. Given that unemployment is a contributing factor in criminal activity, a decrease in the unemployment rate has the potential to reduce crime rates (Chapman *et al*., 2002).

Allowing for the 300 person construction camp places proposed for the region by the AGL Gloucester Gas Project the potential cumulative direct construction workforce associated with the Project and the other mining projects would directly result in the demand for up to 96 accommodation units (e.g. houses, units, hotels, cabins, etc.). While short-term accommodation is more limited in the Gloucester LGA there is significant short-term accommodation in the Great Lakes LGA i.e. 594 rooms or 1,856 beds in hotels, motels and serviced apartments with five or more rooms (Table 4.7).

Given the potential cumulative construction workforce associated with the Project and other approved and proposed resource projects in the region there is some potential for short-term accommodation demands that would otherwise be available for tourism to be occupied by construction workers, potentially squeezing out tourists. However, room occupancy rates in Great Lakes LGA would suggest sufficient capacity to accommodate both sources of demand (i.e. once Gloucester LGA accommodation is full some demand would be expected to flow the Great Lakes LGA) and provision of construction camps by the AGL Gloucester Gas Project would significantly reduce the cumulative demand for local short-term accommodation.

4.4.2 Potential Operations Workforce Impacts

Population Context

The Project would result in a population influx (direct and flow-on) to the Gloucester LGA of up to 176 people and to the Great Lakes LGA of up to 93 (Table 4.11) which represents 3.7% and 0.3% of the 2006 population of the Gloucester and Great Lakes LGAs, respectively. This represents in the order of six years average population growth between 2001 and 2006 for the Gloucester LGA and three months average population growth between 2001 and 2006 for the Great Lakes LGA (Table 4.1).

The Project, AGL Gloucester Gas Project and the proposed Rocky Hill Coal Project would cumulatively result in the direct and indirect population influx during operations to the Gloucester LGA of up to 499 and to the Great Lakes LGA of up to 263 (Table 4.13). This represents 2.0% of the regional population in 2006 or 10.4% and 0.8% of the Gloucester and Great Lakes LGAs population in 2006, respectively.

Housing

The Project is likely to generate additional direct and indirect demand for up to 68 residences in the Gloucester LGA and 36 residences in the Great Lakes LGA (Table 4.14). In the Gloucester LGA, the demand this population influx would create for housing represents 3.4% of total occupied housing stock in 2006 or 17.3% of unoccupied residential properties in 2006. In the Great Lakes LGA it represents 0.3% of total occupied housing stock in 2006 or 0.6% of unoccupied residential properties in 2006 (Table 4.14). The increased Project-only direct and indirect demand for housing is most significant in the smaller Gloucester LGA (Table 4.14).

Table 4.14
Predicted Demand for Additional Accommodation
for the Project, Proposed Rocky Hill Coal Project and the AGL Gloucester Gas Project

LGA	Demand for Housing		Housing Stock		Private Housing Building Approvals 2010
	Project Direct and Indirect	Cumulative Direct and Indirect	Total Occupied Housing Stock 2006	Unoccupied Residential Properties 2006	
Gloucester	68	192	2,004	392	43
Great Lakes	36	101	14,357	5,831	145

Source: ABS (2006e; 2006f; 2012a; 2012b)

The Project, AGL Gloucester Gas Project and the proposed Rocky Hill Coal Project would result in the direct and indirect demand for up to 192 accommodation units (e.g. houses, units, etc.) in the Gloucester LGA and 101 in the Great Lakes LGA during operations (Table 4.14). The Project contribution represents approximately 35% of the total cumulative direct and indirect demand. While the Project on its own would potentially generate some new demand for housing, particularly in the Gloucester LGA, combined with the AGL Gloucester Gas Project and particularly if the proposed Rocky Hill Coal Project coincides with the Project, new operational phase demand for housing in the region is likely to be more significant (Table 4.14).

Because of higher relative wages in the mining sector, the demand for rental accommodation and to purchase is likely to be at the higher end of the market, where supply is more limited. If the Gloucester and Great Lakes LGAs are to capture the increased workforce associated with the Project and other projects they would need a supply of sufficient quality accommodation.

As mentioned above, there is also considerable scope for an increased proportion of workers to locate in the Great Lakes LGA if there is insufficient housing or other facilities in the Gloucester LGA. This would be expected to result in reduced potential accommodation demand on the smaller Gloucester LGA.

Where housing supply is insufficient to meet demand, even temporarily, this may manifest itself in increased property prices and higher rent prices. While this may be seen as beneficial for property owners, it can adversely affect existing tenants, particularly those on lower incomes who can be priced out of the market.

To ensure adequate housing supply there may be some need for timely and efficient planning by Gloucester Shire and Great Lakes Councils. It is recommended that the Gloucester Shire and Great Lakes Councils undertake an assessment of the existing and potential housing stock available in the region and the likely level of future demand to determine whether additional land may need to be rezoned to allow for sufficient staged growth. It is noted that the Project is also located such that alternative accommodation options are available and in other nearby LGAs such as Dungog, Greater Taree, Port Stephens, Maitland and Newcastle if insufficient accommodation is available in the Gloucester and Great Lakes LGAs. It is considered feasible for the Project workforce to reside in these areas as approximately 42% of the existing Stratford Mining Complex workforce resides outside of the Gloucester and Great Lakes LGAs.

These nearby LGAs represent a significant population base (approximately 333,000) (ABS, 2012d) relative to the combined Gloucester and Great Lakes LGAs population (approximately 38,000 – Table 4.1) and are therefore expected to readily accommodate any additional housing demand that may arise due to the cumulative effects of the AGL Gloucester Gas Project, the proposed Rocky Hill Coal Project and the Project.

Education and Training

Workers

The Project workforce employed from within the region and outside the region would have varying skills and experience on which to draw in undertaking their job. Many are likely to have experience in the mining sector, while some may not. Nevertheless, most required training is likely to be undertaken in-house and on the job. The workforce is therefore not expected to place any significant demands on tertiary education institutions in the region.

Workers Children

During the operation of the Project, any incoming workers would be expected to exhibit average family structures and hence would be associated with some children, creating some increased demand for education facilities within the region. Assuming that the incoming population exhibits the same characteristics as the NSW working age population, Table 4.15 summarises the likely demand for pre-school, infants/primary and high school places.

Table 4.15
Predicted Project-Related Demand for Children's Schooling

Type	Demand	2006 Enrolment (No.)	School Change in Enrolment 2001-2006
Gloucester			
Pre-school	16	80	24
Infants/Primary	19	388	-111
Public	*16*	*322*	*-97*
Private	*3*	*66*	*-14*
Secondary	17	324	-29
Public	*16*	*308*	*-31*
Private	*1*	*16*	*2*
Great Lakes			
Pre-school	8	500	67
Infants/Primary	10	2,301	-325
Public	*8*	*1,956*	*-329*
Private	*1*	*345*	*4*
Secondary	9	2,136	202
Public	*7*	*1,752*	*11*
Private	*2*	*384*	*191*

Source: ABS (2006a; 2006b)

These demands can be compared to the total enrolments in 2006 and growth/decline in school enrolments between 2001 and 2006 (see Table 4.15). In this context, it is evident that the increased demand by prospective Gloucester LGA residents for infants schooling and public school secondary schooling is less than the decline in demand from existing Gloucester LGA residents between 2001 and 2006. Increased demand by prospective Great Lakes LGA residents for infant/primary public schooling is also less than the decline in demand from existing Great Lakes LGA residents between 2001 and 2006. Potential demand by prospective Great Lakes LGA residents for secondary public schools is small in the context of total enrolments. The main potentially significant relative demand arising from the Project would be in relation to pre-school places where demand representing 3-years intercensal growth in enrolments may arise.

Cumulative potential developments in the region would contribute greater demand for education in both the public and private sectors in the region. Provision of education services is primarily the responsibility of the public sector, although there is an increasing role for the private sector, with planning and development driven by population changes. As the population of school age children grows, potential expansion responses by the Department of Education and Training include use of demountables, operating a network with other schools in the region (so students do not all have to be located in the larger schools to access curriculum), development of new schools or permanent expansion of existing schools if demand is forecast to be more permanent. Non-government education sectors would also respond to identified growth in demand through the expansion or development of education facilities in the region. In both the Gloucester and Great Lakes LGAs an increasing proportion of infants/primary students and secondary students are attending private schools.

In other regions where mining has resulted in population growth it has been suggested that increasing child aged population has ultimately had positive education benefits such as more teachers, reduced class sizes and broader curriculum (Gillespie Economics, 2009c).

Health

There is potential for the Project to increase the demand for public health facilities in the region such as for hospitals, General Practitioner Medical Services, Dental, Physiotherapy, Chiropractors, Optometrists, etc., via the anticipated increase in population during the operation phase of the Project.

While the anticipated population increase during operation of the Project is relatively small compared to the total populations of the region, any increase is likely to place some additional demand on existing medical services. Cumulative changes in population levels (Table 4.13) would further increase demand for health services and facilities in the region.

Provision of health services is primarily the responsibility of the public sector, although some aspects of these services are also provided by the non-government sector. The driving force for the provision of health services is demand which is primarily a response to population changes. The *Hunter New England Health Service Strategic Plan* (Hunter New England Area Health Service, 2007) recognises that in some parts of the region there is rapid population growth while other parts are stable or declining. One of the strategic initiatives of the *Hunter New England Health Service Strategic Plan* (Hunter New England Area Health Service, 2007) is to *expand community services in areas expected to have significant population growth*. It is anticipated that non-government sectors in health care would also respond to identified growth in demand through the relocation or expansion of private health care practices in the region.

It is recognised that there may be a lag between population growth and the provision of additional health services resulting in temporary health care access issues, but ultimately increased populations result in the provision of more health facilities for the community (Gillespie Economics, 2009c).

The Project also has the potential to indirectly positively impact on public health through the provision of employment opportunities and the reduction in unemployment. Prolonged unemployment can generate a range of personal and social problems including increased drug and alcohol dependency and increased demand for health services (University of NSW, 2006). Providing opportunities to reduce unemployment can therefore be beneficial.

Community Services and Recreation Facilities

Demand for additional investment in community services such as aged care and community care services, by Local, State and Commonwealth Governments can arise from increases in the population. However, as identified above the expected Project increases in population are reasonably small in the context of the existing population of the region. However, from a cumulative impact perspective there may be a more material increase in demand for community services and recreation facilities that would require some planning by local and State Government agencies.

General Community Impacts

The demand for mining labour can result in skilled labour being bid away from other professions (e.g. domestic trade services) which can result in shortages of these services in the region. However, far from being a local phenomena, Australia is experiencing a National skills shortage, with builders, engineers and tradespeople in high demand. The causes of skill shortages are complex but include skilled baby boomers reaching retirement age, negative perceptions of careers in the traditional trades and the difficulties in attracting people, particularly young people, to work in some industries, large infrastructure spending by governments and the mining boom.

However, the solution does not lie in constraining economic growth that utilises trade, building and engineering skills, but rather in adjustments to traditional training and education approaches. In this respect the Federal Governments National Skills Shortages Strategy identified the need for greater flexibility in traditional trade training, including shorter apprenticeships and specialist apprenticeship pathways.

The impact of the Project on skills shortages in the region is likely to be negligible. However, it is anticipated that there may be some impacts from the cumulative effects of prospective projects in the region.

Cumulative influxes in populations associated with prospective projects can also potentially contribute to a changing sense of place for existing residents, as towns move away from their historical focus on servicing agricultural (beef and dairy) and forestry enterprises to an increased focus on servicing mining activities. The high wages in the mining sector relative to other sectors can also potentially result in social divisions between those involved in the mining sector and those who are not. Both these effects can be heightened during construction phases of projects if there are high numbers of unattached construction workers, who may only partially integrate into the community. It is noted that the Project construction workforce is modest (Section 4.3.2).

4.5 SOCIAL AMENITY

There is potential for the Project to negatively impact on local and regional amenity through a reduction in air quality and increases in noise and blasting, and visual prominence of the Project site.

Appendix D of the EIS includes assessment of the likely impacts on air quality in the Project area. The assessment indicates that one nearby private receiver would be impacted by air quality emissions above relevant criteria. GCL has a made allowance for purchase of this affected property (i.e. to internalise the cost of this amenity impact into the Project production costs).

A Noise and Blasting Impact Assessment (Appendix C of the EIS) has been prepared for the Project. Fourteen residences and one vacant property are predicted to have marginal to moderate exceedances of applicable noise criteria. Contemporary Development Consent conditions for these residences typically require proponents to provide at receiver noise mitigation on request. In addition, 11 rural residences and four vacant properties have been identified as being in the Project noise affectation zone (i.e. greater than 5 dBA above applicable noise criteria). These residences include two residences that would be above the blasting building damage criteria and human comfort criteria and a further two residences that would be above the blasting human comfort criteria. GCL has a made allowance for purchase of these noise affected residences/properties (i.e. to internalise the cost of this amenity impact into the Project production costs).

Visual intrusion can potentially impact the property value[17] of affected households and the consumer surplus of visitors to surrounding area. Visual impacts of the Project would include new and/or increased views of the waste rock emplacements and open cuts from local viewpoints. Modification of topographic features and additional clearance or disturbance of vegetation within the Project area would also result in visual impacts. Continuation and extension of night-lighting would also be associated with the Project. Visual impacts would be most appreciable at the nearest privately owned dwellings with views of the Project landforms. The potential impacts at the nearest private dwellings have been assessed as being low to high and following rehabilitation, residual impacts would be very low to moderate (Appendix O of the EIS). The properties expected to have a high level of impact are also noise affected (i.e. GCL has made allowance to internalise the cost of this amenity impact into the Project production costs).

Section 4 of the Main Report of the EIS provides a description of various amenity related mitigation and management measures.

4.6 MITIGATION AND MANAGEMENT MEASURES

From Section 4.4 it is evident that the community infrastructure impacts of the Project, alone, are not likely to be substantial and are likely to be focussed in the Gloucester LGA. However, it is recognised that a range of prospective projects may have cumulative impacts on the region with respect to:

- pressure on short-term accommodation for construction workforce – potentially squeezing out some tourism, etc.;
- increased demand for housing potentially leading to increased house prices and rental prices, leading to some displacement of those on low incomes;
- increased demand for health services;
- increased demand for schools places;
- increased demand for child care facilities;
- increased demand for recreation facilities and other community infrastructure;
- social division;
- changing sense of place;
- labour – skills shortages and difficulty retaining workers in non-mine sectors; and
- increased crime during construction phases associated with influx of single males.

[17] And potentially consumer surplus.

SCPL would work in partnership with the Gloucester Shire and Great Lakes Councils and the local community so that the benefits of the projected economic growth in the region are maximised and impacts minimised, as far as possible. In this respect, a range of general and specific social impact mitigation and management measures are proposed and would include:

- Early provision of information to the Gloucester Shire and Great Lakes Councils and relevant State Government agencies regarding employment and population level changes to facilitate early community infrastructure provision responses.
- Continuation of the current donations policy which supports education, health and community causes.
- Employ local residents preferentially where they have the required skills and experience and demonstrate a cultural fit with the organisation.
- Purchase local non-labour inputs to production preferentially where local producers can be cost and quality competitive.
- Include a code of conduct for construction workers with regard to behaviour in Contractor Induction Program.

It is expected that as with other recent coal mining projects in NSW, a planning agreement in accordance with Division 6 or Part 4 of the EP&A Act would be required by the Development Consent for the Project. The planning agreement would be negotiated between the DP&I, Gloucester Shire and Great Lakes Councils and SCPL.

5 CONCLUSIONS

A BCA of the Project indicated that it would have net production benefits of $215M, with $146M of these accruing to Australia. The estimated net production benefits that accrue to Australia can be used as a threshold value or reference value against which the relative value of the residual environmental impacts of the Project, after mitigation, may be assessed. The threshold value indicates the price that the community must value the residual environmental impacts (be willing to pay) to justify in economic efficiency terms the no further development option. This threshold value is also the opportunity cost to Australia of not proceeding with the Project.

For the Project to be questionable from an economic efficiency perspective, all incremental residual environmental impacts from the Project, that impact Australia[18], would need to be valued by the community at greater than the estimate of the Australian net production benefits i.e. greater than $146M. This is equivalent to each household in the Gloucester and Great Lakes LGAs and in NSW valuing residual environmental impacts at $8,600 and $58, respectively.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to quantify the residual environmental, social and cultural impacts of the Project. The main quantifiable impacts of the Project that have not already been incorporated into the estimate of net production benefits, relate to greenhouse gas emissions and potential impacts on surface water and groundwater resources. These impacts are estimated at $41M in total or $2M to Australia, considerably less than the estimated net production benefits of the Project. There may also be some non-market benefits of employment provided by the Project which are estimated at in the order of $29M.

Overall, the Project is estimated to have net benefits to Australia of between $145M and $174M and hence is desirable and justified from an economic efficiency perspective.

While BCA is primarily concerned with the aggregate benefits and costs of the Project to Australia, the distribution of costs and benefits may also be of interest to decision-makers.

The total net production benefit is distributed amongst a range of stakeholders including:

- SCPL and its shareholders in the form of after tax profits;
- the Commonwealth Government in the form of any Company tax payable or minerals resource rent tax payable from the Project, which is subsequently used to fund provision of government infrastructure and services across Australia and NSW, including the region;
- the NSW Government via royalties which are subsequently used to fund provision of government infrastructure and services across the State, including the region; and
- the local community in the form of voluntary and/or mandatory contributions to community infrastructure and services.

The environmental, social and cultural costs may potentially accrue to a number of different stakeholder groups at the local, State, National and global level, however, are largely internalised into the productions costs of SCPL.

[18] 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.

Greenhouse gas emission costs occur at the National and Global level and would be internalised into the operating costs of the Project through payment of a carbon tax as the Commonwealth Government's carbon tax will be implemented in July 2012 (i.e. before the commencement of the Project). The economic costs associated with a reduction in agricultural production, air quality, vibration, noise and visual impacts are initially borne by affected local landholders. However, GCL has made allowance for the purchase of significantly impacted landholders and/or the estimated management and mitigation costs and hence these costs are internalised into the production costs of the Project. The economic costs associated with the clearing of native vegetation would occur at the State or National level and would be counterbalanced by the biodiversity offset actions proposed by SCPL. The costs of these offset actions are internalised into the production costs of the Project. Other potential environmental impacts would largely occur at the State or Local level and were found to be minor or insignificant. Non-market benefits associated with employment provided by the Project would largely accrue at the Local or State level[19].

An economic impact analysis found that the operation of the Project is estimated to provide up to the following average annual economic activity to the regional economy over the life of the Project:

- $215M in annual direct and indirect output;
- $89M in annual direct and indirect value added;
- $24M in annual direct and indirect household income; and
- 250 direct and indirect jobs.

For the NSW economy, the operation of the Project is estimated to provide up to the following average annual economic activity to the NSW economy over the life of the Project:

- $340M in annual direct and indirect output;
- $175M in annual direct and indirect value added;
- $72M in annual direct and indirect household income; and
- 714 direct and indirect jobs.

Any changes in the workforce, and populations of regions and towns may have implications in relation to access to community infrastructure and human services, which includes for example housing, health and education facilities.

It is anticipated that during the initial development of the Project an additional 30 people would be required for short periods of time with in the order of up to 17 of these temporarily migrating into the region. This is expected to have minimal impacts on community infrastructure in the region. However, the cumulative construction workforce across a number of resource development projects have the potential to increase the demand for short-term accommodation that would otherwise be available for tourism to be occupied by construction workers, potentially squeezing out tourists. However, room occupancy rates in Great Lakes LGA accommodation would suggest sufficient capacity to accommodate both sources of demand (i.e. once Gloucester LGA accommodation is full some demand would be expected to flow the Great Lakes LGA) and the provision of construction camps by the approved AGL Gloucester Gas Project would significantly reduce the cumulative demand for short-term accommodation.

[19] It should be noted that the study from which the employment values were transferred surveyed NSW households only.

The operation of the Project has the potential to increase the population of the region by up to 269, with corresponding increased demand for housing, schools, health and community infrastructure. The Gloucester LGA is likely to be most sensitive to any population influx, particularly with regard to demand for housing and pre-school places. From a cumulative impact perspective should the various approved and proposed developments coincide there may be a more significant impacts including:

- increased demand for housing potentially leading to increased house prices and rental prices leading to displacement of those on low incomes;
- increased demand for health services;
- pressure on school places;
- increased demand for child care facilities;
- increased demand for recreation facilities and other community infrastructure;
- social division;
- changing sense of place;
- labour – skills shortages and difficulty retaining workers in non-mine sectors; and
- potentially increased crime during construction phases associated with influx of single males.

SCPL would work in partnership with the Gloucester and Great Lakes Councils and the local community so that the benefits of the projected economic growth in the region are maximised and impacts minimised, as far as possible. In this respect, a range of general and specific social impact mitigation and management measures are proposed.

Cessation of the Project after 11 years of operation may lead to a reduction in economic activity. The significance of these Project cessation impacts would depend on:

- The degree to which any displaced workers and their families remain within the region, even if they remain unemployed. This is because continued expenditure by these people in the regional economy (even at reduced levels) contributes to final demand.
- The economic structure and trends in the regional economy at the time. For example, if Project cessation takes place in a declining economy the impacts might be felt more greatly than if it takes place in a growing diversified economy.
- Whether other mining developments or other opportunities in the region arise that allow employment of displaced workers.

Given these uncertainties it is not possible to foresee the likely circumstances within which Project cessation would occur. It is therefore important for regional authorities and leaders to take every advantage from the stimulation to regional economic activity and skills and expertise that the Project brings to the region, to strengthen and broaden the region's economic base.

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ATTACHMENT 1

VALUING GREENHOUSE GAS EMISSIONS

To place an economic value on carbon dioxide equivalent (CO_2-e) emissions a shadow price of carbon is required that reflects its social costs. The social cost of carbon is the present value of additional economic damages now and in the future caused by an additional tonne of carbon emissions.

A prerequisite to valuing this environmental damage is scientific dose-response functions identifying how incremental emissions of CO_2-e would impact climate change and subsequently impact human activities, health and the environment on a spatial basis. Only once these physical linkages are identified is it possible to begin to place economic values on the physical changes using a range of market and non market valuation methods. Neither the identification of the physical impacts of additional greenhouse gas nor valuation of these impacts is an easy task, although various attempts have been made using different climate and economic modelling tools. The result is a great range in the estimated damage costs of greenhouse gas.

The *Stern Review: Economics of Climate Change* (Stern, 2006) acknowledged that the academic literature provides a wide range of estimates of the social cost of carbon. It adopted an estimate of United States (US) $85 per tonne (/t) of carbon dioxide (CO_2) for the "business as usual" case (i.e. an environment in which there is an annually increasing concentration of greenhouse gas in the atmosphere).

Tol (2006) highlights some significant concerns with Stern's (2006) damage cost estimates including:

- that in estimating the damage of climate change Stern (2006) has consistently selected the most pessimistic study in the literature in relation to impacts;
- Stern's (2006) estimate of the social cost of carbon is based on a single integrated assessment model, PAGE2002, which assumes all climate change impacts are necessarily negative and that vulnerability to climate change is independent of development; and
- Stern (2006) uses a near zero discount rate which contravenes economic theory and the approach recommended by Treasury's around the world.

All these have the effect of magnifying the social cost of the carbon estimate, providing what Tol (2006) considers to be an outlier in the marginal damage cost literature.

Tol (2005) in a review of 103 estimates of the social cost of carbon from 28 published studies found that the range of estimates was right-skewed: the mode was US$0.55/t CO_2 (in 1995 US$), the median was US$3.82/t CO_2, the mean US$25.34/t CO_2 and the 95th percentile US$95.37/t CO_2. He also found that studies that used a lower discount rate and those that used equity weighting across regions with different average incomes per head, generated higher estimates and larger uncertainties. The studies did not use a standard reference scenario, but in general considered 'business as usual' trajectories.

Tol (2005) concluded that "it is unlikely that the marginal damage costs of CO_2 emissions exceed US$14/t CO_2 and are likely to be substantially smaller than that". Nordhaus's (2008) modelling using the DICE-2007 Model suggests a social cost of carbon with no emissions limitations of US$30 per tonne of carbon (US$8/t CO_2).

An alternative method to trying to estimate the damage costs of CO_2 is to examine the price of carbon credits. This is relevant because emitters can essentially emit CO_2 resulting in climate change damage costs or may purchase credits that offset their CO_2 impacts, internalising the cost of the externality at the price of the carbon credit. The price of carbon credits therefore provides an alternative estimate of the economic cost of greenhouse gas. However, the price is ultimately a function of the characteristics of the scheme and the scarcity of permits, etc. and hence may or may not reflect the actual social cost of carbon.

In 2008, the price of carbon credits under the European Union Emissions Trading Scheme were around Pounds (£) 24/t CO_2, the equivalent of about US$38/t CO_2 while spot prices in the Chicago Climate Exchange were in the order of US$3.95/t CO_2.

As of July 2008 the spot price under the New South Wales Government Greenhouse Gas Reduction Scheme was Australian Dollars (AUD) $7.25/t CO_2. Prices under the Commonwealth Governments Greenhouse Friendly Voluntary Scheme were AUD$8.30/t CO_2 and Australian Emissions Trading Unit (in advance of the Australian Governments Emissions Trading Scheme) was priced at AUD$21/t CO_2-e (Next Generation Energy Solutions, pers. comms., 24 July 2008).

A National Emissions Trading Scheme was foreshadowed in Australia by 2010. The National Emissions Trading Taskforce cited a carbon permit price of around AUD$35/t CO_2.

The *Carbon Pollution Reduction Scheme: Australia's Low Pollution Future* (Commonwealth of Australia, 2008) cited a carbon permit price of AUD$23/t CO_2-e in 2010 and AUD$35/t CO_2-e in 2020 (in 2005) dollars for a 5 percent (%) reduction in carbon pollution below 2000 levels by 2020.

The carbon tax proposed for introduction in Australia from 1 July 2012 starts at AUD$23 t CO2-e increasing by 2.5% every year for next three years and then converting into an emissions trading scheme.

Given the above information and the great uncertainty around damage cost estimates, a range for the social cost of greenhouse gas emissions from AUD$8/t CO_2-e to AUD$40/t CO_2-e was used in the sensitivity analysis described in Section 2.6 of the Socio-Economic Assessment, with a conservatively high central value of AUD$30/t CO_2-e.

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ATTACHMENT 2

AGRICULTURAL ECONOMIC ANALYSIS

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1 INTRODUCTION

Stratford Coal Pty Ltd (SCPL), a wholly owned subsidiary of Gloucester Coal Limited, is seeking consent for the continuation and extension of open cut coal mining and processing activities at the Stratford Coal Mine (SCM) and Bowens Road North Open Cut (BRNOC) (both mines are referred to collectively as the Stratford Mining Complex) (referred to as the Stratford Extension Project [the Project]). The SCM and BRNOC are open cut coal operations located approximately 100 kilometres north of Newcastle, New South Wales (NSW) in the Gloucester Basin.

This report assesses the potential economic implications of the impacts of the Project on agricultural (including land and water) resources.

2 AGRICULTURAL AND MINING INDUSTRIES IN NEW SOUTH WALES

2.1 Land Use

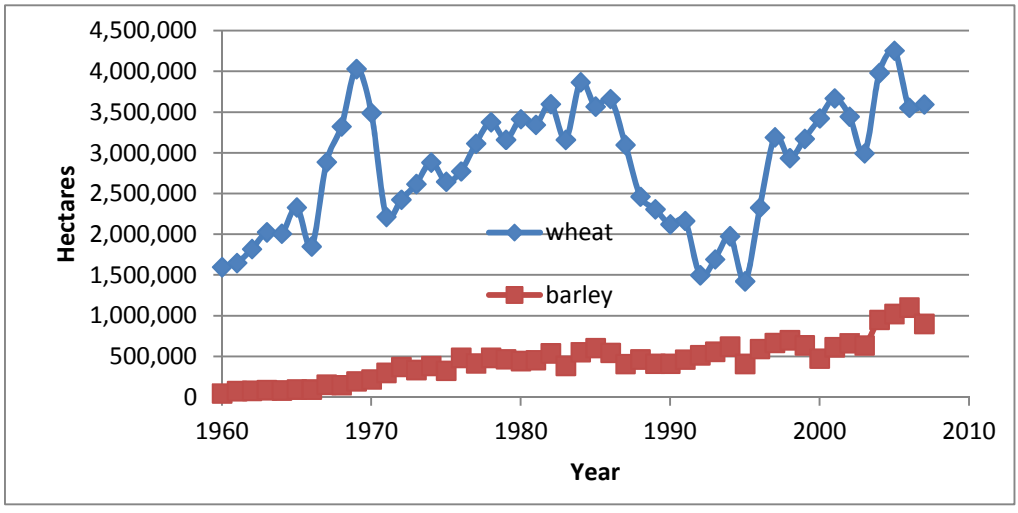
Agricultural lands are important to NSW and cover approximately 81 percent (%) of NSW (i.e. 65 million [M] hectares [ha]) (Australian Natural Resources Atlas [ANRA], 2009a). While the total agricultural land area in NSW has declined marginally since 1960 (Table A1-1), the area of land under major food crop production (i.e. wheat and barley[1]) has actually increased (Figure A1-1).

Table A1-1
NSW Agricultural Land Area

Area of Agricultural Land (M ha)		
1960	**1980**	**1997**
69.95	65.01	60.90

Source: ANRA (2009b).

Figure A1-1
NSW Land Area Allocated to Wheat and Barley



[1] Wheat and barley are the two largest food crops produced in Australia.

The NSW agricultural industry directly provides employment for 76,261 people or 2.7% of total employment in NSW (Australian Bureau of Statistics [ABS], 2006)[2]. Payment to agriculture, forestry and fishing employees in 2009-10 was $1,421M and value-added was $5,077M. Gross operating surplus and gross mixed income from agriculture, forestry and fishing was $2,441M (ABS, 2010a).

Mining land use accounts for a small fraction of the area of NSW (i.e. less than 0.1% of the total NSW land area) (Bureau of Rural Sciences 2009) and directly employs 19,026 or 0.7% of total employment in NSW (ABS, 2006). Payment to mining employees in 2009-10 was $3,049M and value-added was $14,535M. Gross operating surplus and gross mixed income from mining was $9,519M (ABS, 2010a).

In this comparison, mining is a more significant sector than agriculture in terms of payments to employees, value-added and gross operating surplus and gross mixed income. However, agriculture employs more people, albeit while using a much larger area of NSW to achieve this employment.

Nevertheless, no policy implication should be drawn from the relative magnitudes of existing sectors. What is relevant in a policy context is whether moving from one land use to another is more economically efficient or not. That is, do the benefits to the community from changing land uses exceed the costs to the community. This is discussed in more detail in Section 4.

2.2 Economic Growth in Regional Areas

Agricultural lands have historically supported the economies of regional areas. However, regional economies are facing a number of trends including:

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

The result is that there has been declining population growth in 47 out of 96 rural statistical local areas that are located in non-coastal statistical subdivisions in NSW (excluding the Hunter Statistical Division) (ABS, 2011). There has also been a decline in the population of smaller towns even in regions that have been growing.

Trends in agriculture are leading to improved productivity, but reduced economic stimulus in regional areas, as demand for inputs such as labour decline. In general, the prosperity of rural areas that are reliant on agriculture has also been in decline.

It is increased or new spending in regions that contributes to economic activity and growth. One potential source of new spending is mining projects that utilise the resource endowments of a region. Studies (Gillespie Economics, 2003, 2007) have shown that mining projects provide significant new economic activity to regional and rural economies through direct expenditures on inputs to production, as well as the expenditure of employees. This latter stimulus is enhanced by the high wages paid in the mining sector.

Mining projects can also broaden the economic base of regions, thereby insulating the economy from external shocks such as droughts and downturns in agricultural commodity prices (Collits, 2001).

[2] This is based on the ABS sector of Agriculture, forestry and fishing.

3 AGRICULTURAL AND MINING INDUSTRIES IN THE GLOUCESTER AND GREAT LAKES REGION

The Gloucester and Great Lakes region (i.e. the Gloucester local government area [LGA] and Great Lakes LGA) has a land area of approximately 633,000 ha, of which 36% is agricultural land (Table A1-2). Of this agricultural land, 0.9% is irrigated with annual irrigation volumes of approximately 3,457 million litres (ML) (Table A1-2). The total value of agricultural production in this region in 2006 is estimated at $63.7M (ABS, 2010b) (Table A1-2).

Table A1-2
Existing Agricultural Land Use and Value of Production
in Gloucester and Great Lakes LGA – 2006

	Units	Gloucester LGA	Great Lakes LGA	Total
Area				
Land Area	ha '000	295.13	337.54	632.67
Area of Agricultural Land	ha '000	152	73	225
Irrigation				-
Area Irrigated	ha '000	2	0	2
Irrigation Volume Applied	ML	2,948	509	3,457
Other Agricultural Uses	ML	1,349	1,129	2,478
Total Water Use	ML	4,297	1,638	5,935
Area Irrigated as Proportion of Agricultural Land	%	1.3	0.0	0.9
Value				-
Gross Value of Crops	$M	1.0	0.8	1.8
Gross Value of Livestock Slaughterings	$M	14.0	32.2	46.2
Gross Value of Livestock Products	$M	8.9	6.9	15.8
Total Gross Value of Agricultural Production	***$M***	***23.8***	***39.9***	***63.7***

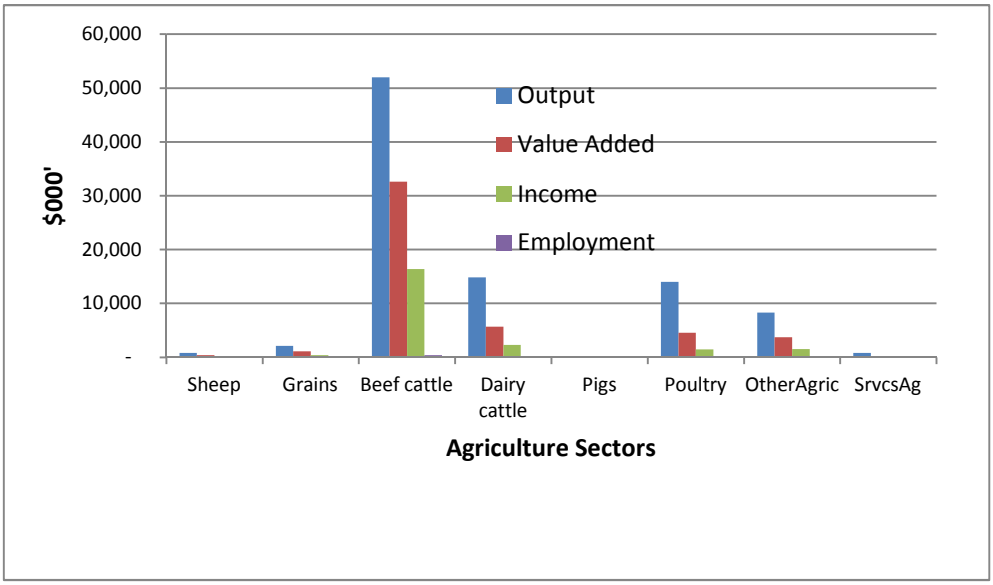
Source: ABS (2010b).

Note: Totals may have minor discrepancies due to rounding.

The input-output table developed for the Gloucester and Great Lakes LGAs (Gillespie Economics, 2012) provides an indication of the direct relative significance of the different agricultural sectors, affirming beef cattle as the main agricultural sector (Figure A1-2).

Total employment in the agricultural industry in the Gloucester and Great Lakes LGAs in 2006 was 829 (ABS, 2010c). Table A1-3 provides a detailed employment by industry breakdown which indicates that the main agricultural employment is in beef cattle farming (specialised).

Figure A1-2
Agricultural Sectors in Gloucester and Great Lakes LGAs



Source: Based on Gillespie Economics (2012).

Table A1-3
Employment by Agricultural Sectors in Gloucester and Great Lakes LGAs

Industry	Employment
A000 Agriculture, Forestry and Fishing, nfd	3
0100 Agriculture, nfd	11
0112 Nursery Production (Outdoors)	5
0115 Floriculture Production (Outdoors)	3
0123 Vegetable Growing (Outdoors)	9
0130 Fruit and Tree Nut Growing, nfd	3
0131 Grape Growing	4
0139 Other Fruit and Tree Nut Growing	3
0140 Sheep, Beef Cattle and Grain Farming, nfd	3
0141 Sheep Farming (Specialised)	7
0142 Beef Cattle Farming (Specialised)	401
0144 Sheep-Beef Cattle Farming	3
0145 Grain-Sheep and Grain-Beef Cattle Farming	3
0149 Other Grain Growing	6
0159 Other Crop Growing nec	6
0160 Dairy Cattle Farming	96
0170 Poultry Farming, nfd	31
0171 Poultry Farming (Meat)	9
0172 Poultry Farming (Eggs)	18
0191 Horse Farming	6
0193 Beekeeping	4
0199 Other Livestock Farming nec	6
0200 Aquaculture, nfd	5
0201 Offshore Longline and Rack Aquaculture	91

Table A1-3 (Continued)
Employment by Agricultural Sectors in Gloucester and Great Lakes LGAs

Industry	Employment
0203 Onshore Aquaculture	6
0301 Forestry	16
0302 Logging	15
0400 Fishing, Hunting and Trapping, nfd	26
0410 Fishing, nfd	9
0411 Rock Lobster and Crab Potting	4
0412 Prawn Fishing	3
0419 Other Fishing	4
0510 Forestry Support Services	7
0529 Other Agriculture and Fishing Support Services	3
Total	**829**

Source: ABS (2010c)

Coal mining in Gloucester and Great Lakes LGAs (i.e. the existing SCM and Duralie Coal Mine) are estimated to occupy less than 0.5% of the regional land area, based on the approximate extent of the existing approved Mining Leases and associated biodiversity offset areas. Despite being a small fraction of the footprint of agriculture in the region, the saleable coal output level in 2007/08 was estimated to have a value of around $120M[3] (Table A1-4) which was greater than the value of all agricultural production in the Gloucester and Great Lakes LGAs in 2006 (Table A1-2).

Table A1-4
Existing Coal Mining Production, Gross Value and Direct Employment in Gloucester Coalfield (Gloucester and Great Lakes LGAs)

Coal Mining	Units	Total
Coal Saleable Production (2007/2008)	Mt	1.89*
Gross Value of Coal Production	$M	120**
Direct Mining Employment	No.	153*

Source: * NSW Department of Primary Industries (DPI) (2009)
** Assuming AUD$63.47/t which was the median price for NSW Steaming coal exports Free on Board (FOB) in December 2007 (DPI, 2009)

Note: Mt = million tonnes.

[3] Assuming a market price of AUD$63.47 per tonne (/t) which was the median price for NSW Steaming coal exports FOB in December 2007 (DPI, 2009)

4 ASSESSING THE ECONOMIC EFFICIENCY OF PROPOSALS THAT IMPACT AGRICULTURAL LAND

4.1 Economic Efficiency

From an economic perspective, the aim is to use scarce resources, such as capital, labour, land and water, to maximise economic welfare or community fulfilment. This is referred to as economic efficiency and refers to a situation where production costs are as low as possible (technical or productive efficiency), and consumers want the combination of goods and services that is being produced (allocative efficiency).

Economic efficiency can be achieved for market goods, where there are no externalities, through competitive markets. In this situation the price mechanism (interaction of supply and demand) functions to allocate resources in a manner that maximises the net benefits to society as a whole.

Agricultural land and water (where property rights have been established) are market goods. The market will allocate these resources to their most productive use for society. The exception is where a change in land use or water use may result in market failure through the occurence of externalities. In these circumnstances markets will not allocate resources to maximise economic welfare. Government intervention may therefore be required to determine how resources should be allocated.

In these situations any Government intervention should be guided by a consideration of the costs and benefits of the intervention. The method that economists use to do this is benefit cost analysis (BCA). The essence of BCA is:

- the estimation of the extent to which a community is made better off by a resource reallocation;
- the estimation of the extent to which the community is made worse off by a resource reallocation; and
- a comparison of these two figures.

If the benefits of the intervention are greater than the costs of the intervention then it provides net benefits to the community and is more economically efficient than no intervention.

4.2 Economic Efficiency of Mining Proposals that Impact Agricultural Land

Mining proposals in NSW are subject to a requirement to obtain government approval through the NSW *Environmental Planning and Assessment Act, 1979*. This commonly includes a consideration of economic efficiency via the completion of a BCA. In a simple BCA framework, the potential costs and benefits of of a mining project that impacts agricultural land are outlined in Table A1-5.

Table A1-5
Potential Costs and Benefits of a Mining Proposal that Impacts Agricultural Land

	Costs	Benefits
Net Production Benefits	**Production**	
	Opportunity costs of land and capital	Value of mineral resource
	Capital and operating costs (including impact mitigation and rehabilitation)	Residual value of land and capital
Net Externalities	**Externalities**	
	Residual environmental impacts of mining after impact mitigitation	Any avoided environmental impacts of agriculture
		Any non use employment benefits of mining[1]

[1] Indications of the potential quantum of these benefits have been estimated using choice modelling in Gillespie Economics (2008, 2009a, 2009b).

Where the mining proposal impacts agricultural land there is an opportunity cost to society of using the land for mining instead of agriculture. The magnitude of this opportunity cost is reflected in the market value of the land, since the market value of the land reflects, among other things, the discounted future net revenue that can be earned from the property and revenue reflects how much the community values the outputs of agricultural production. Any increasing scarcity of agricultural commodities will be reflected in the market value of agricultural land.

The utlimate outcome of any BCA of a proposal is an empirical issue. But estimating the value of the opportunity cost of agricultural land is an integral component of the analysis.

5 PROJECT IMPACTS ON AGRICULTURAL RESOURCES

5.1 Net Production Impacts

Land Resources

The Project (including the biodiversity offset areas) would result in the temporary disturbance and the long-term loss of some agricultural lands. A summary of the current area of agricultural lands at the Project site, the area of agricultural lands disturbed during the Project life, the area of agricultural lands post-mining and the area of proposed biodividersity offests, is provided in Table A1-6.

Table A1-6
Summary of Agricultural Land Impacts and Estimated Productivity

Agricultural Suitability Classification	Area of Agricultural Land (ha)				Productivity	
	Existing	Disturbed During Project	Post-Mining Rehab. to Agriculture	Net Change	Enterprise	Gross Margin ($/ha/year)
Project Site						
Unimproved pasture			*300**	*300*	Beef Cattle	*$53.06*
Improved pasture	*830*	*690***		*-690*	Beef Cattle	*$134.81*
Total	**830**	**690**	**300**	**-390**		
Biodiversity Offset Area						
Existing Agricultural Areas	380	380**	0	-380	Beef Cattle	*$134.81*

Source: McKenzie Soil Management Pty Ltd (2012) adjusted for area of agricultural land affected by offsets.
* It is conservatively assumed that all rehabilitation is unimproved pasture.
** It is conservatively assumed that all impacted agricultural land is improved pasture.

There are estimated to be 830 ha of improved and unimproved pastures within the Project mining leases (MLs) and mining lease application areas (MLAs). While the majority of this land is considered to be unimproved pastures, for the purpose of this analysis it is conservatively assumed to be entirely improved pastures.

It is estimated that 690 ha of pastures would be progressively disturbed during the Project, with 300 ha of this land rehabilitated to Class 4 Agricultural Suitability with a combination of improved and unimproved pastures, as per the the existing rehabilitation of the Stratford Waste Emplacement. For the purpose of the analysis, it is conservatively assumed that all rehabilitation is to unimproved pastures. The remainder of the disturbed areas post-mining would be a combination of final voids, biodiversity offset lands, woodland rehabilitation and biodiversity enhancement areas.

Biodiversity offsets areas proposed for the Project would result in agriculture being removed from an additional 380 ha of cleared grazing land outside of the MLs (mapped as a combination of Class 3, 4 and 5 Agricultural Suitability), which in this analysis are all conservatively assumed to be improved pastures. It is assumed that biodiversity offsets are put in place in 2013 and hence these lands would no longer be available for agricultural use from that time.

Beef grazing is the assumed enterprise for all impacted agricultural lands, with the productivity of the land varying between improved and unimproved pastures (Table A1-6).

Based on the change in the area of agricultural land and the estimated productivities in Table A1-6, the present value of forgone agricultural net production benefit (in perpetuity) as a result of the Project is estimated at $1.9M, comprising $1.2M associated with the Project site and $0.7M associated with the biodiversity offsets located outside the Project ML and MLA areas.

Water Resources

As well as using the agricultural lands identified in Table A1-6, the Project would continue to use groundwater resources (up to approximately 600 ML per year) and surface water resources up to approximately 240 ML in the Avon River in a median rainfall year, through the maximum surface water catchment excision associated with the Project water management system. At Project cessation, this surface water catchment excision is expected to be reduced to approximately 60 ML per year in a median year, as the majority of the site would be free-draining and only the mine voids and associated areas would remain excised. Groundwater inflows into the mine voids would continue for an extended period post-mining until a new equilibrium level is reached.

While it is arguable that the majority of the impacts identified above would occur, or are already occurring with the existing Stratford Mining Complex (the site already holds some 1,021 ML of groundwater licences, and SCPL also holds 140 ML of unregulated river access licences in the Avon River Water Source associated with its landholdings) it is conservatively assumed in this analysis that 600 ML per year of groundwater and 240 ML per year of surface water would otherwise be available for improved pasture beef cattle grazing.

NSW Agriculture (2003) identified that on average irrigated pasture in the NSW Mid-Coast region used 4 million litres per hectare per year (ML/ha/year). Current irrigation of improved pastures on-site (rehabilitated Stratford Waste Emplacement) is at a rate of 4.3 ML/ha/year. The water resources required for the Project (840 ML per year) could therefore contribute to an estimated maximum of 210 ha of improved pasture cattle grazing per year that would otherwise be used for unimproved pasture cattle grazing.

This is particularly conservative as the use of groundwater in the vicinity of the Project is low (Heritage Computing, 2012). The present value of foregone agriculture net production benefit as a result of using existing groundwater and surface water resources for the Project is conservatively estimated to be $0.2M.

5.2 REGIONAL IMPACTS

The regional impacts of the maximum level of annual agricultural production forgone as a result of the Project were estimated from the sectors in the Gloucester/Great Lakes regional input-output table (Gillespie Economics, 2012) within which production is located i.e. beef enterprises are included in the *beef sector.*

Table A1-7 provides a summary of the annual regional production and economic impacts associated with the Project (with the conservative assumptions in Section 5.1 above) on annual agricultural production.

Table A1-7
Maximum Annual Regional Production/Economic Impacts of the Forgone Agriculture as a Result of the Project

	Water	Agriculture Land
Annual Water Usage (ML)	840[1]	-
Area (ha)	210	1070[2]
Production Type	Improved pasture beef cattle grazing	Improved pasture beef cattle grazing
Direct Output Value	$0.033M	$0.255M
Direct Income	$0.010M	$0.08M
Direct Employment	0.2	1.8
Direct and Indirect Output Value	$0.044M	$0.341M
Direct and Indirect Income	$0.014M	$0.105M
Direct and Indirect Employment	0.3	2.2

[1] This is the annual volume of water that conservatively could be considered to be no longer available for agriculture due to the groundwater inflows and surface water catchment excisions associated with the Project.

[2] This is the maximum area of additional agricultural land that would be impacted by the Project and includes biodiversity offsets. This area would reduce to 770 ha post-mining.

Conservatively, the annual agricultural direct output from the land and water resources that would potentially be impacted by the Project is estimated to be $0.3M (Table A1-7).

The Project is estimated to provide considerable stimulus to the Gloucester and Great Lakes regional economy that is far in excess of the regional economic impacts associated with the maximum level of annual agricultural production that would be forgone as a result of the Project (refer main Socio-Economic Assessment report [Gillespie Economics, 2012]).

5.3 Economic Efficiency of Reallocation of Agricultural Resources to the Project

The BCA completed for the Project included estimation of the present value of production costs and benefits of the Project. The present value of the net production benefit of the Project has been estimated and is detailed in the main Socio-Economic Assessment report.

This value can be compared to the present value of net production benefits from future use of agricultural lands that would be utilised by the Project which is estimated at $1.9M and the present value of net production benefits from future use of the water resources that conservatively have been assumed to be diverted from agricultural uses by the Project, which is estimated at $0.2M (Table A1-8).

Table A1-8
Net Production Benefits of Agricultural Resources Potentially Affected by the Project

	Water Resource (Improved pasture for beef grazing)	Land Resources (Improved and Unimproved pasture for beef grazing)
Annual Net Production Benefits[1]	$0.02M	$0.14M
Net Production Benefits[1]	$0.2M	$1.9M

Source: Gillespie Economics (2011).

[1] Discounting is at 7%.

The Project is estimated to provide a considerable net production benefit that is far in excess of the net production benefit of continued use of land and water resources for agriculture.

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ATTACHMENT 3

BENEFIT COST ANALYSIS SENSITIVITY TESTING

Table A3.1
Sensitivity Testing of Net Benefits to Australia
(Excluding Employment Benefits)

	4%	7%	10%
CORE ANALYSIS	$180	$145	$118
INCREASE 20%			
Opportunity cost of land and capital equipment	$177	$142	$115
Capital costs	$176	$141	$114
Operating costs	$77	$58	$44
Mine and CHPP decommissioning and rehabilitation costs	$180	$144	$117
Avoided mine and CHPP decommissioning and rehabilitation costs	$181	$145	$118
Value of coal	$326	$266	$220
Residual value of land and capital equipment	$182	$146	$119
Foreign ownership	$162	$131	$107
Greenhouse gas costs @$40 t CO_2-e	$180	$145	$117
Surface water impacts	$180	$145	$117
Groundwater impacts	$180	$145	$117
DECREASE 20%			
Opportunity cost of land and capital equipment	$184	$148	$120
Capital costs	$185	$149	$121
Operating costs	$284	$231	$191
Mine and CHPP decommissioning and rehabilitation costs	$181	$145	$118
Avoided mine and CHPP decommissioning and rehabilitation costs	$180	$144	$117
Value of coal	$35	$23	$15
Residual value of land and capital equipment	$178	$143	$117
Foreign ownership	$198	$158	$128
Greenhouse gas costs @$8 t CO_2-e	$181	$145	$118
Surface water impacts	$180	$145	$118
Groundwater impacts	$180	$145	$118

% = percent.
CHPP = coal handling and preparation plant.
/t = per tonne.
CO_2-e = carbon dioxide equivalent.

ATTACHMENT 4

UNDERLYING ASSUMPTIONS AND INTERPRETATIONS OF INPUT-OUTPUT ANALYSIS AND MULTIPLIERS

1. "The *basic assumptions* in input-output analysis include the following:

   - there is a fixed input structure in each industry, described by fixed technological coefficients (evidence from comparisons between input-output 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 input-output 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 input-output 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 2 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 devices" (Australian Bureau of Statistics [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 (Centre for Farm Planning and Land Management, 1989).

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

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

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

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

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ATTACHMENT 5

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 non-ferrous metals and building and construction sectors. 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. It also means that the method should be used by an analyst who is familiar with the economy being modelled, or at least someone with that familiarity should be consulted.

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). That 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 A5.1" (Powell and Chalmers, 1995).

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Table A5.1
The GRIT Method

Phase	Step	Action
I		ADJUSTMENTS TO NATIONAL TABLE
	1	Selection of national input-output table (109-sector table with direct allocation of all imports, in basic values).
	2	Adjustment of national table for updating.
	3	Adjustment for international trade.
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.
III		DEFINITION OF REGIONAL SECTORS
	6	Insertion of disaggregated superior data.
	7	Aggregation of sectors.
	8	Insertion of aggregated superior data.
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.
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: Table 2 in Bayne and West (1988)