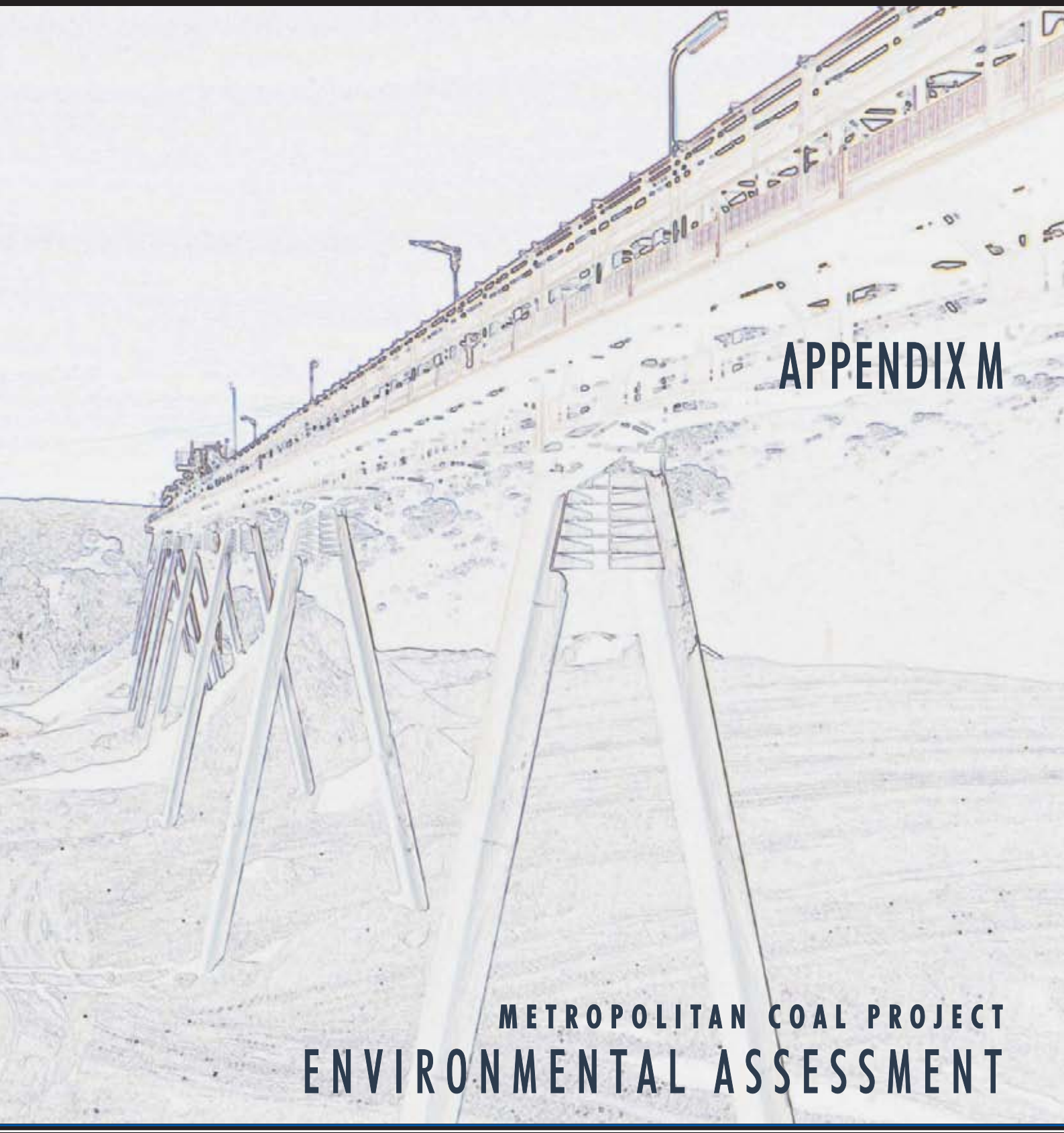


APPENDIX M

METROPOLITAN COAL PROJECT

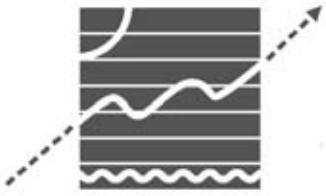
ENVIRONMENTAL ASSESSMENT

Metropolitan Coal Project
Socio-Economic Assessment

Prepared for

Helensburgh Coal Pty Limited

By



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September 2008

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EXECUTIVE SUMMARY

The Metropolitan Coal Project (the Project) involves the continuation of longwall mining at the Metropolitan colliery at Helensburgh, for 23 years, including production of up to 3.2 Mtpa of run-of-mine (ROM) coal and up to 2.8 Mtpa of product coal.

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

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

- its economic efficiency (i.e. consideration of the economic costs and benefits of the Project);
- its 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) often considered in terms of the impacts on employment, population and community infrastructure.

A benefit cost analysis of the Project identified a range of potential economic costs and benefits of the Project and placed values on most of the production costs and benefits. Possible environmental externalities of the Project were considered and while some were valued e.g. greenhouse impacts and infrastructure impacts, others remained unquantified. The analysis indicated that the total net quantified production benefit of the Project is likely to be in the order of $592 M. Quantified environmental externalities were valued at $156 M. The net quantified benefit of the Project of $436 M represents the opportunity cost to Australian society of not proceeding with the proposal.

Put another way, the unquantified environmental externalities from the Project, after mitigation by Helensburgh Coal Pty Ltd, would need to be valued at greater than $436 M to make the Project questionable from an economic efficiency perspective.

To put this threshold value in some context, every household in the Illawarra region would need to be willing to pay in the order of $2,750 to avoid the identified potential environmental impacts of the Project, to make it questionable from an economic efficiency perspective. The equivalent figure for NSW is $170.

To minimise subsidence impacts on Waratah Rivulet a 500m setback either side of the stream would be required. This level of setback would have a number of economic costs and benefits relative to the Project. It would have net production costs of $130 M together with some offsetting greenhouse gas benefits giving net quantified costs to the community of $114M. The quantified net costs of the setback of $114 M can therefore be considered as a threshold value. This threshold value is the opportunity cost to society of mining adopting a 500m setback. Interpreted another way, the unquantified environmental benefits of a 500m setback from Waratah Rivulet would need to be valued at greater than $114 M to make such a setback desirable from an economic efficiency perspective.

To put this into a regional context, this is equivalent to each household in the Illawarra SD having a willingness to pay of over $720 to avoid the impact on Waratah Rivulet. The equivalent figure for NSW households is $45.

A regional economic impact analysis, using input-output analysis, estimated that in total, the Project would contribute the following to the Illawarra economy:

- $372M in annual direct and indirect regional output or business turnover;
- $136M in annual direct and indirect regional value added;
- $56M in annual household income; and
- 700 direct and indirect jobs.

At the State level the Project would make the following contribution to the economy:

- $687M in annual direct and indirect output or business turnover;
- $301M in annual direct and indirect value added;
- $154M in annual household income; and
- 1,951 direct and indirect jobs.

The sectors most impacted by output, value-added and income flow-ons are likely to be the rail, pipeline and other transport sector, services to transport sector (Port), services to mining sector, scientific research, technical and computer services sector, retail trade sector, agriculture, mining and construction equipment sector and the wholesale mechanical repairs sector.

Employment impacts are also likely to be felt across a number of sectors including the mining sectors, transport sectors, manufacturing sectors, wholesale and retail trade sectors, accommodation, cafes and restaurants sectors and services sectors (education, health, community services and personal services).

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

During construction of the Project, an additional workforce of up to 50 people would be required during peak periods of construction. However, this workforce is likely to be sourced locally or commute to the regional daily from Sydney. Consequently, little if any population change as a result of the construction workforce is envisaged.

No additional direct operational workforce or population is envisaged as a consequence of the continued operation of the Project. However, some additional flow-on workforce (151) is expected as a result of greater flow-on employment associated with the Project compared to the current Metropolitan Colliery operation. This greater flow-on employment arises because the Project involves greater levels of operational expenditure in the region than the current operation.

The maximum potential population influx to the region of 378 is small in the context of annual population growth of the region and is considered likely to have negligible impacts on housing, schools, health or community infrastructure.

Cessation of the Project after 23 years of operation may lead to a reduction in economic activity. The significance of these Project cessation impacts will depend on:

- The degree to which any displaced workers and their families remain within the region, even if they remain unemployed. This is because continued expenditure by these people in the regional economy (even at reduced levels) contributes to final demand.

- The economic structure and trends in the regional economy at the time. For example, if Project cessation takes place in a declining economy the impacts might be felt more greatly than if it takes place in a growing diversified economy.
- Whether other mining developments or other opportunities in the region arise that allow employment of displaced workers.

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

1 INTRODUCTION

Helensburgh Coal Pty Limited (HCPL) owns and operates the Metropolitan Colliery which is located approximately 30 km north of Wollongong in NSW. The Metropolitan Colliery currently produces approximately 1.5 Million tonnes (Mt) of hard coking and semi-hard coking coal per year with 90% of coal produced being exported.

HCPL is seeking approval for the continuation of longwall (LW) mining for 23 years, including production of up to 3.2 Mtpa of run-of-mine (ROM) coal and up to 2.8 Mtpa of product coal.

Resource Strategies has been commissioned by HCPL to prepare an Environmental Assessment (EA) for the Metropolitan Coal Project (the Project) in accordance with the requirements of the NSW *Environmental Planning and Assessment Act, 1979*. The Department of Planning (DoP) Environmental Assessment Requirements for the Project indicate that a socio-economic assessment is required as part of the EA. In this respect, consideration was given to the relevant aspects of the DoP's (James and Gillespie, 2002) Draft Guideline for Economic Effects and Evaluation in EIA and the Office of Social Policy's (1995) Techniques for Effective Social Impact Assessment: A Practical Guide.

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

- the economic efficiency of the Project (i.e. consideration of economic costs and benefits);
- the regional economic impacts of the Project (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).

Planning NSW (James and Gillespie, 2002) draft *Guideline for Economic Effects and Evaluation in EIA* identified economic efficiency as the key consideration of economic analysis. Benefit Cost Analysis (BCA) is the method used to consider the economic efficiency of proposals. The draft guidelines identified benefit cost analysis as essential to undertaking a proper economic evaluation of proposed developments that are likely to have significant environmental impacts.

The above draft guideline indicates 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).

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

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

These social impacts are often considered in terms of the impacts on employment, population and community infrastructure. This study relates to the preparation of each of the following types of analyses:

- a BCA (threshold value analysis) of the Project;
- a regional economic impact assessment of the Project; and
- an employment, population and community infrastructure assessment.

An extensive consultation programme for the EA was undertaken by HCPL and is reported in Section 3 of the EA.

2 BENEFIT COST ANALYSIS

2.1 INTRODUCTION

For the Project to be economically desirable from an Australian community perspective, it must be economically efficient. Technically, a project is economically efficient and desirable on economic grounds if the benefits to society exceed the costs (James and Gillespie, 2002). For mining projects, the main economic benefit is the producer surplus generated by the mine while the main economic costs relate to environmental costs. The main technique that is used to weigh up these benefits and costs is BCA.

BCA involves the following key steps:

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

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

2.2 IDENTIFICATION OF THE BASE CASE AND PROJECT

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

In this study, the “without” option involves:

- continuation of approved mining of Longwalls (LW) 14-19A to produce up to approximately 1.5 million tonnes per annum (Mtpa) of product coal;
- cessation of mining activity in August 2010 with associated decommissioning and rehabilitation;
- sale of capital equipment;
- completion of rehabilitation and relinquishment of the mining tenements to the Department of Primary Industries (DPI);
- rehabilitation and relinquishment of the Metropolitan Colliery Major Surface Facilities Area with land allocated to its next best use, presumed to be residential development, industrial development or public space; and
- subsidence effects and environmental impacts arising from historical mining and mining of LW 14-19A.

In contrast to the “base case”, the Project involves:

- ongoing surface and underground exploration activities in the Project Underground Mining Area and surrounds;
- continued development of underground mining operations within the existing HCPL coal lease (and associated sub-lease) and two new MLA areas (MLA 1 and MLA 2);

- upgrades of the existing mining and materials handling systems (e.g. longwall machinery and conveyors) to facilitate an increased ROM coal production rate (up to approximately 3.2 Mtpa);
- upgrades of the Coal Handling Preparation Plant (CHPP) to facilitate increased production of washed coal, addition of a beneficiation circuit, and to progressively attenuate noise emissions;
- continued transport of coal reject to the Glenlee Washery which is owned and operated by SADA (with annual road movements capped at the existing maximum rate);
- continued transport of product coal by road to Coalcliff and Corrimal Coke Works (with annual road movements capped at the existing maximum rate);
- construction of a coal reject paste plant and associated coal reject stockpile, pumping, pipeline and underground delivery systems to facilitate the underground backfilling of the mine void using coal reject materials as an integrated component of the longwall mining operation;
- train loading and train movements associated with the transport of product coal to Port Kembla Coal Terminal 24 hours per day, seven days per week;
- surface access within the Woronora Special Area and surrounds that is required for the environmental monitoring, management and remediation of mine subsidence;
- upgrades and/or extension of the existing supporting infrastructure systems (e.g. underground access, water management system, yard area, conveyor transfers and drives, ventilation, gas management and electrical systems) as required;
- extension of the life of the Metropolitan Colliery by approximately 23 years; and
- other associated minor infrastructure, plant, equipment and activities.

The Project also involves a commitment to manage mining so that no significant cracking in the larger heritage listed masonry buildings at the Garrawarra Centre (aged care facility) would occur.

At the end of the Project it is assumed that capital equipment would be sold and the mining tenements would be relinquished to the DPI and the Metropolitan Colliery Major Surface Facilities Area would be allocated to its next best use, presumed to be residential development, industrial development or public space.

HCPL has also considered a number of alternatives to the Project. These involve various levels of restriction on mining activities to examine the relative costs and environmental benefits of avoiding or minimising subsidence effects on key surface features. The analysis of these alternatives is presented in Section 2.7.

2.3 IDENTIFICATION OF BENEFITS AND COSTS

Relative to the base case or “without” scenario of mining cessation, the Project may have the potential incremental economic benefits and costs shown in Table 2.1.

Table 2.1
Economic Benefits and Costs of the Project

Category	Costs	Benefits
Production	Opportunity cost of land	Sale value of export and domestic coal
	Opportunity cost of capital	
	Capital costs of establishment and construction including ancillary works	Residual value of capital and land at the cessation of the Project
	Operating costs, including administration, mining, processing and transportation	
	Decommissioning and rehabilitation costs of Major Surface Facilities Area at cessation of the Project	Avoided decommissioning and rehabilitation costs of Major Surface Facilities Area in 2010
Major Surface Facilities Area Externalities	Operational noise	
	Air quality	
	Road transport and road transport noise	
	Offsite rail and road transport vibration	
	Non-Aboriginal heritage impacts	
	Surface water release/runoff	
Project Underground Mining Area Externalities	Localised streamflow and water quality effects	
	Groundwater impacts	
	Aboriginal heritage impacts	
	Upland swamp impacts	
	Garrawarra Centre impacts	
	Infrastructure, roads and buildings impacts	
	Flora and fauna impacts	
	Greenhouse gas generation	
	Visual impacts	

Note: All external impacts need to be relative to the base case which is cessation of mining after 2010.

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

2.4 QUANTIFICATION/VALUATION OF BENEFITS AND COSTS

In accordance with NSW *Treasury Guidelines for Economic Appraisal* (NSW Treasury, 1997), where competitive market prices are available, they have generally been used as an indicator of economic values.

2.4.1 *Production Costs and Benefits*

Economic Costs

Opportunity Cost of Land

There is an opportunity cost associated with using land for the Major Surface Facilities Area instead of its next best use. An indication of the opportunity cost of the land can be gained from the market value of this land following decommissioning and rehabilitation. The final land use of the Major Surface Facilities Area is uncertain. However, for the purpose of this analysis it is assumed that the 20 ha of land would be suitable for residential development, with a raw land value of $1.5M per ha. This is the highest opportunity cost land use for the site (i.e. is conservative).

Opportunity Cost of Plant

Where the mining and coal processing activity would utilise plant and machinery already owned by HCPL, there is an opportunity cost associated with utilising this plant rather than selling it or using it elsewhere. An indication of its opportunity cost can be gained from its estimated market value. The market value estimated by HCPL is in the order $5M.

Capital Cost of the Project

Capital costs of the Project are associated with establishment of new longwalls, purchase of continuous miners, ramping up ROM production and sustaining capital. These capital costs over the life of the mine are estimated at $560M. These costs are included in the economic analysis in the years that that they are expected to occur.

Annual Operating Costs of the Mine

The annual operating costs of the Project include those associated with mining, monitoring and stream restoration, infrastructure remediation, operation of the CHPP and handling, administration, marketing, rail freight, port costs and sampling costs. Average annual operating costs of the mine are estimated at $200M.

While royalties are a cost to HCPL they are part of the overall producer surplus benefit of the mining and processing activity that is redistributed by government. Royalties are therefore not included in the calculation of the resource costs of operating the Project. Nevertheless, it should be noted that the Project would generate total royalties in the order of $11M pa with total royalties over the life of the Project in the order of $250M.

Decommissioning and Rehabilitation Costs of Major Surface Facilities Area

With the Project, the Metropolitan Colliery Major Surface Facilities Area would be decommissioned and rehabilitated at cessation of mining at a cost in the order of $3M.

Economic Benefits

Sale Value of Coal

The provisional production schedule is provided in Table 2.2.

Table 2.2
Provisional Production Schedule

Year	Total ROM Coal (Mtpa)	Total Coking Coal (Mtpa)	Total Thermal Coal (Mtpa)	Total Coal Reject (Mtpa)
1	1.80	1.53	0.03	0.24
2	1.91	1.62	0.03	0.26
3	2.13	1.81	0.03	0.29
4	2.50	2.12	0.04	0.34
5	2.45	2.08	0.04	0.33
6	2.60	2.21	0.04	0.35
7	2.61	2.22	0.04	0.35
8	2.61	2.22	0.04	0.35
9	2.72	2.31	0.04	0.37
10	2.86	2.43	0.04	0.39
11	2.91	2.48	0.04	0.39
12	3.06	2.60	0.05	0.41
13	3.10	2.63	0.05	0.42
14	2.99	2.54	0.05	0.40
15	3.19	2.71	0.05	0.43
16	3.02	2.56	0.05	0.41
17	3.03	2.58	0.04	0.41
18	2.86	2.43	0.04	0.39
19	2.97	2.53	0.04	0.40
20	3.03	2.58	0.04	0.41
21	3.15	2.68	0.04	0.43
22	2.80	2.38	0.04	0.38
23	2.60	2.21	0.04	0.35
Total	**62.90**	**53.46**	**0.94**	**8.50**

Source: HCPL (2008)

Both demand and supply for coal influences current and projected prices.

Demand for coal is derived demand, i.e. dependent on demand for the end products within which the coal resource is used. For coking coal the end product is steel production while for thermal coal it is electricity. Demand for coal therefore fluctuates considerably based on numerous market factors including the price of the steel and electricity, the prices of related end product, income of consumers, expected future prices, population, preferences, etc.

World supply of coal also fluctuates depending on price of steel and electricity, prices of factors of production, prices of related goods, expected future prices, the number of suppliers, technology, greenhouse gas emission policy, etc.

Coal prices fluctuate considerably and are expected to continue to do so. The price for high quality coking coal averaged A$157/t in 2005-06, A$133/t in 2006/07 and A$112/t in the March quarter of 2007-08. For other metallurgical coal the price averaged A$111/t in 2005-06, A$82/t in 2006/07 and A$78/t in March quarter 2007-2008. The average price for thermal coal was A$65/t in 2005-06, A$60/t in 2006/07 and A$71/t in the March quarter of 2007-08 (ABARE, 2008).

However, coal prices have increased significantly recently and are expected to remain high for a number of years. HCPL has provided coal price estimates based on existing contracts and conservative expectations for the Project life. There is obviously considerable uncertainty around future coal prices and hence coal prices have been subjected to sensitivity testing (Section 2.6).

Residual Value at End of the Evaluation Period

At the end of the Project, purchased capital equipment may have some residual value that could be realised by sale. On decommissioning of the mine, the Major Surface Facilities Area would also have some value, estimated by its market value. The residual value of capital and land are estimated at $5M and $30M, respectively.

Decommissioning and Rehabilitation Costs of Major Surface Facilities Area

Under the base case the Metropolitan Colliery Major Surface Facilities Area would be decommissioned and rehabilitated in 2010 at a cost in the order of $3M. With the Project, this decommissioning cost would not occur until approximately 2033. This cost in 2010 is therefore avoided and hence is a benefit of the Project.

2.4.2 ***External Costs and Benefits***

The environmental impacts or externalities of the Project can be considered within two contexts:

- continuation of existing amenity impacts of the existing Metropolitan Colliery Major Surface Facilities Area on the urban environment of Helensburgh and beyond; and
- subsidence effects and associated potential impacts on the natural and built environment above the Project Underground Mining Area.

Major Surface Facilities Area Externalities

Urban externalities of the Project arise from continued noise and air quality emissions associated with the existing Metropolitan Colliery facilities at Helensburgh and transport noise and vibration associated with transportation of product coal and coal rejects on the public road network and rail network. These are described further below.

Operational Noise

As described in Appendix J of the EA, the existing Metropolitan Colliery Major Surface Facilities Area contributes to the existing noise environment in Helensburgh.

Although operational noise emissions would fall as a result of the Project at the majority of residential properties in the vicinity of the Major Surface Infrastructure Area (Appendix J), residences in close proximity would continue to experience ambient noise levels in excess of project specific noise criteria until Project cessation. Without the Project, ambient noise levels at these properties would return to baseline urban levels within 2 years (assuming future use of the site for non-industrial purposes). Hence, while noise emissions would be reduced by the Project, the continued noise emissions of the Metropolitan Colliery would continue to be reflected in the property values of nearby properties.

Air Quality

As described in Appendix K of the EA, the existing Metropolitan Colliery Major Surface Facilities Area contributes to existing air quality conditions in Helensburgh. Current dust and particulate monitoring at locations in close proximity to the Major Surface Facilities Area indicates compliance with applicable air quality criteria at the nearest residences, and this compliance is predicted to continue for the Project (Appendix K). Hence, no economic effects have been identified with respect to the predicted air quality emissions of the Project.

Road Transport Noise

As described in Appendix J of the EA, the existing Metropolitan Colliery contributes to off-site road transport noise effects along the transport routes, to and from the Major Surface Facilities Area, with the key transport contribution being the transport of product coal to local coke works and coal reject to the Glenlee Washery.

With the Project, these activities would continue at the current levels, contributing less than 6.5% of daily traffic movements along Parkes Street and negligible traffic movements to the regional road network. These traffic movements would then substantially reduce when coal reject road transport to Glenlee Washery for emplacement is expected to cease after Year 12 of the Project.

However, without the Project, existing Metropolitan Colliery truck movements along Parkes Street would cease in 2010. Consequently, the Project may result in some continuing amenity impacts to houses located along Parkes Street, relative to without the Project.

Rail Transport Noise

Similarly to road transport noise, as described in Appendix J of the EA, the existing Metropolitan Colliery contributes to off-site rail transport noise effects along the railway to Port Kembla. With the Project, these activities would continue and cumulative rail movements would be increased marginally by the additional Project product coal movements on the rail network (less than 4% on average) which equates to <1 decibel (dB) variation in rail noise over the 24hr rail noise assessment period (Appendix J). For the purpose of this analysis, it is assumed that the variation in rail noise impacts associated with cessation of the Metropolitan Colliery in 2010 or the alternative development of the Project would not be of sufficient magnitude to introduce a cost into the benefit cost analysis.

Off-Site Rail and Road Transport Vibration

As described in Appendix J of the EA, existing Metropolitan Colliery heavy vehicle and train movements on the public road and rail networks would generate some ground vibration effects. As the Project would not result in significant increases in the total number of heavy vehicle movements on the public road network or total rail movements on the South Coast rail network, the existing road vibration effects of heavy vehicle movements on the public road network and rail vibration effects of trains on the South Coast rail network would be generally unchanged by the Project (Appendix J). For the purpose of this analysis, it is assumed that the variation in ground vibration effects associated with cessation of the Metropolitan Colliery in 2010 or development of the Project would not be of sufficient magnitude to alter land valuations along the key road transport or rail routes.

Non-Aboriginal Heritage

The Metropolitan Colliery is listed in the Wollongong Local Environmental Plan (LEP) and Illawarra Regional Environmental Plan (REP) as a registered heritage site. Identified places of heritage significance at the Metropolitan Colliery include various aspects of the built environment (e.g. buildings and mining infrastructure) that remain from the development of the site over the period since mining commenced in the 1880s. A description of the key listed heritage items and their location is provided in Appendix I to the EA.

Potential impacts to items of heritage within the Metropolitan Colliery surface facilities area include impacts associated with:

- upgrades/extensions to the CHPP, material handling (conveyor) systems, water management systems and electrical reticulation and control systems; and
- construction of additional infrastructure such as a demountable bathhouse, and coal reject paste plant and associated coal reject stockpile, pumping, pipeline and underground delivery systems.

These impacts are expected to be minor as the Project upgrades would be undertaken in accordance with a Conservation Management Plan (CMP) to be developed for the Metropolitan Colliery as a component of the Project.

Surface Water Management

Water supply would be in the form of recycled water from the underground mine, capture of runoff from active mining and operational areas, extractions from Camp Creek and potable water supplied from Sydney Water. In accordance with existing requirements, releases of treated water off-site at the Metropolitan Colliery Major Surface Facilities Area would be undertaken as necessary during wet periods in accordance with the requirements of the Environment Protection Licence (EPL).

Water management and mitigation measures at the Major Surface Facilities Area include:

- the effective diversion of runoff from undisturbed areas around areas of disturbance;
- the containment, and treatment where necessary, of runoff from areas of disturbance; and
- water conservation via maximising reuse.

No measurable impacts on the Hacking River are expected to result from operation of the Major Surface Facilities Area over the life of the Project.

Project Underground Mining Area Externalities

As described in Appendix A of the EA, underground longwall mining results in mine subsidence effects occurring at the surface. These effects include shifting of the ground surface downwards (subsidence) and within confined valleys, shifting of the ground surface upwards (upsidence). Subsidence effects can result in some impacts on natural features including streams, upland swamps, and cultural heritage sites.

Surface Water

Mine subsidence can result in surface cracking of some sections of the stream bed as well as cracking to a depth of up to 15m. This cracking can result in the diversion of surface flows in the following ways:

- Diversion underground and resurfacing further downstream.
- Leakage through rock bars, where water held in ponds and pools may leak through fractures and joints in rock bars and resurface further downstream.

Re-emerging water can have elevated levels of iron oxides and manganese resulting in red staining of the water or rock surfaces. Consequently, during periods of low flows, subsidence cracking can:

- reduce water levels in natural weirs that pond water;
- reduce surface water flows in the sections of the stream where cracking occurs (i.e. diversion of a portion of the surface flow to the sub-surface);
- result in staining of the water downstream of where the water re-merges;
- cause localised changes to water quality and aquatic habitats; and
- cause localised effects on riparian vegetation (e.g. loss of vigour or localised dieback).

These impacts are observed during periods of low flow. During periods of moderate to high flow, sections of the streams affected by subsidence function normally, i.e. pool water levels persist, rock bars experience over flow and significant surface flows occur.

Investigation of the existing impacts of mining at the Metropolitan Colliery indicate that these effects do not have any impact on the quality or quantity of water reporting to the Woronora Reservoir and hence Greater Sydney's water supply (refer Appendix C of the EA).

Subsidence impacts have been observed along Waratah Rivulet and associated tributary streams above the Completed and Current Underground Mining Areas. If the Project were approved it is predicted that subsidence effects would be experienced along additional lengths of streams located above the Project Underground Mining Area (i.e. Waratah Rivulet and associated tributaries of the Woronora Reservoir).

Groundwater

Analysis of groundwater data indicates that there are three separate groundwater systems:

- Perched Groundwater System – typically less than 20m below the ground surface.
- Shallow Groundwater System – typically less than 100m below the ground surface.
- Deep Groundwater System – typically more than 100m below the ground surface.

The Deep Groundwater System is considered to be disconnected or separated from the Shallow Groundwater System with very little effective groundwater flow between them.

The coal seam that is extracted during underground coal mining is located more than 400m below the ground surface in the Deep Groundwater System. The underground mining has no material effect on the Shallow Groundwater System or the Perched Groundwater System. This means that there is:

- no mechanism by which the proposed underground mining would affect surface water flows;
- no loss of groundwater flow to the Woronora Reservoir; and
- no effect to vegetation or swamps as a result of groundwater pressure change in the Deep Groundwater System.

Upland Swamps

Upland swamps may occur in gently sloping valleys, on steep slopes, benches on valley sides or extend to the valley flow. They are considered to be species rich and provide habitat for a range of fauna including birds and frogs. Subsidence may lead to minor cracking in upland swamps in the Project Underground Mining Area.

Monitoring to date indicates that there have been no significant adverse impacts on upland swamps of the nature found in the Project Underground Mining Area. For the purpose of the analysis, it is assumed that no swamps would be adversely affected by subsidence effects to the extent that any externalities would arise.

Aboriginal Heritage

The landscape of Southern Coalfields is characterised by sandstone ridges, steep slopes, valleys, rocky outcrops and cliff formations typical of the Sydney basin. Weathering of the Hawkesbury sandstone forms a range of features including scooped-out ledges with overhangs and large boulders. Some sandstone features contain known Aboriginal heritage sites e.g. grinding sites, engraving sites, sandstone overhangs with art, sandstone overhangs with artefacts and/or archaeological deposits. Instabilities occur naturally, particularly in cliff lines and overhangs, however, subsidence movements have the potential to further reduce the stability of these features. Sandstone overhangs and open sites such as engravings on rock platforms are the Aboriginal site types most likely to experience subsidence related impacts (i.e. cracking of rock platforms or instability of overhangs). If the Project were approved it is estimated that a small number of Aboriginal sites may be affected.

Non-Aboriginal Heritage

The Garrawarra Centre is listed in the Wollongong LEP as a registered heritage site. Identified places of heritage significance at the Garrawarra Centre include various aspects of the built environment (e.g. buildings and their setting) that remain from the original development of the site as a Tuberculosis treatment centre (Waterfall State Sanatorium) in 1909. Description of the key listed heritage items within Garrwarra Centre and the location of the facility are provided in Appendix I to the EA.

Potential impacts to items of heritage within the Garrawarra Centre relate to the potential effects of subsidence on the buildings (e.g. cracks or damage). HCPL have committed to performance criteria as part of the mine design in the vicinity of the Garrawarra Centre, such that buildings within the Garrawarra Centre would experience negligible impacts (Appendix I to the EA).

Infrastructure, Roads and Buildings

In addition to the Garrawarra Centre, there is a range of other infrastructure located above or in close proximity to the Project Underground Mining Area that may potentially be adversely affected by subsidence effects. These include features such as:

- optical fibre cables;
- electrical transmission lines;
- water pipelines;
- the Princes Highway; and
- the F6 Southern Freeway.

Potential impacts on these items of infrastructure would be managed through the Subsidence Management Plan (SMP) process post Project Approval. Management measures would be implemented by HCPL where required and remediation of subsidence effects would be facilitated by the Mine Subsidence Board, as required.

An allowance of $2.5M has been made for these remediation costs, spread across the years when impacts are expected.

Flora and Fauna

Areas of native vegetation overlying the Project underground mining would not be significantly impacted by subsidence effects. A number of threatened flora and fauna species were identified in the Project area and surrounds as described in Appendices E and G to the EA. Assessment of the impacts of the Project indicated that none of these species would be appreciably impacted by the Project.

Greenhouse Gas Generation

The Project would generate an estimated 262,931 tonnes (t) carbon dioxide equivalent (CO_2-e) per annum of Scope 1 greenhouse gas emissions predominantly from the use of LPG, diesel and mine ventilation/gas drainage. There would also be an estimated 147,752 t CO_2-e per annum of Scope 2 and 3 emissions from on-site electricity use, diesel use and LPG use. Transport of coal (to local coking works and Port Kembla) and coal rejects (to Glenlee Washery) would be associated with an estimated 3,740 t CO_2-e per annum of Scope 3 emissions. All these emissions have conservatively been included in the economic analysis.

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

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

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

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

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

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

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

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

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

The price of carbon credits under the European Union Emissions Trading Scheme are currently around 24/t CO_2, the equivalent of about US$38/t CO_2 while spot prices in the Chicago Climate Exchange are in the order of US$3.95/t CO_2.

More recent information on the cost of carbon credits can be obtained from the carbon reduction schemes in Australia. As of July 2008 the spot price under the NSW Government Greenhouse Gas Reduction Scheme was AUS$7.25/t CO_2. Prices under the Commonwealth Governments Greenhouse Friendly Voluntary Scheme were AUS$8.30/t CO_2 and Australian Emissions Trading Unit (in advance of the Australian Government's Emissions Trading Scheme) was priced at AUS$21/t CO_2-e (Next Generation Energy Solutions pers. comms. 24 July 2008).

A National Emissions Trading Scheme is foreshadowed in Australia by 2010. While the ultimate design and hence liabilities under the scheme are still a work in progress, the National Emissions Trading Taskforce has cited a carbon permit price of around AUS$35/t CO_2.

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

Visual Impacts

The Project would have very limited potential for visual impacts as the Project mining would be underground primarily in an area where public access is generally restricted (i.e. the Woronora Special Area), and the existing Metropolitan Colliery Major Surface Facilities Area is located in a topographic location which limits the number of potential public viewpoints, has extensive vegetation screening and the Project modifications are generally consistent with the existing development.

2.5 CONSOLIDATION OF VALUE ESTIMATES

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

Table 2.3
Benefit Cost Analysis Results of the Project (Present Values)

Benefits		**Costs**	
Production		***Major Surface Facilities Area Externalities***	
Net Production Benefits	$592 M	Operational noise from surface infrastructure	$1.5 M
		Air quality from surface infrastructure	Negligible
		Road transport and road transport noise	$3.9 M
		Rail transport noise	Negligible
		Offsite Rail and Road Transport Vibration	Negligible
		Non-Aboriginal Heritage impacts on surface infrastructure	Negligible
		Run-off impacts from surface infrastructure	Negligible
		Project Underground Mining Area Externalities	
		Stream impacts	Some impacts
		Groundwater impacts	Negligible
		Aboriginal heritage impacts	Some impacts
		Upland swamps impacts	Negligible
		Garrawarra Centre Impacts	Negligible
		Infrastructure, Roads and Buildings	$1.4 M
		Flora and fauna	Negligible
		Greenhouse gas generation	$149 M
		Visual impacts	Negligible
TOTAL QUANTIFIED	**$592 M**	**TOTAL QUANTIFIED**	**$156 M**
NET QUANTIFIED BENEFITS		**$436 M**	

The main decision criterion for assessing the economic desirability of a project to society is its Net Present Value (NPV). NPV is the present value of benefits less the present value of costs. A positive NPV indicates that it would be desirable from an economic perspective for society to allocate resources to the Project, because the community as a whole would obtain net benefits from the Project. Table 2.3 indicates that the Project would have net production benefits of $592M.

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

- HCPL shareholders;
- the NSW Government via royalties; and
- the Commonwealth Government in the form of Company tax.

The NSW Government receives additional benefits in the form of payroll tax and local councils may also benefit through appropriate licensing and permitting contributions.

The Project also has a range of external economic costs. Greenhouse gas generation, the impacts of subsidence on infrastructure, roads and bridges and amenity impacts in Helensburgh have been quantified at $156M (assuming a conservative high greenhouse gas social cost).

This gives a quantified net benefit of the Project of $436M. However, some of the environmental externalities of the Project have not been able to be quantified. These are the subsidence related impacts on streams and Aboriginal heritage sites.

The quantified net benefits of the Project of $436M can therefore be considered as a threshold value. This threshold value is the opportunity cost to society of not proceeding with the Project. Interpreted another way, the unquantified environmental externalities of the Project, after mitigation by HCPL would need to be valued at greater than $436M to make the Project questionable from an economic efficiency perspective.

To put this into a regional context, this is equivalent to each household in the Illawarra SD having a willingness to pay of over $2,750 to avoid any of the residual environmental impacts of the Project, after mitigation by HCPL. The equivalent figure for NSW households is over $170.

The external economic costs of the Project would be borne by residents of Helensburgh and the general community who value the environment of the Southern Coalfields.

Notwithstanding this, HCPL is undertaking measures to minimise external costs as much as possible. These measures include:

- progressively reducing noise emissions a the Major Surface Facilities Area in Helensburgh as a component of the Project upgrades;
- progressively developing and implementing alternative methods for disposal of rejects; and
- implementing stream restoration works at key rock bars at the Waratah Rivulet over the Project life.

2.6 SENSITIVITY ANALYSIS

This NPV presented in Table 2.3 is based on a range of assumptions around which there is some level of uncertainty. Uncertainty in a BCA can be dealt with through changing the values of critical variables in the analysis (James and Gillespie, 2002) to determine the effect on the NPV.

In this analysis, the BCA result was tested for changes to the following variables:

- opportunity cost of land;
- opportunity cost of capital;
- rehabilitation and decommissioning costs;
- capital costs;
- operating costs;
- revenues; and
- external costs.

What this analysis indicated is that the results of the BCA are not sensitive to reasonable changes in assumptions regarding any of these variables. In particular, significant increases in the values used for external impact such as noise impacts or impacts on infrastructure, roads and bridges had little impact on the economic desirability of the Project.

Increasing the estimate of the social cost of carbon to the level suggested by Stern (2006), results in net quantified benefits of the Project of $90M. Reducing the estimate of the social cost of carbon to the level suggested by Nordhaus (2008), results in net quantified benefits of the Project of $540M.

The results were most sensitive to increases in operating costs and decreases in the sale value of coal.

2.7 CONSIDERATION OF ALTERNATIVES

Even if a BCA of a particular project indicates that the net production benefits of coal mining exceed the environmental costs, this does not mean that the project design has optimised the net benefits for society from the Project. The design of an underground mining project inevitably involves a trade-off between the quantity of coal recovered (i.e. producer surplus) and environmental damage costs (i.e. consumer surplus).

To explore this further, HCPL has considered setbacks from the Waratah Rivulet to minimise impacts on this natural feature. The Subsidence Assessment (Appendix A to the EA) suggests an upper-bound predicted closure target of about 200mm would be required in order to minimise impacts on streams. The required setback to achieve this closure target at the Waratah Rivulet is in the order of 500m either side of the stream.

This level of setback would have a number of economic costs and benefits relative to the Project base case analysed earlier in this Section.

A longwall jump (i.e. relocation around a block of coal to be left behind) within the same panel would be required for each of the first 10 longwalls, at an estimated capital cost of $2.75M per jump. The relocation of the longwall would take 23 days and result in 23 lost days of production with resulting losses in revenue. Some savings in variable costs of production such as ROM costs to CHPP, freight, marketing and port/sampling costs would occur to partially offset the lost revenue.

To maintain mining without a major stoppage for development (i.e. greater than 23 days) and resolve gas drainage issues would require development of a bleeder and faceline out to LW30 at a cost of $20M in capital equipment and 40 additional employees for 10 years.

The longwall jumps would also result in less ROM coal ultimately being extracted (approximately 7Mt of ROM) shortening the life of the mine by approximately 2 to 3 years with associated reductions in revenue, and some partially offsetting reductions in operating costs and sustaining capital costs in the lost years.

Decommissioning of the Major Surface Facilities Area would occur 2 to 3 years earlier than under the Project, imposing a small cost, while realisation of capital and land residual value would occur 2 to 3 years earlier than under the Project base case.

The setback is assumed to negate the need for stream remediation actions resulting in a cost saving. For the purpose of the analysis some greenhouse gas cost savings have also been assumed proportional to reductions in annual production.

The major benefit of these changes would be avoidance of potential subsidence impacts on the Waratah Rivulet.

The present values of these costs and benefits, using a 7% discount rate, are given in Table 2.4.

Table 2.4
Benefit Cost Analysis Results of a Hypothetical 500m Setback from Waratah Rivulet (Present Values)

Benefits		Costs	
Production			
Operating cost savings	$228 M	Additional capital equipment	$18 M
Reduced sustaining capital from shortened mine life	$10 M	Additional labour	$30 M
Reduced stream remediation costs	$7 M	Cost of longwall jumps	$18 M
Brining forward realisation of residual land	$2 M	Foregone revenue	$311 M
		Bringing forward decommissioning	$0 M
Sub-total production benefits	***$247 M***	***Sub-total production costs***	***$377 M***
Environment			
Reduced greenhouse gas impacts	$16 M		
TOTAL QUANTIFIED	**$263 M**	**TOTAL QUANTIFIED**	**$377 M**
NET QUANTIFIED COST			**$114 M**

Table 2.4 indicates that a 500m setback would have net quantified costs to the community of $114 M.

However, some of the environmental benefits of a setback have not been able to be quantified. These are the avoided subsidence impacts on Waratah Rivulet.

The quantified net costs of the setback of $114 M can therefore be considered as threshold value. This threshold value is the opportunity cost to society of mining adopting a 500m setback. Interpreted another way, the unquantified environmental benefits of a 500m setback would need to be valued at greater than $114 M to make such a setback desirable from an economic efficiency perspective.

To put this into a regional context, this is equivalent to each household in the Illawarra SD having a willingness to pay over $720 to avoid the impact on Waratah Rivulet. The equivalent figure for NSW households is $45.

3 REGIONAL ECONOMIC IMPACT ASSESSMENT

3.1 INPUT-OUTPUT TABLE AND ECONOMIC STRUCTURE OF THE REGION

For the regional economic impact assessment, a 2005-06 input-output table of the Illawarra regional economy (Illawarra Statistical Division [SD]) was developed using the Generation of Input-Output Tables (GRIT) procedure (Attachment A). Even though reject emplacement would take place outside this region (i.e. at Glenlee Washery), the Illawarra SD is the region within which the major component of the Project (i.e. mining) would take place. A 2005 to 2006 input/output table for the NSW economy was also developed using this method for comparative purposes.

A 109 sector input-output table of the regional economy was aggregated to 30 sectors and 6 sectors for the purpose of describing the economies.

A highly aggregated 2005-06 input-output table for the regional economy is provided in Table 3.1. The rows of the table indicate how the gross regional output of an industry is allocated as sales to other industries, to households, to exports and other final demands (OFD - which includes stock changes, capital expenditure and government expenditure). 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 3.1
Aggregated Transactions Table: Regional Economy 2005-06 ($'000)

	Ag, forestry, fishing	Mining	Manuf.	Utilities	Building	Services	TOTAL	Household Expenditure	OFD	Exports	Total
Ag, forestry, fishing	5,340	55	21,509	8	576	14,638	**42,126**	32,497	67,370	124,476	**266,469**
Mining	14	24,785	105,230	36,586	4,032	3,372	**174,019**	1,251	-12,976	508,384	**670,678**
Manuf.	13,444	17,351	1,175,096	8,527	269,867	534,070	**2,018,355**	413,931	159,092	3,651,041	**6,242,419**
Utilities	2,015	3,116	91,373	208,680	7,683	102,581	**415,448**	88,562	5,468	173,389	**682,867**
Building	1,335	5,376	13,753	10,734	532,074	183,699	**746,971**	0	1,400,721	119,076	**2,266,768**
Services	25,101	38,767	697,175	25,216	235,990	2,975,611	**3,997,860**	5,281,225	3,400,767	4,141,116	**16,820,968**
TOTAL	**47,249**	**89,450**	**2,104,136**	**289,751**	**1,050,222**	**3,813,971**	**7,394,779**	**5,817,466**	**5,020,442**	**8,717,482**	**26,950,169**
Household Income	72,747	94,757	1,054,156	57,411	610,447	6,170,374	**8,059,891**	0	0	0	**8,059,892**
OVA	50,676	399,546	673,223	143,645	170,110	2,842,979	**4,280,178**	528,941	177,514	15,668	**5,002,302**
Imports	95,797	86,924	2,410,906	192,060	435,990	3,993,643	**7,215,320**	3,240,008	953,748	618,014	**12,027,090**
TOTAL	**266,469**	**670,677**	**6,242,421**	**682,867**	**2,266,769**	**16,820,967**	**26,950,170**	**9,586,415**	**6,151,704**	**9,351,164**	**52,039,453**
Employment	**1,740**	**1,384**	**16,277**	**864**	**8,745**	**99,062**	**128,072**				

Gross regional product (GRP) for the Illawarra economy is estimated at $13,062M, comprising $8,060M to households as wages and salaries (including payments to self employed persons and employers) and $5,002M in OVA.

The employment total in the Illawarra region was 128,072 people.

The economic structure of the regional economy can be compared with that for NSW through a comparison of results from the input-output model (Figures 3-1 and 3-2). This reveals that the manufacturing sector and mining sector (GRP only) in the regional economy is of greater relative importance than it is to the NSW economy, while the agricultural/forestry/fishing sectors, service sectors (GRP and output) and building sectors (output) are of less relative importance than they are to the NSW economy. Other sectors are of similar relative importance to both the Illawarra region and NSW.

Figure 3.1
Summary of Aggregated Sectors: Regional Economy (2005-06)

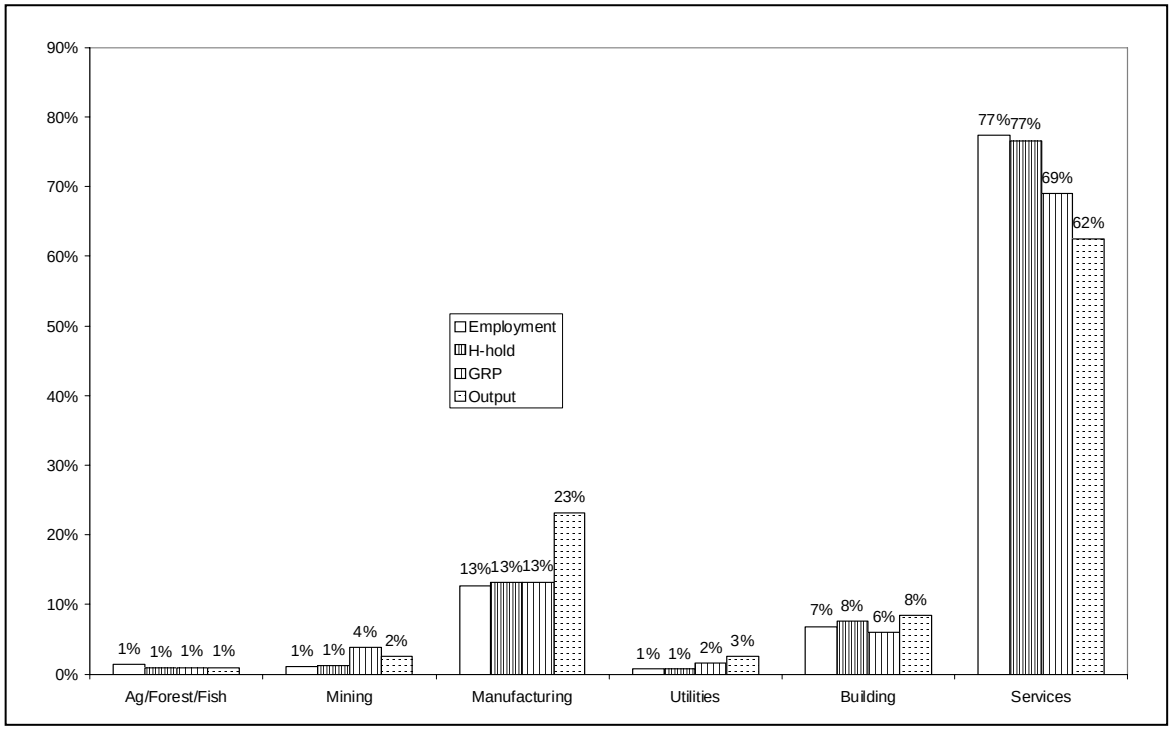
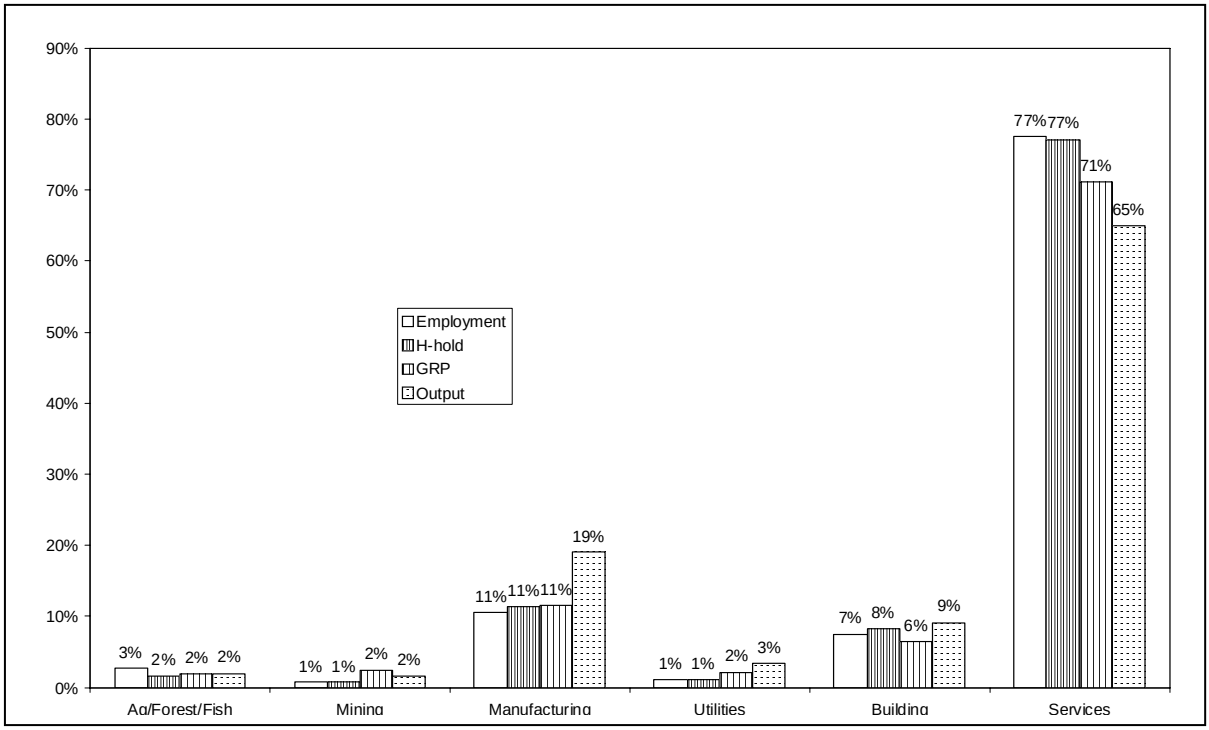


Figure 3.2
Summary of Aggregated Sectors: NSW Economy (2005-06)



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

In terms of gross regional output, the metal manufacturing sector is the most significant sector of the regional economy followed by the business services sector, retail trade and building/construction. For value-added, business services, ownership of dwellings and retail trade are the most significant sectors. The retail trade sector is the greatest employer in the region followed by the services sectors (predominantly education, business services, health and personal/other services). However, in terms of income paid to employment the business services sectors is the most significant, reflecting the high wages in this sector. Metal manufacturing is the major sector responsible for exports from the region and imports to the region.

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

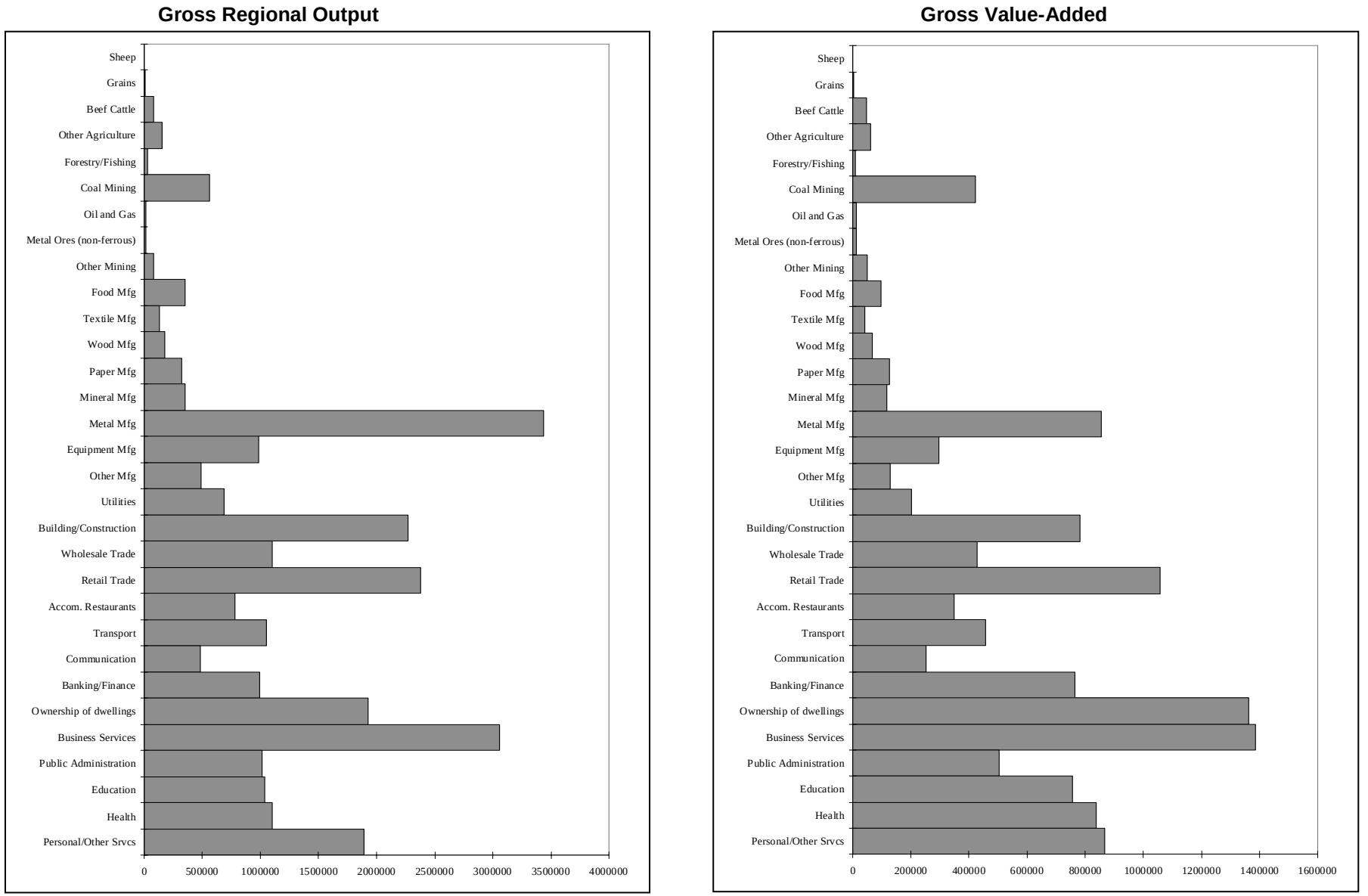
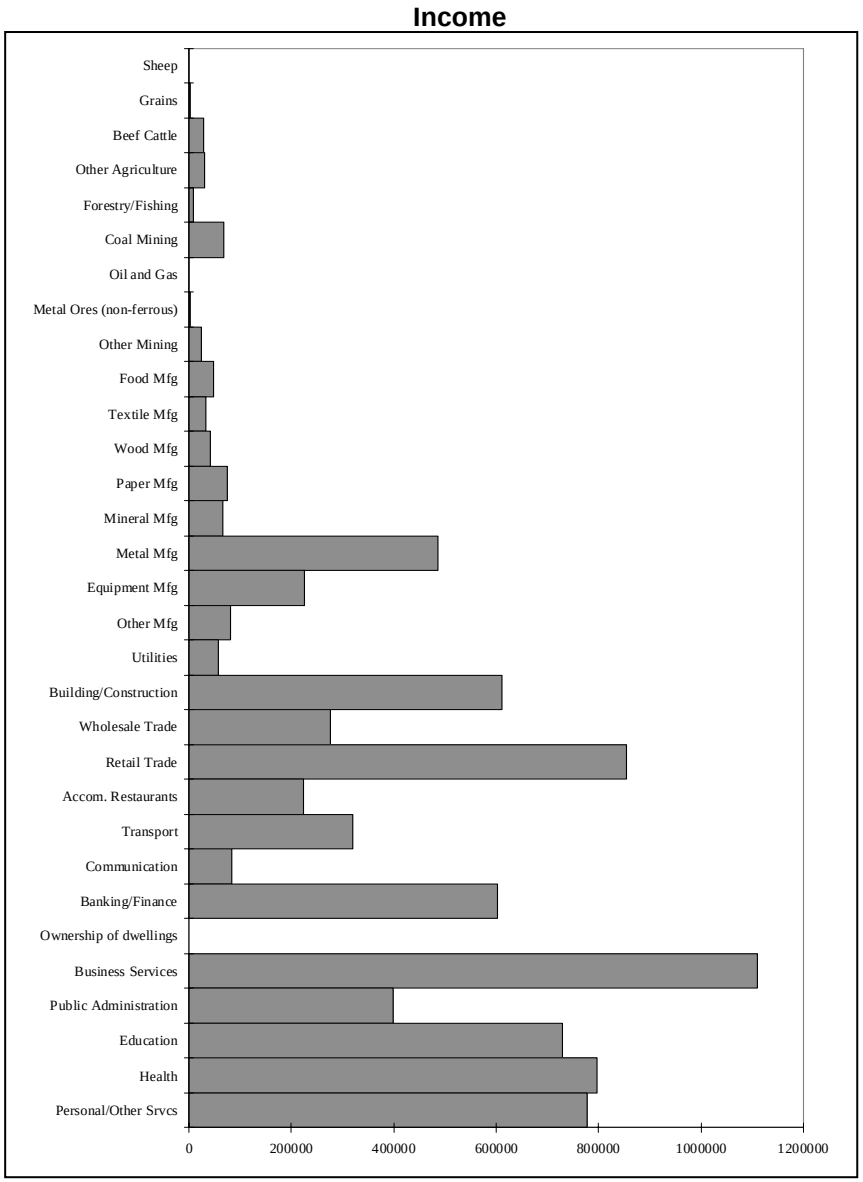


Figure 3.4 Sectoral Distribution of Gross Regional Income ($'000) and Employment (No.)



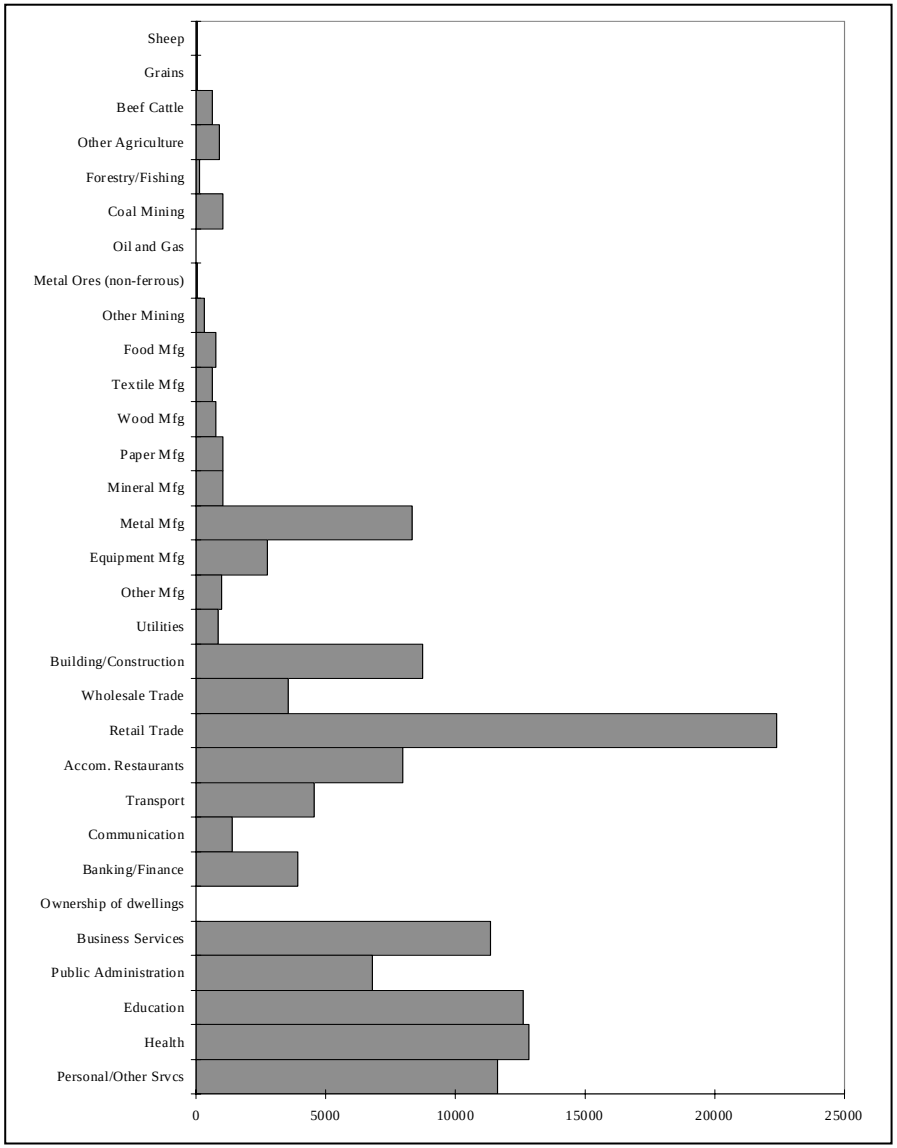
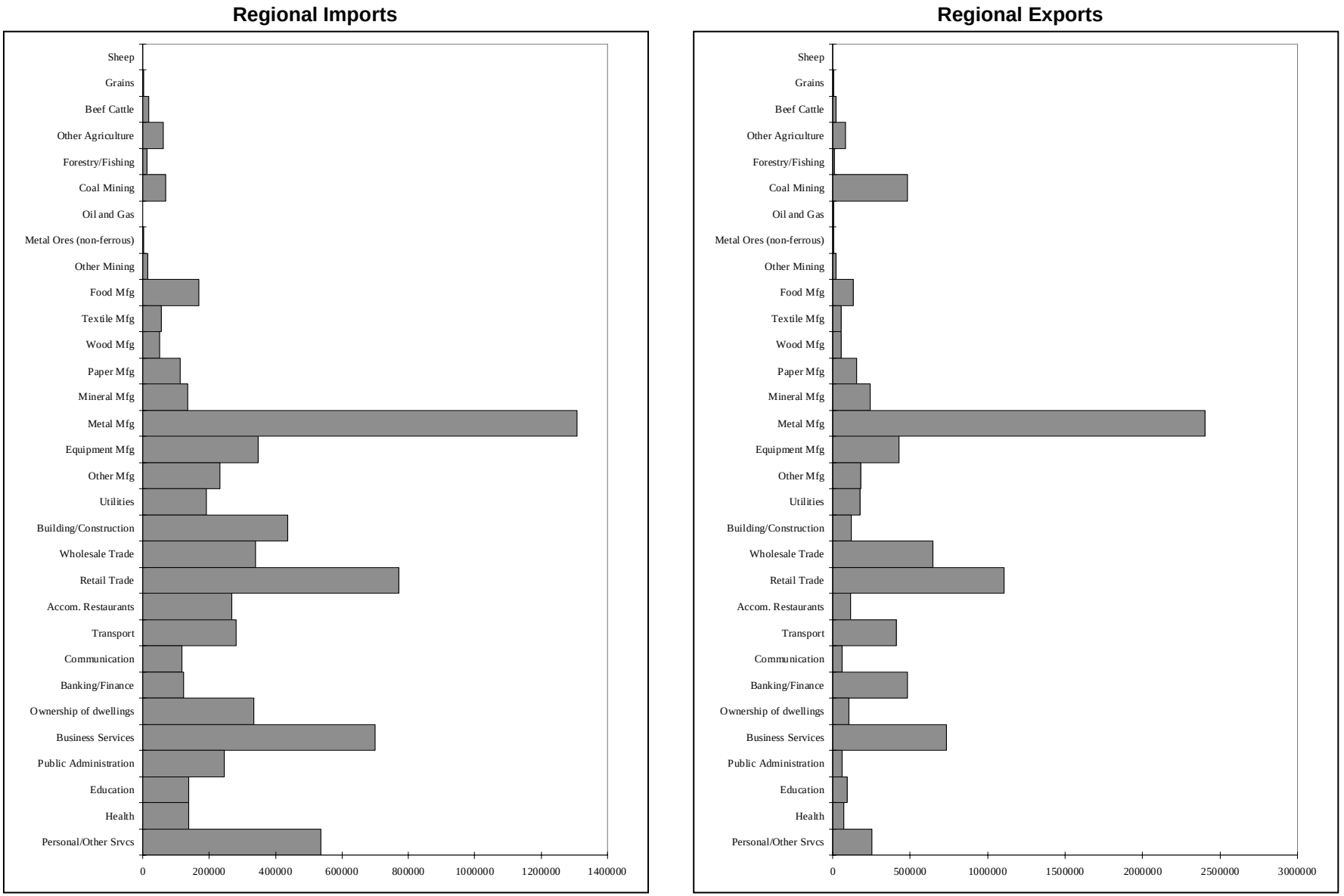


Figure 3.5 Sectoral Distribution of Imports and Exports ($'000)



3.2 REGIONAL ECONOMIC IMPACT OF THE PROJECT

3.2.1 *Introduction*

The main regional economic impact of the Project is associated with the continued operation of the Metropolitan Colliery, albeit at higher than historical production levels. For the analysis of the Project, a Metropolitan Mine sector was inserted into the input-output table. For this sector:

- the estimated average annual gross revenue over the life of the Project was estimated from data provided by HCPL and allocated to the *Output* row;
- the estimated average annual expenditure over the life of the Project was estimated from data provided by HCPL;
- a detailed expenditure break down for one typical historical year was provided by HCPL and this was pro-rated up to the estimated average annual expenditure estimate (except wages and on-costs which were held constant);
- information from HCPL on expenditure within the region was used to allocated expenditure between local expenditure and *imports*;
- local expenditure was allocated to appropriate *intermediate sectors*, the *household wages* row, the o*ther value-added* row;
- purchase prices for each sector were adjusted to basic values and margins and taxes allocated to appropriate sectors using relationships in the latest (2001-02) National Input-Output Tables;
- the difference between total revenue and total costs was allocated to the *other value-added* row*;* and
- direct employment by HCPL (not including contractors) that reside in the region was allocated to the *employment* row.

To facilitate the later employment, population and community infrastructure assessment, the regional economic impact of the existing levels of operation of the Metropolitan Mine are reported first.

3.2.2 *Impacts of the Existing Operation of the Metropolitan Colliery*

The total and disaggregated annual impacts of the existing operation of the Metropolitan Colliery on the Illawarra economy in terms of output, value added, income and employment (in 2006 dollars) are shown in Table 3.2.

Table 3.2
Annual Regional Economic Impacts of the Existing Operation of the Metropolitan Colliery

	Direct Effect	Production Induced	Consump. Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000)	168,389	48,982	35,538	84,520	252,909
Type 11A Ratio	*1.00*	*0.29*	*0.21*	*0.50*	*1.50*
VALUE ADDED ($'000)	69,641	21,097	19,151	40,248	109,889
Type 11A Ratio	*1.00*	*0.30*	*0.27*	*0.57*	*1.57*
INCOME ($'000)	23,428	12,744	9,989	22,733	46,161
Type 11A Ratio	*1.00*	*0.54*	*0.43*	*0.97*	*1.97*
EMPL. (No.)	199	176	174	350	549
Type 11A Ratio	*1.00*	*0.88*	*0.87*	*1.75*	*2.75*

In total, the existing operation of the Metropolitan Colliery is estimated to make the following contribution to the regional economy:

- $253M in annual direct and indirect regional output or business turnover;
- $110M in annual direct and indirect regional value added;
- $46M in annual household income; and
- 549 direct and indirect jobs.

3.2.3 *Impacts of the Project*

The total and disaggregated annual impacts of the Project on the Illawarra economy in terms of output, value added, income and employment (in 2006 dollars) are shown in Table 3.3.

Table 3.3
Annual Regional Economic Impacts of the Project

	Direct Effect	Production Induced	Consump. Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000)	248,964	80,050	43,479	123,529	372,493
Type 11A Ratio	*1.00*	*0.32*	*0.17*	*0.49*	*1.49*
VALUE ADDED ($'000)	78,007	34,479	23,430	57,909	135,916
Type 11A Ratio	*1.00*	*0.44*	*0.30*	*0.74*	*1.74*
INCOME ($'000)	23,428	20,826	12,221	33,047	56,475
Type 11A Ratio	*1.00*	*0.89*	*0.52*	*1.41*	*2.41*
EMPL. (No.)	199	288	213	501	700
Type 11A Ratio	*1.00*	*1.45*	*1.07*	*2.52*	*3.52*

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

- $372M in annual direct and indirect regional output or business turnover;
- $136M in annual direct and indirect regional value added;
- $56M in annual household income; and
- 700 direct and indirect jobs.

3.2.4 *Multipliers*

The adjusted Type 11A ratio multipliers for the Project range from 1.49 for output up to 3.52 for employment.

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

The low output ratio multiplier largely reflects the high direct output value of the Project compared to the sectors that experience flow-on effects from the Project.

3.2.5 *Main Sectors Affected*

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

- Rail, pipeline and other transport sector;
- Services to transport sector (Port);
- Services to mining sector;
- Scientific research, technical and computer services sector;
- retail trade sector;
- agriculture, mining and construction equipment sector; and
- wholesale mechanical repairs sector.

Examination of the estimated direct and flow-on employment impacts gives an indication of the sectors in which employment opportunities would be generated (Table 3.4).

Table 3.4
Sectoral Distribution of Total Regional Employment Impacts

Sector	Average Direct Effects	Production Induced	Consumption Induced	Total
Primary	0	0	2	2
Mining	199	24	0	223
Manufacturing	0	61	12	73
Utilities	0	1	2	3
Wholesale/Retail	0	31	44	75
Accommodation, cafes, restaurants	0	4	35	39
Building/Construction	0	13	3	16
Transport	0	92	6	98
Services	0	62	109	171
Total	**199**	**288**	**213**	**700**

Note: Totals may have minor discrepancies due to rounding.

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

The Project would provide direct employment for 320 people (224 employees and 96 on-site contractors). Some 89% of these are estimated to reside in the region i.e. 199 employees and an estimated 85 on-site contractors (located within the production-induced employment in Table 3.4). A further 25 employees and 11 on-site contractors are estimated to reside outside the region. Production-induced employment impacts would mainly occur in the transport, services and manufacturing sectors. Consumption-induced employment flow-ons would mainly occur in the services, wholesale/retail and accommodation/cafes/restaurants sectors.

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

3.3 STATE ECONOMIC IMPACTS OF THE PROJECT

3.3.1 *Introduction*

The State economic impacts of the Project operation were assessed in the same manner as the regional impacts. A new Metropolitan Mine sector was inserted into a 2005-06 NSW input-output table. For this new sector:

- the estimated average annual gross revenue over the life of the Project was estimated from data provided by HCPL and allocated to the *Output* row;
- the estimated average annual expenditure over the life of the Project was estimated from data provided by HCPL;
- a detailed expenditure break down for one typical historical year was provided by HCPL and this was pro-rated up to the estimated average annual expenditure estimate (except wages and on-costs which were held constant);
- information from HCPL on expenditure within the State was used to allocate expenditure between State expenditure and *imports*;
- State expenditure was allocated to appropriate *intermediate sectors*, the *household wages* row, the o*ther value-added* row;
- purchase prices for each sector were adjusted to basic values and margins and taxes allocated to appropriate sectors using relationships in the latest (2001-02) National Input-Output Tables;
- the difference between total revenue and total costs was allocated to the *other value-added* row*;* and
- direct employment by HCPL that resides in NSW was allocated to the *employment* row.

3.3.2 *Impacts*

The total and disaggregated annual impacts of the operational phase of the Project on the NSW economy in terms of output, value added, income and employment (in 2006 dollars) are shown in Table 3.5.

Table 3.5
Annual State Economic Impacts of the Project

	Direct Effect	Production Induced	Consump. Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000)	248,964	259,640	178,360	438,000	686,964
Type 11A Ratio	*1.00*	*1.04*	*0.72*	*1.76*	*2.76*
VALUE ADDED ($'000)	94,781	115,039	90,848	205,887	300,668
Type 11A Ratio	*1.00*	*1.21*	*0.96*	*2.17*	*3.17*
INCOME ($'000)	26,323	75,472	51,990	127,461	153,785
Type 11A Ratio	*1.00*	*2.87*	*1.98*	*4.85*	*5.85*
EMPL. (No.)	224	920	807	1,727	1,951
Type 11A Ratio	*1.00*	*4.11*	*3.60*	*7.71*	*8.71*

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

- $687M in annual direct and indirect output or business turnover;
- $301M in annual direct and indirect value added;
- $154M in annual household income; and
- 1,951 direct and indirect jobs.

These impacts are substantially greater than for the Illawarra alone, as the NSW economy is able to capture almost all the mine expenditure, and there is a greater level of intersectoral linkages in the larger NSW economy.

3.4 PROJECT CESSATION

The establishment and operation of the Project would stimulate demand in the regional and NSW economy leading to increased business turnover in a range of sectors and increased employment opportunities. Conversely, cessation of the mining operations would result in a contraction in regional economic activity.

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

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

Ignoring all other influences, the impact of Project cessation would depend on whether the workers and their families affected would leave the region. If it is assumed that some or all of the workers remain in the region, then the impacts of Project cessation would not be as severe compared to a greater level leaving the region. This is because the consumption-induced flow-ons of the decline would be reduced through the continued consumption expenditure of those who stay (Economic and Planning Impact Consultants, 1989). Under this assumption the regional economic impacts of Project cessation would approximate the direct and production-induced effects in Table 3.3. However, if displaced workers and there families leave the region then impacts would be greater and begin to approximate the total effects in Table 3.3.

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

To the extent that alternative development opportunities arise in the regional economy, the regional economic impacts associated with mining closure that arise through reduced production and employment expenditure can be substantially ameliorated and absorbed by the growth of the region. One key factor in the growth potential of region is a region's capacity to expand its factors of productions by attracting investment and labour from outside the region (BIE, 1994). This in turn can depend on a region's natural endowments. The Illawarra region is highly prospective with considerable coal resources (DPI, 2006).

It is therefore likely that over time, new mining developments would occur, offering potential to strengthen and broaden the economic base of the region and hence buffer against impacts of the cessation of individual activities.

Ultimately, the significance of the economic impacts of cessation of the Project would depend on the economic structure and trends in the regional economy at the time. For example, if Project cessation takes place in a declining economy, the impacts might be 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.

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

4 EMPLOYMENT, POPULATION AND COMMUNITY INFRASTRUCTURE ASSESSMENT

4.1 INTRODUCTION

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

The objective of this Employment, Population and Community Infrastructure Assessment (EPCIA) is to examine the potential impacts of the Project on the existing community infrastructure as a result of employment and population change associated with the Project.

The basic methodology for carrying out the EPCIA was to:

- analyse the existing socio-economic environment of the region potentially impacted by the Project;
- analyse the likely magnitude of the Project work force and associated population including estimated flow-on employment and population effects;
- consider the impacts of estimated employment and population change on community infrastructure based on Australian Bureau of Statistics (ABS)data, research and consultations; and
- recommend impact mitigation or management measures for any substantive impacts that are identified.

The geographic scope of the EPCIA was determined by the location of Project and the region that would potentially service the Metropolitan Colliery and its' employees. The Project is located in Helensburgh in the Illawarra region.

The assessment draws on a range publications, press releases and reports as well as data provided by HCPL, the ABS Census, and information from Section 3 on the potential regional economic impacts of the Project.

4.2 REGIONAL PROFILE

Population

The Illawarra region (Illawarra SD) comprises the Statistical Local Areas [SLAs] of Wollongong, Wingecarribee, Shellharbour, Kiama and Shoalhaven). In 2006, it had a population of 390,616, representing 5.9% of the NSW population (ABS Census).

At the 2006 Census there were relatively even proportions of males (49%) and females (51%) and a lesser proportion of people born overseas (18%) in the region compared to NSW as a whole (24%).

In 2006, 37.9% 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, Illawarra SD has a slightly lower proportion of 15 to 44 year olds and slightly greater proportion of younger people and older people (Table 4.1).

Table 4.1
Distribution of the Illawarra SD and NSW Population by Age Group

Proportion of Total Population	Illawarra			NSW
	1996	2001	2006	2006
Aged 14 years and younger	22.5%	21.5%	20.1%	19.8%
Aged 15 years to 44 years	42.5%	40.3%	37.9%	41.7%
Aged 45 years to 64 years	21.3%	23.2%	25.4%	24.7%
Aged 65 years and over	13.8%	15.0%	16.6%	13.8%

Source: ABS Census Time Series Profile
Note: Percentages may not add to 100% due to rounding.

The population of the Illawarra SD has increased steadily between the 1991 and 2001 Censuses at a rate greater than that for NSW (Table 4.2). However, population growth has slowed since 2001 to a rate less than that for NSW (Table 4.2). The population is expected to continue to grow but at a declining rate of 0.97% pa then 0.86% pa after 2016, greater than that expected for NSW as a whole (NSW Department of Planning, 2005) (Table 4.3).

Table 4.2
Illawarra and NSW Population and Growth Rates 1991 to 2006

	Year	1991	1996	2001	2006
Illawarra SD	Population	337,478	360,298	381,898	390,616
	Population Growth Rate (per annum)	-	1.35%	1.20%	0.46%
NSW	Population	5,732,032	6,038,696	6,371,745	6,585,732
	Population Growth Rate (per annum)	-	1.07%	1.10%	0.67%

Source: ABS Census Time Series Profile

Table 4.3
Illawarra and NSW Population Projections 2011 to 2031

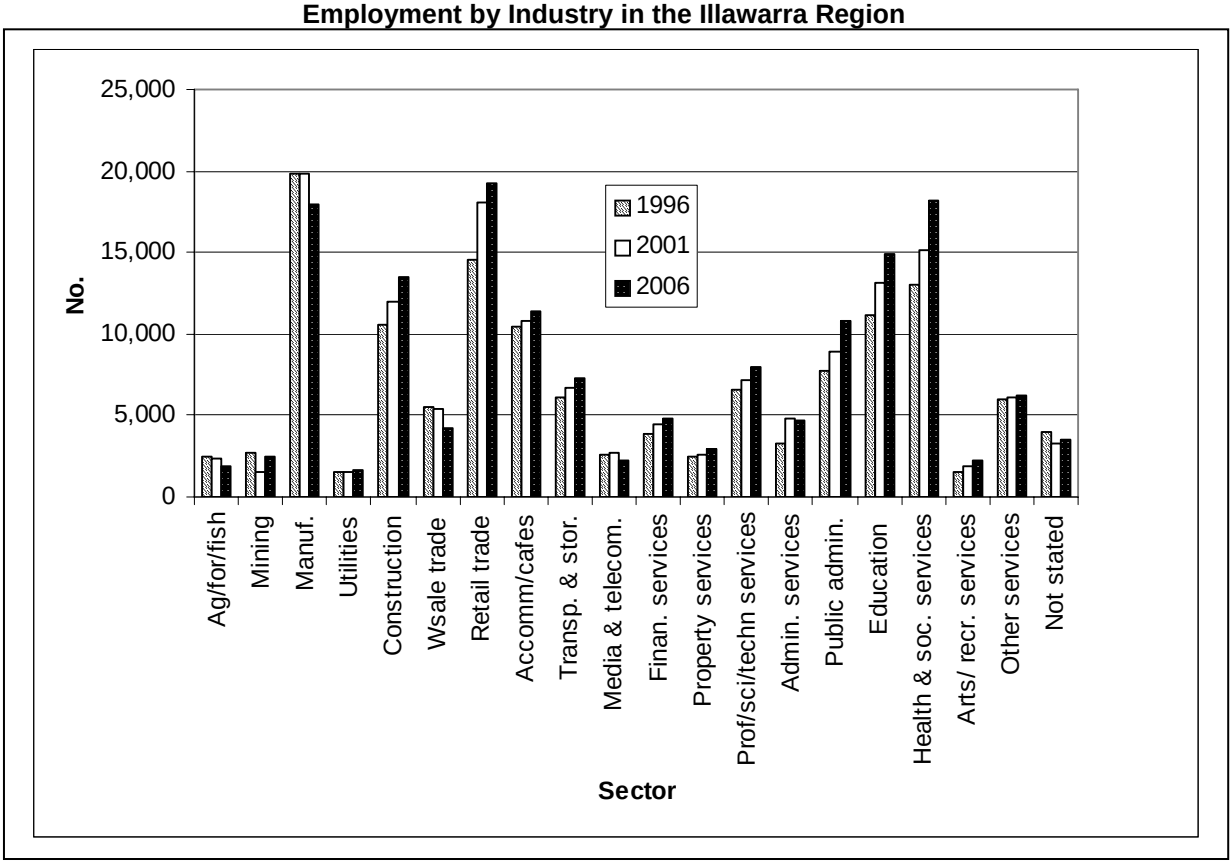
Region	2011	2016	2021	2026	2031
Illawarra SD	438,400	457,200	475,300	492,300	507,800
	0.97%	0.86%	0.79%	0.72%	0.63%
NSW	7,145,200	7,437,300	7,725,200	8,002,500	8,259,200
	0.88%	0.82%	0.77%	0.72%	0.64%

Source: NSW Department of Planning (2005)

Employment

Detailed employment by industry data is presented on Figure 4.1. This clearly indicates the prominence of retail trade sector and the manufacturing sector to employment in the region.

Figure 4.1
Employment by Industry in the Illawarra Region

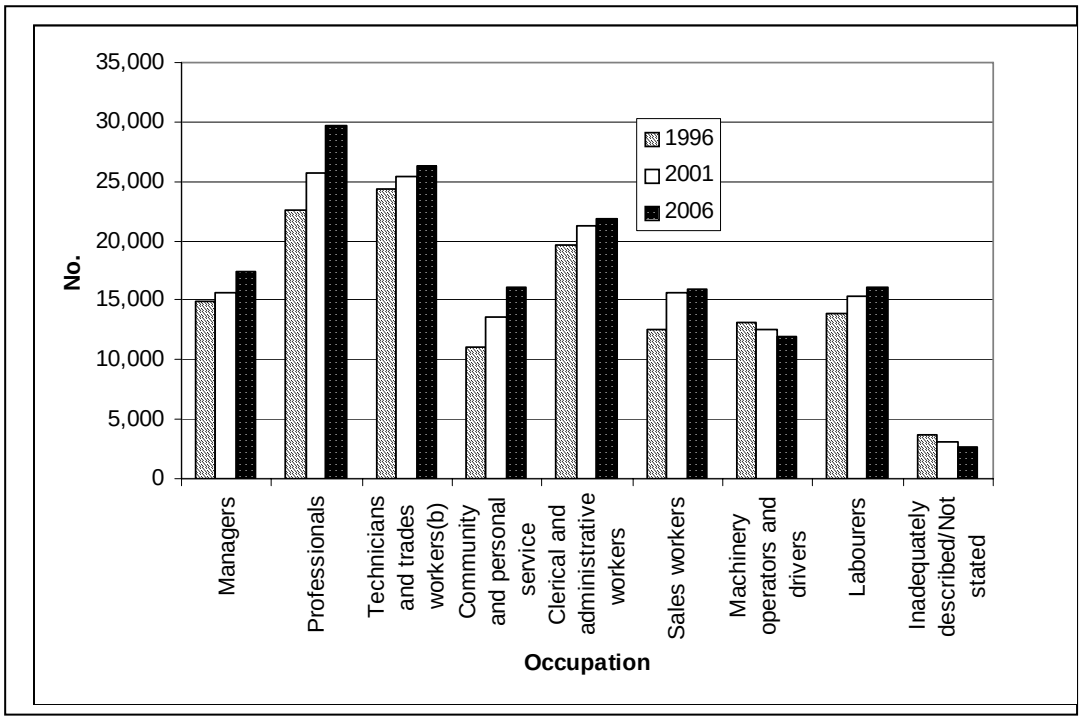


Source: ABS Census Time Series Profile

Figure 4.1 also illustrates the increasing importance of the construction sector, retail trade sector, accommodation/cafes/restaurants sector, transport and storage sector and the services sectors (financial services sectors, property services sector, professional, scientific and technical services sectors, administration services sectors, public administrations sectors, education sectors, health care and social assistance sectors, arts and recreation services sectors and other services sectors). The agriculture, forest and fishing sector is the only declining sector in the Illawarra economy. The mining sector has bounced back from the 2001 decline in employment numbers.

Supporting this sectoral change in employment is growth in managerial and professional occupations as well as technicians and trades, community and personal services, clerical and administrative workers, sales workers and labourers (Figure 4.2).

Figure 4.2
Occupations in the Illawarra Region



Source: ABS Census

The unemployment rate in the Illawarra region has been declining over time. However, the unemployment rate has been consistently higher than that for NSW (Table 4.4). The unemployment rate for men has been consistently higher than the unemployment rate for women (Illawarra Regional Information Services [IRIS], 2007a).

Table 4.4
Unemployment in the Illawarra Region

	1991	1996	2001	2006
Total No. in Labour Force	147,949	154,008	162,947	170,670
As % of People over 15 Years	57.0%	55.1%	54.7%	55.00%
Total Employment	127,626	135,966	148,402	158,028
Total Unemployment	20,323	18,042	14,545	12,642
Unemployment Rate	13.7%	11.7%	8.9%	7.41%
NSW Unemployment Rate	**11.2%**	**8.8%**	**7.2%**	**5.90%**

Source: ABS Census

Average individual taxable income in the Illawarra region was in the order of $40,000 in 2003 compared to $43,649 for NSW (ABS Regional Statistics).

Housing

In 2006 there were approximately 151,616 private dwellings in the Illawarra region, about 6.1% of the State total. The Region had a higher proportion of separate houses than the State (80% compared with 70%, respectively) and a lower proportion of townhouses/units/flats/apartments (19%) compared with 29% in NSW (Table 4.5).

Table 4.5
Housing Stock in the Illawarra SD and NSW (Occupied Dwellings Only)

	Illawarra			NSW
	1996	2001	2006	2006
Total Private Dwellings	132,418	144,201	151,616	2,470,452
% Separate Houses	79.8%	79.8%	79.6%	69.7%
% Townhouse, Flat, Unit, Apartment	16.7%	17.4%	18.8%	28.8%
% Other	2.1%	2.1%	1.6%	1.4%
% Not Stated	1.4%	0.6%	0.05%	0.08%

Source: ABS Census

Approvals for dwellings have been declining in the Wollongong Statistical District[1] since June quarter 2002 (IRIS, 2007b).

Medium house prices for the Wollongong Statistical District rose significantly from 1998 to December 2003 to reach a peak of $400,000. They have since declined slightly and in June quarter of 2007 they were $378,250. A similar pattern has been experienced with units, with the medium price rising rapidly to just over $300,000 in December 2003. However, unit prices remained reasonable stable since then with the June quarter of 2007 median price being $300,000 (IRIS, 2007b).

The average number of rental listings generally increased from March quarter 2001 to June 2006 and has since declined (IRIS, 2007b).

There is considerable short stay tourism accommodation available in the Illawarra region including in the order of 89 hotels/motels as well as serviced apartments (Table 4.6).

Table 4.6
Illawarra Region Hotels and Motels

Hotels/Motels	2002/03	2003/04	2004/05	2005/06
Establishments with Facilities (a)	83	84	85	89
Room Occupancy Rates	49.8	50.1	50.1	50.4
Guest Nights	793,556	824,773	822,576	940,442
Bed Occupancy Rate	28.7	30.3	30.5	32.4
Accommodation Gross Takings $000	51,616	55,715	57,329	64,157

(a) as at June Quarter
Source: IRIS 2007a

[1] Wollongong Statistical District comprises the Wollongong, Shellharbour and Kiama areas.

Crime and Safety

NSW Bureau of Crime Statistics and Research indicates that the incidence of crime in the Illawarra region per 100,000 head of population is following the general decreasing trend being experienced in NSW as a whole (Table 4.7).

Table 4.7
Illawarra SD and NSW Incidence of Crime per 100,000 Head of Population

	Illawarra SD					NSW
	2002	**2003**	**2004**	**2005**	**2006**	**2006**
Homicide	4.1	4.9	6.5	5.0	5.0	4.4
Assault	1100.5	1082.7	1039.5	1067.2	1063.1	1053.6
Sexual offences	131.5	135.9	135.7	133.5	138.8	136.6
Abduction and kidnapping	3.5	5.9	4.6	3.1	6.0	5.8
Robbery	82.8	58.9	67.2	70.0	66.3	117.2
Blackmail and extortion	0.0	0.5	0.0	0.7	1.0	1.0
Harassment, threatening behaviour and private nuisance	278.5	277.1	265.5	327.9	327.9	331.3
Other offences against the person	16.6	25.7	26.6	23.4	24.9	24.6
Theft	6266.0	5632.0	4941.0	4315.6	3930.1	4375.4
Arson	94.9	77.7	77.1	101.9	134.2	113.2
Malicious damage to property	1589.4	1571.2	1590.5	1716.9	1804.6	1594.2
Drug offences	236.8	266.2	221.1	237.2	293.2	342.3
Prohibited and regulated weapons offences	125.8	124.1	136.7	90.5	105.0	116.7
Disorderly conduct	256.7	246.2	217.2	217.1	261.2	314.6
Betting and gaming offences	0.2	6.1	3.9	5.6	9.4	5.6
Liquor offences	156.9	224.1	201.8	146.6	218.5	223.0
Pornography offences	1.0	1.5	2.4	1.0	1.7	1.5
Prostitution offences	3.0	1.5	2.9	1.2	1.4	2.7
Against justice procedures	550.8	561.8	554.8	606.6	609.4	507.2
Driving offences[#]	7077.9	8475.1	8907.6	8249.5	7672.0	9213.0
Transport regulatory offences	1009.3	886.5	713.4	746.8	869.7	509.8
Other offences	343.8	282.8	290.4	217.1	205.2	227.1
Total	**19330.0**	**19948.4**	**19406.4**	**18284.4**	**17748.6**	**19220.8**

Source: NSW Bureau of Crime Statistics and Research

While the overall incidence of crime per capita was lower in the Illawarra region than for NSW, the per capita incidence of the following crimes was higher in the Illawarra region than in NSW in 2006:

- homicide;
- assault;
- sexual offences;
- abduction and kidnapping;
- other offences against the person;
- arson;
- malicious damage to property;
- betting and gaming offences;
- pornography offences;
- against justice procedures; and
- transport regulatory offences.

It is difficult to specify reasons for the higher incidence of some categories of crime in the Illawarra 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 Illawarra region that may be relevant include relatively lower income levels and higher unemployment rates.

Community Infrastructure

Education

The NSW Department of Education and Training (DET) is the main provider of primary and secondary education in the Illawarra region, providing 130 of the 180 schools. The Illawarra region has 131 infant and primary schools, 35 secondary schools and 14 combined schools (Table 4.8). There has been a general trend of declining enrolments (Table 4.8) and hence it is reasonable to assume that schools in the region have excess capacity. There has also been a slight increase in the level of private schooling.

Table 4.8
Education in the Illawarra Region

		2003	2004	2005 (e)	2006 (e)
Schools (a)	**No.**	**178**	**179**	**178**	**180**
Primary	No.	132	132	132	131
Secondary	No.	36	36	34	35
Combined	No.	10	11	12	14
Public	No.	129	129	130	130
Private	No.	49	50	48	50
Students (b)(c)	**No.**	**69,549**	**69,329**	**68,905**	**68,589**
Primary	%	57.4%	57.0%	56.7%	55.9%
Secondary	%	42.6%	43.0%	43.3%	44.1%
Public	%	73.6%	73.0%	72.4%	72.0%
Private	%	26.4%	27.0%	27.6%	28.0%
TAFE					
College Enrolments	No.	38,845	38,705	34,268	36,331
University (d)					
Full Time	No.	11,163	11,360	11,798	11,488
Part Time	No.	7,957	7,408	7,931	7,203

Source: IRIS 2007a

(a) Location of Schools: Non Government is as at November 2003, Government is as at August 2005
(b) All enrolment figures are full-time equivalents
(c) Primary grades K-6. Students without a grade are assigned to primary if age at Census calculation data is less than 13 years
(d) Includes both Local and Off-Shore Campuses, excludes WUC students as at session one.
(e) 2005 and 2006 figures have been revised due to new count method.

Health

According to the 2006 population census there were 16,598 people employed in the health and community services industries in the Illawarra SD (Table 4.9). Approximately 75% of all regional employment in this sector was in the health services sub-sector and 23% was in community services (Table 4.9).

Table 4.9
Employment in Health and Community Services in the Illawarra SD

Industry	2006	%
Hospitals and Nursing Homes	7,396	45%
Medical and Dental Services	2,122	13%
Other Health Services (including optometry, pathology, physiotherapy etc)	2,631	16%
Veterinary Services*	244	1%
Total Health Services	**12,393**	**75%**
Community Services (undefined)	348	2%
Child Care Services	1,179	7%
Community Care Services (including accommodation for the aged, residential and non-residential care, etc,)	2,227	13%
Total Community Services	**3,754**	**23%**
Health and Community Services (undefined)	451	3%
Total Health and Community Services	**16,598**	**100%**

Source: ABS 4 Digit Employment by Industry Data for SLA of Workplace
* 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 13% of all employment in 2006, compared to a figure of 11% for NSW.

The South East Sydney and Illawarra Area Health Service (SESIAHS) administers the following health and community services in they Illawarra region:

- 1 principal hospital – Wollongong Hospital;
- 2 major district hospitals – Shoalhaven Hospital and Shellharbour Hospital;
- 2 small district hospitals – Bulli Hospital and Milton-Ulladulla Hospital;
- 4 sub-acute facilities – Coledale Hospital, Pt Kembla Hospital, Kiama Hospital, David Berry Hospital and Garrawarra Centre;
- 12 community health centres;
- 8 dental clinics;
- 22 early childhood centres; and
- 10 mental health centres.

4.3 PROJECT WORKFORCE AND POPULATION CHANGE

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

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

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

Whether local labour is sourced from the unemployment pool or from other industries, it can reduce unemployment levels - directly in the case of employing unemployed people and indirectly via the filter effect[2] where labour is sourced from other industries.

The impact of commuter workers would depend on the extent to which they integrate into the regional communities, however, for a region like the Illawarra where any commuter workers are likely to come from major centres such as Sydney, any impact is likely to be modest.

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

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

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

4.3.1 *Construction Workforce and Population Change*

During construction of the Project, an additional workforce of up to 50 people would be required during peak periods of construction. As the various construction activities would be spread over a period of approximately five years, the average construction workforce over this period would be approximately five people.

Construction generally requires a labour force with highly specialised skills including specialized welders, fitters, electrical contractors, machinery mechanics and construction engineers (CIE, 2001). These types of professions are located in the construction sector, wholesale trade sector (mechanics) and the professional/scientific/technical services sector. Examination of the employment by industry data in Section 4.2 indicates that the Illawarra region has a large and strongly growing construction sector and profession/scientific/technical services sector and a declining wholesale trade sector.

A considerable amount of the construction workforce is therefore likely to be able to be sourced locally. The construction workforce unable to be sourced locally would most likely be able to be sourced from Sydney and commute to the region daily.

Consequently, little if any population change as a result of the construction workforce is envisaged.

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

4.3.2 *Operation Workforce and Population Change*

The Project relates to the continuation of an existing activity, albeit at increased rates of ROM coal and product coal production. In 2007, the total workforce at the Metropolitan Colliery was approximately 320 people (comprising 224 employees and 96 on-site contractors). The operational workforce would be maintained by the Project with increases in efficiency allowing for the proposed increases in coal production. Therefore compared to current levels, no additional direct workforce or population is envisaged as a consequence of the continued operation of the Project.

However, some additional flow-on workforce (151) is expected as a result of greater flow-on employment associated with the Project compared to the current operation (compare Table 3.3 to Table 3.2). This greater flow-on employment arises because the Project involves greater levels of operational expenditure in region than the current Metropolitan Colliery operation.

Assuming the average Illawarra household size of 2.5, the population associated with additional flow-on employment would be in the order of 378. However, this represents a maximum population change associated with the Project as some or all of the indirect workforce change may be sourced from within the Illawarra region, either directly or indirectly, particularly as the Illawarra region has generally had a higher unemployment rate than NSW.

4.4 COMMUNITY INFRASTRUCTURE IMPACT ASSESSMENT

4.4.1 *Construction*

Because current levels of employment at the Metropolitan Colliery would continue and the construction phase involves a modest level of temporary employment that is likely to be sourced from within the Illawarra region or commuters from Sydney no community infrastructure impacts are envisaged as a result of the Project.

4.4.2 *Operation*

A maximum population influx to the region of 378 is small in the context of annual population growth of the region, representing in the order of 3 months average population growth between 2001 and 2006 and 1 months average population growth between 1996 and 2001.

As such the demand this maximum population influx would create for housing is also modest (Table 4.10). It represents 0.1% of total occupied housing stock in 2006, 0.6% of unoccupied residential properties in 2001[3] and 8% of new dwelling approvals in 2006-07. The Illawarra Regional Strategy (Department of Planning, 2007) provides a strategy to accommodate a population increase of 47,600 over the next 25 years.

Table 4.10
Predicted Project Related Demand for Additional Accommodation

Demand for Housing		Housing Stock		
Direct Construction	**Addition Flow-on Workforce**	**New Dwellings Approved 2006-07**	**Total Occupied Housing Stock 2006**	**Unoccupied Residential Properties 2006**
0	151	2,038	151,616	24,602

[3] This data is no longer available in the 2006 Census.

During operation of the Project, any incoming flow-on workers would be expected to exhibit average family structures and hence would be associated with some children creating some increased demand for education facilities within the region. Assuming that the incoming population exhibits the same characteristics as the Illawarra region working population, Table 4.11 summarises the likely demand for pre-school, infants/primary and high school places.

Table 4.11
Predicted Project Related Demand for Children's Schooling

Type	Illawarra	2006 Enrolment Nos.
Pre-school	29	N/A
Infants/Primary	52	38,341
High school	41	30,247

These demands can be compared to the enrolments in 2006 and growth/decline in enrolments between 2003 and 2006 across the region (see Table 4.8). In this context, it is evident that the increased demand for schooling associated with Project flow-on employment effects could be considered to be insignificant.

There is potential for the Project to increase the demand for public health facilities in the region such as for Hospitals, GP Medical Services, Dental, Physiotherapy, Chiropractors, Optometrists, etc. via the potential increase in population as a result of increased flow-on employment associated with the Project. However, the potential indirect population increase for the Project is very small compared to the total population of the region.

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

Demand for additional investment in community services such as child care, aged care and community care services, by Local, State and Commonwealth Governments can arise from increases in the population. However, as indicated in this Table 4.10 and Table 4.11 the expected increases in population are very small. No requirement for additional investment in community services and facilities infrastructure is therefore anticipated.

5 CONCLUSION

A BCA identified a range of potential economic costs and benefits of the Project and placed values on most of the production costs and benefits. Possible environmental externalities of the Project were considered and while some were valued e.g. greenhouse impacts and infrastructure impacts, others remained unquantified. The analysis indicated that the total net quantified production benefit of the Project is likely to be in the order of $592 M. Quantified environmental externalities were valued at $156 M. The net quantified benefit of the Project of $436 M represents the opportunity cost to Australian society of not proceeding with the proposal.

Put another way, the unquantified environmental externalities from the Project, after mitigation by Helensburgh Coal Pty Ltd, would need to be valued at greater than $436 M to make the Project questionable from an economic efficiency perspective.

To put this threshold value in some context, every household in the Illawarra region would need to be willing to pay in the order of $2,750 to avoid the identified potential environmental impacts of the Project, to make it questionable from an economic efficiency perspective. The equivalent figure for NSW is $170.

To minimise subsidence impacts on the Waratah Rivulet a 500m setback either side of the stream would be required. This level of setback would have a number of economic costs and benefits relative to the Project. It would have net production costs of $130 M together with some offsetting greenhouse gas benefits giving net quantified costs to the community of $114 M. The quantified net costs of the setback of $114 M can therefore be considered as a threshold value. This threshold value is the opportunity cost to society of mining adopting a 500m setback. Interpreted another way, the unquantified environmental benefits of a 500m setback from Waratah Rivulet would need to be valued at greater than $114 M to make such a setback desirable from an economic efficiency perspective.

To put this into a regional context, this is equivalent to each household in the Illawarra SD having a willingness to pay of over $720 to avoid the impact on Waratah Rivulet. The equivalent figure for NSW households is $45.

A regional economic impact analysis, using input-output analysis, estimated that in total, the Project would contribute the following to the Illawarra economy:

- $372M in annual direct and indirect regional output or business turnover;
- $136M in annual direct and indirect regional value added;
- $56M in annual household income; and
- 700 direct and indirect jobs.

At the State level the Project would make the following contribution to the economy:

- $687M in annual direct and indirect output or business turnover;
- $301M in annual direct and indirect value added;
- $154M in annual household income; and
- 1,951 direct and indirect jobs.

The sectors most impacted by output, value-added and income flow-ons are likely to be the rail, pipeline and other transport sector, services to transport sector (Port), services to mining sector, scientific research, technical and computer services sector, retail trade sector, agriculture, mining and construction equipment sector and the wholesale mechanical repairs sector.

Employment impacts are also likely to be felt across a number of sectors including the mining sectors, transport sectors, manufacturing sectors, wholesale and retail trade sectors, accommodation, cafes and restaurants sectors and services sectors (education, health, community services and personal services).

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

During construction of the Project, an additional workforce of up to 50 people would be required during peak periods of construction. However, this workforce is likely to be sourced locally or commute to the regional daily from Sydney. Consequently, little if any population change as a result of the construction workforce is envisaged.

No additional direct operational workforce or population is envisaged as a consequence of the continued operation of the Project. However, some additional flow-on workforce (151) is expected as a result of greater flow-on employment associated with the Project compared to the current Metropolitan Colliery operation. This greater flow-on employment arises because the Project involves greater levels of operational expenditure in region than the current operation.

The maximum potential population influx to the region of 378 is small in the context of annual population growth of the region and is considered likely to have negligible impacts on housing, schools, health or community infrastructure.

Cessation of the Project after 23 years of operation may lead to a reduction in economic activity. The significance of these Project cessation impacts will depend on:

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

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

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ATTACHMENT A

THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES

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

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

The resultant GRIT procedure has a number of well-defined steps. Of particular significance are those that involve the analyst incorporating region-specific data and information specific to the objectives of the study. The analyst has to be satisfied about the accuracy of the information used for the important sectors; in this case the non-ferrous metals and building and construction sectors. The method allows the analyst to allocate available research resources to improving the data for those sectors of the economy that are most important for the study. It also means that the method should be used by an analyst who is familiar with the economy being modelled, or at least someone with that familiarity should be consulted.

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

Table A-1
The GRIT Method

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

Source: Bayne and West (1988)