SOCIO-ECONOMIC ASSESSMENT

APPENDIX G

NEWCASTLE COAL INFRASTRUCTURE GROUP COAL EXPORT TERMINAL

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COAL EXPORT TERMINAL

SOCIO-ECONOMIC ASSESSMENT

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EXECUTIVE SUMMARY

Strong increases in world demand, especially by China and India, have led to sharp increases in the price for coal. However, the ability to export coal relies on the capacity of the coal supply chain to handle current and future output from mines.

Currently there is substantial pressure on the Hunter Valley coal supply chain, including the Hunter Valley Port Facility and the rail network. Bottlenecks in the supply chain are constraining the production and export of coal. If these can be overcome, coal exports from the Hunter Valley are expected to grow.

Australian Rail Track Corporation (ARTC) is currently proposing upgrades to the capacity of the Hunter Valley rail corridor, with the planned enhancement program to move system capacity ahead of anticipated demand (ARTC 2005).

The proposed NCIG Coal Export Terminal (CET) (the Project) includes the construction and operation of a 66 million tonnes per annum (Mtpa) CET in Newcastle, with initial construction to a capacity of 33 Mtpa and the timing of subsequent expansion subject to market demand. The Project includes associated rail and coal loading infrastructure and wharf/shiploading facilities on the South Arm of the Hunter River.

An environmental assessment of the Project is required under Part 3A of the NSW *Environmental Planning and Assessment Act* (EPA Act). An important component of that assessment and justification of the Project is the consideration of the export terminal's socio-economic impacts.

From a socio-economic perspective there are three key aspects that need to be considered:

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

All these socio-economic aspects of the Project are considered in this report. However, it should be noted that in relation to the economic efficiency framework, it makes little sense to consider the Project in isolation of other infrastructure and supporting projects that are required to alleviate the Hunter Valley coal supply chain bottlenecks, or the additional coal production that it will facilitate. Consequently, while the project application is solely in relation to the construction and operation of the Project, the benefit cost analysis must take a broader strategic perspective.

The regional economic impact assessment and social impact assessment are more amenable to focusing solely on the construction and operation of the Project.

The strategic benefit cost analysis of the Project and associated infrastructure indicated that they would result in incremental net production benefits to Australia of between approximately $700M and $6,000M, net present value (NPV) on the basis of Australian Bureau of Agriculture and Resource Economics (ABARE) (2005) and ARTC (2006) export demand predictions and conservative coal price assumptions.

While there is considerable uncertainty around future coal prices and export demand, it is evident that there are potentially very significant net production benefits to the NSW and Australian economies that will be foregone, due to any coal supply chain capacity constraints. Approval of the Project with maximum capacity flexibility would ensure that port capacity constraints are removed and NSW and Australia can capture the economic benefits of meeting increasing world coal demand.

Each individual infrastructure component included in the strategic benefit cost analysis may potentially have environmental externalities associated with it. For this reason, they are each subject to detailed environmental impact assessment procedures under the NSW *Environmental Planning and Assessment Act*. However, in a benefit cost framework, any residual environmental impacts after mitigation by the relevant proponents and conditions imposed by government needs to be weighed up against the estimated net production benefits.

For the suite of infrastructure projects included in this benefit cost analysis to be undesirable from an economic efficiency perspective, any residual environmental impacts would need to be valued by the community at greater than the estimated net production benefits i.e. greater than between approximately $700M and $6,000M. This is equivalent to households in the Newcastle/Hunter region valuing residual environmental impacts at between of $3,000 and $25,000 each. The equivalent figure for NSW households is between $285 and $2,400 each.

The Project will also stimulate economic activity in the Newcastle region and NSW. Using input-output analysis, it was estimated that the initial construction of the Project, to a capacity of 33 Mtpa, would contribute the following to the Newcastle economy and NSW economy for a period of 3 years:

Newcastle Economy – Construction Phase

- $43M in annual direct and indirect regional value added;
- $25M in annual direct and indirect household income; and
- 587 direct and indirect jobs.

NSW Economy – Construction Phase

- $45M in annual direct and indirect regional value added;
- $26M in annual direct and indirect household income; and
- 588 direct and indirect jobs.

Additional temporary construction impacts would occur during expansion of the CET from 33 Mtpa to 66 Mtpa and these impacts would be of a similar magnitude, depending upon the rate of construction activity. The timing for this expansion would be determined by market demand.

The main sectors of the regional economy that would be stimulated by the construction phase of the Project are the other construction sector, wholesale and retail trade, road transport, accommodation, cafes and restaurants, scientific research, technical and computer services, other property services, legal, other business services, cement manufacturing and structural metal products manufacturing.

The NSW impacts are also very conservative since the assessment assumes all leasing and purchasing of machinery and equipment occurs outside of NSW.

The regional economic impact of operation of the Project was estimated for both 33 Mtpa and 66 Mtpa and found to be as follows:

Newcastle Economy – Operational Phase

- $78M (33 Mtpa) and $162M (66 Mtpa) in annual direct and indirect regional value added;
- $18M (33 Mtpa) and $26M (66 Mtpa) in annual household income; and
- 243 (33 Mtpa) and 351 (66 Mtpa) direct and indirect jobs.

NSW Economy – Operational Phase

- $83M (33 Mtpa) and $169M (66 Mtpa) in annual direct and indirect regional value added;
- $21M (33 Mtpa) and $30M (66 Mtpa) in annual household income; and
- 305 (33 Mtpa) and 440 (66 Mtpa) direct and indirect jobs.

Furthermore, to the extent that NCIG can maximise local procurement, the regional intersectoral linkages reported here may be able to be increased, with corresponding increases in local economic activity and employment.

The main sectors impacted by the operation of the Project are likely to be the agricultural, mining and lifting and material handling machinery manufacturing sector, electricity supply sector, wholesale trade sector, retail trade sector, other property services sector, mechanical repairs sector and the other construction sector.

Operation of the Project would generate direct demand for employment in the transport sector (specifically the services to transport sector). Production-induced employment impacts would generate demand for employment across a range of sector including manufacturing (lifting and material handling machinery manufacturing), utilities (electricity and water sectors) wholesale and retail trade, mechanical repairs, non-residential construction (including repairs and trades), transport (road transport and services to transport) services sectors (predominantly other property services, other businesses services, communication services, legal, accounting and business management sector).

Consumption-induced employment flow-ons would mainly generate demand in the wholesale and retail trade sectors and the services sectors (education, health, community services and personal services).

These job opportunities that are generated during both the construction and operation of the Project will contribute to a reduction in regional unemployment since it is estimated that in the order of 65% of the construction workforce and 95% of the operational workforce will be sourced from within the region. Any alleviation of unemployment in the region has the potential to have a positive impact on public health and crime since there is a correlation between unemployment and both criminal activity and drug and alcohol dependency and hence demand for health services.

The proposed Project will only add very modestly to the population and population growth of the Newcastle region and hence is not expected to negatively impact on community structure or community services and facilities. Nevertheless, given the tight rental market in Newcastle, even a small influx in temporary workforce could lead to increased rents and some displacement of lower income Newcastle tenants. However, the abundance of short term accommodation facilities in the wider Newcastle region (i.e. including Cessnock, Maitland, Port Stephens and Lake Macquarie) may act to mitigate any potential impacts on the Newcastle rental market.

Development of the site will have no public safety implications for the community, minimal access implications and only very small local amenity impacts since while the Project site can be viewed from elevated land to the south and would be lit to allow for operation on a 24 hour basis, this activity is consistent with the existing uses of the industrially zoned land of Kooragang Island.

G1 INTRODUCTION

Strong increases in world demand, especially by China and India, have led to sharp increases in the price for coal. However, the ability to export coal relies on the capacity of the coal supply chain to handle current and future output from mines.

Currently there is substantial pressure on the Hunter Valley coal supply chain, including the Hunter Valley rail network and Newcastle port facilities. Bottlenecks in the supply chain are constraining the production and export of coal. If these can be overcome, coal exports from the Hunter Valley are expected to grow.

Australian Rail Track Corporation (ARTC) are currently proposing upgrades to the capacity of the Hunter Valley rail corridor, with the planned enhancement program to move system capacity ahead of anticipated demand (ARTC, 2005).

The proposed Newcastle Coal Infrastructure Group (NCIG) Coal Export Terminal (CET) (the Project) includes the construction and operation of a 66 million tonnes per annum (Mtpa) CET in Newcastle, with initial construction to a capacity of 33 Mtpa and the timing of subsequent expansion subject to market demand. The Project includes associated rail and coal loading infrastructure and wharf/shiploading facilities on the South Arm of the Hunter River.

An environmental assessment of the Project is required under Part 3A of the NSW *Environmental Planning and Assessment Act* (EPA Act). An important component of that assessment and justification of the Project is the consideration of the potential Project socio-economic impacts.

From a socio-economic perspective there are three key aspects that need to be considered:

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

The Department of Planning NSW's draft *Guideline for Economic Effects and Evaluation in Environmental Impact Assessments* (James and Gillespie, 2002) identified economic efficiency as the key consideration of economic analysis. Benefit cost analysis is the method used to consider the economic efficiency of proposals. This assessment is provided in Sections G2 and G3.

The draft guidelines consider that regional 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). This assessment is provided in Section G4.

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 impacts on population, demographics, community structure, local and regional amenity, public health, community services and facilities, crime and public safety. This assessment is provided in Section G5.

In accordance with the Project Environmental Assessment Requirements issued by the Department of Planning, an Environmental Risk Analysis (ERA) was undertaken to identify the key environmental risk groups for the construction and operation of the Project. The findings of this ERA were considered and addressed where relevant in this report and the Environmental Assessment of the Project.

G2 BENEFIT COST ANALYSIS OF THE PROJECT

Benefit cost analysis involves examination of the incremental costs and benefits of a Project over time to determine whether the aggregate incremental benefits of a proposal are greater than the aggregate incremental costs.

The Project involves the construction and operation of a CET including the mitigation of any potential environmental impacts of the CET. The Project does not include mining of coal, transport of the coal to or from the CET or use of the coal by other countries. The CET will operate on a full cost recovery basis (including costs associated with environmental impact mitigation), with per tonne charges set accordingly.

The aim of the Project is to facilitate the export of coal from the Hunter Valley to meet predicted world demand. It is appealing therefore to consider the revenue received from the increase in export sales of coal as a direct benefit of the Project and compare this to the cost of construction and operation of the CET.

However, the proposed CET alone is insufficient to generate additional export sales of coal. Other infrastructure improvements (costs) are also required including upgrade of the rail network to the Port. Even with a new CET and rail upgrades, additional export sales of coal will not be achieved. Mining production from the Hunter Valley would also need to increase (another cost) in line with production plans of Hunter Valley coal mining companies.

Together the development of the CET, rail infrastructure improvements and increased mining production in the Hunter Valley would facilitate additional export sales of coal to meet world demand. Consequently all the costs associated with these activities are required to facilitate consideration of the costs and benefits of overcoming the current coal supply chain infrastructure bottleneck and allowing supply to meet world demand for Hunter Valley Coal.

It makes little sense to consider the economic efficiency impacts of the Project in isolation of other required infrastructure and activities, apart from recognising that the Project is essential to overcoming the coal supply chain bottleneck in the Hunter Valley, and without it, significant net production benefits to Australia will be foregone.

Nevertheless, any benefit cost analysis must include all relevant costs associated with achieving the benefit of increased export coal sales, not just those of the CET. For this reason, benefit cost analysis of the Project alone is not sensible or possible. A broader strategic benefit cost analysis, including the Project is required and is undertaken in Section G3.

G3 STRATEGIC BENEFIT COST ANALYSIS

As described in Section G2, the nature of the Project is such that from an economic efficiency perspective it makes little sense to consider the Project in isolation of other infrastructure and supporting projects that are required to alleviate the Hunter Valley coal supply chain bottlenecks and enable coal producers to meet world demand for Hunter Valley Coal. Consequently, while the project application is solely in relation to the construction and operation of the Project, the benefit cost analysis must take a broader strategic perspective.

The following strategic benefit cost analysis was conducted to ascertain the economic benefits that would be forgone if the Project or other improvements in the coal supply chain and associated coal mining are not undertaken to meet increasing coal export demand.

G3.1 INTRODUCTION

Benefit cost analysis involves examination of the incremental costs and benefits of a proposal over time to determine whether the aggregate incremental benefits of a proposal are greater than the aggregate incremental costs. It involves the following key steps:

- identification of the objective;
- identification of the base case;
- identification of the proposal and its implications;
- identification and valuation of the incremental costs and benefits;
- consolidation of value estimates;
- application of decision criteria;
- sensitivity testing; and
- consideration of unquantified costs and benefits.

G3.2 IDENTIFICATION OF THE OBJECTIVE

The objective of the Project and other initiatives by ARTC is to help alleviate capacity restrictions in the Hunter Valley coal supply chain, so that Hunter Valley coal producers can meet export demand for their coal.

G3.3 IDENTIFICATION OF THE BASE CASE AND PROPOSED INFRASTRUCTURE DEVELOPMENTS

Demand for Hunter Valley Coal

As part of an Australian Government process to examine bottlenecks in the development of coal transport infrastructure in Australia, the Federal Department of Industry, Tourism and Resources commissioned the Australian Bureau of Agricultural and Resource Economics (ABARE) to assess the following:

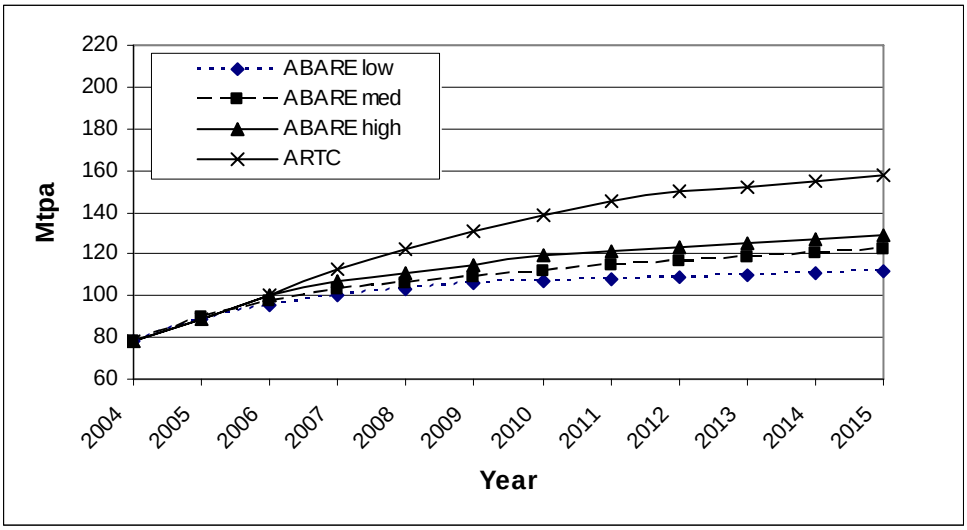
- the current and future demand for coal from the Hunter Valley;
- the capacity of coal producers to meet current and expected future demand for coal from the Hunter Valley;

- whether current rail and port infrastructure is sufficient to support estimated coal exports from the Hunter Valley over the medium term; and
- the potential economic costs of infrastructure constraints in the Hunter Valley coal supply chain.

ABARE (2005) found that demand for Hunter Valley coal is strong and predicted that potential demand for coal exports from the Hunter Valley will increase at an annual rate of 2.8% per annum from the 2004 level of 78 million tonnes (Mt) to reach 122 Mt in 2015. As has historically been the case, most of this demand will be for thermal coal with the remainder for metallurgical (or coking) coal.

Given the uncertainty surrounding any projections of international coal trade, ABARE also identified two other potential export demand scenarios for Hunter Valley coal that are used in this analysis for sensitivity testing. The first scenario is where the Kyoto Protocol comes into force and Japan meets its Kyoto Protocol emissions reduction target by reducing its demand for coal. The second scenario is where China exports less coal and imports more to meet its rapidly rising domestic energy demand. These potential demand scenarios for Hunter Valley coal are illustrated in Figure G3.1.

Figure G3.1
Potential Demand Scenarios for Hunter Valley Coal



Source: ABARE (2005)

Recent presentations by ARTC (ARTC, March 2006) indicate it has significantly upgraded its predictions of Hunter Valley export coal demand. ARTC (March, 2006) predicts export demand to rise from approximately 100 Mt in 2006 to approximately 150 Mt by 2012. This level of export demand is being used as the basis for ARTC rail upgrade planning and is significantly higher than the ABARE (2005) high export demand scenario illustrated on Figure G3.1.

It is worth noting here that predictions of the future export demand for Hunter Valley coal have been revised upwards a number of times in recent years as growth in demand exceeded earlier predictions. For example ARTC (2006) has upgraded its export demand predictions significantly in comparison with its previous 2005 report (ARTC, 2005).

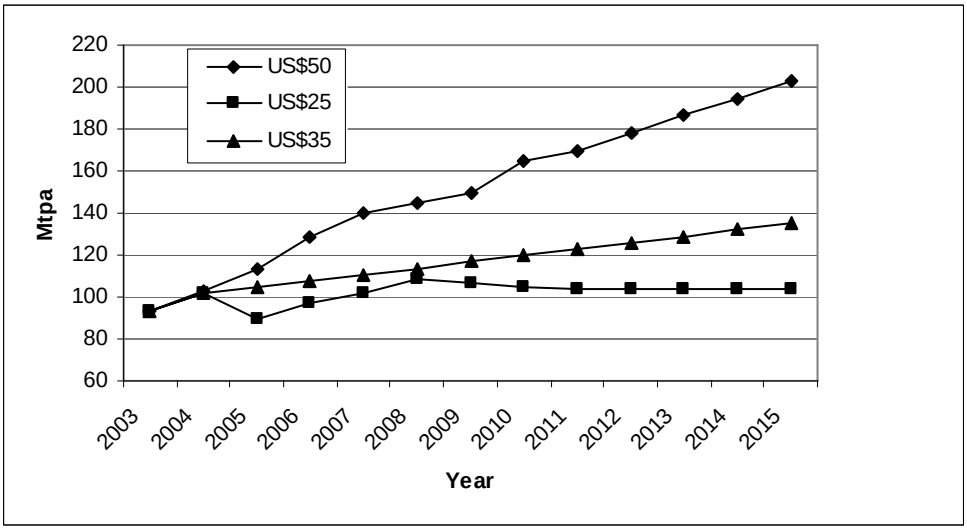
Supply

ABARE (2005) undertook a census of coal producers in the Hunter Valley to forecast potential supply of coal to 2015 at two international coal prices, US$50/t and US$20/t. At a high market price of US$50/t, unconstrained supply is estimated to grow at 6.3% a year to reach 203 Mt by 2015. At an average price of US$20/t, unconstrained supply is likely to increase to 108 Mt in 2008 and remain relatively constant over the period to 2015. These forecasts were based on production plans for individual coal mining companies.

ABARE identified that thermal coal contract prices are projected to remain above US$35/t until 2010 and then ease to around US$33/t by 2015. The prices of metallurgical (coking) coal are expected to remain above US$35/t over the outlook period (ABARE, 2005). However, these prices are conservative in comparison to recent prices of over US$50/t for thermal coal and recent prices as high as US$125 for coking coal (Industry Search, 2005).

ABARE estimates that at the average mid point price of their projections, US$35/t (the price assumption for ABARE's demand forecasts), producers could supply between 130 and 140 Mt of coal by 2015 if unconstrained by the supply chain. If coal prices were in the US$50/t range then the ABARE report indicates producers could supply over 200 Mt of coal by 2015 if unconstrained by the coal supply chain[1]. These unconstrained supply forecasts are represented on Figure G3.2.

Figure G3.2
Unconstrained Hunter Valley Coal Supply at US$50/t, US$35/t and US$20/t



Source: Adjusted from ABARE 2005
* the US$35/t scenario was not graphed by ABARE 2005 and hence it has been interpolated based on ABARE's prediction that at this price supply in 2015 would be between 130Mt and 140Mt.

[1] It should be noted there is potential for these supply forecasts to be overstated if respondents to ABARE's survey adopted strategic behaviour in order to influence government policy relating to infrastructure provision.

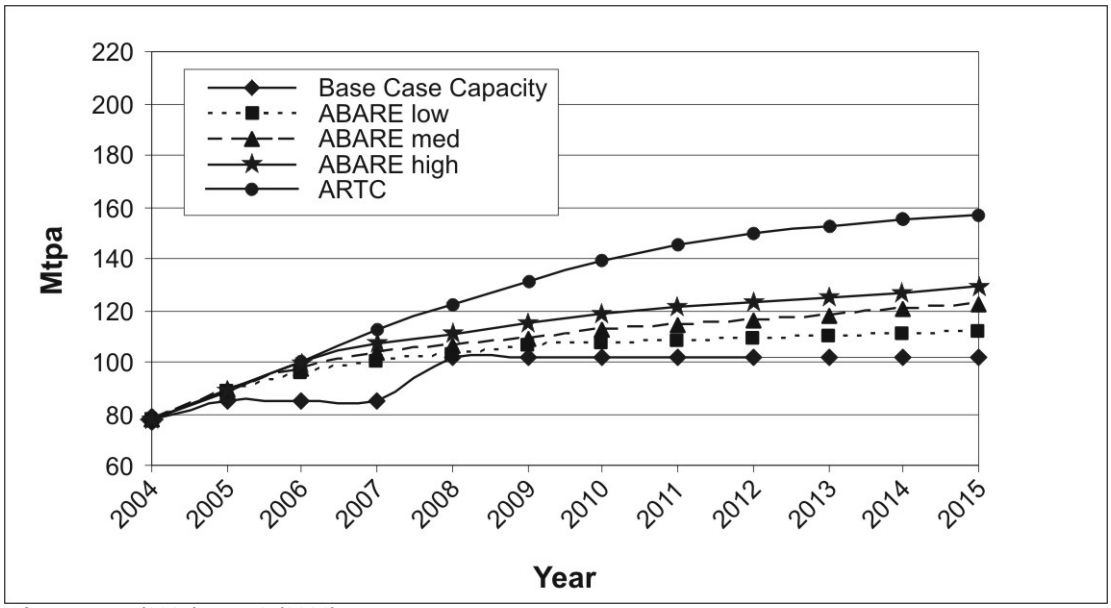
From a comparison of Figures G3.1 and G3.2, it is evident that at the ABARE predicted price for thermal coal and metallurgical coal of US$35 per tonne or more, coal producers in the Hunter Valley, if unconstrained, would be able to meet the predicted export demand under all ABARE's demand scenarios[2]. At a price of US$50 per tonne all demand scenarios could be met[3]. However, the ability of individual Hunter Valley coal producers to meet potential market demand depends on there being sufficient capacity in the Hunter Valley coal supply chain infrastructure, namely the railway and the port.

In the absence of the Project and ARTC rail upgrades, coal supply chain infrastructure will be insufficient to enable producers to meet predicted export demand. Estimates of the coal supply chain capacity in 2005 were 85 Mt (ABARE, 2005). This is a function of Port Waratah Coal Services (PWCS) capacity at Kooragang Island and Carrington being in the order of 89 Mtpa (ABARE, 2005) and the rail system capacity being in the order of 85 Mtpa (ARTC, 2005). However, in the absence of the Project there are plans for some increase in capacity to the coal supply chain infrastructure, most notably an increase in the capacity of PWCS operations to 102 Mtpa by 2008 and a planned enhancement program of rail infrastructure improvements to move ahead of anticipated demand (ARTC, 2005). Even with these increases, the port will remain as a major constraint to coal producers meeting demand if the Project does not go ahead.

This situation comprises the base case for the economic analysis from which the strategic incremental costs and benefits are estimated. Under this base case, the coal supply chain infrastructure results in impediments to Hunter Valley coal producers meeting estimated export demand.

This capacity gap under the base case for the three ABARE demand scenarios and the ARTC demand scenario is illustrated on Figure G3.3.

Figure G3.3
Base Case Gap Between Supply Chain Capacity and Export Demand



After ABARE (2005); ARTC (2006)

[2] Even allowing for some overstatement of potential supply as a result of strategic behaviour. It should be noted that the comparison is complicated by ABARE's demand forecast making no reference to the coal price on which it is based.

[3] Even allowing for some overstatement of potential supply as a result of strategic behaviour.

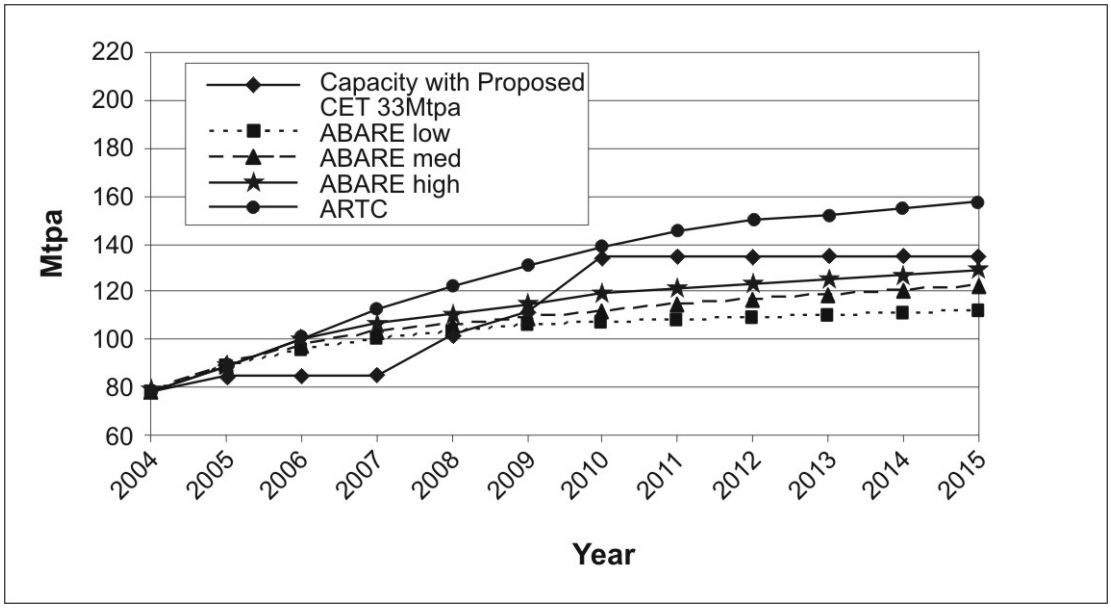
From Figure G3.3 it can be seen that under the base case, Hunter Valley coal producers are essentially constrained in their exports to the capacity of the Hunter Valley supply chain infrastructure. There is lost export potential every year from the present until 2015 and beyond. This lost opportunity to export coal represents a very significant economic cost to the coal industry and the NSW and Australian economies.

G3.4 IDENTIFICATION OF THE PROPOSED INFRASTRUCTURE DEVELOPMENTS AND THEIR IMPLICATIONS

The Project relates to the development of a new CET on Kooragang Island. The Project would initially have a capacity of 33 Mtpa and would ramp up to a capacity of 66 Mtpa as required to meet market demand. Construction would commence in 2007 with coal loading beginning in 2009.

The implications of increased port capacity associated with the Project, for meeting export demand is illustrated on Figure G3.4.

Figure G3.4
Capacity Gap with Project Capacity at 33Mtpa



After ABARE (2005); ARTC (2006)

Once the Project establishes a 33 Mtpa CET on Kooragang Island, there would be no constraint to Hunter Valley Coal producers meeting expected world demand under any of the export demand forecast scenarios identified by ABARE out to 2015, provided rail infrastructure upgrades in capacity also kept pace. On the basis of ABARE export demand forecasts, the timing of further development of the CET for a capacity of above 33Mtpa would be after 2015.

On the basis of the ARTC 2006 export demand predictions, even the development of the Project to 33 Mtpa would not completely alleviate the constraint on Hunter Valley coal producers and further expansion would be required in 2010 (Figure G3.4).

Ultimately, the timing of the demand for an increase in the capacity of the CET above 33 Mtpa would be sensitive to changes in world coal prices and coal demand.

G3.5 IDENTIFICATION AND VALUATION OF INCREMENTAL PRODUCTION COSTS AND BENEFITS

At a strategic level, there are a range of production costs and benefits associated with eliminating the Hunter Valley coal supply chain bottleneck. These costs are as summarised as Table G3.1 and discussed below.

Table G3.1
Potential Strategic Production Costs and Benefits

Incremental Costs	Incremental Benefits
Capital and operating costs of CET (including dredging under an existing separate approval).	Increased export revenue.
Capital costs of rail upgrades and incremental operating costs.	Residual value of infrastructure.
Capital and operating costs associated with coal production (less payments to rail and export terminals, less royalties).	-

Production Costs

The timing of costs for the construction and operation of the Project is linked to the projected increase in export of coal that will be facilitated by the infrastructure developments.

NCIG identifies that the first stage development (33 Mtpa) will cost in the order of $540M with an additional cost of $382M to ramp the terminal capacity up to 66 Mtpa. Timing for expansion to 66 Mtpa ranges from 2010 for the ARTC demand scenario to 2036 under the ABARE low growth scenario.

Another capital cost item that must be incurred for proper function of the Project and is therefore relevant to this strategic benefit cost analysis, but which is subject to a separate existing approval, is the dredging of the South Arm of the Hunter River. The cost of this dredging is estimated by NCIG at up to $80M.

Operating costs of the Project will vary as throughput volume increases but average operating costs have been estimated by NCIG and have been included in the analysis.

Other capital costs are those associated with ARTC's Hunter Valley Corridor Capacity Improvement Strategy, estimated at in the order of $270M (ARTC, 2005). Some of these costs may be considered to be base case costs, however, for simplicity are conservatively all included as costs associated with the infrastructure development. The ARTC's strategy also only includes expansion until 2009 from the current capacity of 85Mtpa to 138 Mtpa. Additional rail infrastructure development would be required around the time that the CET increases above 33 Mtpa (when the total Port capacity will be 135Mtpa) however this is beyond ARTC's current (2005) planning horizon. For the purpose of the analysis, a similar cost per Mt, has been included in the analysis for expansion of the CET to 66 Mtpa.

The incremental operating cost of additional rail line movements to haul coal to the NCIG port is commercially confidential information held by ARTC and difficult to estimate. Of the average $3/t rail costs paid by coal producers, a proportion is transferred by rail access providers to ARTC to fund infrastructure. Given that the capital costs of rail haulage have already been included above, only that part of the rail cost related to extra coal movements by rail access providers should be added to the analysis. Given the commercially confidential nature of the information, it has been necessary to select an arbitrary average haulage cost of $1.50/t for the purpose of the analysis. Given the arbitrary nature of this assumption, sensitivity testing for this variable is undertaken in Section G3.7.

The purpose of the above infrastructure developments is to facilitate mining production to meet export demand. This increased mining production has a capital and operating cost associated with it that will vary from producer to producer, depending on the resource, mining methods and location. For the purpose of this analysis, it is therefore necessary to rely on broad indicators of per tonne costs.

ABARE (2005) examined the average free-on-board (FOB) costs (including capital costs) of coal producers in the Hunter Valley. It found that to meet demand out to 2015, FOB costs of different companies ranged from US$25/t up to US$35/t. These costs, however, included royalty costs, rail costs and port costs. Royalty costs are a transfer payment and represent part of the producer surplus benefit of increased exports that are redistributed to government and hence should not be included as a resource cost in benefit cost analysis.

Rails costs and port costs are payments to fund the incremental rail and port infrastructure costs that have already been included in the analysis above. To include them again would be double counting. Current port costs are estimated at $2.68/t (Port Waratah Coal Services Limited, 2005) and rail costs at in the order of $3.00/t. Royalty costs were assumed to be $2.15/t. Adjusting FOB cost estimates and converting from US to Australian dollars using an exchange rate of 1.4 gives an economic cost of coal mining at $27/t to $41/t (excluding port, rail and royalty costs). For the core analysis, a central figure of $34/t was used with sensitivity testing at higher and lower costs. This figure has been applied to the estimated incremental export production that infrastructure developments will facilitate.

Production Benefits

The main economic benefit of the suite of infrastructure investments is the additional export earnings that it will generate. This can be estimated from the increased export volumes that it will facilitate together with the export price of coal. The export coal price is assumed to be US$35/t to 2010 and thereafter US$33/t, as predicted by ABARE (2005), a conservative estimate based on recent prices.

At the end of the 30 year evaluation period, the economic infrastructure that is the subject of the analysis (i.e. the Project and ARTC developments) will still have economic value. Provided operating costs include capital replacement and this capital replacement also addresses technical redundancy, this residual value should approximate initial construction costs. Discussions with NCIG suggest that most capital redundancy in the operation of the CET will relate to computer control systems and that these will be periodically replaced, as required. Hence, a residual value approximating initial capital costs is considered appropriate and has been included in the final year of the analysis as a benefit. However, to address the uncertainty around this assumption sensitivity testing at 50% and 0% residual value has been undertaken.

G3.6 ESTIMATE OF PRODUCTION NET BENEFITS

Table G3.2 summarises the net production benefits of the strategic infrastructure developments, based on the above assumptions for the ABARE low, medium and high demand scenarios as well as the ARTC (2005) demand scenario, and a central discount rate of 7%.

Table G3.2
Net Production Benefits (AUS$M) of Proposed Infrastructure Developments

	ABARE Low	ABARE Medium	ABARE High	ARTC
Production Costs ($M)*	$6,088	$11,682	$14,243	$22,103
Production Benefits ($M)*	$6,821	$13,701	$17,843	$28,188
Net Production Benefits ($M)	**$733**	**$2,019**	**$3,600**	**$6,085**

* Breakdown of individual production costs and production benefits not included as commercially sensitive.

If the Project and ARTC upgrades of rail infrastructure are not approved and the existing capacity restrictions in the Hunter Valley coal supply chain remain, then coal exports would be constrained and there would be an opportunity cost to society of between approximately $700M and $6,000M, net present value (NPV) on the basis of the ABARE (2005) and ARTC (2006) export demand predictions.

As described in Section G3.3, the timing and rate of increase in export demand has been revised upwards in recent reports and can be considered uncertain. The range of ABARE demand scenarios are conservative in comparison to the ARTC (2006) demand scenario and the potential for coal producers to supply coal if unconstrained by the export coal supply chain and coal prices are high (Figure G3.2).

While there is considerable uncertainty around future coal prices and export demand, it is evident that there are potentially very significant net production benefits to the NSW and Australian economies that will be foregone, due to coal supply chain capacity constraints. Approval of the Project with maximum capacity flexibility would ensure that port capacity constraints are removed and NSW and Australia can capture the economic benefits of meeting increasing world coal demand.

G3.7 SENSITIVITY ANALYSIS

The above result is based on a range of assumptions around which there is some level of uncertainty. Uncertainty in a benefit cost analysis 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 production benefit (threshold value) under each export demand scenario was tested for changes to the following variables:

- infrastructure capital costs;
- infrastructure operating costs;
- residual values; and
- coal prices.

As would be expected, the sensitivity analysis indicates that the results of the benefit cost analysis are sensitive to assumptions about mining costs and export coal prices, as well as predicted export demand. However, the variables adopted in the benefit cost analysis are conservative and are based on a recent Australian federal government publication that provides average coal production costs, predicted coal export prices and a range of coal export demand scenarios (ABARE, 2005) (Section G3.3). In addition, the assessment considers coal export demand data published by ARTC (2005) as part of its rail improvement strategy (Section G3.3). The export coal prices used in the assessment are conservative when compared to current prices (Section 3.5). The sensitivity analysis indicates that the benefit cost analysis is not particularly sensitive to reasonable changes in the capital or operating costs of the Project or rail infrastructure.

G3.8 CONSIDERATION OF ENVIRONMENT EXTERNALITIES

Each individual infrastructure component included in the strategic benefit cost analysis, the Project, dredging, rail and mine development, may potentially have environmental externalities associated with it. For this reason, they are each subject to detailed environmental impact assessment procedures under the NSW EP&A Act.

In a benefit cost framework, any residual environmental impacts after mitigation by the relevant proponents and conditions imposed by government would need to be weighed up against the net production benefits that have been estimated above.

For instance, greenhouse gas emissions from operation of the CET are estimated at 39,990 tonnes of CO2-e/yr for operations at 33 Mtpa and 69,760 tonnes of $CO_{2\text{-}e}$/yr for operations at 66 Mtpa. The present value economic cost of this level of emissions over the 30 year evaluation period is estimated at between $5M and $9M based on a price of $10 per tonne of $CO_{2\text{-}e}$[4]. These are insignificant impacts compared to the estimated net production benefits identified in the strategic benefit cost analysis.

For the suite of infrastructure projects included in this strategic benefit cost analysis to be undesirable from an economic efficiency perspective, all residual environmental impacts including greenhouse impacts from the coal mining, rail and CET would need to be valued by the community at greater than the estimate of the net production benefits i.e. greater than between $700M and $6,000M. This is equivalent to households in the Newcastle/Hunter region valuing residual environmental impacts at between of $3,000 and $25,000 each. The equivalent figure for NSW households is between $285 and $2,400 each.

A persistent issue that has arisen in community consultation concerns potential greenhouse gas emissions from the burning of the coal that is exported through Newcastle. However, these impacts are not considered relevant to the Project or the strategic benefit cost analysis of the proposed infrastructure developments that are required to alleviate the Hunter Valley coal supply chain bottlenecks and enable coal producers to meet world demand for Hunter Valley Coal.

Traditional and continuing practice in benefit cost analysis 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 project and incurs the costs.

At a global level, substitution effects also become important. Refusal of the Project and associated infrastructure and mining developments would not stop the burning of coal by other countries. The coal would simply be sourced from elsewhere. Hence, greenhouse gas emissions from the burning of the coal overseas would occur regardless, and should not be attributed to the Project.

The major destinations of Hunter Valley coal exports are Japan, Korea and Chinese Taipei (ABARE, 2005). Strong growth in demand is forecast for Korea, Chinese Taipei and Malaysia, while Japanese thermal coal imports are projected to increase more slowly (ABARE, 2005). South Korea, Malaysia and Japan have all signed and ratified the Kyoto protocol, while Chinese Taipei has not. Nevertheless, each of these countries has the sovereignty to address greenhouse gas emissions as they see fit within any requirements of conventions and protocols to which they are signatories.

[4] There is no single agreed and robust price or cost per unit of CO_2-e emissions, rather there are a variety of approaches that can be taken to deriving a price or cost. These different approaches do not yield a single price/cost, but a range from near zero to $15 per tonne CO_2-e.

G4 REGIONAL ECONOMIC IMPACTS

G4.1 INTRODUCTION

Regional economic impact assessment is primarily concerned with the effect of an impacting agent on an economy. In this framework, it is much easier to isolate the impacts of an individual infrastructure proposal, even where strategically it is part of a larger suite of projects. Hence the focus in this part of the analysis is on the regional economic impacts of the construction and operation of the Project, the specific infrastructure that is subject of the Environmental Assessment. These impacts are considered in terms of a number of indicators:

- ***Output***[5] - 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). 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 proposal becomes trivial (Powell and Chalmers, 1995).

For this study, the impacts of the Project have been estimated for two regions:

- the Newcastle Statistical Subdivision (SSD); and
- NSW.

A range of methods that 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). This study uses regional input-output analysis.

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, p 2-1).

[5] Output is used in the description of the regional and NSW economy. However, impacts are not reported for this indicator due to the commercial sensitivity of the information.

G4.2 INPUT OUTPUT TABLE AND ECONOMIC STRUCTURE OF THE REGION

For this study, two input output tables were used:

- a 2000-01 input-output table of the NSW economy developed by the Centre for Agricultural and Regional Economics (CARE) using the Generation of Regional Input-output Tables (GRIT) procedure and indexed to 2006 for the impact assessment; and
- a 2000-01 input-output table of the regional economy, developed by Gillespie Economics using the GRIT procedure (and the CARE NSW table as the parent table) and indexed to 2006 for the impact assessment.

The 106 sector input-output table of the NSW economy and regional economy was aggregated to 30 sectors and 6 sectors, respectively, for the purpose of describing the economies.

Highly aggregated 2001 input-output tables for the regional economy and NSW economy are provided in Table G4.1 and Table G4.2. The rows of the table indicate how the gross regional output of an industry is allocated as sales to other industries, to households, to Other Final Demands (OFD - which includes stock changes, capital expenditure and government expenditure) and to exports. The corresponding column shows the sources of inputs to produce that gross regional output. These include purchases of intermediate inputs from other industries, the use of labour (household income), the returns to capital or Other Value Added (OVA - which includes gross operating surplus and 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.

Table G4.1
Aggregated Transactions Table: Regional Economy 2000-01 $,000

	Ag/Forest/ Fish	Mining	Manufact-uring	Utilities	Building	Services	TOTAL	H-hold Exp	O.F.D	Exports	Total
Ag/Forest/Fish	6,750	132	90,368	21	293	14,728	**112,294**	30,337	20,031	85,320	**247,982**
Mining	280	14,896	205,609	29,545	4,393	6,823	**261,546**	1,654	30,818	687,128	**981,146**
Manufacturing	32,401	72,428	1,770,723	46,343	220,544	689,496	**2,831,934**	822,952	694,785	4,801,043	**9,150,715**
Utilities	2,363	11,105	166,549	74,000	1,813	130,267	**386,096**	301,705	201,817	31,717	**921,335**
Building	627	1,286	736	594	604	47,484	**51,332**	0	876,238	1,382	**928,952**
Services	28,459	100,027	954,757	89,549	143,718	2,954,531	**4,271,041**	3,454,168	4,711,647	1,870,784	**14,307,640**
TOTAL	**70,881**	**199,874**	**3,188,742**	**240,053**	**371,365**	**3,843,328**	**7,914,243**	**4,610,817**	**6,535,337**	**7,477,374**	**26,537,770**
H-hold Income	63,074	158,021	819,630	105,478	318,809	4,012,271	**5,477,284**	0	0	-	**5,477,284**
OVA	53,205	356,868	1,283,410	407,456	121,284	4,254,761	**6,476,984**	1,352,728	289,189	-	**8,118,901**
Imports	60,822	266,383	3,858,933	168,349	117,494	2,197,280	**6,669,260**	4,204,043	1,238,282	-	**12,111,585**
TOTAL	**247,982**	**981,146**	**9,150,715**	**921,335**	**928,952**	**14,307,640**	**26,537,770**	**10,167,588**	**8,062,807**	**7,477,374**	**52,245,539**
Employment*	2,033	1,976	21,371	1,927	9,403	126,654	**163,364**	-	-	-	**-**

* Number of people employed in each industry.

Table G4.2
Aggregated Transactions Table: NSW Economy 2000-01 $,000

	Ag/Forest/ Fish	Mining	Manufact- uring	Utilities	Building	Services	TOTAL	H-hold Exp	O.F.D	Exports	Total
Ag/Forest/Fish	837,023	2,439	3,121,709	463	10,066	306,839	**4,278,539**	822,126	636,626	4,125,589	**9,862,880**
Mining	5,652	212,186	2,432,110	271,315	90,610	127,306	**3,139,179**	26,585	-50,440	4,328,971	**7,444,294**
Manufacturing	1,270,348	738,871	25,149,154	609,260	5,078,821	17,615,714	**50,462,167**	21,910,219	10,266,636	42,420,940	**125,059,963**
Utilities	69,799	100,205	1,466,256	792,155	34,026	2,334,402	**4,796,843**	4,767,459	204,846	17,348	**9,786,495**
Building	28,667	22,626	11,186	6,429	12,744	909,975	**991,627**	0	17,134,126	24,527	**18,150,280**
Services	1,626,674	1,005,985	17,524,606	1,417,175	3,429,349	74,234,660	**99,238,449**	89,172,065	43,542,228	30,352,294	**262,305,037**
TOTAL	**3,838,163**	**2,082,311**	**49,705,021**	**3,096,798**	**8,655,616**	**95,528,896**	**162,906,804**	**116,698,453**	**71,734,023**	**81,269,669**	**432,608,949**
H-hold Income	2,991,412	1,105,865	11,831,244	1,122,199	6,329,488	70,585,278	**93,965,486**	0	0	-	**93,965,486**
OVA	2,093,100	2,641,217	16,720,602	4,357,212	2,112,604	79,161,739	**107,086,475**	20,925,131	3,174,230	-	**131,185,836**
Imports	940,204	1,614,901	46,803,096	1,210,287	1,052,571	17,029,123	**68,650,183**	19,657,219	13,591,792	-	**101,899,195**
TOTAL	**9,862,880**	**7,444,294**	**125,059,963**	**9,786,495**	**18,150,280**	**262,305,037**	**432,608,949**	**157,280,803**	**88,500,045**	**81,269,669**	**759,659,466**
Employment*	96,130	15,095	322,393	20,835	194,118	2,092,051	**2,740,622**	-	-	-	**-**

* Number of people employed in each industry.

From the above tables, it can be seen that the value of the gross regional output for the NSW economy and the regional economy in 2001 is estimated by the model at $759,659M and $52,245M, respectively. However, it is generally considered that gross regional product (value-added) is a better measure of economic activity, as it avoids double counting associated with purchases of intermediate products.

Gross regional product for the NSW economy is estimated at $225,151M comprising $93,965M to households as wages and salaries (including payments to self employed persons and employers) and $131,185M in OVA. Gross regional product for the regional economy is estimated at $13,596M, comprising $5,477M to households as wages and salaries (including payments to self employed persons and employers) and $8,118M in OVA.

The employment totals were 2,740,622 and 163,364 for the NSW and regional economy, respectively.

The economic structure of the regional economy may be compared with that for NSW through a comparison of Figure G4.1 and Figure G4.2. This reveals that the mining sectors, manufacturing sectors and utilities sectors are of greater relative importance to the regional economy than they are to the NSW economy. While the agriculture, forest and fishing sectors, building sectors and services sectors are of less relative importance than they are to the NSW economy.

The destination of imports into the respective regions from all sources (overseas, inter-regional and interstate) are shown in aggregate in Figures G4.3 and G4.4.

For NSW, the intermediate sector of manufacturing has the greatest reliance on imports while for the regional economy the services sector and household expenditure also rely considerably on imports. This reflects the smaller size of the economy and hence its inability to supply all the inputs demanded by industries and households.

Figure G4.1
Summary of Aggregated Sectors: Regional Economy (2000-01)

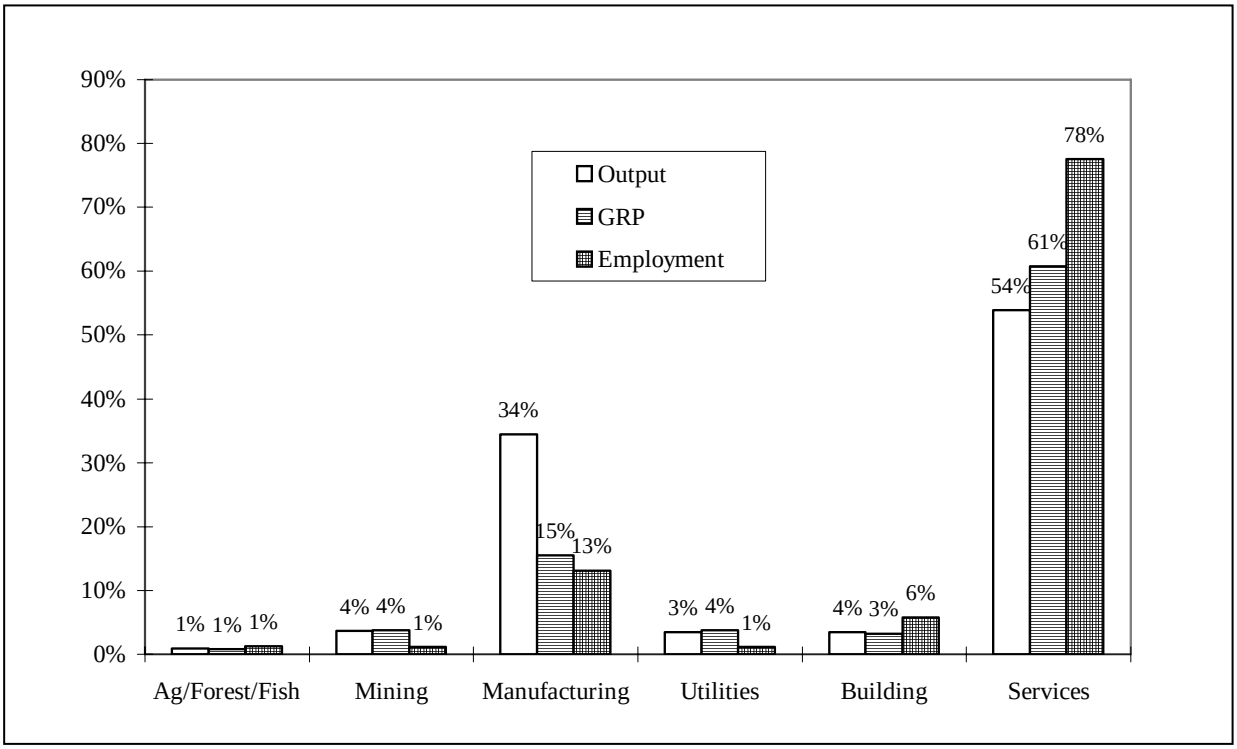


Figure G4.2
Summary of Aggregated Sectors: NSW Economy (2000-01)

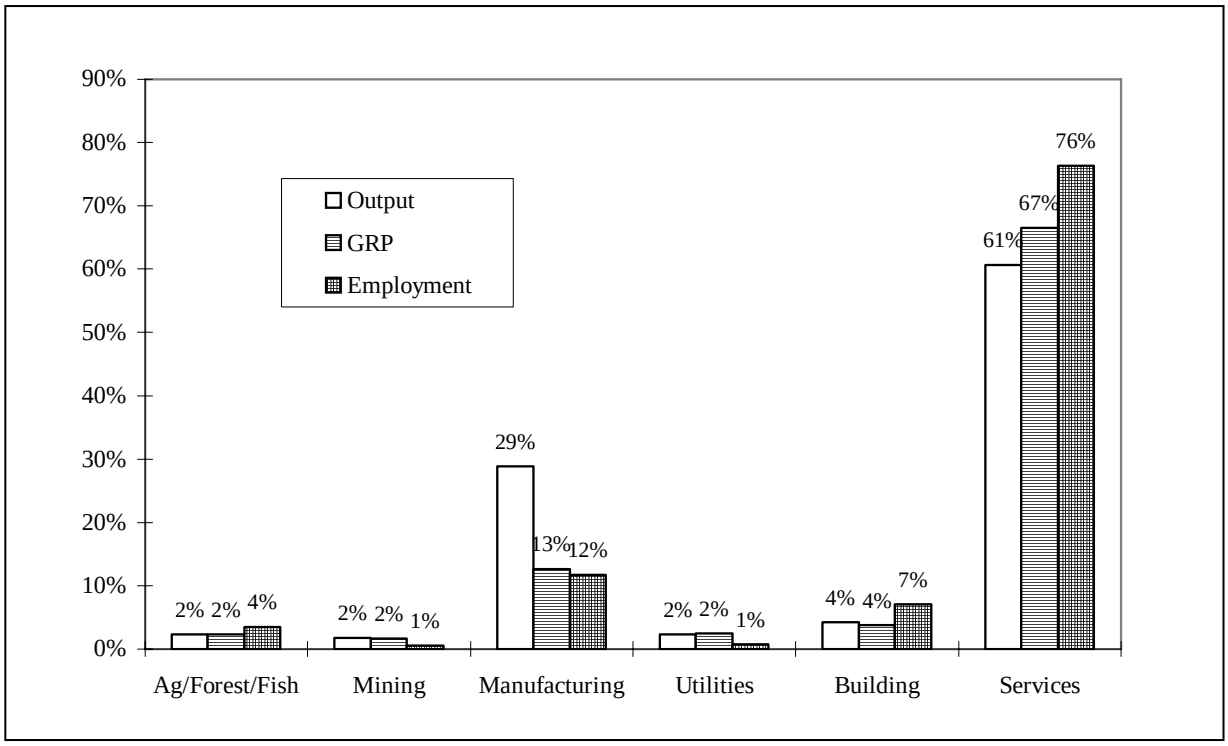
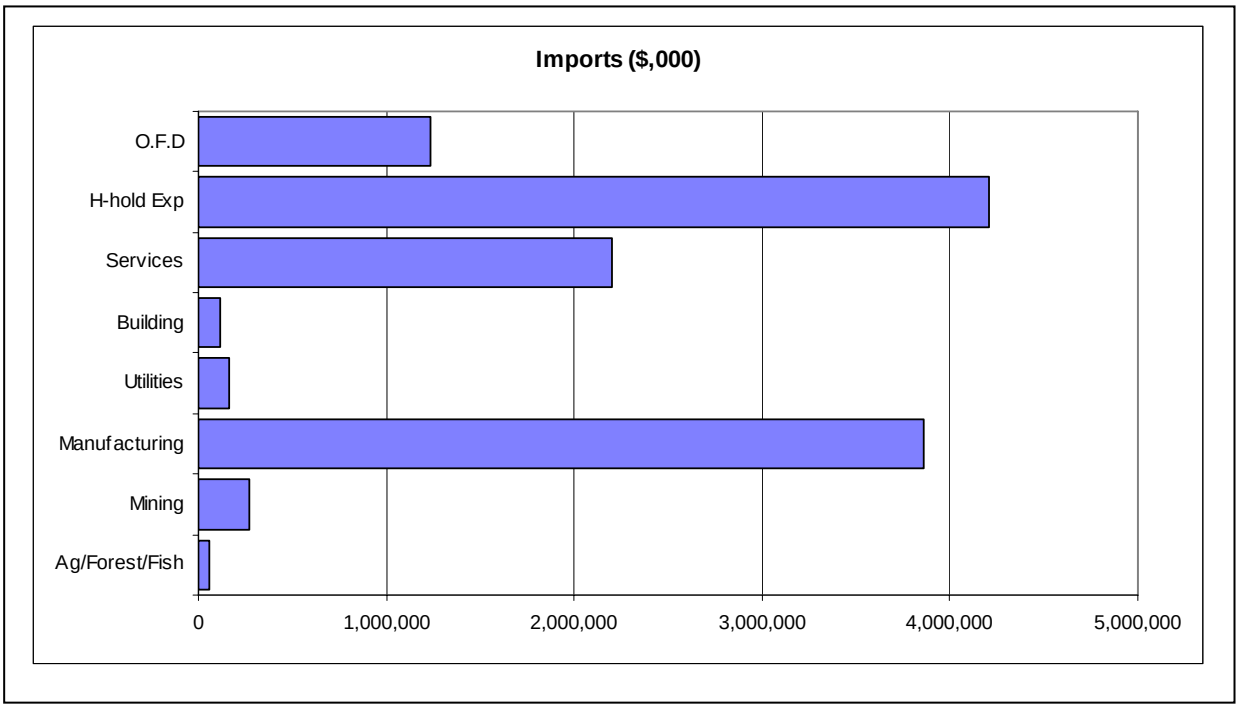
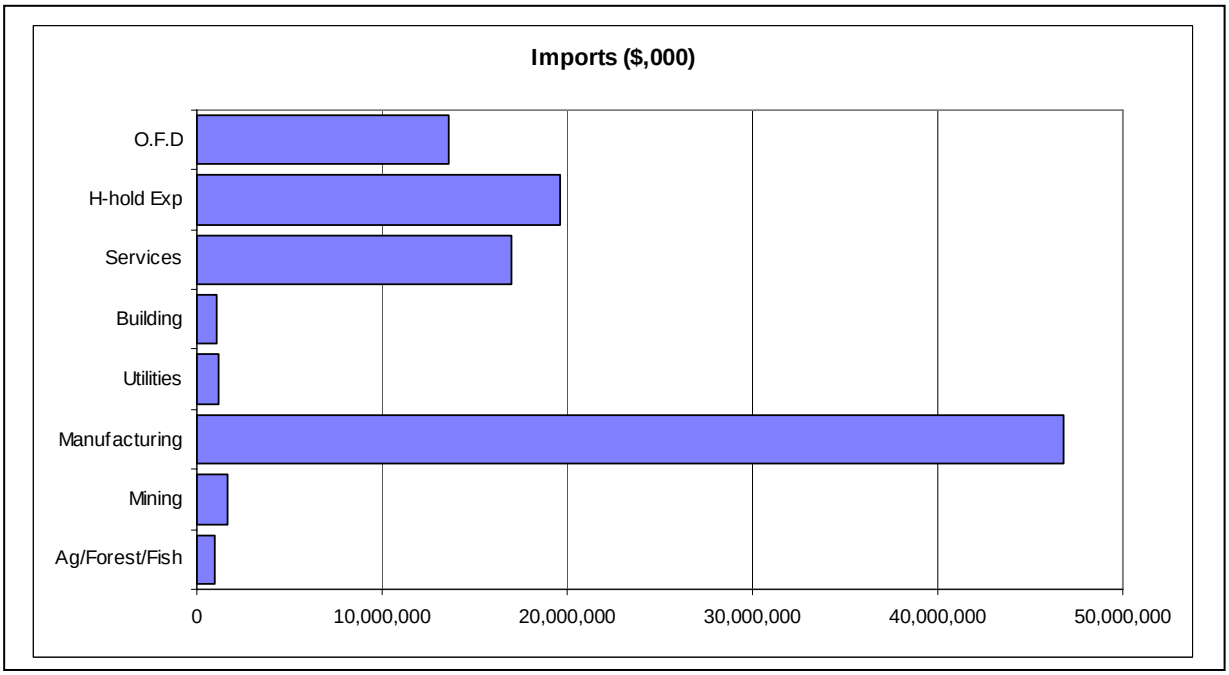


Figure G4.3
Regional Economy - Distribution of Imports by Destination Sector



Note: OFD is other final demand and includes Government final consumption expenditure, private gross fixed capital expenditure, public enterprise and general government gross fixed capital expenditure and increases in stocks.

Figure G4.4
NSW Economy - Distribution of Imports by Destination Sector



Note: OFD is other final demand and includes Government final consumption expenditure, private gross fixed capital expenditure, public enterprise and general government gross fixed capital expenditure and increases in stocks.

Figures G4.5 to G4.10 provide a more expansive sectoral distribution of gross regional output, employment, household income, gross regional product, exports and imports, and can be used to provide some more detail in the description of the economic structure of the economy.

While the 2001 model is two years after the closure of BHP steelworks, the importance of metal manufacturing (iron and steel and basic non-ferrous metals manufacturing) to the regional economy in terms of output is still evident. However, reflecting the capital intensive nature of metal manufacturing it is not the most significant sector in terms of employment numbers and income. The labour intensive retail trade sector is by far the greatest employer and provider of income in the region followed by the services sectors (predominantly education, health, personal services and business services sectors).

While not being the most significant contributor to regional employment, the metal manufacturing sector was an important contributor to gross regional product, after ownership of dwellings, business services and retail trade.

The definition of the region also includes some coal mining areas and hence in comparison to the NSW economy, coal mining is of greater relative significance to the regional economy.

G4.3 MULTIPLIERS

The multipliers for each sector of the economy can also be derived from the input-output tables for the NSW economy and the regional economy.

The calculation of multipliers from the input-output tables is based on the following underlying assumptions:

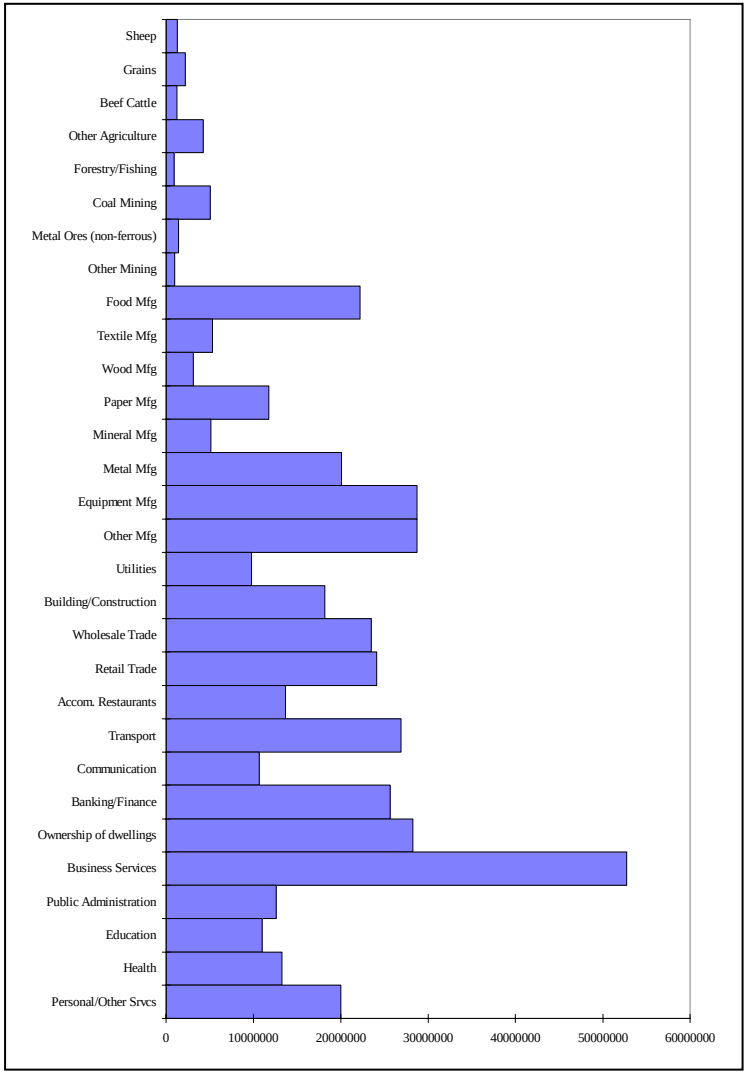
- “there is a fixed input structure in each industry, described by fixed technological coefficients;
- all products of an industry are identical or are made in fixed proportions to each other;
- each industry exhibits constant returns to scale in production;
- unlimited labour and capital are available at fixed prices; 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.” (ABS 1995, p 24).

Multipliers therefore do not take account of economies of scale, unused capacity or technological change since they describe average effects rather than marginal effects (ABS 1995).

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 gross regional output, employment, gross regional product and income multipliers show the gross regional output, employment, gross regional product and income responses to an initial gross regional output stimulus (Jensen and West, 1986).

Figure G4.5 Sectoral Distribution of Gross Regional Output ($,000)

NSW Economy



Regional Economy

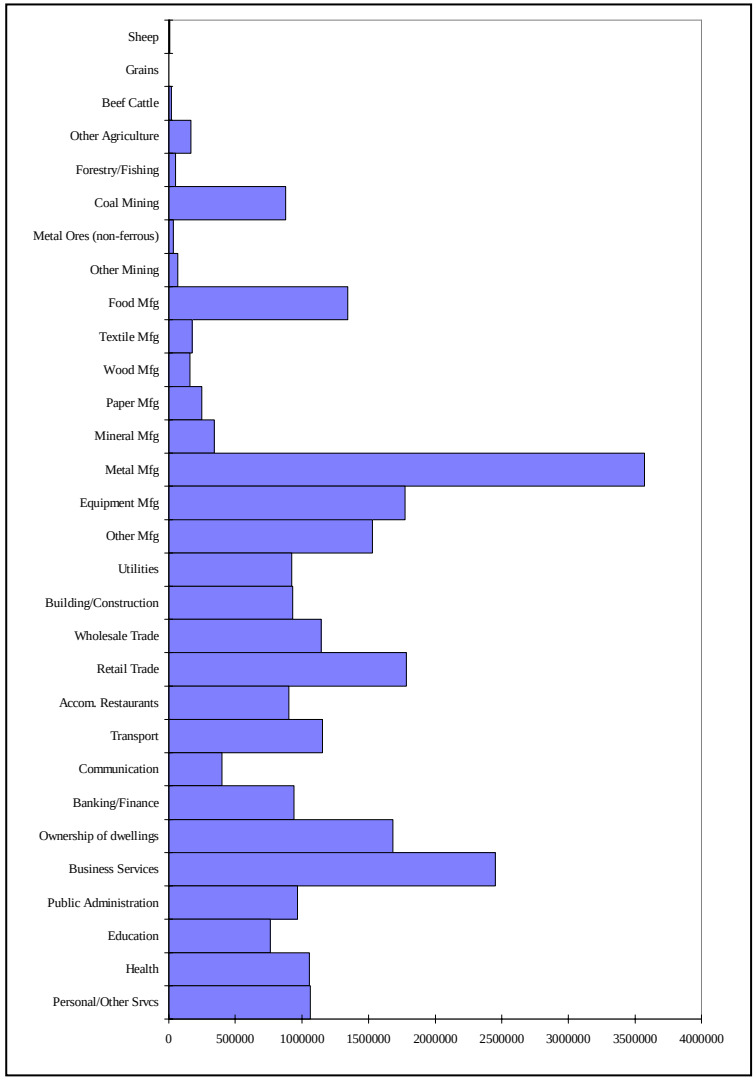
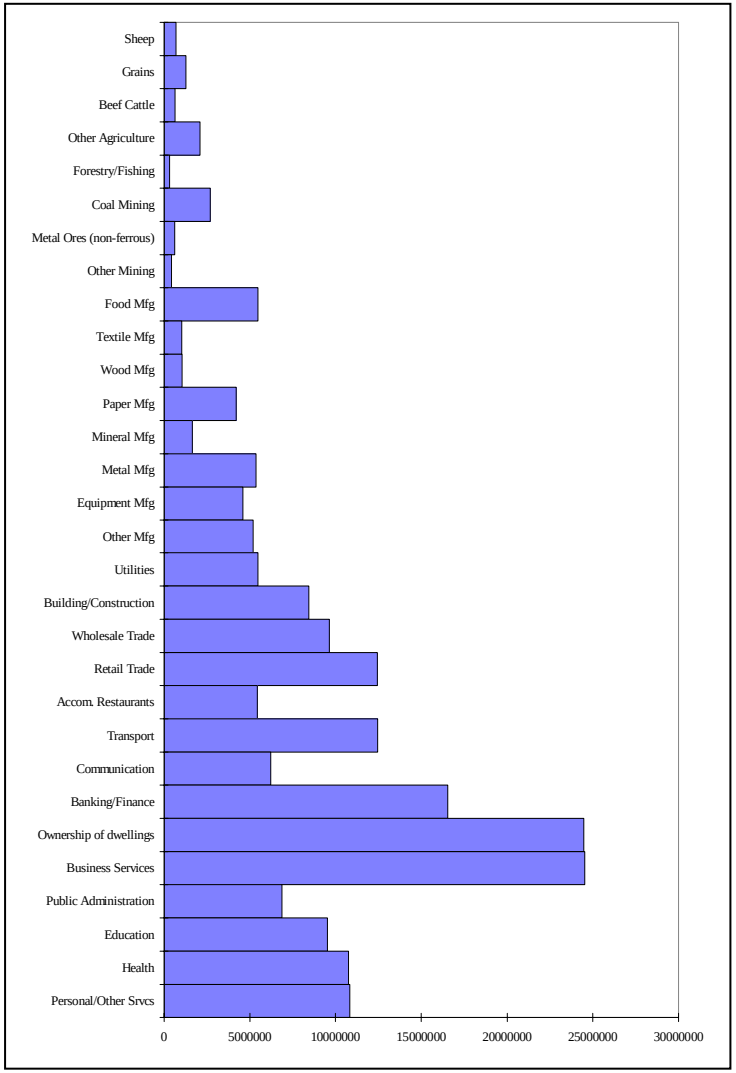


Figure G4.6 Sectoral Distribution of Gross Regional Product ($,000)

NSW Economy



Regional Economy

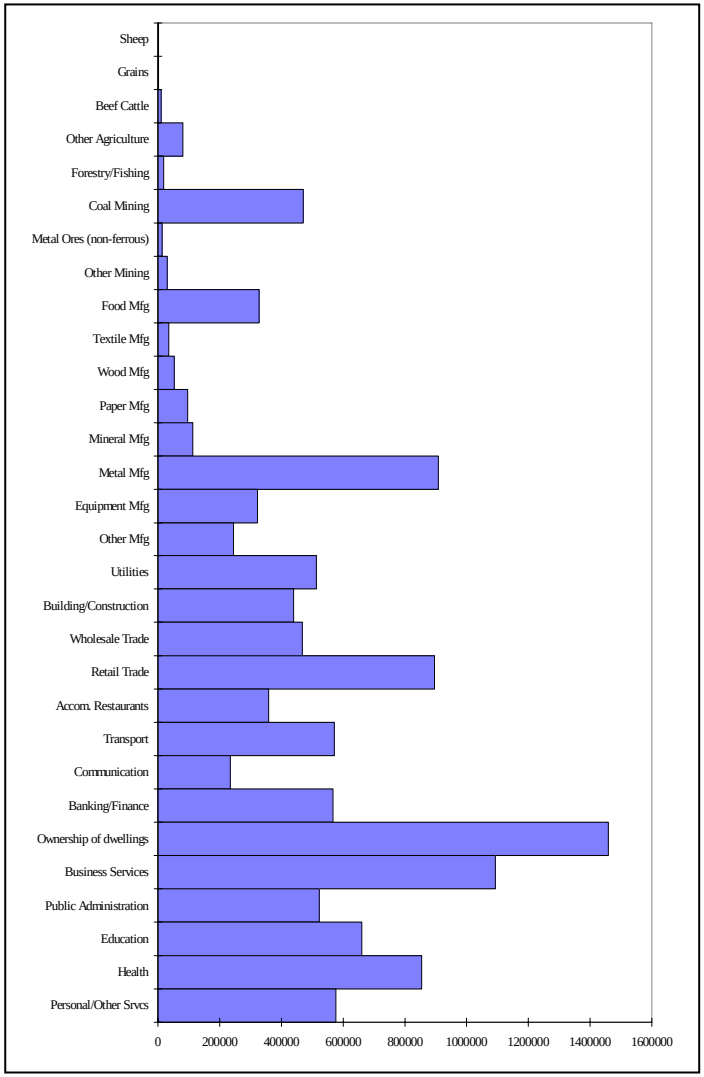
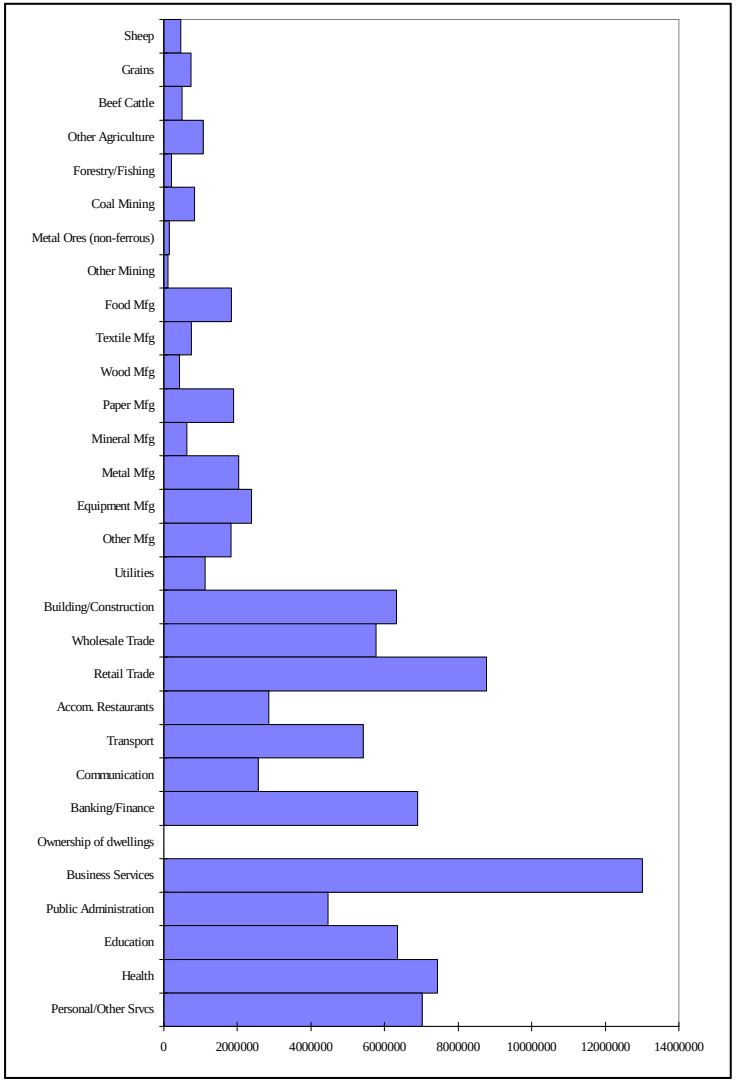


Figure G4.7 Sectoral Distribution of Gross Regional Income ($,000)

NSW Economy



Regional Economy

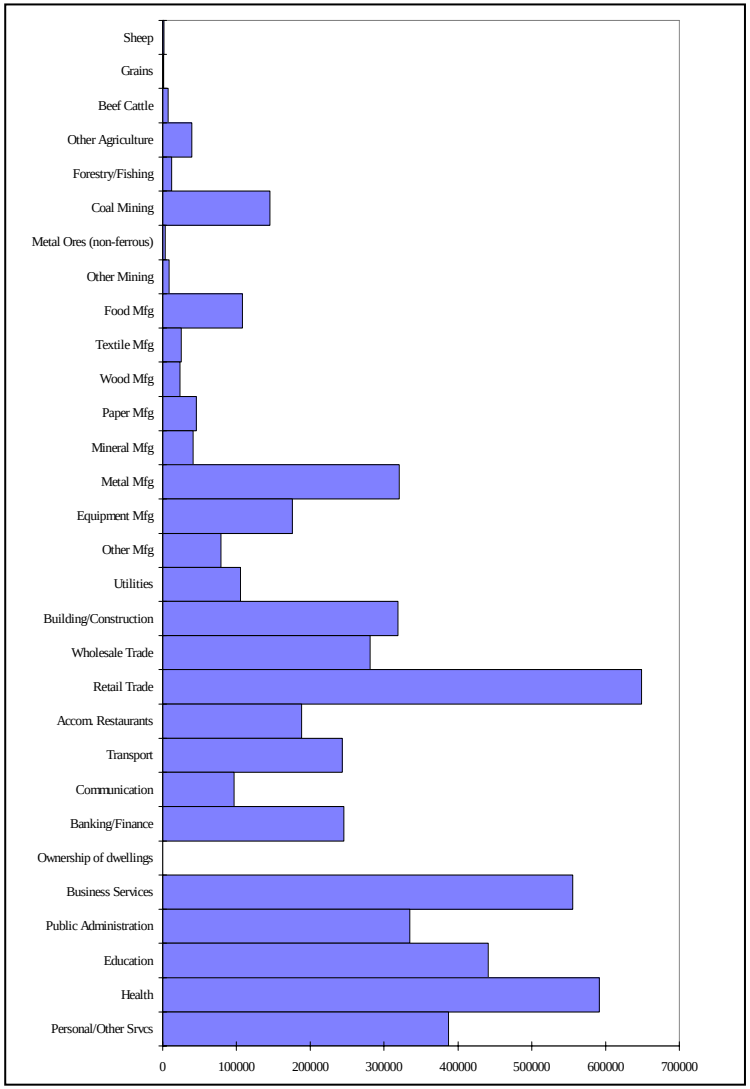
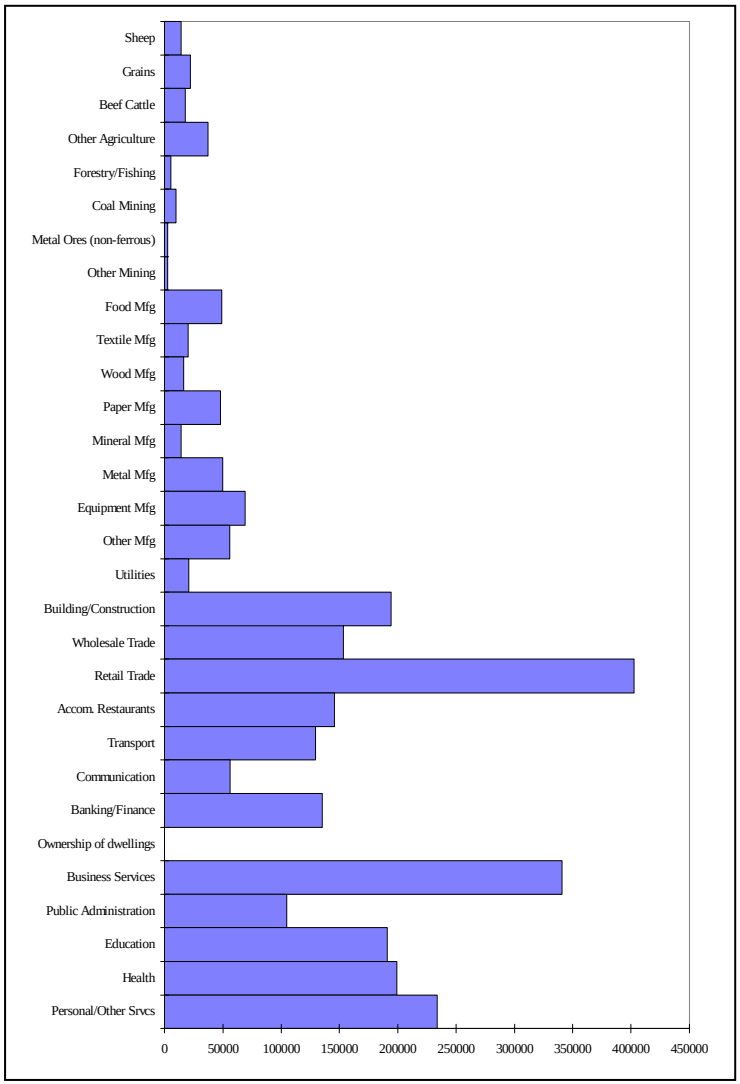


Figure G4.8 Sectoral Distribution of Regional Employment (No.)

NSW Economy



Regional Economy

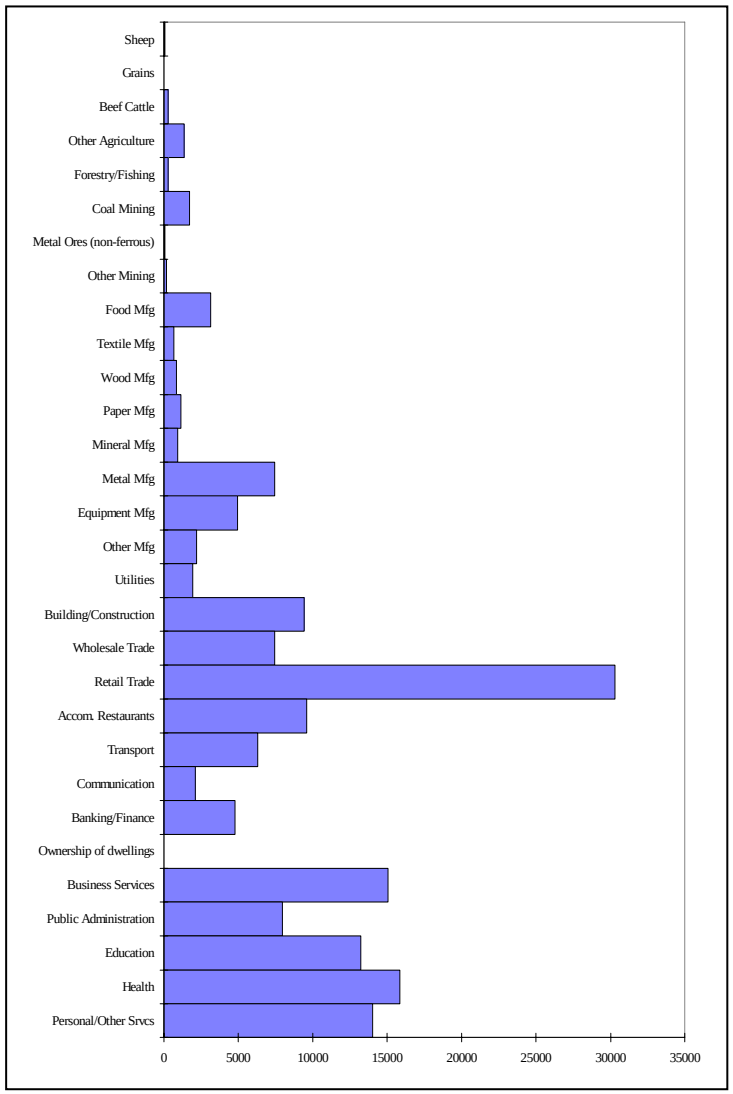
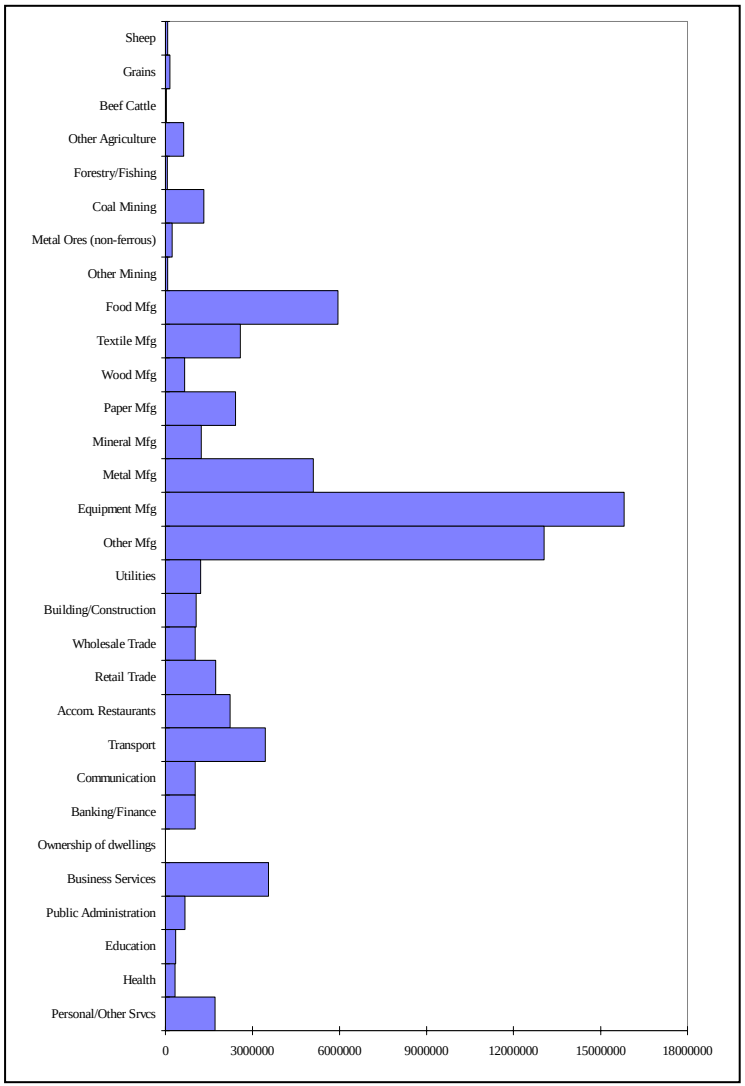


Figure G4.9 Sectoral Distribution of Imports ($,000)

NSW Economy



Regional Economy

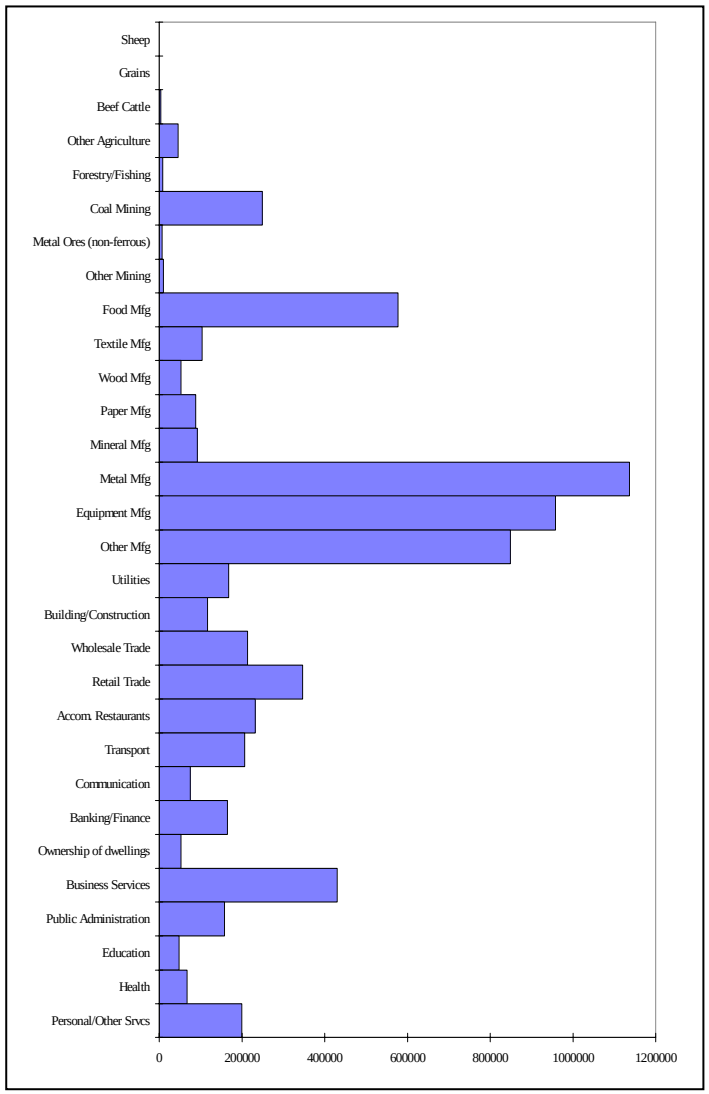
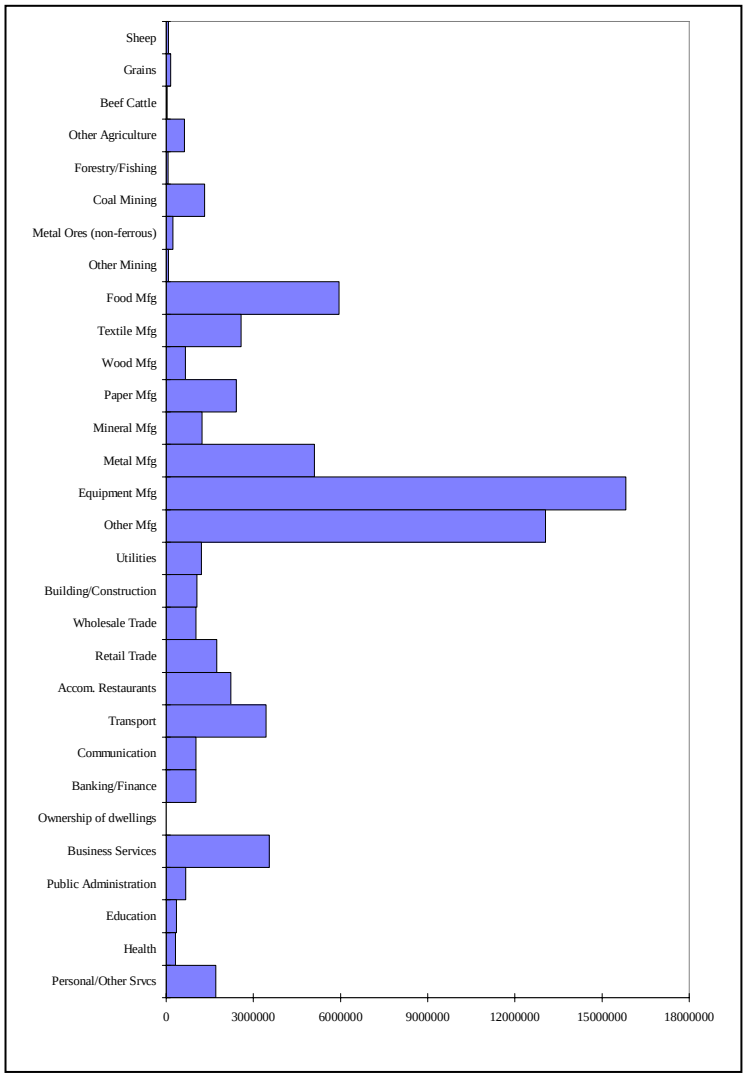
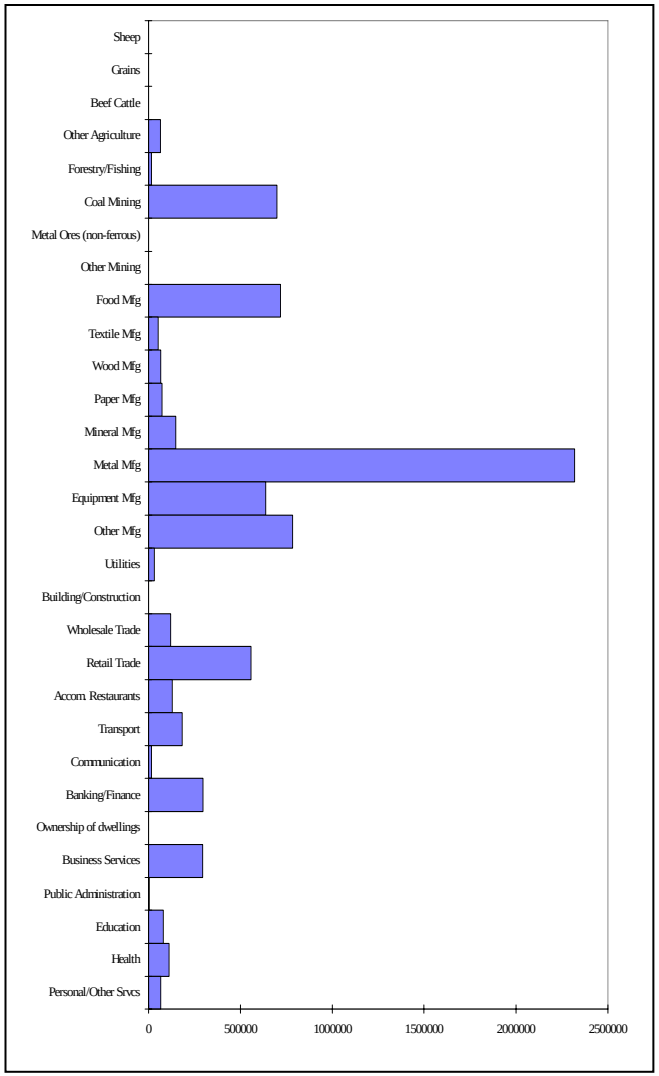


Figure G4.10 Sectoral Distribution of Gross Regional Exports ($,000)

NSW Economy



Regional Economy



Components of the conventional gross regional 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 ie. 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, gross regional product and income multipliers have similar components to the gross regional output multiplier, however, through conversion using the respective coefficients show the employment, gross regional product and income responses to an initial gross regional output stimulus (Jensen and West 1986).

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

A description of the different ratio multipliers is given below.

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

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

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

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

(Centre for Farm Planning and Land Management 1989, p.207)

Type 11A ratio multipliers are used in Section G4.4 to estimate the total regional economic impact of the Project.

G4.4 ECONOMIC IMPACT OF THE PROJECT

The revenue, expenditure and employment associated with the construction and operation of the Project would stimulate economic activity for the regional economy, as well as for the broader NSW economy. The regional impacts of both these stimuli are estimated for the indicators of output, value-added, income and employment.

G4.4.1 Construction Phase

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

- the *other construction sector* which includes businesses involved in the construction of non-residential buildings and sites, including port terminals;
- the *other property services sector* which includes businesses involved in the leasing of industrial machinery, plant or equipment;
- the *agriculture, mining and construction machinery, lifting and material handling equipment manufacturing sector*; and
- *other machinery and equipment manufacturing sector*.

G4.4.1.1 Impact on Regional Economy

Given the largely specialist nature of capital equipment and the relatively small size of the Newcastle economy, for the purpose of this analysis a conservative assumption is made that all such purchases and the leasing of machinery are made outside the regional economy. Thus regional economic activity from the Project construction phase primarily relates to the *other construction sector*.

It is estimated by NCIG that the construction workforce for the initial construction phase will average approximately 400 people for a period of 3 years, peaking at 500. Based on the input-output coefficients of the *other construction sector* in the Newcastle region transactions table (indexed to 2006) in the order of $55M of the estimated $180M capital costs in each of 2007, 2008 and 2009 would need to be spent on the *other construction sector* within the region to result in a direct average annual workforce of 400 people. The direct and indirect regional economic impacts, of this level of expenditure in the Newcastle economy, during the construction years of the Project, were used as a starting point for the analysis.

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

Production-induced effects occur in a near-proportional way, whereas the consumption-induced flow-on effects will only occur in a proportional way if workers and their families enter the region. The implicit assumption of the above approach, is that all employment generated by the construction phase is sourced from workers outside the region who subsequently migrate into the region. Advice from NCIG about the specialist nature of the construction workforce required for the Project construction suggests that in the order of 35% of the construction workforce will come from outside the region. Consumption-induced impacts were therefore reduced to 35% to take this into account. Estimates of the economic impacts of Project construction on the regional economy are provided in Table G4.3.

Impacts

Table G4.3
Adjusted Regional Economic Impacts of Construction of the Project on the Regional Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
INCOME ($'000)	17,956	5,695	1,602	7,297	25,253
Type 11A Ratio	1.00	0.32	0.09	0.41	1.41
VALUE ADDED ($'000)	27,942	12,623	2,910	15,533	43,475
Type 11A Ratio	1.00	0.45	0.10	0.56	1.56
EMPL. (No.)	400	138	49	187	587
Type 11A Ratio	1.00	0.34	0.12	0.47	1.47

From Tables G4.3 it is estimated that the initial construction of the Project to 33 Mtpa may contribute in the order of:

- $25M in annual direct and indirect household income;
- $43M in annual direct and indirect regional value added; and
- 587 direct and indirect jobs.

These particular impacts on the regional economy are likely to be felt for a period of in the order of 3 years.

Additional temporary construction impacts would occur during expansion of the CET from 33 Mtpa to 66 Mtpa and these impacts would be of a similar magnitude, depending upon the rate of construction activity. The timing for this expansion would be determined by market demand.

Multipliers

The adjusted Type 11A ratio multipliers for the initial construction phase of the Project range from 1.41 for income up to 1.56 for value added.

Main Sectors Affected

Flow-on impacts from the construction phase of the Project are likely to affect a number of different sectors of the regional economy. The sectors most impacted by value-added and income flow-ons are likely to be wholesale and retail trade, road transport, accommodation, cafes and restaurants, scientific research, technical and computer services, other property services, legal, other business services, cement manufacturing, structural metal products manufacturing.

Examination of the estimated direct and flow-on employment impacts (Table G4.4) gives an indication of which sectors employment opportunities would be generated in.

Table G4.4
Distribution of Average Direct and Flow-on Employment by Industry Sector in the Regional Economy from Construction of the Project

Sector	Average Direct Effects	Production Induced	Adjusted Consumption-induced	Total
Primary	0	0	1	1
Mining	0	2	0	2
Manufacturing	0	46	3	49
Utilities	0	1	1	2
Wholesale/Retail	0	15	18	33
Mechanical and other repairs	0	6	1	7
Accommodation, cafes, restaurants	0	4	6	10
Building/Construction	400	0	0	401
Transport	0	15	2	17
Services	0	48	18	66
Total	**400**	**138**	**49**	**587**

Note: Totals may have minor discrepancies due to rounding.

Direct employment impacts would generate demand for employment in the *other construction sector*. Production-induced employment impacts would mainly generate demand for employment in the:

- business services sectors (predominantly other property services, legal, accounting and business management sector, scientific research, technical and computer services and other business services);
- wholesale and retail trade sectors;
- manufacturing sectors (predominantly cement lime and concrete slurry manufacturing, structural metal products manufacturing and fabricated metal products manufacturing); and
- transport sector (predominantly road transport).

Consumption-induced employment flow-ons would mainly generate demand in the:

- wholesale and retail trade sectors; and
- services sectors (education, health, community services and other services).

G4.4.1.2 Impact on the NSW Economy

When the impact of $55M of expenditure in the other construction sector is assessed for the NSW economy, the impacts are greater because of the larger inter-sectoral linkages and hence multipliers of a larger economy.

Impacts

Again, the estimated consumption-induced flow-on of this level of expenditure was adjusted for the estimated proportion of direct employment that would likely come from outside of NSW (i.e. 0%). Adjusted impacts taking this into account are provided in Table G4.5.

Table G4.5
Adjusted Regional Economic Impacts of Construction of the Project on the NSW Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
INCOME ($'000)	17,956	7,916	0	7,916	25,872
Type 11A Ratio	*1.00*	*0.44*	*0.00*	*0.44*	*1.44*
VALUE ADDED ($'000)	27,942	17,211	0	17,211	45,153
Type 11A Ratio	*1.00*	*0.62*	*0.00*	*0.62*	*1.62*
EMPL. (No.)	400	188	0	188	588
Type 11A Ratio	*1.00*	*0.47*	*0.00*	*0.47*	*1.47*

Based on the above approach, expenditure in the *other construction sector* during construction of the Project may result in the following impacts on the NSW economy:

- $26M in annual direct and indirect household income;
- $45M in annual direct and indirect regional value added; and
- 588 direct and indirect jobs.

These particular impacts on the NSW economy are only likely to be felt for a period of in the order of 3 years.

Additional temporary construction impacts would occur during expansion of the CET from 33 Mtpa to 66 Mtpa and these impacts would be of a similar magnitude, depending upon the rate of construction activity. The timing for this expansion would be determined by market demand.

However, the above estimated impacts on the NSW economy are likely to be very conservative because expenditures in NSW may not be limited to expenditures in the other construction sector. The NSW economy is likely to be able to also supply some Machinery and Equipment Manufacturing, Lifting and Material Handling Equipment Manufacturing and Machinery Leasing that would not be able to be supplied by the smaller Newcastle economy.

Multipliers

The adjusted Type 11A ratio multipliers for the construction phase of the Project range from 1.44 for income up to 1.62 for value added in the NSW economy.

Main Sectors Affected

As identified above, the direct affects of the construction phase of the Project on the NSW economy will occur in the other construction sector, other property services sector, agriculture, mining and construction machinery, lifting and material handling equipment manufacturing sector and other machinery and equipment manufacturing sector.

Considering only direct construction expenditures in the regional economy, flow-on impacts from the construction phase of the Project are likely to affect a number of different sectors of the NSW economy. The sectors most impacted by output, value-added, income and employment flow-ons include wholesale and retail trade, other property services, legal, accounting, marketing and business management services, scientific research, technical and computer services, and other business services.

G4.4.2 Operation Phase

For the analysis of the operation phase of the Project, two new CET sectors were developed (a 33 Mtpa sector and a 66 Mtpa sector) and individually inserted into the regional input-output table and the NSW input-output table (indexed to 2006). To generate these new sectors, NCIG provided estimates of annual costs and revenue when the CET is operating at 33 Mtpa and 66 Mtpa. This cost and revenue data was then refined as follows, to be in the form required for regional economic impact assessment:

- Revenue was adjusted to exclude GST and was allocated to the *total output* row of the new sector. The monetary values of this data is not presented in this report as it is commercially sensitive.
- The *income* row was calculated from the estimated annual level of direct employment and the average wage of those employed at the CET.
- The difference between annual gross revenue and annual operating costs was allocated to the *other value-added sector.*
- Annual operating costs (net of *income* paid to employment) by specified item (provided by NCIG) were initially allocated to the appropriate sectors of the economy. *Other expenditure* was allocated between the remaining sectors of the economy in proportion to the expenditure pattern in the *services to transport sector* in the NSW input-output table. The relationships between purchaser prices, margins and taxes from the 1998/99 national input-output table (adjusted for the introduction of GST) were then use to convert these purchaser prices to basic values. Location quotients for the region and NSW were then used to allocate intermediate expenditures between the regional/state economy and imports.
- Employment was allocated to the employment row.

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 was able to be captured at the NSW level compared to the regional economy. The latter having a greater reliance on imports.

On this basis the estimated impacts of the operation of the Project at 33 Mtpa and 66 Mtpa were determined for the regional economy and for the NSW economy.

Again the consumption-induced impacts were adjusted to reflect the source of labour. Having regard to the size and nature of the regional economy, NCIG suggested that in the order of 95% of its workforce would come from the regional economy. Thus for the regional economy a conservative estimate of the consumption induced flow-on effects is to include only 5% of the effects. This is conservative since it assumes that the 95% of employees who already reside in the region, are employed and earn a similar salary to what they will receive working on the Project. To the extent that this overestimates the existing spending power of future employees who already reside in the region the consumption-induced effects will be underestimated.

With regard to the NSW Region, it is likely that all the jobs are obtained by people already residing in NSW. Hence a conservative estimate to exclude consumption induced flow-on. This is conservative since it assumes that the employees who already reside in NSW currently earn the same level of income as they will on the Project i.e. that their disposable income does not increase.

Adjusted estimates of the economic impacts of the operation phase of the Project (33 Mtpa and 66 Mtpa) on the regional and state economy are provided in Tables G4.6 to G4.9.

G4.4.2.1 Impacts

Table G4.6
Adjusted Annual Regional Economic Impacts of the Operation of the Project (33 Mtpa) on the Regional Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
INCOME ($'000)	11,191	6,785	174	6,959	18,150
Type 11A Ratio	*1.00*	*0.61*	*0.02*	*0.62*	*1.62*
VALUE ADDED ($'000)	60,859	16,545	316	16,861	77,721
Type 11A Ratio	*1.00*	*0.27*	*0.01*	*0.28*	*1.28*
EMPL. (No.)	70	168	5	173	243
Type 11A Ratio	*1.00*	*2.40*	*0.08*	*2.48*	*3.48*

Table G4.7
Adjusted Annual Regional Economic Impacts of the Operation of the Project (66 Mtpa) on the Regional Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
INCOME ($'000)	16,000	9,765	249	10,014	26,014
Type 11A Ratio	*1.00*	*0.61*	*0.02*	*0.63*	*1.63*
VALUE ADDED ($'000)	137,533	23,841	453	24,294	161,827
Type 11A Ratio	*1.00*	*0.17*	*0.00*	*0.18*	*1.18*
EMPL. (No.)	100	243	8	251	351
Type 11A Ratio	*1.00*	*2.43*	*0.08*	*2.51*	*3.51*

Table G4.8
Adjusted Annual Regional Economic Impacts of the Operation of the Project (33 Mtpa) on the NSW Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
INCOME ($'000)	11,200	9,510	0	9,510	20,710
Type 11A Ratio	*1.00*	*0.85*	*0.00*	*0.85*	*1.85*
VALUE ADDED ($'000)	60,908	22,234	0	22,234	83,142
Type 11A Ratio	*1.00*	*0.37*	*0.00*	*0.37*	*1.37*
EMPL. (No.)	70	235	0	235	305
Type 11A Ratio	*1.00*	*3.36*	*0.00*	*3.36*	*4.36*

Table G4.9
Adjusted Annual Regional Economic Impacts of the Operation of the Project (66 Mtpa) on the NSW Economy

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
INCOME ($'000)	16,000	13,651	0	13,651	29,651
Type 11A Ratio	*1.00*	*0.85*	*0.00*	*0.85*	*1.85*
VALUE ADDED ($'000)	137,535	31,865	0	31,865	169,400
Type 11A Ratio	*1.00*	*0.23*	*0.00*	*0.23*	*1.23*
EMPL. (No.)	100	340	0	340	440
Type 11A Ratio	*1.00*	*3.40*	*0.00*	*3.40*	*4.40*

In total, the operation of the Project is estimated to make the following contribution to the regional economy:

- $78M (33 Mtpa) and $162M (66 Mtpa) in annual direct and indirect regional value added;
- $18M (33 Mtpa) and $26M (66 Mtpa) in annual household income; and
- 243 (33 Mtpa) and 351 (66 Mtpa) direct and indirect jobs.

For the NSW economy, the operation of the Project is estimated to contribute:

- $83M (33 Mtpa) and $169M (66 Mtpa) in annual direct and indirect regional value added;
- $21M (33 Mtpa) and $30M (66 Mtpa) in annual household income; and
- 305 (33 Mtpa) and 440 (66 Mtpa) direct and indirect jobs.

It should be noted that this impact assessment was based on an estimate of the current size and nature of the Newcastle and NSW economies. Both of these economies are likely to grow considerably over time and hence by the time the Project is operating at 66 Mtpa these economies will be larger with greater inter-sectoral linkages and hence multipliers. The multipliers used in this impact assessment are therefore likely to be conservative.

Furthermore, to the extent that NCIG can maximise local procurement, the regional intersectoral linkages reported here may be able to be increased, with corresponding increases in local economic activity and employment.

G4.4.2.2 Multipliers

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

- the magnitude of and relationship between the direct effects eg. 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 unadjusted type 11A ratio multipliers for the operation of the Project are provided in Tables G4.6 to G4.9.

For the regional economy, the adjusted Type 11A ratio multipliers for 33 Mtpa ranged from 1.28 for value-added up to 3.48 for employment. For 66 Mtpa the multipliers ranged from 1.18 for value-added up to 3.51 for employment.

For the larger NSW region Type 11A ratio multipliers for 33 Mtpa ranged from 1.37 for value added up to 4.36 for employment. For 66 Mtpa the multipliers ranged from 1.23 for value-added up to 4.40 for employment.

The higher ratio multipliers for employment reflect the capital-intensive nature of operation of the Project. Capital intensive industries tend to have a high level of linkages with other sectors in an economy thus contributing substantial flow-on employment while at the same time only having a lower level of direct employment (relative to output levels). This tends to lead to high ratio multipliers for employment. The lesser ratio multiplier for income (compared to employment) largely reflects comparatively higher wage levels associated with the Project employees compared to incomes in the sectors that will experience flow-on effects from the Project. The low ratio multiplier for value-added largely reflect the high direct value-added generated by the Project compared to the sectors that experience flow-on effects from the Project.

The generally higher ratio multipliers for the 33 Mtpa option (for all indicators except value-added) reflect the greater levels of expenditure that occur in the economy under this option as a percentage of output value.

G4.4.2.3 Main Sectors Affected

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

- agricultural, mining and lifting and material handling machinery manufacturing sector which consists of businesses engaged in manufacturing, among other things, lifting and material handling equipment;
- electricity supply sector which consists of businesses engaged in the generation, transmission or distribution of electricity;
- wholesale trade sector which consists of businesses engaged in wholesale trade;
- retail trade sector which consists of business engaged in retail trade;
- other property services sector which includes business involved in renting and leasing assets including machinery, equipment, motor vehicles, real estate, airplanes, etc;
- mechanical repairs sector which consists of businesses that undertake mechanical repairs; and
- other construction sector which consists of businesses engaged in, among, other things repairs to non-residential buildings and non-residential building services.

For NSW similar sectors are likely to the most impacted, however, other sectors also become more significant such as the communication sector and the legal and accounting sector.

Tables G4.10 and G4.11 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.

Table G4.10
Distribution of Average Direct and Flow-on Employment by Industry Sector for the Regional Economy (33 Mtpa)

Sector	Average Direct Effects	Production Induced	Adjusted Consumption-Induced	Total
Primary	0	0	0	0
Mining	0	0	0	0
Manufacturing	0	17	0	17
Utilities	0	8	0	8
Wholesale/Retail	0	15	2	17
Mechanical and other repairs	0	39	0	39
Accommodation, cafes, restaurants	0	4	1	5
Building/Construction	0	11	0	11
Transport	70	8	0	78
Services	0	66	2	68
Total	**70**	**168**	**5**	**243**

Note: Totals may have minor discrepancies due to rounding.

Table G4.11
Distribution of Average Direct and Flow-on Employment by Industry Sector for the Regional Economy (66 Mtpa)

Sector	Average Direct Effects	Production Induced	Adjusted Consumption-Induced	Total
Primary	0	0	0	0
Mining	0	1	0	1
Manufacturing	0	27	1	27
Utilities	0	15	0	15
Wholesale/Retail	0	25	3	27
Mechanical and other repairs	0	65	0	66
Accommodation, cafes, restaurants	0	5	1	6
Building/Construction	0	14	0	14
Transport	100	11	0	111
Services	0	81	3	84
Total	**100**	**243**	**8**	**351**

Note: Totals may have minor discrepancies due to rounding.

Direct employment impacts would generate demand for employment in the transport sector (specifically the services to transport sector). Production-induced employment impacts would generate demand for employment across a range of sector including manufacturing (lifting and material handling machinery manufacturing), utilities (electricity and water sectors) wholesale and retail trade, mechanical repairs, non-residential construction (including repairs and trades), transport (road transport and services to transport) services sectors (predominantly other property services, other businesses services, communication services, legal, accounting and business management sector).

Consumption-induced employment flow-ons would mainly generate demand in the wholesale and retail trade sectors and the services sectors (education, health, community services and personal services).

G4.5 IMPACT OF CESSATION OF THE PROJECT ON THE REGIONAL ECONOMY

The operation of the CET is expected to continue indefinitely subject to sufficient supply of Hunter Valley coal and continuing strong world demand. However, should the supply and demand conditions for Hunter Valley coal significantly change in the future, the CET may cease to operate.

The magnitude of the regional economic impacts of cessation of the Project would largely depend on whether the workers and their families affected by Project cessation would leave the region. Where displaced workers remain in the region 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 on the regional economy of Project closure would approximate the direct effects and production-induced effects identified in Table G4.6 and Table G4.7. However, if displaced workers and their families leave the region then impacts would be even greater.

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).

There is some evidence to suggest that on closure of major employment activities in regional economies many displaced workers and their families remain in the area. The greater number of families that remain in the region the less would be the economic impact of Project cessation.

Ultimately, the significance of the economic impacts of cessation of the Project would depend on the relative significance of the Project to the regional economy and the economic structure and trends in the regional economy at the time. For example, if the impacts of Project cessation take place in a declining economy the impacts might be significant. Alternatively, if Project cessation takes place in a growing diversified economy, where there are other development opportunities, the ultimate cessation of the Project may not be a cause for concern.

To the extent that alternative development opportunities arise in the regional economy, the regional economic impacts associated with CET 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 regions growth potential, is its capacity to expand its factors of production by attracting investment and labour from outside the region (BIE, 1994). This in turn can depend on a region's natural endowments. The Newcastle region services the highly prospective Hunter Valley region and has in recent times been experiencing strong growth and increasing diversification. Newcastle is seeking to continue to build new economic drivers to replace the ones that served the City and region in the past and to reduce dependence upon a few traditional sectors. It is therefore possible that over time developments would occur, offering potential to further strengthen the economic base and hence buffer against impacts of the cessation of an individual enterprise such as the CET.

Nevertheless, given the long term nature of the Project, it is not possible to foresee the likely circumstances within which any Project cessation would occur. It is therefore important for regional authorities and leaders to take every advantage of the stimulation to regional economic activity that the Project will bring.

In the unlikely event of impending cessation of the CET, NCIG should commit to the development of a CET exit strategy. This exit strategy should be prepared in consultation with regulatory agencies and the Project Community Consultative Committee. The exit strategy should include consideration of amelioration of adverse socio-economic effects due to the reduction in employment at Project closure.

G5 SOCIAL IMPACT ASSESSMENT

Profile

Population

The Newcastle SSD (Lower Hunter) comprises the SLAs of Port Stephens (A), Maitland (C), Cessnock (C), Lake Macquarie (C), Newcastle (C) inner and Newcastle (C) remainder. In 2003, it had a population of 501,335, representing 7.5% of the NSW population (ABS Regional Statistics).

At the 2001 Census there were relatively even proportions of males (49%) and females (51%) and a small proportion of people born overseas (3%) compared to NSW as a whole (20%).

In 2003, 40.8% of the population was between the age of 15 and 44 with this proportion and the proportion that is aged 14 years and younger having declined slightly over time with slight increases in the proportion in older age brackets, reflecting the general aging of the Australian population. Compared to NSW, however, Newcastle SSD has a slightly lower proportion of 25 to 44 year olds and slightly greater proportion of older people (Table G5.1).

Table G5.1
Distribution of the Newcastle Population by Age Group

Proportion of total population		Newcastle					NSW
		1999	2000	2001	2002	2003	2003
Aged 14 years and younger	%	20.8	20.6	20.5	20.2	19.9	19.9
Aged 15 years to 44 years	%	41.9	41.6	41.3	41.2	40.8	43.1
Aged 45 years to 64 years	%	22.6	23.1	23.4	23.8	24.2	23.7
Aged 65 years and over	%	14.6	14.7	14.8	14.9	15.0	13.3

Source: ABS Regional Statistics
Note: Percentages may not add to 100% due to rounding.

The population of the Newcastle SSD has increased steadily overtime (0.9% pa), at a rate similar to that for NSW as a whole (Table G5.2). The population is expected to continue to grow but at a declining rate of 0.6% pa then 0.5% pa after 2016, less than that expected for NSW as a whole (Mackintosh and Parr, 2004) (Table G5.3).

Table G5.2
Newcastle and NSW Population and Growth Rate

	Year	1991a	1996a	2001a	2002b	2003b
Newcastle SSD	Population	427,824	449,772	470,610	496,990	501,335
	Population Growth Rate (per annum)		1.0%	0.9%	0.9%	0.9%
NSW	Population	5,732,032	6,038,696	6,371,745	6,634,110	6,682,053
	Population Growth Rate(per annum)		1.1%	1.1%	0.9%	0.7%

Source: a - ABS Census; b - ABS Regional Statistics

Table G5.3
Newcastle and NSW Population Projections

Region	2001	2006	2011	2016	2021	2026	2031
Newcastle SSD	492,500*	511,900	528,400	543,400	558,300	572,800	585,900
		0.8%	0.6%	0.6%	0.5%	0.5%	0.5%
NSW	6,575,200	6,868,900	7,164,700	7,450,400	7,734,900	8,012,600	8,271,900
		0.9%	0.9%	0.8%	0.8%	0.7%	0.6%

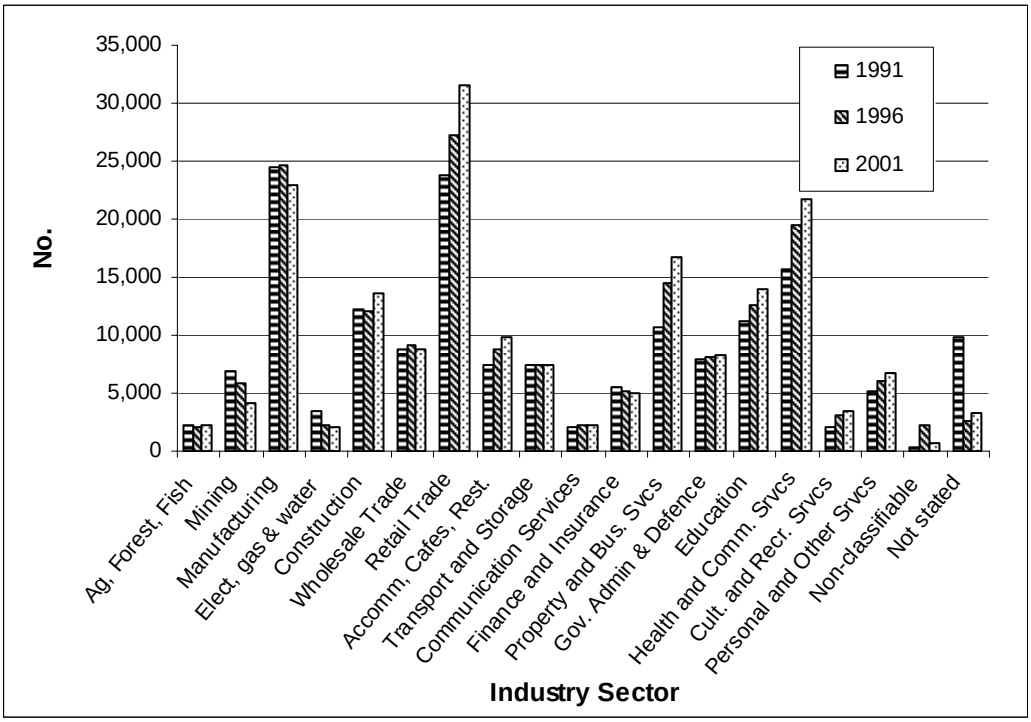
Source: Mackintosh and Parr (2004)

*This population estimate has a different source to that in Table G5.2

Employment

Detailed employment by industry data is presented on Figure G5.1. This clearly indicates the prominence of retail trade and the tertiary sector to employment in the region.

Figure G5.1
Employment by Industry in the Newcastle Region



Source: ABS Housing and Population Census 1991, 1996 and 2001

Figure G5.1 indicates employment by industry over time for the Newcastle region and illustrates the increasing importance of the services sectors and the declining employment trend in the primary and manufacturing sectors.

The unemployment rate in the Newcastle region has been consistently higher than that for NSW but similar to that for non-Sydney NSW. Between 1996 and 2001 the Newcastle unemployment rate fell by 1.3%, less than the fall for NSW (1.6%) and less than the fall for non-Sydney NSW (2.1%) (Table G5.4). This fall in unemployment rate was helped by a fall in the participation rate in the region, whereas in NSW there was an increase in the participation rate.

Table G5.4
Unemployment in the Newcastle Region

	Unemployment Rate		Unemployment to Population Ratio		Participation Rate	
	1996	2001	1996	2001	1996	2001
Newcastle	11.6%	10.3%	7.9%	6.9%	68.0%	67.3%
Non-Sydney NSW	11.5%	9.4%	7.7%	6.3%	67.3%	67.2%
NSW	8.9%	7.3%	6.2%	5.1%	69.3%	69.6%

Source: Hunter Valley Research Foundation

From 2001 to 2003 the unemployment rate in the region fell to 7.2% (16,801), a larger fall than recorded in NSW which only fell by 1.3% to 6% (ABS Regional Statistics).

Average individual taxable income in the Newcastle region was in the order of $38,000 in 2003 (ABS Regional Statistics).

Housing

In 2001 there were approximately 197,639 private dwellings in the Newcastle region, about 8% of the State total. The Region had a higher proportion of separate houses than the State (76% compared with 64%, respectively) and a lower proportion of units/flats/apartments (15%) compared with 26%.

At the time of the 2001 census, 8% of all private dwellings were unoccupied in the Newcastle SSD, slightly less than the Hunter Region (10%) and NSW (9%) (Table G5.5).

Table G5.5
Housing in the Newcastle Region

	Total Private Dwellings	Population	Dwellings/ Capita	Separate Houses %	Other Dwellings %	Not Stated %	Unoccupied Private Dwellings %
Pt Stephens	26,115	56,677	0.46	65.6	15.8	1	17.6
Cessnock	18,118	45,203	0.4	85.2	5	0.9	8.8
Lake Macquarie	71,986	177,619	0.41	80.1	12.4	0.6	6.9
Maitland	20,639	53,803	0.38	84.1	9.9	0.3	5.6
Newcastle	60,781	137,307	0.44	69.5	23.1	0.6	6.8
Newcastle Region	**197,639**	**470,609**	**0.42**	**76.9**	**13.20**	**0.65**	**8.32**
Hunter	**241,620**	**563,587**	**0.43**	**74.4**	**14.8**	**0.7**	**10.1**
NSW	**2,571,540**	**6,371,745**	**0.4**	**64.1**	**26.3**	**0.8**	**8.9**

Source: Hunter Valley Research Foundation

While the rental market is tight in Newcastle itself, with vacancy rates in the order of 2.4%, short term accommodation facilities in the wider Newcastle region (i.e. including Cessnock, Maitland, Port Stephens and Lake Macquarie) are abundant with over 11,500 bed spaces available in motels, hotels or guesthouses (Table G5.6).

Table G5.6
Hotels, Motels and Serviced Apartments in the Newcastle Region, 2003-04
Establishments with 15 or more Rooms

	Establishments No.	Bed Spaces No.	Guest Rooms No.
Pt Stephens	21	3,246	1,020
Cessnock	19	2,834	872
Lake Macquarie	15	1,787	518
Maitland	5	475	174
Newcastle	19	3,196	1,110
Total Newcastle Region	**79**	**11,538**	**3,694**

Source: Hunter Valley Research Foundation

Crime and Safety

NSW Bureau of Crime Statistics and Research indicates that of the 35 categories of crime the per capita incidence of the following 17 offences were higher in the Newcastle region than in the State in 2004:

- assault;
- sexual assault;
- indecent assault;
- break and enter dwelling;
- break and enter non-dwelling;
- motor vehicle theft;
- steal from motor vehicle;
- steal from retail store;
- steal from dwelling;
- arson;
- malicious damage to property;
- possession and/or use of drugs (other than cannabis);
- cultivating cannabis;
- breach apprehended violence order;
- driving under influence of alcohol or drugs;
- dangerous or negligent driving; and
- drive without a licence.

It is difficult to specify reasons for the higher incidence of some categories of crime in the Newcastle region 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 Newcastle region that may be relevant include relatively lower income levels and higher unemployment rates (Hunter Valley Research Foundation).

Community Infrastructure

Education

The NSW Department of Education and Training (DET) is the main provider of primary and secondary education in the Newcastle region. The Newcastle region has 145 DET infant and primary schools and 28 secondary schools (Hunter Valley Research Foundation). There has been a trend of declining enrolments (Table G5.7) and hence it is reasonable to assume that schools in the region have excess capacity.

Table G5.7
DET Infants, Primary and Secondary Schools and Student Enrolments

	No. Schools	No. Student Enrolments		
Infants and Primary		**2002**	**2003**	**2004**
Pt Stephens	19	5,070	5,012	4,926
Cessnock	22	4,248	4,296	4,292
Lake Macquarie	55	13,928	13,669	13,437
Maitland	15	4,612	4,664	4,747
Newcastle	34	9,182	9,020	8,999
Total	**145**	**37,040**	**36,661**	**36,401**
Secondary				
Pt Stephens	3	2,853	2,867	2,823
Cessnock	3	2,363	2,367	2,411
Lake Macquarie	11	9,576	9,522	9,475
Maitland	4	3,407	3,381	3,394
Newcastle	7	6,618	6,623	6,601
Total	**28**	**24,817**	**24,760**	**24,704**
All DET Schools				
Pt Stephens	22	7,923	7,879	7,749
Cessnock	25	6,611	6,663	6,703
Lake Macquarie	70	23,611	23,304	23,032
Maitland	20	8,065	8,095	8,190
Newcastle	46	17,058	16,897	16,847
Total	**183**	**63,268**	**62,838**	**62,521**

Source: Hunter Valley Research Foundation

Health

According to the 2001 population census there were 21,774 people employed in the health and community services industries in the Newcastle SD, 12% more than five years earlier in 1996 (compared to growth of 8% for NSW) (Table G5.8). Approximately 70% of all regional employment in this sector was in the health services sub-sector and 24% was in community services (Hunter Valley Research Foundation).

Table G5.8
Employment in Health and Community Services in the Newcastle SSD

ANZSIC Code	Industry	1996	2001	% Change	% Total 2001
860	Health Services, undefined	632	2,019	219	1
861	Hospitals and Nursing Homes	9,098	6,758	-26	4
862	Medical and Dental Services	2,516	2,895	15	2
863	Other Health Services (including optometry, pathology, physiotherapy etc)	2,516	3,378	34	2
864	Veterinary Services*	180	292	62	0
86	**Total Health Services**	**14,940**	**15,342**	**3**	**8**
870	Community Services (undefined)	199	545	174	0
871	Child Care Services	1,285	1,214	-6	1
872	Community Care Services (including accommodation for the aged, residential and non-residential care, etc,)	2,669	3,386	27	2
87	**Total Community Services**	**4,153**	**5,145**	**24**	**3**
O000	Health and Community Services (undefined)	327	1,287	299	1
O	**Total Health and Community Services**	**19,420**	**21,774**	**12**	**12**

Source: Hunter Valley Research Foundation
* Veterinary Services are included in Health Services by ABS.

Health and community services are a relatively large sector in the Region's economy, accounting for 12% of all employment in 2001, compared to a figure of 9% for NSW (Hunter Valley Research Foundation).

The Hunter Area Health Service (HAHS) is the major provider of health services in the region. In 2004, HAHS administered 14 hospitals and two polyclinics in the Hunter region. In addition, the HAHS was responsible for two psychiatric hospitals, two aged care facilities, 30 community health centres, 37 child and family health centres and 19 dental clinics (Hunter Valley Research Foundation).

Social Impacts

Employment

From the regional economic impact analysis in Section G4 it is evident that the initial construction of the Project will directly create an average of 400 temporary jobs per annum for the 3 years of construction as well as in the order of 187 indirect jobs across of a range of sectors. Short term peaks of up to 500 direct jobs are expected.

When fully operational at 66 Mtpa, the Project will provide 100 direct employment opportunities and in the order of 251 indirect jobs across a broad range of sectors.

These job opportunities will contribute to the reduction in regional unemployment since it is estimated that in the order of 65% of the construction workforce and 95% of the operational workforce will be sourced from within the region. Even the generation of temporary employment for the unskilled during construction, may provide enough experience to help them secure future permanent employment.

For skilled labour, the increased demand may lead to competition with other employers.

Population Growth and Community Structure

As indicated by Tables G5.2 and G5.3, the population of the Newcastle region has been steadily increasing over the past three Census periods, and more recently, and this growth is predicted to continue into the future. The proposed Project would assist in catering for this growth by providing employment opportunities for the regional workforce.

In terms of community structure, Newcastle is a relatively close-knit area with a traditional industrial base in coal shipment and steel production. The proposed Project reinforces and expands this historical focus of the region. Furthermore, since most of the ongoing workforce would be drawn from the existing population, it is not expected that the proposed development would negatively impact on the existing community structure.

Local and Regional Amenity

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

The Project Environmental Assessment document includes a detailed assessment of the potential impacts of the Project on road transport. It indicates that traffic flows in the vicinity of the Project would increase as a result of the Project and that traffic generation would be higher during construction than operation. With the implementation of proposed traffic management measures, the Project would not create significant adverse traffic impacts and is considered to be acceptable from a road transport perspective.

The Project Environmental Assessment document includes a detailed assessment of the likely impacts on the noise environment. It indicates that noise during construction of the Project would be below the relevant assessment criteria and hence any noise impacts are considered acceptable. Damage and annoyance risk to all residential receivers and the nearest commercial and industrial receivers from construction vibration was also considered to be negligible. Assessment of noise impacts during operation of the CET indicated that predicted intrusive levels are below the relevant assessment criteria and hence noise impacts are considered acceptable.

Impacts on the visual environment are also considered within the context of the existing industrial area which surrounds the site (refer Project Environmental Assessment document), the number of sensitive viewing locations and the degree to which the proposed works are visible. Although the site can be viewed from elevated land to the south and would be lit to allow for operation on a 24 hour basis, this is consistent with the surrounding landuse which includes a similar facility (Port Waratah). The visual assessment identified 8 viewpoints from which to consider the visual impact of the Project with visual impact after mitigation ranging from nil to low/moderate. The low/moderate impacts relate to the viewing locations of Mayfield, Mayfield West (Gregson Avenue) and Fern Bay (River Rd).

The air quality report concludes that air quality goals would not be exceeded at sensitive receptors.

Public Health

There is potential for the proposed development to negatively impact on public health through impacts on air and water quality. However, the assessments of these potential affects as described in the Environmental Assessment document indicate insignificant impacts.

The proposal 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 be therefore be beneficial.

Community Services and Facilities

Demand for additional investment in social services by Local, State and Commonwealth Governments can arise from increases in the population. While population in the area is expected to continue to increase, albeit at a lesser rate, the proposal is seen as supporting this population growth with employment opportunities rather than being a significant impetus for population growth.

During construction there may be some modest increase in temporary population as in the order of 35% of the average 400 direct workforce (or 35% of the 500 peak direct workforce) is expected to come from outside the region. If a similar percentage is assumed for flow-on employment, then during peak periods the workforce migrating into the region would be in the order of 257. Assuming that 10% of the direct construction workforce migrating into the region has a normal family size for the region (i.e. 2.5) and the remainder are single[6] and the flow-on workforce migrating into the region has a normal family size for the region, the additional peak population would be a once-off and temporary increase of up to 406 people. This represents less than 0.1% of the 2003 population, an increase that is unlikely to place any significant demands on housing or existing community services, facilities and emergency services. Nevertheless, given the tight rental market in Newcastle even an influx in temporary workforce and their families could lead to increased rents and displacement of some lower income Newcastle tenants. However, significant temporary accommodation capacity is available in the region.

During operation of the Project the population impacts and hence increased demand for community services and facilities will be even less. Of the estimated 100 direct workforce at full operation of the Project, only 5% are expected to originate from outside the region. If a similar percentage is applied to the estimated flow-on effects and a normal family size for the region of 2.5 is assumed, the increase in population would be in the order of 44 or 0.009% of the regional population.

Crime and Public Safety

The Project is unlikely to have a negative impact on public safety. The site is not located in close proximity to any well-utilised public areas and would be suitably fenced and patrolled. Access to the site would be restricted to the workforce during both the construction and operation phases to ensure public safety is not impacted.

The site would be suitably lit, configured and patrolled to minimise potential for vandalism to occur.

[6] This is because the construction workforce in mining and for other major development generally tend to be very mobile and not be accompanied by spouse and children.

Furthermore, there is potential for the proposed development to indirectly result in a decrease in crime rates through providing 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).

Access

The majority of the site is currently fenced and security patrolled and therefore not publicly accessible. The exception is an area of riverbank on the South Arm of the Hunter River that is proposed to be developed for wharf/shiploading facilities. While this area is currently accessible to the public it appears to receive little use. Development of the site will therefore not significantly impact on public access.

Distribution Issues

Section G3 examines the overall economic efficiency of the proposed Project and associated infrastructure that is required to facilitate Hunter Valley coal producers meeting expected export demand. While on aggregate there are estimated to be net market benefits from the proposals, it is also relevant to consider the distribution of costs and benefits between stakeholders.

Construction and operating costs of the Project will be borne initially by members of the NCIG with costs recouped over time through charges to Hunter Valley Coal producers, which includes NCIG members as well as others.

Some costs may also be borne by Port Waratah to the extent that there is any switching of exports to the NCIG CET.

Capital costs of new rail infrastructure developments will be borne initially by ARTC, but progressively recouped through charges passed on by the rail access providers to Hunter Valley Coal producers. Any additional costs of operating rolling stock will also be passed on Hunter Valley Coal producers through transport charges.

The major beneficiaries of the Project and associated infrastructure will also be the shareholders of the Hunter Valley coal producers through the opportunity to increase production to meet export demand. The net benefit to these producers is in the form of increased export revenue less mining and other costs.

There may also be some competition benefits from an additional CET with a different operator. Competition benefits are generally in the form of improved service and reduced costs.

Any environmental externalities of the infrastructure and mining developments after mitigation by proponents and imposition of strict conditions by regulators would largely be borne by consumers in the community.

G6 CONCLUSIONS

The strategic benefit cost analysis of the Project and associated infrastructure indicated that they would result in incremental net production benefits to Australia of between of between approximately $700M and $6,000M, net present value (NPV) on the basis of Australian Bureau of Agriculture and Resource Economics (ABARE) (2005) and ARTC (2006) export demand predictions and conservative coal price assumptions.

While there is considerable uncertainty around future coal prices and export demand, it is evident that there are potentially very significant net production benefits to the NSW and Australian economies that will be foregone, due to any coal supply chain capacity constraints. Approval of the Project with maximum capacity flexibility would ensure that port capacity constraints are removed and NSW and Australia can capture the economic benefits of increasing world coal demand.

Each individual infrastructure component included in the strategic benefit cost analysis may potentially have environmental externalities associated with it. For this reason, they are each subject to detailed environmental impact assessment procedures under the NSW *Environmental Planning and Assessment Act*. However, in a benefit cost framework, any residual environmental impacts after mitigation by the relevant proponents and conditions imposed by government needs to be weighed up against the estimated net production benefits.

For the suite of infrastructure projects included in this benefit cost analysis to be undesirable from an economic efficiency perspective, any residual environmental impacts would need to be valued by the community at greater than the estimated net production benefits i.e. greater than between approximately $700M and $6,000M. This is equivalent to households in the Newcastle/Hunter region valuing residual environmental impacts at between of $3,000 and $25,000 each. The equivalent figure for NSW households is between $285 and $2,400 each.

The Project will also stimulate economic activity in the Newcastle region and NSW. Using input-output analysis, it was estimated that the initial construction of the Project, to a capacity of 33 Mtpa, would contribute the following to the Newcastle economy and NSW economy for a period of 3 years:

Newcastle Economy – Construction Phase

- $43M in annual direct and indirect regional value added;
- $25M in annual direct and indirect household income; and
- 587 direct and indirect jobs.

NSW Economy – Construction Phase

- $45M in annual direct and indirect regional value added;
- $26M in annual direct and indirect household income; and
- 588 direct and indirect jobs.

Additional temporary construction impacts would occur during expansion of the CET from 33Mtpa to 66Mtpa and these impacts would be of a similar magnitude, depending upon the rate of construction activity. The timing for this expansion would be determined by market demand.

The main sectors of the regional economy that would be stimulated by the construction phase of the Project are the other construction sector, wholesale and retail trade, road transport, accommodation, cafes and restaurants, scientific research, technical and computer services, other property services, legal, other business services, cement manufacturing and structural metal products manufacturing.

The NSW impacts are also very conservative since the assessment assumes all leasing and purchasing of machinery and equipment occurs outside of NSW.

The regional economic impact of operation of the Project was estimated for both 33Mtpa and 66Mtpa and found to be as follows:

Newcastle Economy – Operational Phase

- $78M (33Mtpa) and $162M (66Mtpa) in annual direct and indirect regional value added;
- $18M (33Mtpa) and $26M (66Mtpa) in annual household income; and
- 243 (33Mtpa) and 351 (66Mtpa) direct and indirect jobs.

NSW Economy – Operational Phase

- $83M (33Mtpa) and $169M (66Mtpa) in annual direct and indirect regional value added;
- $21M (33Mtpa) and $30M (66Mtpa) in annual household income; and
- 305 (33Mtpa) and 440 (66Mtpa) direct and indirect jobs.

Furthermore, to the extent that NCIG can maximise local procurement, the regional inter-sectoral linkages reported here may be able to be increased, with corresponding increases in local economic activity and employment.

The main sectors impacted by the operation of the Project are likely to be the agricultural, mining and lifting and material handling machinery manufacturing sector, electricity supply sector, wholesale trade sector, retail trade sector, other property services sector, mechanical repairs sector and the other construction sector.

Operation of the Project would generate direct demand for employment in the transport sector (specifically the services to transport sector). Production-induced employment impacts would generate demand for employment across a range of sector including manufacturing (lifting and material handling machinery manufacturing), utilities (electricity and water sectors) wholesale and retail trade, mechanical repairs, non-residential construction (including repairs and trades), transport (road transport and services to transport) services sectors (predominantly other property services, other businesses services, communication services, legal, accounting and business management sector).

Consumption-induced employment flow-ons would mainly generate demand in the wholesale and retail trade sectors and the services sectors (education, health, community services and personal services).

These job opportunities that are generated during both the construction and operation of the Project will contribute to a reduction in regional unemployment since it is estimated that in the order of 65% of the construction workforce and 95% of the operational workforce will be sourced from within the region. Any alleviation of unemployment in the region has the potential to have a positive impact on public health and crime since there is a correlation between unemployment and both criminal activity and drug and alcohol dependency and hence demand for health services.

The proposed Project will only add very modestly to the population and population growth of the Newcastle region and hence is not expected to negatively impact on community structure or community services and facilities. Nevertheless, given the tight rental market in Newcastle itself, even a small influx in temporary workforce could lead to increased rents and some displacement of lower income Newcastle tenants. However, the abundance of short term accommodation facilities in the wider Newcastle region (i.e. including Cessnock, Maitland, Port Stephens and Lake Macquarie) may act to mitigate any potential impacts on the Newcastle rental market.

Development of the site will have no public safety implications for the community, minimal access implications and only very small local amenity impacts since while the Project site can be viewed from elevated land to the south and would be lit to allow for operation on a 24 hour basis, this activity is consistent with the existing uses of the industrially zoned land of Kooragang Island.

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ATTACHMENT GA

THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES

ATTACHMENT GA
THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES

"The 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 GA-1" (Powell and Chalmers 1995, p13-14).

Table GA-1
The GRIT Method

Phase	Step	Action
PHASE 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.
PHASE II		ADJUSTMENTS FOR REGIONAL IMPORTS
		(*Steps 4-14 apply to each region for which input-output tables are required*)
	4	Calculation of 'non-existent' sectors.
	5	Calculation of remaining imports.
PHASE III		DEFINITION OF REGIONAL SECTORS
	6	Insertion of disaggregated superior data.
	7	Aggregation of sectors.
	8	Insertion of aggregated superior data.
PHASE IV		DERIVATION OF PROTOTYPE TRANSACTIONS TABLES
	9	Derivation of transactions values.
	10	Adjustments to complete the prototype tables.
	11	Derivation of inverses and multipliers for prototype tables.
PHASE V		DERIVATION OF FINAL TRANSACTIONS TABLES
	12	Final superior data insertions and other adjustments.
	13	Derivation of final transactions tables.
	14	Derivation of inverses and multipliers for final tables.

Source: Table 2 in Bayne and West (1988)