APPENDIX I

ECONOMIC IMPACT
RESPONSE TO PAC REVIEW REPORT

RESPONSE BY GILLESPIE ECONOMICS TO THE COALPAC CONSOLIDATION PROJECT PAC REVIEW REPORT

1.0 CONTEXT AND PURPOSE

This report is prepared by Robert Gillespie the Principal of Gillespie Economics

1.1 Environmental Assessment Report

Gillespie Economics was instructed by Hansen Bailey Environmental Consultants **(Hansen Bailey)** on behalf of Coalpac Pty Limited **(Coalpac)** to prepare the Economic Assessment of the Coalpac Consolidation Project (**Project**), which was Appendix T (**EA Economic Assessment**) in the Environmental Assessment (**EA**) of the Project.

1.2 Report Following Public Exhibition

Following submissions responding to the public exhibition of the EA, Gillespie Economics was instructed by Hansen Bailey to prepare a response to the Department of Planning and Infrastructure (**Department**) to submissions that related to economic aspects of the Project. That document is Section 4.17 of the Response to Submissions (**RTS**) prepared by Hansen Bailey and I am informed, provided by Hansen Bailey to the Department.

1.3 PAC Review

Gillespie Economics has been provided with a copy of the request of the Minister for Planning to the Planning Assessment Commission (**PAC**) to:

1. *"Carry out a review of the Coalpac Consolidation Project, and:*
   - *(a) consider the Environmental Assessment of the project, all issues raised in submissions on the project, and any information provided on the project during the course of the review;*
   - *(b) assess the merits of the project as a whole, paying particular attention to the potential:*
     - *local health and amenity impacts of the project, particularly dust, noise and blasting impacts;*
     - *biodiversity impacts of the project;*
     - *water resource impacts of the project; and*
   - *(c) recommend appropriate measures to avoid, minimise and/or offset these impacts.*

1.4 PAC Report

Gillespie Economics has also been provided with a copy of the PAC report to the Minister (PAC Report) dated 14 December 2012 to enable Gillespie Economics to consider it with regard to its conclusions in relation to the economic effects of the Project. The Project considered by the PAC is described at Section 3 of the PAC Report, which is the Project in the EA as adjusted by the RTS.

1.5 Response to PAC Report

Hansen Bailey instruct that the Department has requested Coalpac to respond (**Coalpac PAC Response**) to the PAC Report, which includes a description of the Project as proposed to be contracted (Contracted Project) and which is described in Section 3 of the Coalpac PAC Response

and which adopts a number of recommendations by the PAC for the amelioration of the impacts of the Project as considered by the PAC.

1.6 Instructions

Gillespie Economics has been instructed by Hansen Bailey to;

- Provide an economic assessment of the Project as considered by the PAC;
- Review and comment on the economic assessment methodology, assumptions, principles and conclusions adopted by the PAC Report; and
- Provide an economic assessment of the Contracted Project.

1.7 Presentation

The qualifications and experience of Robert Gillespie are in Section 2. This report has been peer reviewed by Dr Jeff Bennett in a separate statement which contains his qualifications and experience.

Section 3 of this report identifies the legislative requirement for the economic assessment of a the Project in accordance with the *Environmental Planning and Assessment Act 1979* (NSW) *(***EPA Act**). This is the basis on which Gillespie Economics prepared the Economic Assessments for the Project and the Contracted Project.

Section 4 outlines the principles and methodology of Economic Assessment used by Gillespie Economics in preparing its assessments.

Section 5 reports on the economic effects of the Project as considered by the PAC and as described particularly in Sections 8.6 and 9.2 of the PAC Report.

Section 6 reports on the economic effects of the Contracted Project as proposed by Coalpac in the Coalpac PAC Response.

Section 7 responds to the Hansen Bailey request for Gillespie Economics to "*comment critically on economic assessment methodology, assumptions, principles and conclusions of the PAC in its consideration of the Project as evidenced by the PAC Report*" particularly at Section 8.6 [Economic Issues] and 9.2 [Project Benefits] of the PAC Report.

2.0 QUALIFICATIONS AND EXPERIENCE

Robert Gillespie, Principal of Gillespie Economics, holds the following undergraduate and post graduate degrees.

- Bachelor of Science (BSc) from Macquarie University;
- Bachelor of Economics (BEc)from Macquarie University;
- Master of Planning (MPlan) from the University of Technology, Sydney; and
- Master of Economics (MEc) from Macquarie University.

Robert is also currently undertaking a Phd. His thesis is on "Valuing the Environmental, Social and Cultural Impacts of Coal Mining".

Robert Gillespie has extensive experience in environmental economics and benefit costs analysis (BCA) gained from 12 years with the NSW Government during which he held the positions of:

- Manager of the Environmental Economics Policy Unit of the National Parks and Wildlife Service;
- Resource Economist with the NSW Department of Planning;
- Various Town Planning Positions, NSW Department of Urban Affairs and Planning; and
- Various Land Management Positions, NSW Department of Lands.

During the 15 years since being employed in the Government, Robert Gillespie has been the Principal of Gillespie Economics, a resource and environmental economics consultancy practice. During this time he has also lectured at Sydney University, Macquarie University and University of Technology, Sydney, in environmental economics, BCA and non-market valuation.

Robert Gillespie has prepared a number of BCA guidelines including:

- the NSW Department of Planning and Infrastructures draft guideline on *Economic Effects and Evaluation in Environmental Impacts Assessment;* and

- the NSW Department of Land and Water Conservation's draft *Economic Guidelines for Determining Environmental Impact Assessments on Bushfire Management Activities*;

- Gillespie, R. (1999) What do I need to know about benefit cost analysis? In: Valuing Tourism: Methods and Techniques, Bureau of Tourism Research, Occasional Paper No. 28, Edited by Corcoran, K., Allcock, A., Frost, T., and Johnson, L.

Over the 15 years that he has been the principal of Gillespie Economics Robert has undertaken BCA of numerous types of projects and policies including of mines, quarries, environmental flows, catchment programs, catchment plans, water supply proposals, visitor centres, world heritage nominations, recreation facilities, forestry, transitways, sewerage infrastructure, native vegetation clearing, urban growth strategies, residential developments, industrial developments, agricultural activities, Council Agenda 21 plans etc.

Robert has undertaken BCA for a range of clients including:

- government agencies including the NSW Department of Planning and Infrastructure, Sydney Water, NSW Department of Finance and Services, NSW National Parks and Wildlife Service, Murray Darling Basin Commission, NSW Tourism, Department of Land and Water Conservation, NSW Fisheries, NSW Marine Parks Authority, NSW Roads and Traffic Authority, Commonwealth Department of Environment and Water Resources, NSW Premier's Department; Environment ACT, NSW EPA, Southerland Council, and the Victorian Environmental Assessment Council;

- environmental groups including the Total Environment Centre, Australian Conservation Foundation, the Victorian National Parks Association and the Blue Mountains Conservation Society and the Colong Foundation for Wilderness;

- developers including BHP Billiton, Rio Tinto, Port Waratah Coal Services, Newcastle Coal Infrastructure Group, Xstrata, Centennial Coal, Peabody Australia, Whitehaven, Gloucester Coal, Concrite Quarries, and Cleary Bros (Bombo);

- industry organisations including the NSW Minerals Councils, Australian Marine Park Tourism Operators and Australian Farm Institute); and

- catchment trusts including the Hawkesbury Nepean Catchment Management Trust, and the Hunter Catchment Management Trust.

Robert has individually and jointly completed a number of published research papers on BCA and non-market valuation, published in Australian and international peer reviewed journals, including:

- Bennett, J., Gillespie, R., Powell, R. and Chalmers, L. 1995 *The Economic Value and Regional Economic Impact of National Parks*. Australian Journal of Environmental Management, Vol. 3, No. 4, pp. 229-239;

- Gillespie, R. and Bennett, J. (1999) Using Contingent Valuation to Estimate Environmental Improvements Associated with Wastewater Treatment, *Australian Journal of Environmental Management*, Vol. 6, No. 1, pp. 14 – 20;

- Gillespie, R. (1999) What do I need to know about benefit cost analysis? In: *Valuing Tourism: Methods and Techniques*, Bureau of Tourism Research, Occasional Paper No. 28, Edited by Corcoran, K., Allcock, A., Frost, T., and Johnson; L.

- Gillespie, R (2004) Economic evaluation and market based instruments, *Journal of Ecological Management and Restoration*, V5, Issue 3, pg 225;

- Crase, L. and Gillespie, R. (2007) The impact of water quality and water level on the recreation values of Lake Hume, *Australasian Journal Of Environmental Management*—Volume 15, pg. 31-39;

- Gillespie, R. and Bennett, J. (2012) Valuing the Environmental, Cultural and Social Impacts of Open Cut Coal Mining in the Hunter Valley of NSW, Australia, Journal of Environmental Economics and Policy, Journal of Environmental Economics and Policy, p. 1-13;

- Gillespie, R. and Kragt, M. (2012) Accounting for nonmarket impacts in a benefit-cost analysis of underground coal mining in New South Wales, Australia, Journal of Benefit Cost Analysis, 3(2): article 4; and

- Gillespie, R. and Bennett, J. (2012) Willingness to pay for kerbside recycling in Brisbane, Australia, Journal of Environmental Planning and Management, 1-16.

A curriculum vitae for Robert Gillespie is provided at Appendix 1.

3.0 LEGISLATIVE REQUIREMENTS FOR ECONOMIC ASSESSMENT

The basis for economic analysis under the EPA Act emanates from the definition of the term "*environment*" in the EPA Act and the "*objects*" of the EPA Act.

In the case of the environmental assessment of a development which requires consent under Part 3 or Part 5, or the former Part 3A, of the EPA (as is the case with the Coalpac Project) there is a specific requirement for an 'economic' assessment in the *Environmental Planning Regulation 20*00. This is also normally required by the Director-Generals Environmental Assessment Requirements (DGRs) for the environmental planning assessment of a development as it is in respect of the Coalpac Project.

3.1 Definition of Environment

Section 4 of the EPA Act provides the definition of "environment "as:

***"environment** includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings.*"

This includes the social and economic environment, as well as the biophysical environment.

3.2 Objects of EPA Act

Section 5 (a) of the EPA Act states that "*The objects of this Act are:*

(a) to encourage:

*(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and **economic welfare** of the community and a better environment,*

*(ii) the promotion and co-ordination of the orderly and **economic use** and development of land,…"*

3.3 EPA Regulations

Clause 7 (1) (f) of Schedule 2 of the EPA Regulations requires the environmental assessment to provide "*the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, **economic** and social considerations…*"

3.3 Environmental Assessment Requirements

The DGRs for the Project require that "The environmental assessment for the Project must include

- *"a detailed assessment of the costs and benefits of the project as a whole, and whether it would result in a net benefit for NSW"*
- *"economic justification of transporting coal and sand products on public roads, including an assessment of the costs and benefits of alternative transport methods"*
- *"an assessment of the potential impacts of the project on the local and regional community".*

3.4 Policies and Guidelines

The DGRs require that "*The environmental assessment of the key issues listed above must take into account relevant guidelines, policies, and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies and plans that may be relevant to the environmental assessment of this project.*"

The ‘Policies, Guidelines and Plans’ attachment to the DGRs refers to the *Draft Economic Evaluation in Environmental Impact Assessment (DoP).*

This guideline identifies that “*To conduct a proper economic evaluation of the options associated with a proposed development that is likely to have significant environmental impacts it is essential to undertake a benefit-cost analysis”.* BCA is the method that economists use to consider **economic welfare** and to **justify** investments on economic grounds.

The guideline also identifies that regional economic impact assessment using input-output analysis may provide additional information as an adjunct to the BCA.

4.0 PRINCIPLES AND METHODOLOGY OF THE ECONOMIC ASSESSMENT

4.1 Introduction

Gillespie Economics has used the BCA method, and principles, as the primary approach to undertaking an economic assessment of the Project and to meet the DGRs for the Project to:

- *"assess the costs and benefits of the project as a whole, and whether it would result in net benefits to NSW*"; and
- *"provide economic justification for transporting coal and sand products on public roads…"*

The consideration of the distribution of costs and benefits in the BCA, and separate input-output analysis of the Project, was used to meet the DGRs to provide:

- *"an assessment of the potential impacts of the project on the local and regional community".*

4.2 Benefit Cost Analysis Principles and Methodology

4.2.1 Introduction

BCA has its theoretical underpinnings in neoclassical welfare economics and applications in NSW are guided by the NSW Treasury (2007)[1]. BCA applications within the NSW environmental assessment framework are guided by NSW DPI Draft Guidelines for Economic Effects and Evaluation in EIA (James and Gillespie 2002). NSW Treasury (2012) has prepared a draft *Guideline for the use of Cost Benefit Analysis in mining and coal seam gas proposals*, in relation to the Strategic Regional Land Use Plans Gateway Process.

BCA is primarily concerned with comparison, using the common yardstick of monetary value, of the present value of aggregate benefits to society, as a result of a project, policy or program, with the present value of the aggregate costs. Provided the present value of aggregate benefits to society exceed the present value of aggregate costs i.e. a net present value of greater than zero, the project is considered to improve the economic welfare of society and hence is desirable from an economic efficiency perspective.

4.2.2 Definition of Society

As a tool of investment appraisal for the public sector, BCA can potentially be applied across different definitions of society. Depending on agency jurisdiction and the geographical spread of benefits and costs, this could range from the population of a Council area through to the whole world. However, most applications of BCA are at the national level. This national focus extends the analysis beyond that which is strictly relevant to a NSW government planning authority. However, the interconnected nature of the Australian economy and society creates significant spillovers between states. These include transfers between States associated with the tax system and the movement of resources (labour and capital) over state boundaries[2].

Nevertheless, as identified by Boardman et al (2001)[3], "where major impacts spill over national borders, then the BCA should be done from the global as well as the national perspective". For mining projects impacts that spill over national borders include greenhouse gas impacts of the project and returns to foreign ownership.

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[1] NSW Treasury (2007) *NSW Government Guidelines for Economic Appraisal*, Office Of Financial Management Policy & Guidelines Paper.
[2] None of the guidelines referred to above provide guidance about the relevant jurisdictional definition of society for BCA.
[3] Boardman, A., Greenberg, D., Vining, A. and Weimer, D. (2001) *Cost-Benefit Analysis: Concepts and Practice*, Prentice Hall, USA.

Adopting a sub-national perspective in the application of BCA is not recommended (Boardman et al 2001), as it can result in a range of costs and benefits from a project being excluded, making BCA a less valuable tool for decision-makers. This is particularly the case for major projects which involve the use of resources drawn from across the nation as well as internationally and which generate benefits that are enjoyed by people who are resident in NSW and beyond.

BCAs of mining projects are therefore normally undertaken from a global perspective i.e. including all the costs and benefits of a project, no matter who they accrue to and then truncating the analysis to Australia, to assess whether there are net benefits to Australia from a project. A consideration of the distribution of costs and benefits can then be undertaken to give consideration to the benefits and costs that accrue to NSW and other regions. However, desirability of a project from an economic efficiency perspective does not require that there are net benefits at a local, regional, state, national and global level. The primary consideration is the net benefits of the project from a national perspective.

4.2.3 Definition of the Project

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

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

4.2.4 Net Production Benefits

BCA of mining proposals invariably involve a trade-off between the net production benefits of a project and the non-market (environmental, social and cultural) impacts (most of which are economic costs of the mining but some of which may also be economic benefits).

Net production benefits can be estimated based on market data on the projected economic value of coal less the capital and operating costs of projects, including opportunity costs of capital and land already in the ownership of mining companies. Production costs and benefits over time are discounted to a present value.

The estimate of net production benefits of a project generally includes accounting for costs aimed at mitigating, offsetting or compensating for environmental, social and cultural impacts. This includes the costs of purchasing properties adversely affected by noise and dust, providing mitigation measures properties moderately impacted by noise and dust, the costs of providing ecological offsets, the cost of purchasing groundwater and surface water entitlements in the water market etc.

4.2.5 Environmental, social and cultural costs

The consideration of non-market impacts in BCA relies on the assessment of other experts contributing information on physical, ecological, cultural and social impacts. The EA process results in detailed (non-monetary) consideration of the potential non-market impacts. This information can then be interpreted by economists in terms of economic efficiency.

4.2.6 Consideration of Net Social Benefits

BCA guidelines are not prescriptive about the level of monetisation that should be undertaken of non-market impacts of projects. This will depend on the time and resources allocated to the economic assessment.

However, even without any monetisation of impacts, BCA still provides important information to the decision-maker about the trade-offs involved with a project.

At its simplest level, BCA can utilise the threshold value method where the net production benefits of a project are estimated in monetary terms and this provides the threshold value that the residual non-market costs of the project, after mitigation, offset and compensation by the proponent (as evaluated in a non-monetary way by specialists in the EA), would need to exceed for the non-market costs of the project to outweigh the net production benefits.

BCA can also utilise benefit transfer to estimated values for the main non-market impacts of projects. Benefit transfer involves using information on the physical magnitude of impacts e.g. area of vegetation cleared or visitors displaced from an area, obtained from the EA specialists and applying values per hectare or per recreation day, obtained from non-market valuation studies undertaken in other contexts.

BCA may also potentially utilise primary valuation methods to estimate the main non-market impacts of a project.

Whichever approach is used, only residual impacts, after mitigation, offset and compensation, require consideration.

There is also an issue of materiality. Only those impacts that are likely to have a material bearing on the decision, need to be considered in BCA (NSW Treasury, 2012).

4.2.7 Distribution of Costs and Benefits

While BCA is concerned with a comparison of aggregate benefits with aggregate costs, the distribution of costs and benefits may also be of interest to decision makers and can be provided in a qualitative or tabular form.

5.0 ECONOMIC ASSESSMENT OF THE PROJECT

This Section summarises the conclusions by Gillespie Economics in its Economic Assessment of the Project (**EA Economic Assessment**) as adjusted by the Coalpac RTS and which was the Project as described in Section 3 of the PAC Report and considered by the PAC.

5.1 Introduction

Gillespie Economics provided an Economic Assessment for the Project as Appendix T to the EA which was reviewed in the RTS. The Economic Assessment was completed in accordance with the principles and approach described in Section 4 of this Report.

The Economic Assessment comprised:

- A BCA (threshold value analysis);
- A regional economic impact assessment using input-output analysis; and a
- Consideration of a range of issues relating to the proposal including transportation of sand and coal by road

5.2 BCA of the Project – Assessment

5.2.1 Net Production Benefits

The BCA of the Project commenced by examining the net production benefits of the Project i.e. the economic value of the coal less the capital and operating costs of the mine. This was estimated at $1,519M.

It was recognised that there is some uncertainty about the future value of coal and so a sensitivity analysis was conducted. If coal value reduced by 20% for the entire life of the Project then the estimated net production benefits of the Project would reduce to $881M. Alternatively, if coal value increased by 20% for the entire life of the Project the estimated net production benefits of the Project would increase to $2,156M.

The estimate of the net production benefits of the Project was presented as a threshold value. This threshold value represents the value that any residual environmental impacts of the Project, to Australia (and in the case of the Coalpac Project to NSW), after mitigation by Coalpac, would need to exceed to make the environmental costs of the Project exceed the net production benefits.

Qualitative and quantitative consideration was then given to the potential environmental impacts of the Project, relating to dust and noise affectation of properties, greenhouse gas generation, the clearing of native vegetation and road transport of sand and minor quantities of coal to other domestic customers.

5.2.2 Air Quality and Noise

Dust and noise impacts were identified as already being internalised into the costs of the Project by including the acquisition costs of affected properties and mitigation measures for properties in the management zones.

5.2.3 Greenhouse

Australian greenhouse gas impacts of the Project were estimated using a carbon value of $23/t CO_2-e to represent the incremental global damage costs from greenhouse gas emissions from the Project and apportioning these based on Australia's share of global GDP to estimate damage costs to Australia. The Australian damage costs from the Project greenhouse gas emissions were estimated at in the order of $0.2M. The carbon tax that has now been implemented internalises the global greenhouse damage costs into the mine's operating costs.

5.2.4 Ecology

The externality costs associated with the clearing of native vegetation was considered in two ways. The first was to note that the Governments policy requires that the ecological values lost through clearing are offset, with the guiding principle being that offsets should aim to result in a net improvement in biodiversity.

Cumberland Ecology prepared an offset strategy for the Project. The capital and operating costs of this offset strategy were included in the costs of the Project. Provided the offset strategy meets its goal to result in a net improvement in biodiversity there is no other cost for inclusion in the BCA.

It should be noted that as part of the RTS the offset strategy was updated and additional costs were included in the costs of the Project. However, these additional costs only reduced net production benefits of the Project by $1M.

The second approach used in the BCA was to ignore the fact that the offset strategy aims to result in an improvement in biodiversity values and to attempt to place a value on the loss of vegetation from Ben Bullen State Forest. It was assumed that in the absence of the Project this area of forest would potentially be available for a combination of forestry, recreation, conservation and carbon sequestration.

Based on a sustained yield scenario presented by GHD (2011), the present value of potential forestry activities was estimated at $0.2M.

The Ben Bullen State Forest has no recreation infrastructure although it is identified as permitting hunting. In absence of any available information it was (generously) assumed that there would be two hunters per weekend for 21 years. Using benefit transfer, an economic value of less than $1M present value, was estimated.

Using benefit transfer from a non-market valuation study of the NSW community's willingness to pay for the conservation of native vegetation, the conservation values of this area of forest was estimated at $0.6M, present value.

Australian carbon sequestration benefits were estimated at $0.02M.

Overall, the forest area impacted by the Project was estimated to have Australian economic values of in the order of $0.9M.

5.2.5 Road Use

The potential impact of road usage was considered qualitatively based on information from Hyder Consulting. The BCA identified that road user costs such as pavement damage were being incorporated into heavy vehicle registration costs and therefore would be reflected in freight charges that were already included in the costs of the Project.

With respect to traffic (capacity) impacts, Hyder Consulting (2011) identified that the truck traffic generated by the product sand and coal haulage to domestic customers (other than MPPS) would not be substantial and would not result in noticeable impact to the Castlereagh Highway/Invincible access. It also identified that this traffic would lead to a marginal increase in crash risk exposure along the sections of the Castlereagh Highway between Cullen Bullen and the Great Western Highway, near Lithgow.

5.2.6 Other Issues

Gardens of Stone Park Stage Two (GoS2) Proposal
Gillespie Economics was previously engaged by the Blue Mountains Conservation Society Inc. and Colong Foundation for Wilderness Ltd to undertake a BCA of its proposed nature-based recreation and tourism plan for a proposed Gardens of Stone Park Stage Two (GoS2). That BCA found that should any proposal for a GoS2 proceed it would have net benefit to Australia of $28M to $38M, provided that the proposal did not restrict sand mining or coal mining. If any GoS2 proposal proceeds and were to restrict coal mining such a proposal would result in a net cost to the community.

Alternatives to the Road Transportation of Coal and Sand
The Project proposed the road transportation of approximately 0.45 million tonnes of product coal and 0.64 Mt of sand per annum. The Economic Assessment identified that there is no practical and feasible alternative to road transportation of product coal and sand. Current customers for the product coal are located in diverse locations including Nowra, Berrima, Gaylong, Marulan and Newcastle. Potential customers for the sand resource are unknown at this stage but are likely to be located across Sydney.

Given that Hyder Consulting identified that the impacts of road transportation of product coal for industrial uses and sand would not be substantial and the increase in crash risk exposure would be marginal, rail was not considered likely to be economically justifiable or feasible for the small volumes involved in transporting these domestic products.

Alternative Sources of Coal for Mount Piper Power Station
The Economic Assessment identified that over 70% of the proposed output from the Project is contracted to Delta Electricity, providing about 70% of the coal requirements for the Mount Piper Power Station (**MPPS**). The MPPS accounts for about 13% of the electricity requirement for NSW. The Project was identified as offering a local, reliable, low cost source of coal for the MPPS.

Known alternative sources of coal for MPPS were identified in the Economic Assessment as including Springvale and Angus Place Collieries, formerly Centennial Coal operated mines (Centennial Coal is now owned by the Thai energy group Banpu). It was identified that contract negotiations between Delta Electricity and Centennial Coal failed in 2011 shortly before Banpu took over Centennial Coal. Banpu has indicated that it will be looking for a “fair market price” in future negotiations.

Greenhouse Gas
Greenhouse Gas emission costs directly associated with the Project (i.e. mining and transportation of coal to Port) were included in the consideration of the benefits and costs of the Project. Emissions from burning the coal were omitted as these relate to the operation of the already approved NSW power stations and burning overseas is subject to the approval processes and greenhouse gas issues and policies as applied in those jurisdictions of the relevant country.

Optimal Mine Plan
Maximum coal recovery (by the ‘optimal mine plan) would recover 160 Mt ROM (116 Mt product) coal over 40 years of mining. To minimise environmental effects, the Project mine plan was reduced to target a resource of approximately 108 Mt ROM foregoing $325M, present value, in total net production benefits to the community, including $31M (present value) in royalties to the NSW government ($268M undiscounted).

5.2.8 Net Social Benefit

With net production benefits of the Project (estimated at $1,519M, present value) and the specified environmental impacts to Australia (estimated at $1.1M, present value), the BCA concluded that the external environmental costs of the Project are likely to be valued at significantly less than the estimated net production benefits. Consequently, the Project is desirable from an economic efficiency (welfare) perspective.

5.2.9 Distribution of Costs and Benefits

The net production benefits of the Project were identified as being distributed between:

- Coalpac in the form of net profits;
- The NSW government in the form of royalties (estimated at $144M, present value);
- The operator of the MPPS in the form of lower cost coal (and ultimately electricity consumers in NSW in the form of lower electricity prices);
- The Commonwealth Government in the form of company tax (estimated at $169M, present value); and
- The local region (Lithgow and Bathurst local government areas), from the proposed Voluntary Planning Agreement to fund local community projects, in addition to reimbursement of any costs to provide services due to the increase in the scale of mining.

Noise and dust impacts would affect nearby properties but the cost of those impacts would be internalised by Coalpac through the acquisition (compensation) of adversely affected properties and mitigation measures for those located in impact management zones. Impacts below impact criteria thresholds or the relevant NSW assessment guidelines were not considered to be material .

Impacts on native vegetation would impact households who hold values for this vegetation but would be internalised through the provision of an offset package by Coalpac.

Global greenhouse gas impacts would be internalised into the operating costs of the Project via the carbon tax.

Other potential impacts of the Project were concluded by specialists to be minimal.

All the net production benefits of the Project accrue to NSW. Only some of the quantified environmental costs accrue to NSW (i.e. some of the greenhouse gas costs would occur outside NSW). Based on the distribution of costs and benefits, the Project is also likely to have net benefits to NSW.

5.3 Regional and NSW Economic Activity

BCA is concerned with whether the incremental benefits of the Project exceed the incremental costs and therefore whether the community would, in aggregate, be better off ‘with’ the Project compared to ‘without’ it.

In contrast, the focus of the economic impact assessment is the effect (impact) of the Project on the economy in terms of a number of specific indicators of economic activity, such as gross regional output, value-added, income and employment.

The regional economic impact assessment examined the economic activity that would be generated in the region (Bathurst and Lithgow local government areas) and State as a result of the Project.

The annual regional economic impacts of the Project were estimated at up to:

- $219M in annual direct and indirect regional output or business turnover;
- $105M in annual direct and indirect regional value added;
- $30M in annual direct and indirect household income; and
- 293 direct and indirect jobs.

The annual NSW economic impacts of the Project were estimated at up to:

- $275M in annual direct and indirect regional output or business turnover;
- $133M in annual direct and indirect regional value added;
- $48M in annual direct and indirect household income; and
- 519 direct and indirect jobs.

6.0 ECONOMIC ASESSMENT OF THE CONTRACTED PROJECT

6.1 The Contracted Project

Gillespie Economics is instructed that the Coalpac PAC Response adopts a number of the recommendations made by the PAC for the amelioration of the environmental impacts of the Project by implementing a number of modifications to the Project (Contracted Project).

Hansen Bailey advises that the variations to the Project assessed by the PAC are as detailed in Section 3 of the Response to PAC Review. The proposed changes are as follows.

1. Removal of the Hillcroft Mining Area and associated access infrastructure (including the Wallerawang-Gwabegar Rail Line overpass bridge and Red Springs Road crossing);
2. Removal of the sand extraction component of the Project located in the Cullen Valley mining area, including the requirement for associated crushing and screening infrastructure and the transport of product sand by road from the site to market;
3. Modification of the open cut mining footprint to avoid the area of Clandulla Geebung habitat previously located in the north western mining area at Cullen Valley Mine;
4. Modification of the open cut mining footprint in relation to the Significant Pagoda Landforms (SPLs) to improve ecological outcomes;
5. Contraction of the highwall mining footprint from under SPLs to improve ecological, heritage and geotechnical outcomes; and
6. Modification and regulation of blasting practice to further minimise the potential for blasting impacts to any Significant Pagoda Landforms and cliffs; and
7. Enhanced Biodiversity Offset Strategy for any residual ecological impacts.

6.2 Economic Assessment of the Contracted Project

As requested, Gillespie Economics has completed an Economic Assessment of the Contracted Project which is provided at Appendix 2. This was based on a revised financial model of the Contracted Project provided by Coalpac and information from Hansen Bailey on the environmental impacts of the Contracted Project.

6.3 Summary of Economic Assessment of the Contracted Project

The conclusions from the economic assessment of the Contracted Project are as follows.

6.3.1 Net Benefit

The Contracted Project is estimated to have total net production benefits of $1,330M. This is a minimum threshold value that any unquantified Australian environmental and social impacts of the Contracted Project, after mitigation by Coalpac, would need to exceed to make the Contracted Project questionable from an economic efficiency perspective.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to investigate and quantify the main residual environmental impacts of the Contracted Project, based on the findings of the specialist sub-consultants. The main potential environmental impacts of the Contracted Project relate to dust and noise affectation of properties, greenhouse gas generation, visual impacts and the clearing of native vegetation. There will also be some road externalities, mainly associated with road transport of minor quantities of coal to other domestic customers.

Dust and noise impacts are internalised into the costs of the Contracted Project by including the acquisition costs of affected properties and mitigation measures for properties in the management zones.

Using a carbon value of $23/t CO_2-e, the incremental global damage costs from greenhouse gas emissions of the Contracted Project are valued at $17M present value[4]. The Australian damage costs from the Contracted Project greenhouse gas emissions are estimated at in the order of $0.2M. The carbon tax internalises the global greenhouse gas costs into Coalpac's operating costs.

Properties identified as experiencing high visual impacts would be eligible for at receptor mitigation works. The cost of these mitigation works is included in the capital costs of the Contracted Project.

The costs of biodiversity offset actions have been included in the estimation of net production benefits. Provided that the proposed offset properties that are negotiated with Office of Environment and Heritage offset the biodiversity values that will be lost from the Contracted Project, there would be no additional ecological costs for inclusion in the BCA. To include an economic cost for cleared vegetation and lost habitat of threatened species in the BCA would result in double counting. Dr David Robertson from Cumberland Ecology in Appendix D of the Response to PAC Review advises that the offset proposed by Coalpac will be sufficient to offset impacted ecological values.

Overall, the Contracted Project is estimated to have net benefits to Australia of in the order of $1,330M and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Contracted Project BCA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than between $1,330M for the Contracted Project to be questionable from an Australian economic efficiency perspective.

6.3.2 Distribution of Costs and Benefits

The net production benefits of the Contracted Project would be distributed between a number of stakeholders including:

- Coalpac in the form of net profits;
- the MPPS, and WPS, in the form of lower cost coal (estimated at $744M, present value) which is ultimately passed on to electricity consumers through lower priced electricity;
- the NSW government in the form of royalties (estimated at $199M, present value) which is subsequently used to fund provision of government infrastructure and services across NSW, including the region;
- the Commonwealth Government in the form of company tax (estimated at $116M, present value) which is subsequently used to fund provision of government infrastructure and services across Australia and NSW, including the region; and
- the local region from the establishment of a Voluntary Planning Agreement to fund local community projects.

Without mitigation and compensation, the environmental impacts of the Contracted Project such as noise and dust and visual impacts would be borne by members of the local community. Greenhouse gas emission impacts would be borne globally and clearing of native vegetation would be borne by those members of the NSW and Australian community who value the impacted native vegetation.

[4] It should be noted that greenhouse gas generation associated with sea transport and usage of the product coal is considered to be outside of the scope of the BCA of the Varied Project.

However, noise and dust impacts will be internalised by Coalpac through the acquisition of (provision of compensation for) adversely affected properties and provision of mitigation measures for those located in noise management zones or considered to be in the high visual impact zone. Impacts on native vegetation will also be internalised through an offset package. With the implementation of the carbon tax, the global greenhouse gas costs from the Contracted Project would be internalised into the operating costs of Coalpac.

Consequently, as well as resulting in net benefits to Australia the Contracted Project is also considered to provide net benefits to NSW.

6.3.3 Regional and NSW Economic Impacts

Regional economic impact assessment is concerned with the effect of an impacting agent on an economy in terms of a number of specific indicators, such as gross regional output, value-added, income and employment.

The main impacting agent for the Contracted Project is the expenditure in the regional economy of Lithgow and Bathurst Local Government Areas, and NSW, as a result of an extension in the life of Coalpac operations.

The average annual expenditure of the Contracted Project will be at least as great as for the original Project and the estimated direct employment level will be the same as for the original Project. Consequently, the estimated regional and NSW impacts of the original Project are considered to be also representative of the Contracted Project.

The annual regional economic impact associated with the Contracted Project is estimated at up to:

- $219M in annual direct and indirect regional output or business turnover;
- $105M in annual direct and indirect regional value added;
- $30M in annual direct and indirect household income; and
- 293 direct and indirect jobs.

The annual NSW economic impact associated with the Contracted Project is estimated at up to:

- $275M in annual direct and indirect regional output or business turnover;
- $133M in annual direct and indirect regional value added;
- $48M in annual direct and indirect household income; and
- 519 direct and indirect jobs.

These estimated annual regional and NSW impacts would be felt for the life of the Contracted Project.

7.0 REVIEW OF ECONOMIC CONCLUSIONS BY THE PAC

7.1 Overview

The PAC Report rejected the Economic Assessment prepared by Gillespie Economics and the response to economic issues detailed in the RTS, and has given weight to and placed material reliance on the Submission from the Institute of Sustainable Futures (ISF) that was an Appendix to the submission from the Total Environment Centre in response to the public exhibition of the EA. The PAC has done this despite the peer review and support of the highly credentialed Professor Bennett for the approach and methodology of the Gillespie Economics Economic Assessment of the Project in the EA. The observations of the ISF are noted to be without any support by credentialed economists.

The biographies of the authors of the ISF report, located on the ISF website[5], indicate that neither of them have any economic qualifications. The comment by the PAC that there are *"strong differences of **professional** opinion as to the approach that should be taken to various aspects of the analysis"* is not properly based due to lack of comparability of the qualifications of the opinion givers.

The ISF report is based on a number of basic flaws resulting in incorrect conclusions and making it inappropriate for the PAC to place reliance on in coming to its conclusions. The conclusions drawn by the PAC are therefore unfounded.

7.2 Appropriate Methodology for Economic Assessment

The ISF has commenced from an assumption that the appropriate method for the determination of the economic effects of the project is the application of the Triple Bottom Line (TBL) approach. The ISF has then reviewed the Economic Assessment for its adherence to TBL principles.

The ISF justifies this approach as being suggested by the NSW Coal and Gas Strategy Scoping Paper. The Scoping Paper was not a document dealing with the appropriate methodology for the determination of the economic impacts of a mining project. The Scoping Paper was prepared to *"encourage community and industry feedback on the directions and issues to be addressed in the Coal & Gas Strategy"* (DoP 2010, p. 12[6]). The Scoping Paper is not a government policy and is not relevant to economic assessment under the *NSW Environmental Planning and Assessment Act, 1979* or the assessment requirements of the DGRs.

TBL is a form of multi-criteria analysis (MCA). It is not a form of economic analysis. Critiques of TBL[7] point to the lack of a consistent conceptual framework in TBL analysis, significant problems in its practical application and the strong likelihood of TBL analyses being open to manipulation by vested interests to secure an assessment that is favourable to their preferred outcome.

While the ISF makes reference to Vanclay, (2004) to reinforce its support of TBL, Vanclay (2004, p. 265) concludes that:

"It would appear that the advocates of TBL and the institutions that have adopted TBL are ignorant of SIA and other forms of impact assessment. The view presented here is that TBL is a fad that presents little that is new..."

As identified in Section 3.0, NSW legislative and policy requirement is to use BCA in assessing the economic aspects of projects. BCA applications in NSW are guided by its theoretical underpinnings in neoclassical welfare economics as well as the NSW Treasury (2007). BCA applications within the

[5] http://cfsites1.uts.edu.au/isf/staff/index.cfm
[6] Department of Planning (2010) NSW Coal & Gas Strategy – Scoping Paper - 2010
[7] Dobes, L and J. Bennett (2009). 'Multi-Criteria Analysis: Good enough for Government Work?', *Agenda*, 16 (3): 7-30.

NSW environmental assessment framework are further guided by NSW DP&I Draft Guidelines for Economic Effects and Evaluation in EIA (James and Gillespie 2002). It is these references that are appropriately required to be used to guide the economic assessment of the Project. It should be noted that draft guidelines, which have recently been prepared by NSW Treasury for the economic assessment of coal mining and coal seam gas proposals (NSW Treasury 2012), embody the principles and practice of BCA. NSW Treasury in its submission to the NSW DP&I regarding the PAC Review of the Coalpac Proposal confirm that BCA is the appropriate method for evaluating projects from an economic perspective.

"Cost Benefit Analysis is the standard evaluative technique for development projects and is prescribed in the NSW Government Guidelines for Economic Appraisal. CBA is widely used for evaluations by governments globally and by international organisations such as the World Bank and the OECD. The CBA framework is the preferred assessment approach for strategic land use situations involving possible conflicts between agriculture and mining and coal seam gas developments, per the recently released draft guidelines."

Despite the NSW Government policy and legislative framework that requires economic assessment of projects to undertake BCA, on the basis of the ISF report, the PAC questions its appropriateness. The PAC mistakenly raises the issue of whether "*TBL cost benefit analysis*" should have been employed in the economic analysis and justification for this Project. The PAC concludes that if that was the case, then the economic analysis presented in the EA falls well short. The PAC considers that *"the RTS avoids discussion of this issue, relying instead on simply re-stating the earlier (2002) Departmental guidelines and arguing that the analysis is consisted with those guidelines".* However, as identified above BCA, not TBL, is required to meet policy and legislative requirements with regard to economic assessment.

The PAC concludes that "*although the economic analysis may have been conducted within the applicable guidelines and bounds of economic theory, the facts of this particular project are sufficiently unusual to test the limits of the approach".*

However, the facts of this particular project are not unusual. They are consistent with the policy context in which NSW Treasury (2012) has prepared its' draft Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals.

The BCA method can be applied to any project or policy. Indeed it must be applied to any mining project proposal in NSW, in order to comply with legislative requirements and the NSW DP&I Draft Guidelines for Economic Effects and Evaluation in EIA (James and Gillespie 2002).

7.3 PAC Report - Economic Assessment Assumptions

The PAC's reliance on the ISF report has led to them into error on a number of economic aspects underpinning the demand for the Project and the Economic Assessment of the Project. These are addressed below.

Demand for Electricity

On the basis of incorrect and misleading information provided by the ISF, the PAC argues that since over 70% of the annual production from the Project is for domestic use, the evidence of **declining demand for electricity** does not support the justification made for this particular project.

The PAC makes reference to a declining demand for electricity in Australia and NSW, based on reference to the ISF. The ISF states that the Australian demand trend for electricity is downwards and this is particularly the case in NSW. The ISF further states that this trend is not anticipated to change in the short-medium term.

It is true that there has been a short term easing in the electricity demand in NSW as a result of the global financial crisis (reduced economic growth), higher prices (partly due to the cost of green schemes and higher network costs), milder weather in 2010-11 and some contribution from improved insulation, other energy efficiency measures, increased use of household photovoltaics (Garnaut 2011)[8] and structural change in the economy with contraction of industrial and manufacturing sector.

However, the long term trend has been one of growth. From 2000 to 2005 electricity demand grew more rapidly than population growth and from then it has grown more or less in line with population growth (Garnaut 2011). The Australian Energy Market Operator predicts that energy demand in the National Electricity Market will continue to increase over the next 10 years at an average yearly rate of 2.1 per cent under a medium growth scenario (Garnaut 2011). The Bureau of Resource and Energy Economics (2011)[9] projects that gross electricity generation in Australia will increase at an average annual rate of 1.4 per cent to 2034-2035.

The Invincible Colliery and the Cullen Valley Mine are a source of current coal supply to Delta Electricity to meet current demand for electricity. The Project is predominantly focused on continuing to supply coal to meet current demand for electricity rather than growth in demand.

The Economics of Energy Resources

The ISF report misunderstands the economics of energy resources.

The market mechanism is accepted in Australia and other advanced western economies as the best vehicle for bringing together the information necessary to determine whether there is sufficient demand for the coal resources proposed to be supplied by the Project. We are informed by Coalpac that there is a demand for the coal that it is proposing to mine. This has been confirmed by Delta Electricity, Energy Australia and the Manildra Group who advise that they intend to purchase a large proportion of the Projects product coal. This market signal to Coalpac is sufficient for it to make a significant investment to continue and expand mining at the Invincible Colliery and Cullen Valley Mine.

Contrary to the PACs conclusion, the evidence does support justification of this Project by reference to both existing and projected increased energy demand in NSW and Australia. This demand has been confirmed in letters of intent to purchase from Delta Electricity, Energy Australia and the Manildra Group and by Coalpac's willingness to make a significant investment in the Project.

Transitioning from Non-renewable Source of Energy to Renewable Sources of Energy

Underpinning much of the ISF report is a view that mining is not a sustainable activity and that the *"Project poses significant threats to energy security by way of prolonging the use of a depleting, increasingly expensive, and unsustainable energy source, and by delaying, a transition to clean energy future for Australia"* (ISF, p. 1). This is a political approach to the issue and not an economic approach. The ISF would seem to be managing an economic assessment to achieve a political outcome whereas the objective of economic assessment is to determine the economic impacts of a development in a given political context.

Within the regulatory and policy framework provided by Government, the market is best placed to manage the transition to clean energy. In competitive markets, the relative price of alternative energy resources indicates their relative scarcity and plays the crucial role in determining the speed at which different resources are used and are substituted one for another. As coal becomes more expensive and energy alternatives become cheaper a gradual transition will occur.

[8] Garnaut, R (2011) Garnaut Climate Change Review Update 2011 Transforming the Electricity Sector.
[9] Syed, A. and Penney, K (2011) Australian energy projections to 2034–35, Bureau of Resource and Energy Economics

However, to date there has been only modest increase in the relative market share of renewable energy sources largely due to their higher cost relative to coal-fired power. Forecasts of this relative price situation (BREE, 2011[10] Figure F) indicate that the cost advantage currently held by coal over renewable energy sources is likely to be maintained for the next twenty years. Most substitution across energy sources is predicted to be between natural gas and coal.

Government interventions that seek to mandate change or to manipulate the process of change away from coal to renewable energy sources, contrary to market signals, are likely to be counterproductive and result in net costs to society. Governments are unlikely to have the amount and detail of information necessary to direct the complex process of change that is constantly occurring in markets.

Components of the Economic Assessment

The PAC relies on a number of criticisms of the Economic Assessment, made by the ISF, to conclude that

"*the economic analysis may not present a sufficiently reliable platform for decision-making"* and can be *"accorded little weight".*

However, the criticisms raised by the ISF and referred to by the PAC are incorrect. Each criticism is addressed below.

The use of in various elements of the analysis of different base cases

The PAC refers to concerns about the base case used in the Economic Assessment i.e. the "without" Project scenario against which the Project is compared:

"The use in various elements of the analysis of different base cases (existing mine vs no mine) is also defended, but an equally plausible explanation is that the base case providing the most favourable outcome for the Proponent's case has been the one utilised."

However, this is incorrect. All aspects of the Economic Assessment (BCA, regional economic impact assessment and consideration of other issues (including consideration of incremental road transport impacts)) use the same base case – cessation of mining in 2012.

This base case is consistent with principles of BCA where the base case should be defined as the situation that arises if the Project is not approved. In this respect, it should be noted that operations have now been suspended at the Cullen Valley Mine resulting in 49 redundancies. Invincible Colliery is due to suspend its operations in March 2013. The suspension of both operations is due solely to the exhaustion of current approved reserves and they will remain suspended until further approvals are granted.

Benefits and Costs are Not Accounted for Consistently

The PAC refers to a criticism of the Economic Assessment made by the ISF:

"that benefits and costs are not accounted for consistently - spatially, temporally or in terms of whether the Project is an expansion project or a new project. The RTS responds to most of these criticisms, albeit not always convincingly. For example the response on spatial scales emphasizes the national scale at which the economic analysis should occur, but then argues that the project should be evaluated in terms of its own specific benefits and costs – many of which are identified as being local or region".

[10] Bureau of Resource and Energy Economics (2011) *Australian energy projections to 2034–35, Commonwealth of Australia.*

Each of the criticism of the ISF relied on by the PAC are incorrect and responded to below.

Expansion Project or New Project

The Economic Analysis treated the Project as a continuation and expansion of the existing mining operations. Mining "with" the Project approval was compared to mining "without" the Project approval. Without the Project, mining at Invincible Colliery and Cullen Valley Mine ceases.

Temporal Consistency

In terms of temporal consistency, the ISF states that the coal reserves will deplete but this is not taken into account in the Economic Assessment, that the Economic Assessment claims there will be ongoing regional economic stimulus from the Project but does not define ongoing and that the value used in the Economic Assessment for agricultural land ignores future land use potential.

However, all these claims are incorrect. The Economic Assessment is of the mining of the coal reserves, as proposed by Coalpac. Costs and benefits of this mining activity are considered. Once the available coal from this Project is mined (depleted) the production costs and benefits of the Project cease.

The ongoing stimulus to the regional economy from the Project is for the life of the Project i.e. 21 years. In the absence of Project approval, mining operations would cease and the regional economic activity currently provided by the mines would cease.

Agricultural land was correctly valued using its market price. The market value of agricultural land reflects the potential future agricultural production that can be achieved from the land and expectations regarding future commodity prices and costs of production, in perpetuity.

Spatial Consistency

The ISF considers that the Economic Assessment is not consistent with the physical boundary when analysing the costs and benefits of the Project. In particular, the ISF considers that the *"Economic Assessment includes the benefits of electricity generation from the burning of the coal, but does not take account of the associated costs of the MPPS, most importantly the associated GHG emissions."* The ISF also considers that a cost benefit analysis should have been undertake at each community level i.e. Lithgow region, State and Federal and Globally.

However, these assertions are incorrect. Consistent, with conventional practice, the BCA was undertaken from a national perspective (Sinden and Thampapillai 1995). BCA at a sub-national level, as proposed by ISF, is not recommended (Boardman et al 2001) as it results in distortions to the analysis. However, consideration was given to the distribution of costs and benefits so that it could be seen who bears the costs and benefits of the Project and that the benefits to NSW would exceed the costs.

The BCA did not include the benefits of electricity production as stated by ISF. The BCA was undertaken of the Project only i.e. the mining of coal and delivery of export coal to port. Only the costs and benefits of these actions were included in the BCA. Coal production, the main benefit of the Project, was valued at the Port (for export coal) and delivered to Delta electricity (for domestic coal) using the world parity price for coal as a basis for determining economic value of the coal. All the costs and benefits up to this point were included in analysis.

It is not appropriate to also include the impacts of burning of the coal by at the Mount Piper Power Station (MPPS) or overseas. The downstream uses of the coal constitute different projects[11] that can be subject to a separate BCA and have their own sets of costs and benefits that are different to those of mining.

For instance, costs associated with the burning of coal for electricity generation include the cost of coal, labour, land and capital inputs, electricity generation and distribution and environmental impacts, such as greenhouse gas generation of the burning of coal. The benefits associated with electricity generation would include the community's willingness to pay for electricity. There may also be externality benefits of electricity for economic development, education, and medical care. All of these costs and benefits are relevant considerations at this next stage of the production process.

Downstream use of coal is also secondary market effect. As identified by Sinden and Thampapillai (1995) net benefits that accrue to those who sell inputs to a Project or process outputs from a Project are secondary effects. These effects can only truly be identified, and their inclusion in BCA justified, when the market for inputs or outputs are clearly non-competitive. This is clearly not the case for coal and normal practice is to exclude secondary market effects.

Because coal was based on world parity price rather than the financial value to Coalpac, the consideration of the distribution of the benefits of the Project identified the MPPS as a direct beneficiary of the cheaper coal i.e. the difference between the World Parity Price and the financial price for the coal, with this benefit being passed on to electricity consumers in NSW in the form of lower electricity prices. But this should not be misconstrued as suggesting that BCA included the benefits of burning the coal from the Project.

Greenhouse Gas Emissions

The PAC states that

"it should be noted that there has been substantial debate between experts for the special interest groups and experts for the Proponent on the calculation of the Greenhouse Gas impacts of the project. The Proponent has conceded that the figures in the EA must be amended (see section 8.7 of this report). The Commission is unsure at this stage what adjustments (if any) need to be made to the economic analysis to deal with this".

The GHG emissions associated with the mining of coal and delivery to Port and for domestic customers (i.e. the definition of the Project) are included in the Gillespie Economics BCA using a global social damage cost of carbon of $23/t CO2-e that is determined by the Federal Government's carbon tax.

Because the BCA is undertaken at a national level the damage costs to Australia are estimated on a pro rata basis based on the proportion of the world's gross production that is contributed by Australia's GDP. The Australian damage costs of these GHG emissions are estimated at $2M. Even if changes to the GHG impacts of the Project are required it would have very little impact on the economic efficiency of the Project.

GHG emissions from the burning of coal from the Project are not relevant to a BCA of the Project.

[11] As identified by NSW Treasury (2007), Projects or programs may contain a range of elements related to one another and the point at which a discrete project can be identified will require careful judgement. In this respect, NSW Treasury (2007) cautions against excessive aggregation in project scope i.e. inclusion of activities in the project scope that can themselves be considered to be separate projects.

Offsets

In relation to offsets, the PAC states that:

" the assertion in the economic analysis that the biodiversity impacts of the project are fully accounted for in the rehabilitation and offset proposals is clearly wrong. Not only does it not stand up to any level of scrutiny from a biodiversity protection perspective, but there have also been substantial changes to these proposals in response to criticism of the EA. The RTS simply adds $1m to the project costs and reasserts the Proponent's original position. The problem is that the Commission does not consider that there is any credible evidence available that the rehabilitation will work in the longer-term and there is no conclusive evidence that even the revised Biodiversity Offset Package is adequate.

It is also arguable whether property offsets can be seriously asserted to 'offset the biodiversity values that will be lost from the Project' and that there 'would be no additional ecological costs for inclusion in the BCA. This may be a convenient economic fiction, but the fact is that destroying biodiversity in one area cannot be compensated for by 'protecting' it in other areas where it was not under threat."

In estimating the net production benefits of the Project, the BCA included the costs of proposed offset actions. The presumption inherent in this approach is that the government policy that requires offsets to result in a 'net improvement' in biodiversity, is effective.

Since the preparation of the Economic Assessment, additional offsets have been proposed. In the RTS it was identified that inclusion of the acquisition and management costs for these offsets would reduce the estimate of net production benefits from $1,519M to $1,518M. The relative magnitude of the offset costs and the production benefits of the Coalpac project are very apparent from this calculation. The addition of further offsets would likely to have minor impacts on the net production benefits of the Project and not overturn the conclusion that the benefits of the project to society outweigh the costs.

As identified in the Response to Submissions:

"Provided offsets that are negotiated with OEH, offset the biodiversity values that will be lost from the Project there would be no additional ecological costs for inclusion in the BCA. To include an economic cost for cleared vegetation and lost habitat of threatened species would result in double counting".

Impact on Pagoda Landforms

The PAC report places considerable emphasis on the impacts of mining on the pagoda landforms and the implied social costs of those impacts. As identified by NSW Treasury in its submission to the NSW DP&I regarding the PAC Review of the Coalpac Proposal, *"the PAC Review is placing a high value on the non-quantified environmental impacts. This "high" value is contentious….."*

This high value is particularly contentious given that the findings of the geotechnical engineering design showed that even under a worst-case scenario, highwall mining could be used to extract coal reserves from beneath these landforms with negligible impact. On the basis of this technical advice no external costs were in included in the Gillespie Economics, Economic Assessment.

Given the proposed concession to remove highwall mining beneath significant pagoda landforms, this approach is further validated

World Parity Price for Coal

The PAC also raises issues with the use of the World Parity Price for valuing the coal and states that:

- *" the coal to be supplied to MPPS is not suitable for export and world parity does not therefore appear to be particularly relevant;*
- *the Proponent has a contract to supply around 70% of the product coal from the project to MPPS at a price substantially below current world parity;*
- *this contract extends to 2029, which covers 17 of the 21 years of a possible approval for this project; and*
- *the claimed threshold benefits of $1,519 million for the project are particularly sensitive to the coal price. A 20% reduction in coal price reduces the threshold benefits 42% to $881 million.*

The Commission's conclusion is that, even though the economic analysis may be acceptable in theoretical terms, for this particular project it appears to grossly overstate the real financial benefits".

The PAC's confusion here seems to revolve largely around the difference between financial analysis and economic analysis.

Economic analysis is concerned with the aggregate net benefits to Australia from a Project. This is defined as the net of changes in producers and consumers surpluses caused by the implementation of the project relative to a without project scenario.

Financial analysis is concerned with the net profit of a Project to a specific entity, such as Coalpac.

Key differences in these approaches included that the value used in the BCA for coal from the Project may differ from that which would be used in a financial analysis (see below). Some of the costs also differ.

In BCA, financial costs to Coalpac such as royalties and taxes are transfer payment rather than real resource costs. That is, they are not being exchanged for a resource or service. They are simply part of the net production benefits of the Project that are transferred to the Government. In BCA, they are therefore not included as an economic cost. It is therefore not surprising that the net production benefits to Australia and NSW estimated in BCA, exceed the financial benefits to Coalpac.

However, it must be emphasised that economic analysis does not attempt to estimate "real financial benefits" and **therefore it is not possible for the economic analysis to "grossly overstate the real financial benefits" of the Project**.

Financial analysis is not a requirement under the EPA Act. The presumption is that a proponent will expect financial viability if it submits a proposal. The BCA component of the Economic Assessment is concerned with the economic efficiency of the Project i.e. the extent of the aggregate net benefits of the Project to the people of Australia.

In economic analysis, the value of goods and services is its value in a competitive market. As identified by Sinden and Thampapillai (1995), the world market for a good is larger and so more competitive than any domestic market. The world market is therefore an appropriate market from which to derive a shadow price[12] for coal from the Coalpac Project.

The fact that the Coalpac coal is contracted at a financial price to Delta for 17 of the 21 years is therefore irrelevant to the BCA. The economic analysis used the world market price (free on board) for coal adjusted for delivery costs to port.

[12] The true social willingness to pay for the good.

Contrary to the statements made by the PAC, Coalpac advises that while the coal from the Project has a high ash content, it is still suitable for export and for use in overseas power generation as a blend with other coal. Its higher ash content, however, may attract an approximate 10% discount from the world parity price.

Leaving all other assumptions in the economic analysis the same, this would result in net production benefits of the Project of $1,200M.

The sensitivity analysis performed as part of the BCA was designed to demonstrate how the net production benefit of the Project varies under different contexts. As identified by the PAC, a 20% sustained reduction in the assumed coal value results in the estimated net production benefits of the Project reducing from $1,519M to $881M. Similarly, if the value of coal increases by 20% in the future, there will be an increase in the net production benefit to $2,156M.

The point of the threshold value analysis is to demonstrate that even with significant variations in the expected contexts of the mine, **the value of residual environmental costs of the project, after offsetting, compensation and mitigation, would need to be substantial for the PAC recommendation to refuse the project approval to be in the best interests of the Australian people**.

Distribution of Costs and Benefits

The PAC identifies that *"the claimed benefits of the Project are largely distributed away from the population bearing the most of the impacts of the Project".*

BCA is primarily concerned with the comparison of the present value of aggregate benefits to society, resulting from a project, policy or program, with the present value of the associated aggregate costs. Provided the present value of aggregate benefits to society exceed the present value of aggregate costs (i.e. a net present value of greater than zero), the project is considered to improve the well-being of society and hence is desirable from an economic efficiency perspective.

BCA is thus primarily concerned with project appraisal from an efficiency perspective. Most conventional BCAs pay less attention to distributional (who gains and who loses and by how much) considerations. For a project to be judged as improving the well-being of the Australian people under a BCA, does not require that all segments of the population are made better off. Nevertheless, the distribution of the costs and benefits of a Project can provide additional information that may be of assistance to decision-makers.

The Economic Assessment identified that the net production benefits of the Project would be distributed between Coalpac in the form of net profits, the NSW government in the form of royalties, the MPPS in the form of lower cost coal (compared to the assumed shadow price of the coal)(and ultimately NSW electricity consumers in the form of lower priced electricity), the Commonwealth Government in the form of company tax and the local region from a Voluntary Planning Agreement with Coalpac.

That is, the net production benefits accrue to stakeholders at all scales. Net production benefits accruing to the NSW Government via royalties and the Commonwealth Government via company tax are subsequently used to fund provision of government infrastructure and services across Australia and NSW, including in the local area.

Coal Price to Electricity Price

There is considerable discussion in the PAC report about the extent to which electricity consumers will benefit from the Project in terms of electricity prices compared to the situation if the Project is not approved.

With regard to issues raised by the PAC regarding the electricity modelling information provided to them, it is irrefutable that if the Project is not approved any increase in coal prices will result in an increase in electricity prices. The issue for the PAC is the magnitude of these increases, which it considers will not be significant and *"will be swamped by other market forces and foreshadowed reforms to the electricity industry".*

Whether other reforms will have a bigger impact or not is irrelevant. What is relevant is the impact of the Project. It is erroneous to consider that if increases in electricity prices as a result of refusal of the Project are small that they are not harmful to consumers. It must be noted that even small rises in electricity prices will be borne by numerous consumers and hence the small individual costs multiply.

Notwithstanding this, part of the PAC's argument about the extent of electricity price costs associated with a price rise to consumers, relates to its claim that the substitute coal price would only be the world parity price, in a worst-case scenario. In this respect, the PAC provides a weak argument of potential access to other unspecified coal that cannot find export markets.

However, as identified in the RTS, known alternative sources of coal for MPPS include Springvale and Angus Place Collieries, formerly Centennial Coal operated mines (Centennial Coal is now owned by the Thai energy group Banpu). Contract negotiations between Delta Electricity and Centennial Coal failed in 2011 shortly before Banpu took over Centennial Coal. Banpu has indicated that it would be looking for a "fair market price" in future negotiations (Wen 2011).

Appendix 1 – Robert Gillespie Curriculum Vitae

Robert is the Principal of Gillespie Economics and has a wealth of experience in environmental and resource economics, and environmental planning and assessment, gained from 12 years with the NSW Government and over 13 years as a consultant. He has tertiary qualifications in science, economics and planning and extensive experience in benefit cost analysis, including non market valuation techniques, and regional economic impact assessment. He co-authored the Planning NSWs' draft *Guideline on Economic Effects and Evaluation in EIA.*

Qualifications

- Bachelor of Science - Macquarie University majoring in Land Management, 1982-84.
- Bachelor of Economics - Macquarie University majoring in micro-economics (part time), 1986-89.
- Master of Planning - University of Technology, Sydney (part time), 1992-1994. Thesis topic was "Economic Analysis in Environment Impact Assessment".
- Master of Economics - Macquarie University (part time), 1995 - 1998.

Employment History

- 1997 to present – Principal of Gillespie Economics
- 2002 to 2009 – Lecturer at Macquarie University in Introduction to Environmental Economics
- 2002 to 2009 – Guest Lecturer at UTS in non-market valuation;
- 2002 to 2003 – Lecturer at Sydney University in non-market valuation techniques
- 2003 – Lecturer at Sydney University in benefit cost analysis
- 1994 to 1997 – Manager, Environmental Economics Policy Unit, NSW National Parks and Wildlife Service
- 1992 to 1994 – Resource Economist, Natural Resources Branch, NSW Department of Urban Affairs and Planning
- 1990 to 1992 – Various Town Planning Positions, NSW Department of Urban Affairs and Planning
- 1986 to 1990 – Various Land Management Positions, NSW Department of Lands

Areas of Expertise

- Environmental and resource economics
- Benefit cost analysis including non-market valuation
- Regional economic impact analysis using input-output analysis techniques
- Financial appraisal
- Pricing policies
- Economic and financial instruments
- Environmental planning
- Environmental impact assessment
- Policy analysis, development and review

Recent Consulting Experience:

- **Environment ACT:** Economic values of the environments of the ACT
- **ERM Mitchell McCotter:** Input Output Analysis of the Dendrobium Coal Mine Proposal
- **NSW DUAP:** Preparation, with Ecoservices Pty Ltd, of guidelines on *Economic Effects and Evaluation in Environmental Impact Assessment*
- **NSW DUAP:** Assessment of Direct Regional Economic Impacts of Timber Harvesting Scenarios for the Upper North East and Lower North East of NSW in relation to the Native Forestry Comprehensive Regional Assessment/Regional Forestry Agreement process.
- **NSW DUAP:** Assessment of Direct Regional Economic Impacts of Timber Harvesting Scenarios for the Southern Region of NSW in relation to the Native Forestry Comprehensive Regional Assessment/Regional Forestry Agreement process.
- **NSW DUAP:** Economic profiling of the mill sector in the Brigalow Belt as part of the Native Forestry Comprehensive Regional Assessment/Regional Forestry Agreement process.
- **NSW DUAP:** Investigation of incentive mechanism applicable to private landholders in the Brigalow Belt as part of the Native Forestry Comprehensive Regional Assessment/Regional Forestry Agreement process.
- **NSW DUAP:** Preparation of a Native Forestry CRA/RFA Base Case - Discussion Paper
- **NSW DUAP:** Preparation of a report on the Economic Value of Recreation and Tourism in Forests of the Eden RFA
- **NSW DUAP:** Review of the economic analysis of the Lake Cowal Gold Mine Project
- **NSW DUAP:** Review of the Threshold Value Analysis for the Lake Cowal Gold Mine Project
- **NSW DUAP:** Review of the *Economic Analysis of the Liverpool-Parramatta Transitway, Working Paper*
- **NSW DUAP:** Preparation of an economic analysis of Sydney Drinking Water Draft Regional Environmental Plan and State Environmental Planning Policy No. 58 – Protecting Sydney's Water Supply.
- **NSW NPWS:** Training of NSW NPWS staff on the using input-output analysis to examine the regional economic impact of Montague Island.
- **NSW NPWS**: Review of the Economic Aspects of the Lake Victoria Preliminary Draft EIS
- **NSW NPWS:** Review of the Economic Aspects of the Lake Victoria Draft EIS
- **NSW NPWS:** Review of the socioeconomic analysis undertaken in the draft EIS for the Quarantine Station
- **NSW NPWS:** Socioeconomic Study of the Cumberland Plain Woodland draft Recovery Plan;
- **NSW NPWS:** Benefit cost analysis of a Regulatory Impact Statement regarding Little Penguin Conservation at Manly;
- **NSW NPWS:** Regional economic impact assessment of the Fitzroy Falls visitor centre;
- **NSW NPWS:** Regional economic impact of assessment of seven national parks in North East NSW;
- **NSW NPWS:** Economic values of the coastal environments of NSW;
- **NSW DEC:** Coastal Lakes Sustainability Assessments – Merimbula Lake and Back Lake Pilot Study: Estimation of Economic Values of Natural Resources and Natural Environments.
- **NSW DEC:** The Contribution of Ecosystem Services to Sustainable Water Resource Management in Coastal NSW: Case Study of the Manning River Catchment.

- **Sydney Water:** Preparation of a Financial Appraisal and Benefit Cost Analysis of the Blue Mountains Sewerage Program (Stage 1)
- **Sydney Water:** Preparation of a Financial Appraisal and Benefit Cost Analysis of the Blue Mountains Sewerage Program (Stage 2)
- **Sydney Water:** Preparation of a Financial Appraisal and Benefit Cost Analysis of the Vaucluse and Diamond Bay Sewerage Diversion, including a Dichotomous Choice Contingent Valuation Study.
- **Sydney Water:** Preparation of a Financial Appraisal and Benefit Cost Analysis of the Priority Sewerage Program. Separate analyses were undertaken for Menangle/Menangle Park, Oaks/Oakdale/Belimbla Park, Warragamba/Wallacia/Silverdale/ Mulgoa, Stanwell Park/Stanwell Tops/Coalcliff/Otford, Jamberoo, Mt Kuringai Industrial Estate, Brooklyn/Dangar Island.
- **Sydney Water:** Economic Evaluation of Developer Funded Odour Mitigation at Warriewood Sewage Treatment Plant – Peer Reviewer;
- **Hassall and Associates Pty Ltd:** Preparation of a Benefit Cost Analysis Framework for a Draft Regulatory Impact Statement for the Proposed Timber Plantation (Harvest Guarantee) Regulation for Hassall and Associates Pty Ltd.
- **Hassall and Associates Pty Ltd:** Review of the financial and economic appraisal of the NSW NPWS's proposal to upgrade camping facilities and provide cabins within the Warrumbungles National Park
- **Hassall and Associates Pty Ltd:** Review of the economic aspects of a Recreation and Tourism Study for the Southern Region RFA/CRA.
- **Hassall and Associates Pty Ltd:** Review of a study by IRIS of the Regional Economic Impacts of the Closure of Wollongong Golf Club due to expansions of the Wollongong STP.
- **NSW EPA:** Various contracts - Review of Environmental Valuation Studies for Inclusion in the ENVALUE Database
- **NSW EPA:** Search for Environmental Valuation Studies for inclusion in the ENVALUE Database.
- **NSW EPA:** Development and delivery of a short course on Benefit Cost Analysis and Environmental Valuation
- **University of Technology, Sydney:** Casual Lecturer on Environmental Valuation in the Master of Planning Program and Master of Urban Estate Program.
- **Sydney University:** Lecturer in environmental valuation to third year resource economics students.
- **Sydney University:** Lecturer in benefit cost analysis to third year resource economics students.
- **Macquarie University:** Lecturer in introduction to environmental economics students in the Graduate School of the Environment.
- **NSW Tourism:** Preparation of a report on the Application of Benefit Cost Analysis to Tourism
- **Sutherland Council:** Preliminary benefit cost analysis of Sutherland Council's proposed actions for implementing Agenda 21 in the LGA.
- **Total Environment Centre Inc.:** Preparation of a report on the Economic Benefits of Environmental Flows for the Snowy River
- **Total Environment Centre Inc.:** Economic Analysis of a Life Cycle Analysis of Waste Management Practices.
- **Total Environment Centre Inc:** Economic analysis of urban consolidation in the Sydney region, funded by DUAP, the development industry and TEC.
- **Australian Conservation Foundation:** Economic use values associated with the Murray River;
- **Australian Conservation Foundation:** The financial costs of an end to logging in 'Tasmania Together' forests
- **NSW Department of Land and Water Conservation:** Benefit Cost Analysis of the Coffs Harbour Sewerage Strategy.
- **NSW Department of Land and Water Conservation:** Review and amendment of *draft Guidelines for Determining Environmental Impact Assessments on Bushfire Management Activities* to incorporate requirements regarding economic and social assessments.
- **NSW Department of Land and Water Conservation:** Benefit cost analysis of the Catchment Protection Scheme
- **NSW Department of Land and Water Conservation:** Economic and social analysis of an application to clear native vegetation to establish a vineyard.
- **NSW Department of Land and Water Conservation:** Member of the Independent Scientific Group engaged to undertake a review of exemptions under the Native Vegetation Conservation Act and provide comment on a discussion paper on offsets for vegetation clearing in NSW.
- **NSW Department of Land and Water Conservation:** Preparation of a study on Valuing Environmental Services at the Farm Level
- **NSW Department of Land and Water Conservation:** Socioeconomic analysis of the Draft Regional Vegetation Plan for the Western Riverina Region
- **NSW Department of Land and Water Conservation:** Socioeconomic analysis of the Draft Regional Vegetation Plan for the Northern Tablelands
- **NSW Department of Land and Water Conservation:** Socioeconomic analysis of the Draft Regional Vegetation Plan for Inverell-Yallaroi
- **NSW Department of Land and Water Conservation:** Socioeconomic analysis of the Draft Regional Vegetation Plan for Tenterfield
- **NSW Department of Land and Water Conservation:** Socioeconomic analysis of the Draft Regional Vegetation Plan for Nundle
- **NSW Department of Land and Water Conservation:** Lake Macquarie Dredging Benefit Cost Analysis and Sand Supply Feasibility;
- **NSW Department of Land and Water Conservation:** Preparation of a Regulatory Impact Statement for the Hunter Catchment Management Trust Regulation 2003;
- **NSW DIPNR:** Cost benefit analysis of environmental flow regimes for sustainable use of Greater Sydney's Water
- **NSW DIPNR:** Benefit cost analysis of Stage 2 of Rouse Hill Regional Park
- **NSW Premier's Department:** Policy Analysis Relating to the Sydney Water Inquiry.
- **NSW Fisheries:** Economic Study of the NSW Abalone and Rock Lobster Fisheries.
- **King and Campbell Pty Ltd:** Review of the *Hastings Council Urban Growth Options Assessment Under the Principles of ESD* and *Draft Urban Growth Strategy 1999*.
- **King and Campbell Pty Ltd:** Review of Port Macquarie Outer Ring Road Selection Study

- **Hawkesbury Nepean Catchment Management Trust:** Contribution to Stormwater/Wastewater Socio-Economic Research Project undertaken by the Centre for Integrated Catchment Management
- **Australian Marine Park Tourism Operators:** Preparation of Input Output analysis to examine the contribution of Marine Park Tourism Operators to the Cairns-Douglas economy.
- **Victorian National Parks Association:** Economic Analysis of the Establishment of the Rushworth-Heathcote National Park
- **Murray Darling Freshwater Research Centre:** Economic Analysis of Weir Pool Manipulations on the Murray River.
- **NSW Marine Park Authority:** Pricing and Charging Review for the Solitary Islands Marine Park, Jervis Bay Marine Park and Lord Howe Island Marine Park.
- **BHP:** Regional economic impact assessment of the proposed Dendrobium Coal Mine on the Illawarra and NSW economies.
- **NSW Native Vegetation Advisory Council:** Preparation of a Background Paper on the Economic Values of Native Vegetation.
- **Roads and Traffic Authority:** Economic Analysis of Afflux from Proposed Bridge over the Murray River at Corowa.
- **Resource Strategies Pty Ltd:** Preparation of a preliminary Benefit Cost Analysis and Regional Economic Impact Analysis of the Ridgeway Gold Mine
- **Resource Strategies Pty Ltd:** Preparation of a Benefit Cost Analysis and Regional Economic Impact Analysis of the Ridgeway Gold Mine including an assessment of the cumulative regional economic impacts of the Cadia and Ridgeway gold mines
- **Resource Strategies Pty Ltd:** Review of economic methodology for a study of the Stawell Big Hill Gold Mine Project.
- **Resource Strategies Pty Ltd:** Benefit cost analysis and regional economic impact analysis of the proposed Syerston Nickel-Cobalt mine.
- **Resource Strategies Pty Ltd:** Benefit cost analysis and regional economic impact analysis of the proposed Ginkgo Mineral Sands mine.
- **Resource Strategies Pty Ltd:** Benefit cost analysis and regional economic impact analysis of the proposed Ginkgo Mineral Separation Plant.
- **Resource Strategies Pty Ltd:** Benefit cost analysis of the Bowens Road North Open Cut Coal Mine Proposal for inclusion in the EIS;
- **Resource Strategies Pty Ltd:** Benefit cost analysis and regional economic impact assessment of the Telfer Gold Mine in Western Australia;
- **Resource Strategies Pty Ltd:** Benefit cost analysis and regional economic impact assessment of the Wambo Coal Mine Development Project;
- **Resource Strategies Pty Ltd:** Benefit cost analysis and regional economic impact assessment of the Wilpinjong Coal Mine Project;
- **Resource Strategies Pty Ltd:** Ex-post evaluation of the Cadia Ridgeway Gold Mine
- **Resource Strategies Pty Ltd:** Benefit cost analysis and regional economic impact assessment of NCIG Coal Export Terminal
- **Resource Strategies Pty Ltd:** Benefit cost analysis, regional economic impact assessment and social impact assessment of the Snapper Mineral Sands Mine;
- **Centennial Hunter Pty Limited:** Benefit cost analysis and regional economic impact assessment of the Anvil Hill Coal Project
- **Concrite Quarries Pty Ltd:** Preparation of a report on the Employment Aspects of the Exeter Quarry Extension
- **Concrite Quarries Pty Ltd:** Expert witness at a Commission of Inquiry into the Exeter Quarry Extension.
- **Concrite Quarries Pty Ltd:** Preparation of a Benefit Cost Analysis and Regional Economic Impact Assessment of the Extension of Exeter Quarry
- **Cleary Bros (Bombo) Pty Ltd:** Preparation of a preliminary benefit cost analysis and regional economic impacts study of a quarry extension
- **Cleary Bros (Bombo) Pty Ltd:** Benefit cost analysis and regional economic impact assessment of extraction of the Gerroa Sand Resource;
- **Consolidated Rutile Limited:** Benefit cost analysis and regional economic impact assessment of mineral sand mining on North Stradbroke Island.
- **Consolidated Rutile Limited:** Benefit cost analysis and regional economic impact assessment of mineral sand mining on North Stradbroke Island, update.
- **Murray Darling Basin Commission:** Choice modelling study into alternative environmental flows.
- **Barlings Beach Community Pty Ltd:** Benefit cost analysis of clearing of native vegetation for a residential subdivision at Barlings Beach.
- **Brenex:** Armidale Bulky Goods Rezoning Proposal Retail Impact Assessment Report;
- **Jonvana:** Retail Impact Assessment Report – For a Development Application for new retail development.
- **Major Projects Victoria:** Regional economic impact assessment of the proposed Long Term Containment Facility, Mildura.
- **Institute of Public Affairs:** Australias' Hazardous Waste Disposal: Persistent Organic Pollutants
- **Dept of Commerce:** Benefit cost analysis of environmental flows in the Shoalhaven and Transfers to Sydney
- **South East Community Water Recycling Scheme Reference Group**: Community benefits study – benefit cost analysis of wastewater recycling scheme.
- **South East Water Limited**: Benefit cost analysis of the Mornington Peninsula Sustainable Water Initiative.
- **Patterson Britton**: Socio-Economic Assessment of the Stony Creek 2 Off-Stream Storage Near Bodalla.
- **Excel Coal Ltd:** Economic Assessment of Newstan-Awaba Coal Mines.
- **DIPNR:** Benefit cost analysis of the proposed Penrith Lakes Regional Environmental Plan.
- **Helensburgh Coal Pty Ltd:** Economic analysis of Mining Longwalls 14-17 at Metropolitan Colliery
- **DIPNR:** Panel member for inquiry into fifth berth at Port Botany
- **DIPNR:** Review of financial and economic aspects of proposal by Coca-cola for a High Bay Warehouse at North Mead
- **DECC:** Travel Cost Studies of Visitors to NSW Marine Parks
- **Australian Farm Institute:** Estimating the Value of Environmental Services Provided by Australian Farmers

- **Victorian Environmental Assessment Council:** Benefit cost analysis and regional impact assessment for the River Red Gum Inquiry.
- **NSW Minerals Council:** Preparation of Socio-economic Submission to the Independent Expert Panel into Underground Mining in the Southern Coalfield
- **NSW Minerals Council:** Preparation of Socio-economic Submission to the Strategic Inquiry into Potential Coal Mining Impacts in Wyong LGA
- **DECC:** Economic evaluation of volunteering in the DECC, Parks and Wildlife Group
- **Commonwealth Department of Environment and Water Resources:** Social and Economic Impacts of Protected Areas
- **Commonwealth Department of Environment and Water Resources:** Regional Economic Impacts of Australia's World Heritage Areas
- **Commonwealth Department of Environment and Water Resources:** Economic analysis of bioresources for the biotechnology sector.
- **Commonwealth Department of Environment and Water Resources:** Review of the Socio-economic Analysis in the Public Environment Report for Rezoning of the Heritage Estates Land
- **Helensburgh Coal Pty Ltd:** Socio-economic analysis of Metropolitan Coal Project
- **Newcrest:** Preparation of a Benefit Cost Analysis and Regional Economic Impact Analysis of the Cadia East Gold Mine Project.
- **Commonwealth Department of the Environment, Water, Heritage and Arts:** Analysis of social and environmental valuation methodologies for waste management.
- **The HUB Action Group:** Review of the economic analysis for the HUB Regional Resource Reprocessing Facility
- **Great Lakes Council:** Economic Values (Benefits) of Water Quality Improvements in the Great Lakes
- **DECC:** Economic Impact of Linking Protected Areas Under the A2A-Initiative (Border Ranges Priority Area) Part 1
- **Australian Farm Institute:** Estimating the Value of Environmental Services Provided by Australian Farmers
- **Sydney Catchment Authority:** Evaluation of Braidwood options - including accounting for the impact on SCA carbon emissions for energy and electricity
- **DECCW:** Economic Assessment of Biocertification
- **DECCW:** Review of Economic Studies on Marine Parks.
- **BHP Billiton:** Socio economic assessment of Bulli Seam Operations
- **Coal and Allied:** Socio economic assessment of the Warkworth Mine Extension
- **Duralie Coal Pty Ltd:** Socio economic assessment of the Duralie Coal Project
- **Boggabri Coal Pty Ltd:** Economic assessment of the continuation of the Boggabri Coal Mine
- **Hunter Valley Energy Coal Pty Ltd:** Economic assessment of the Mount Arthur Coal Consolidation Project
- **Ravensworth Operations Pty Ltd:** Economic assessment of the Ravensworth Operations Project
- **Oceanic Coal Australia Ltd:** Economic assessment of the West Wallsend Colliery Continued Operations Project
- **DECCW:** Economic analysis of the proposed Environmental Outcomes Assessment Methodology;
- **DECCW:** Economic analysis of Biocertification

Professional Memberships

- Member of the Australian Agriculture and Resource Economics Society

Published or Conference Papers

- Gillespie, R. (1993) Do Retail Hierarchies Exist? An Investigation in the Epping-Eastwood-Ryde Area, *Land Economics Review*, Vol. 4, No. 2, pp 24-30.
- Bennett, J., Gillespie, R., Powell, R. and Chalmers, L. 1995 *The Economic Value and Regional Economic Impact of National Parks*. Proceedings of Ecological Economics Conference, Coffs Harbour 1995.
- Bennett, J., Gillespie, R., Powell, R. and Chalmers, L. 1995 *The Economic Value and Regional Economic Impact of National Parks*. Australian Journal of Environmental Management, Vol. 3, No. 4, pp. 229-239.
- Gillespie, R. (1997) *The Economic Value and Regional Economic Impact of Minnamurra Rainforest Centre, Budderoo National Park*, NSW National Parks and Wildlife Service, Environmental Economics Series.
- Gillespie, R. and Bennett, J. (1999) Using Contingent Valuation to Estimate Environmental Improvements Associated with Wastewater Treatment, *Australian Journal of Environmental Management*, Vol. 6, No. 1, pp. 14 - 20.
- Gillespie, R. (1999) What do I need to know about benefit cost analysis? In: *Valuing Tourism: Methods and Techniques*, Bureau of Tourism Research, Occasional Paper No. 28, Edited by Corcoran, K., Allcock, A., Frost, T., and Johnson, L.
- Gillespie, R (2000) *The Economic Values of Native Vegetation*, Background Paper No. 4, Native Vegetation Advisory Council of NSW.
- Gillespie, R. (2000) *Multi-criteria Analysis: A Critique from an Economist's Perspective*, Presented to the 2000 Australian Agricultural and Resource Economics Society Conference, Adelaide.
- Gillespie, R. (2002) *Measuring the Benefits of Reticulated Sewerage: Expectations and Expert Property Valuation*, Presented to the 2002 Australian Agricultural and Resource Economics Society Conference, Canberra.
- Gillespie, R. (2004) *Linking Science, Community Consultation and Economics: The Living Murray Project*, Presented to be presented to the 2004 Australian Agricultural and Resource Economics Society Conference, Melbourne.
- Gillespie, R (2004) Economic evaluation and market based instruments, *Journal of Ecological Management and Restoration*, V5, Issue 3, pg 225.
- Crase, L. and Gillespie, R (2006) A Preliminary Consideration of Use and Non-Use Values Circumscribing the Lake Hume Water and Foreshore Management Plan, Presented to the 2006 Australian Agricultural and Resource Economics Society Conference, Melbourne.
- Gillespie, R. (2007) Mine Subsidence At Waratah Rivulet: A Case Study Of The Consideration Of Environmental Costs And Benefits Of Underground Longwall Mining, presented to the Mine Subsidence Technical Society Conference, Wollongong, 26-27 November.
- Gillespie. R. (2008) Economics of Global Warming, paper to be presented at the 52nd AARES Conference, Canberra, Australia, February 2008
- Bennett, J., Dumsday, R. and Gillespie, R. (2008) Analysing Options for the Red Gum Forests Along the Murray River, Paper To Be Presented At The 52nd AARES Conference, Canberra, Australia, February 2008

- Bennett, J., Dumsday, R. and Gillespie, R. (2008) Australian Economic Development and the Environment: Conflict or Synergy, Paper To Be Presented At The 52nd AARES Conference, Canberra, Australia, February 2008
- Crase, L. and Gillespie, R. (2007) The impact of water quality and water level on the recreation values of Lake Hume, *Australasian Journal Of Environmental Management*—Volume 15, pg. 31-39.
- Gillespie, R. (2008) *Estimating Community Values for Environmental Impacts of Mining Using Choice Modelling*, NSW Minerals Council Environment and Community Conference 2008.
- Gillespie, R. and Kragt, M. (2010) Valuing the Impacts of Underground Coal Mining in the Southern Coalfield, Paper Presented At The 54th AARES Conference, Adelaide, Australia, February 2010
- Gillespie, R. and Bennett, J. (2011) Willingness to Pay for Kerbside Recycling, Environmental Economics Research Hub.
- Gillespie, R. and Bennett, J. (2010) Willingness to Pay for Recycling Food Waste, Environmental Economics Research Hub.
- Gillespie, R. and Bennett, J. (2010) Non Use Economic Values Of Marine Protected Areas In The South-West Marine Region , Environmental Economics Research Hub.
- Gillespie, R. and Bennett, J. (2012) Valuing the Environmental, Cultural and Social Impacts of Open Cut Coal Mining in the Hunter Valley of NSW, Australia, accepted for publication in the Journal of Environmental Economics and Planning.
- Gillespie, R. and Kragt, M. (2012) Accounting for nonmarket impacts in a benefit-cost analysis of underground coal mining in New South Wales, Australia, Journal of Benefit Cost Analysis, 3(2): article 4.
- Gillespie, R. and Bennett, J. (2012) Willingness to pay for kerbside recycling in Brisbane, Australia, Journal of Environmental Planning and Management, 1-16.

Appendix 2 – Coalpac Consolidation Contracted Project Economic Assessment

Coalpac Consolidation Contracted Project Economic Assessment

Final Report

Prepared for

Coalpac Pty Ltd

By

Gillespie Economics
Email: gillecon@bigpond.net.au

February 2013

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1 INTRODUCTION

Cullen Valley Mine and Invincible Colliery are located approximately 25 km north-west of Lithgow, NSW. Coalpac Pty Ltd (Coalpac) is seeking a Project Approval under Part 3A of the *Environmental Planning & Assessment Act 1979* to consolidate the operations and management of these sites under a single, contemporary planning approval, to allow coal mining operations within its current mining tenements to continue for a further period of 21 years (the Project).

In response to the Planning Assessment Commissions (PACs) consideration of the Project, Coalpac is proposing a number of contractions to the scale of the Project to further reduce its environmental impacts.

Hansen Bailey advises that the proposed contractions to the Project as reviewed by the PAC include:

1. Removal of the Hillcroft Mining Area and associated access infrastructure (including the Wallerawang-Gwabegar Rail Line overpass bridge and Red Springs Road crossing);
2. Removal of the sand extraction component of the Project located in the Cullen Valley mining area, including the requirement for associated crushing and screening infrastructure and the transport of product sand by road from the site to market;
3. Modification of the open cut mining footprint to avoid the area of Clandulla Geebung habitat previously located in the north western mining area at Cullen Valley Mine;
4. Modification of the open cut mining footprint in relation to the Significant Pagoda Landforms (SPLs) to improve ecological outcomes;
5. Contraction of the highwall mining footprint from under SPLs to improve ecological, heritage and geotechnical outcomes; and
6. Modification and regulation of blasting practice to further minimise the potential for blasting impacts to any Significant Pagoda Landforms and cliffs; and
7. Enhanced Biodiversity Offset Strategy for any residual ecological impacts.

This report undertakes an economic assessment of the Contracted Project.

2 BACKGROUND

From an economic perspective, there are two important aspects of the Contracted Project:

- The economic efficiency of the Contracted Project (i.e. consideration of economic costs and benefits); and
- The regional economic impacts of the Contracted Project (i.e. the economic stimulus that the Contracted Project would provide to the regional economy).

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

The draft guideline considered that regional economic impact assessment may provide additional information as an adjunct to the economic efficiency analysis. Economic stimulus to the region can be estimated using input-output modelling of the regional economy (regional economic impact assessment).

This assessment report provides:

- A BCA of the Contracted Project (Section 3);
- Identification of the distribution of impacts between stakeholder groups (Section 4);
- A regional economic impact assessment of the Contracted Project (Section 5);
- Consideration of the impacts of mine cessation (Section 6); and
- A conclusion summarising the above (Section 7).

3 ECONOMIC EFFICIENCY

The main decision criterion for assessing the economic desirability of a project to society is its net benefit to Australia. Net benefit is the sum of the discounted benefits to society, less the sum of the discounted costs. A positive net benefit indicates that it would be desirable from an economic perspective for society to allocate resources to a proposal, because the community as a whole would be better off.

In a simple framework, the benefits to society of mining relate to the net production and employment benefits, while the economic costs to society relate to any environmental and social impacts.

Net production benefits of the Contracted Project are a function of expected incremental coal production, coal value and costs of production over time associated "with" the Contracted Project compared to "without" the Contracted Project. These values can be estimated from market data. Employment benefits and environmental and social costs are non-market values that can potentially be estimated using non-market valuation methods.

This BCA is based on financial, technical and environmental advice provided by the proponent and its specialist consultants

3.1 Identification of the "With" and "Without" Project Scenarios

Cullen Valley Mine and Invincible Colliery currently have approval for extraction of up to 1.0 Mtpa and 1.2 Mtpa of product coal, respectively. Most of this supplies the Mount Piper Power Station (MPPS), with provision for some emergency supply to the Wallerawang Power Station (WPS) and the remainder to other domestic customers. Prior to the recent suspension of operations at the Cullen Valley Mine, approximately 90 full-time personnel and contractors were employed across Cullen Valley Mine and Invincible Colliery (26 full time personnel plus contractors at the Cullen Valley Mine and 20 full-time personnel plus contractors at the Invincible Colliery). "Without" the Contracted Project, Invincible Colliery is due to suspend its operations in March 2013. The suspension of both operations is due solely to the exhaustion of currently approved coal reserves and they will remain suspended until further approvals are granted.

In contrast, the Contracted Project involves the following, over a period of 21 years:

- Continuation of mining operations at:
  - Cullen Valley Mine (west of the Castlereagh Highway) by both open cut and highwall mining methods to access an additional resource of approximately 35 Mt ROM coal; and
  - Invincible Colliery (including an extension north into the East Tyldesley area) by open cut and highwall mining methods to access an additional resource of approximately 63 Mt ROM coal;
- Continuation of coal supply to the local MPPS by a dedicated coal conveyor over the Castlereagh Highway with emergency supply to MPPS and WPS by road, with flexibility for supply to additional domestic destinations and Port Kembla by rail) for export;

- Upgrade of the existing Invincible Colliery Preparation Plant, administration and other infrastructure;
- Construction and operation of additional offices at Cullen Valley Mine;
- Construction and use of the East Tyldesley Coal Preparation Plant (incorporating the previously approved Coal Deshaling Plant at Cullen Valley Mine);
- Construction of a rail siding and associated infrastructure for transport of product coal;
- Integration of water management infrastructure on both sites into a single system; and
- Integration of the management of mine rehabilitation and conceptual final landform outcomes for Cullen Valley Mine and Invincible Colliery.

Employment for the Contracted Project would be approximately 120 full-time personnel and contractors.

3.2 Decommissioning Costs, Residual Capital Costs and Residual Land Costs

The Contracted Project would extend the life of the existing Cullen Valley Mine and Invincible Colliery as a consolidated operation and hence the approximately $18M of decommissioning costs that would have been incurred in 2013 following cessation of the current operations are deferred to the end of the Contracted Project. This is an economic benefit of the Contracted Project.

However, the $11M of residual capital value and $8M of land value that would have been realised in 2013 would be deferred, representing a cost of the Contracted Project.

3.3 Capital Costs

The Contracted Project is associated with capital investment, including sustaining capital, of $384M over the life of the Contracted Project. This includes capital for construction of the East Tyldesley Coal Preparation Plant, construction of haul roads and road crossings, rail siding and crossing, electricity infrastructure, conveyor from the existing Invincible Colliery Preparation Plant to MPPS, land purchases and establishment of biodiversity offsets.

3.4 Operating Costs

Average incremental operating costs of the Contracted Project are estimated at in the order of $124M per annum. While royalties are a cost to Coalpac, they are part of the overall net production benefit of the mining activity that is redistributed by government. Royalties are therefore not included in the calculation of the resource costs of the Contracted Project. Nevertheless, it should be noted that the Contracted Project would generate total royalties to NSW in the order of $371M ($199M, present value).

3.5 Value of Coal

The Contracted Project will result in incremental coal production for:

- local industrial purposes;
- export (15% ash coal and 20% to 25% ash coal);
- supply to the MPPS (27-29% ash coal).

Consistent with NSW Treasury (2007), the economic value of a product coal for local industrial purposes and export, which is supplied into a competitive market, can be taken as the revenue generated from its sale. The higher ash coal for export is predicted to have a lower value than the lower ash coal for export.

While the Contracted Project would supply coal to MPPS (and WPS), at a negotiated financial price, the appropriate estimate of the economic value for thermal coal from the Contracted Project is the world price for this quality of coal (Sinden and Thampapillai 1995). While the coal from the Contracted Project, that would be supplied to MPPS, has a high ash content, Coalpac advises that it is still suitable for export and for use in overseas power generation as a blend with other coal. Coalpac has also advised that if the coal being supplied to the MPPS were blended with other product coal from the Contracted Project, it would have an ash content of 21% and could be exported at the world price for coal of this ash level. This is the basis on which all coal from the Contracted Project is valued in the analysis.[1]

There is obviously considerable uncertainty around future coal values and hence assumed coal values have been subjected to sensitivity testing (see Section 3.7).

3.6 Threshold Value Analysis

At the NSW Treasury recommended central discount rate of 7%, the Contracted Project is estimated to have total net production benefits to Australia of $1,330M (refer to Table 1). This is a minimum threshold value that any unquantified Australian environmental and social impacts of the Contracted Project, after mitigation by Coalpac, would need to exceed to make the Contracted Project questionable from an economic efficiency perspective.

It is a minimum threshold value because the Contracted Project would also provide employment benefits to the community in the form of at least 120 direct full-time jobs for up to 21 years. Studies have shown that the community may have non-use economic values for these employment effects (Gillespie 2008, Gillespie 2009). However, conservatively, no values for these benefits have been included in the analysis.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to investigate and quantify the main residual environmental impacts of the Contracted Project, based on the findings of the specialist sub-consultants. The main potential environmental impacts of the Contracted Project relate to dust and noise affectation of properties, greenhouse gas generation, visual impacts and the clearing of native vegetation. There will also be some road

[1] All coal is valued free-on-board. For coal that would be supplied to MPPS the coal value has been adjusted backwards for rail and port costs.

externalities, mainly associated with road transport of minor quantities of coal to other domestic customers.

Dust and noise impacts are internalised into the costs of the Contracted Project by including the acquisition costs of affected properties and mitigation measures for properties in the management zones.

Using a carbon value of \$23/t CO_2-e, the incremental global damage costs from greenhouse gas emissions of the Contracted Project are valued at \$17M present value[2]. The Australian damage costs from the Contracted Project greenhouse gas emissions are estimated at in the order of \$0.2M. The carbon tax internalises the global greenhouse gas costs into Coalpac's operating costs.

Properties identified as experiencing high visual impacts would be eligible for at-receptor mitigation works. The cost of these mitigation works is included in the capital costs of the Contracted Project.

The costs of biodiversity offset actions have been included in the estimation of net production benefits. Provided offsets that are negotiated with Office of Environment and Heritage offset the biodiversity values that will be lost from the Contracted Project, there would be no additional ecological costs for inclusion in the BCA. To include an economic cost for cleared vegetation and lost habitat of threatened species in the BCA would result in double counting.

Overall, the Contracted Project is estimated to have net benefits to Australia of in the order of \$1,330M (refer to Table 1) and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Contracted Project BCA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than between \$1,330M for the Contracted Project to be questionable from an Australian economic efficiency perspective.

[2] It should be noted that greenhouse gas generation associated with sea transport and usage of the product coal is considered to be outside of the scope of the BCA of the Varied Project. [3] It should be noted that greenhouse gas generation associated with sea transport and usage of the product coal is considered to be outside of the scope of the BCA of the Varied Project.

Table 1
Benefit Cost Analysis Results of the Contracted Project ($M Present Values at 7% Discount Rate)

	COSTS		BENEFITS	
	Description	**Value ($M)**	**Description**	**Value ($M)**
Net Production Benefits	Opportunity cost of land	7	Avoided decommissioning costs 2013	17
	Opportunity cost of capital equipment	10	Economic value of coal	2,918
	Capital costs	275	Residual value of land at the cessation of the project	1
	Operating costs less royalties	1,316	Residual value of capital equipment at the cessation of the project	2
	Decommissioning and rehabilitation costs	4		
	Production Sub-total	***$1,608M***	-	***$2,938M***
	Net Production Benefits		-	***$1,330M***
Environmental, cultural and social impacts	Greenhouse gas emissions	$17 ($0.2)	Non-market benefits of employment	Unquantified
	Agricultural production	Value included in opportunity cost of land and capital costs	-	-
	Operational noise	Cost of acquisition of adversely impacted properties and noise management included in capital costs and opportunity cost of land	-	-
	Air quality	Cost of acquisition of adversely impacted properties included in capital costs and opportunity cost of land	-	-
	Surface water	Insignificant	-	
	Groundwater	Insignificant	-	-
	Flora and fauna	Some values lost but offset. The cost of offset is included in capital cost, opportunity cost of land and operating cost	-	-
	Road transport	Insignificant		-
	Aboriginal and non-Aboriginal heritage	Insignificant	-	-
	Visual impacts	Insignificant. Cost of mitigation to high visual impact properties included in capital costs	-	-
	Pagoda landforms	Insignificant	-	**-**
	Tourism and recreation	Insignificant		
	Externalities sub-total	***$17M($0.2M)***		
	Net externalities	***$17M($0.2M)***	-	-
NET BENEFITS				**$1,313M ($1,330M)**

*Where impacts occur globally, the impact occurring to Australia is provided in brackets.

3.7 Sensitivity Testing

The estimated net benefit to Australia of $1,330M is most sensitive to assumptions about the economic value of coal. If coal value reduced by 20% for the entire life of the Contracted Project then the net benefit to Australia would reduce to $641M. Alternatively, if coal value increased by 20% for the entire life of the Contracted Project, the estimated net benefit to Australia would increase to $2,019M.

4 DISTRIBUTION OF IMPACTS

The net production benefits of the Contracted Project would be distributed between a number of stakeholders including:

- Coalpac in the form of net profits;
- The MPPS (and WPS), in the form of lower cost coal ($744M, present value) which is ultimately passed on to electricity consumers through lower priced electricity;
- The NSW government, in the form of royalties (estimated at $199M, present value) which is subsequently used to fund provision of government infrastructure and services across NSW, including the region;
- The Commonwealth Government, in the form of company tax (estimated at $116M, present value) which is subsequently used to fund provision of government infrastructure and services across Australia and NSW, including the region; and
- The local region, from the establishment of a Voluntary Planning Agreement to fund local community projects.

Without mitigation and compensation, the environmental impacts of the Contracted Project such as noise and dust and visual impacts would be borne by members of the local community. Greenhouse gas emission impacts would be borne globally and clearing of native vegetation would be borne by those members of the NSW and Australian community who value the native vegetation that would be impacted.

However, noise and dust impacts will be internalised by Coalpac through the acquisition of (provision of compensation for) adversely affected properties and provision of mitigation measures for those located in noise management zones or considered to be in the high visual impact zone. Impacts on native vegetation will also be internalised through a biodiversity offset package of suitable land. The global greenhouse gas costs from the Contracted Project would be internalised into the operating costs of Coalpac via the carbon tax.

Consequently, as well as resulting in net benefits to Australian the Contracted Project is also considered to provide net benefits to NSW.

5 REGIONAL ECONOMIC IMPACTS

Regional economic impact assessment is concerned with the effect of an impacting agent on an economy in terms of a number of specific indicators, such as gross regional output, value-added, income and employment.

These indicators are defined as follows:

- ***Gross regional output*** - is the gross value of business turnover;
- ***Value-added*** – is the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services brought in to produce the gross regional output;
- ***Income*** – is the wages paid to employees including imputed wages for self employed and business owners; and
- ***Employment*** – is the number of people employed (including full-time and part-time).

The main impacting agent for the Contracted Project is the expenditure in the regional economy of Lithgow and Bathurst local government areas, and NSW, as a result of an extension in the life of Coalpac operations.

The average annual expenditure of the Contracted Project will be at least as great as for the original Project and the estimated direct employment level will be the same as for the original Project. Consequently, the estimated regional and NSW impacts of the original Project are considered to be also representative of the Contracted Project.

Table 2
Estimated Annual Regional Economic Impacts of the Contracted Project

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($000)	168,659	34,739	15,973	50,713	219,372
Type 11A Ratio	*1.00*	*0.21*	*0.10*	*0.30*	*1.30*
VALUE ADDED ($000)	78,028	19,622	7,687	27,310	105,338
Type 11A Ratio	*1.00*	*0.25*	*0.10*	*0.35*	*1.35*
INCOME ($000)	14,400	10,698	5,733	16,432	30,831
Type 11A Ratio	*1.00*	*0.74*	*0.40*	*1.14*	*2.14*
EMPLOYMENT (No.)	120	98	75	173	293
Type 11A Ratio	*1.00*	*0.82*	*0.62*	*1.44*	*2.44*

Note: Totals may have minor discrepancies due to rounding.

The annual regional economic impact associated with the Contracted Project (refer to Table 2) is estimated at up to:

- $219M in annual direct and indirect regional output or business turnover;
- $105M in annual direct and indirect regional value added;
- $30M in annual direct and indirect household income; and
- 293 direct and indirect jobs.

Table 3
Estimated Annual NSW Economic Impacts of the Contracted Project

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($000)	168,659	51,516	55,226	106,742	275,401
Type 11A Ratio	*1.00*	*0.31*	*0.33*	*0.63*	*1.63*
VALUE ADDED ($000)	78,028	27,274	28,130	55,404	133,432
Type 11A Ratio	*1.00*	*0.35*	*0.36*	*0.71*	*1.71*
INCOME ($000)	14,400	17,119	16,098	33,217	47,617
Type 11A Ratio	*1.00*	*1.19*	*1.12*	*2.31*	*3.31*
EMPLOYMENT (No.)	120	178	222	399	519
Type 11A Ratio	*1.00*	*1.48*	*1.85*	*3.33*	*4.33*

Note: Totals may have minor discrepancies due to rounding.

The annual NSW economic impact associated with the Contracted Project (refer to Table 3) is estimated at up to:

- $275M in annual direct and indirect regional output or business turnover;
- $133M in annual direct and indirect regional value added;
- $48M in annual direct and indirect household income; and
- 519 direct and indirect jobs.

These estimated annual regional and NSW impacts would be felt for the life of the Contracted Project.

6 MINE CESSATION

Cessation of mining after the Contracted Project will lead to a reduction in economic activity in the region. The significance of these Contracted Project cessation impacts would depend on:

- The degree to which any displaced workers and their families remain within the region, even if they remain unemployed. This is because continued expenditure by these people in the regional economy (even at reduced levels) contributes to final demand;
- The economic structure and trends in the regional economy at the time. For example, if cessation of the mine takes place in a declining economy the impacts might be felt more greatly than if it takes place in a growing, diversified economy; and
- 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 cessation of the Contracted Project would occur. It is therefore important for regional authorities and leaders to take every opportunity provided by the regional economic stimulus of the Contracted Project to strengthen and broaden the region's economic base.

7 CONCLUSION

The Contracted Project is estimated to have total net production benefits of $1,330M. This is a minimum threshold value that any unquantified Australian environmental and social impacts of the Contracted Project, after mitigation by Coalpac, would need to exceed to make the Contracted Project questionable from an economic efficiency perspective.

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to investigate and quantify the main residual environmental impacts of the Contracted Project, based on the findings of the specialist sub-consultants. The main potential environmental impacts of the Contracted Project relate to dust and noise affectation of properties, greenhouse gas generation, visual impacts and the clearing of native vegetation. There will also be some road externalities, mainly associated with road transport of minor quantities of coal to other domestic customers.

Dust and noise impacts are internalised into the costs of the Contracted Project by including the acquisition costs of affected properties and mitigation measures for properties in the management zones.

Using a carbon value of $23/t CO_2-e, the incremental global damage costs from greenhouse gas emissions of the Contracted Project are valued at $17M present value[3]. The Australian damage costs from the Contracted Project greenhouse gas emissions are estimated at in the order of $0.2M. The carbon tax internalises the global greenhouse gas costs into Coalpac's operating costs.

Properties identified as experiencing high visual impacts would be eligible for at receptor mitigation works. The cost of these mitigation works is included in the capital costs of the Contracted Project.

The costs of biodiversity offset actions have been included in the estimation of net production benefits. Provided that offset properties are negotiated with the Office of Environment and Heritage and offset the biodiversity values that will be lost as a result of the Contracted Project, there would be no additional ecological costs for inclusion in the BCA. To include an economic cost for cleared vegetation and lost habitat of threatened species in the BCA would result in double counting.

Overall, the Contracted Project is estimated to have net benefits to Australia in the order of $1,330M and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Contracted Project BCA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $1,330M for the Contracted Project to be questionable from an Australian economic efficiency perspective.

[3] It should be noted that greenhouse gas generation associated with sea transport and usage of the product coal is considered to be outside of the scope of the BCA of the Varied Project.

The Contracted Project would provide an ongoing stimulus to the economy of the Lithgow and Bathurst region for the life of the Contracted Project. The annual regional economic impact associated with the Contracted Project is estimated at up to:

- $219M in annual direct and indirect regional output or business turnover;
- $105M in annual direct and indirect regional value added;
- $30M in annual direct and indirect household income; and
- 293 direct and indirect jobs.

The annual NSW economic impact associated with the Contracted Project is estimated at up to:

- $275M in annual direct and indirect regional output or business turnover;
- $133M in annual direct and indirect regional value added;
- $48M in annual direct and indirect household income; and
- 519 direct and indirect jobs.

8 REFERENCES

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

Gillespie, R. (2009) *Bulli Seam Operations: Choice Modelling Study of Environmental and Social Impacts*, Prepared for Illawarra Coal Holdings Pty Ltd.

James, D. and Gillespie, R. (2002) *Draft Guideline for economic effects and evaluation in EIA,* prepared for Planning NSW.

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

Sinden, J. and Thampapillai, D. (1995) *Introduction to Benefit Cost Analysis*, Longman, Australia.

PEER REVIEW BY DR JEFF BENNETT

1 CONTEXT AND PURPOSE

This report is prepared by Dr Jeff Bennett.

Review of Gillespie Economics Economic Assessment

I was instructed by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of Coalpac Pty Limited (Coalpac) to prepare an independent evaluation of the Economic Assessment of the Coalpac Consolidation Project (Project) prepared by Gillespie Economics which was Appendix T (EA Economic Assessment) of the Project Environmental Assessment (EA).

PAC Report

I have been provided with a copy of the PAC report to the Minister (PAC Report) dated 14 December 2012 in relation to the economic effects of the Project. The Project considered by the PAC is described at Section 3 of the PAC Report, which is the Project in the EA adjusted by the RTS.

Response to PAC Report

I have also been provided with a copy of the report prepared by Gillespie Economics responding to the PAC report and evaluating the Contracted Project as proposed by Coalpac in the Coalpac PAC Response.

Instructions

I have been instructed by Hansen Bailey to:

- Review the Gillespie Economics Economic Assessment of the Project as included in the Environmental Assessment of the Coalpac Project and as considered by the PAC;
- Review Gillespie Economics' response to the PAC Report's economic assessment methodology, including the principles employed and the assumptions made and the conclusions drawn; and
- Review Gillespie Economics' economic assessment of the Contracted Project as proposed by Coalpac in the Coalpac PAC Response.

Presentation

My qualifications and experience are briefly outlined in Section 2.

Section 3 summarises my review of the principles, processes, methodology and conclusions set out in Gillespie Economics' Economic Assessment as contained in the Environmental Assessment.

Section 4 contains my review of the Gillespie Economics response to the PAC's comments on the Economic Assessment of the Project, particularly at Section 8.6 [Economic Issues] and 9.2 [Project Benefits] of the PAC Report.

Section 5 sets out my review of the Economic Assessment undertaken by Gillespie Economics of the Contracted Project as proposed by Coalpac in the Coalpac PAC Response.

2 QUALIFICATIONS AND EXPERIENCE

I am Professor of Environmental Management in the Crawford School of Public Policy at the Australian National University and Principal of the consulting group Environmental and Resource Economics. I hold a Bachelor of Agricultural Economics (1st Class Honours) from the University of New England and a Doctor of Philosophy in the field of environmental and resource economics from the Australian National University.

I have over 30 years of experience researching, consulting and teaching in the fields of Environmental Economics, Natural Resource Economics, Agricultural Economics and Applied Micro-Economics. I am a Fellow of the Academy of Social Sciences in Australia, a Distinguished Fellow of the Australian Agricultural and Resource Economics Society and a past-President of that Society and an elected member of the Mont Pelerin Society. I have published over 100 papers in refereed international journals and more than a dozen books in the field of environmental, agricultural and resource economics including benefit cost analysis and non-market valuation. I teach post-graduate and under-graduate courses in environmental economics, including one entitled Methods for Environmental Decision Making at the ANU. I have acted as a consultant to numerous Australian and international, private and public sector entities including the World Bank, the International Food Policy Research institute, the Consultative Group on International Agricultural Research, the Australian Department of Sustainability, Environment, Water, Population and Communities, the Murray Darling Basin Authority, the Victorian Department of Primary Industries, NSW and Victorian Treasuries and the NSW Department of Finance and Services. I was appointed a member of the PAC for the cases of the Metropolitan Colliery and the Bulli Seam Operations projects.

My full curriculum vitae is available at:

http://crawford.anu.edu.au/pdf/staff/jeff_bennett/2012/CV2012b.pdf

and an abridged version is provided at Appendix 1.

3 REVIEW OF GILLESPIE ECONOMICS' ECONOMIC ASSESSMENT AS INCLUDED IN THE COALPAC ENVIRONMENTAL ASSESSMENT.

My review of the Economic Assessment of the Coalpac Consolidation Project carried out by Gillespie Economics and included in the Environmental Assessment of the Project is provided in Appendix 2. The review involved a consideration of the methods used in the assessment including the validity of their application to the case at hand. This consideration was based on benchmarking the Gillespie Economics analysis against the established principles of applied welfare economics generally and cost benefit analysis in particular.

The Gillespie Economics assessment used two techniques to assess the economic impacts of the Project: Cost Benefit Analysis (CBA) and Input Output Analysis (IOA). The CBA was used to assess the Project's impacts on the well-being of the Australian people. This analysis is based on the welfare economics principles of resource use efficiency. The IOA was used to predict the changes to the structure of the regional and state economies that would result from the Project expenditures.

I found that both the CBA and IOA techniques are appropriate to the separate and distinct tasks they addressed and are well established both in theory and practice.

Furthermore, I found that Gillespie Economics had implemented both techniques consistent with established practice. My caveat to that finding was that limitations to data availability restricted the full and complete implementation of the CBA. Because of the limited available data on the community's value of uncompensated environmental damages associated with the project, in lieu of a full CBA, Gillespie Economics set up a Threshold Value Analysis. This approach requires decision makers to consider the qualitatively assessed environmental costs against the quantified net economic benefit of the project. This is an appropriate and well accepted approach to dealing with data inadequacies and the Gillespie Economics application of Threshold Value Analysis in the Coalpac context is correct.

The CBA conducted by Gillespie Economics was notable for its correct use of the concept of opportunity costs for the estimation of the land costs of the project where the proponent alrerady owned the land involved. Similarly, I considered the use of world parity prices for the coal mined to be appropriate even though the price received for the product was lower.

The incorporation into the CBA of the costs of components of the suite of environmental impacts of the proposed mine is also worth noting. Where possible, Gillespie Economics used the costs of associated avoidance or mitigation actions to account for a number of environmental costs. For instance, the costs of biodiversity offsets were used to account for losses of vegetation and associated biodiversity. Dust and noise costs were included through property acquisition costs and the costs of mitigation works on properties impacted but not aquired as determined by the regulator. In the data constrained context of the assessment I found these to be acceptable practices.

The EA economic assessment incorporates the costs of greenhouse gas emissions from the mining and delivery of the Coalpac coal by using the Federal Government's carbon tax rate

of $23 per tonne of carbon dioxide equivalent. This is necessarily an approximation of the social costs caused by any climate change consequences of these emissions. However, I found the use of $23 per tonne of carbon dioxide equivalent to involve an over-estimation of greenhouse gas costs. With world prices of greenhouse gas emissions subsequently falling well below this level this finding has been verified.

In summary, and to quote from my review:

" … the Gillespie Economics analysis has used conceptually sound techniques that are appropriate to the tasks addressed. The analysis has been performed competently within the bounds of the constraints to data collection. Decision makers who are to judge the merits of the Project should feel confident of this analysis as a basis for their deliberations."

4 REVIEW OF THE GILLESPIE ECONOMICS RESPONSE TO THE PAC'S FINDINGS

I have read the PAC Report on the Coalpac proposal and the Gillespie Economics response to the economic issues raised by the PAC in its review. I find that the PAC report's economic analysis is deficient in a number of dimensions and agree with Gillespie Economics' critique of the PAC's analysis. In my review set out in this section, I make some specific comments on the matters raised by Gillespie Economics.

1. I am in full accord with Gillespie Economics in supporting the use of CBA as the most appropriate tool for the analysis of the economic efficiency of the proposed mine. I am, similarly, a strident critic of the use of 'triple bottom line accounting' (TBLA) as a means of project appraisal as advocated by the PAC on the recommendation of the Institute for Sustainable Futures (ISF). TBLA is a variant of multi criteria analysis, a technique that I have critiqued in a published paper that I co-authored with Dr Leo Dobes, one of Australia's most experienced and well-versed cost benefit analysis practitioners (Dobes, L. and J. Bennett, 2009. 'Multi-Criteria Analysis: Good enough for Government Work?', Agenda, 16 ,3: 7-30.)
2. The PAC in its report questions the financial viability of the Coalpac project by raising concerns regarding the future demand for steaming coal as a source of energy for electricity generation. My response to these doubts is in accord with the points made by Gillespie Economics. Specifically, the financial viability of the Contracted Project and the forecasts of product demand that are inherent in that viability are matters for the project proponent to consider. The appropriate stand for the public decision maker and the CBA analyst is to presume that the project proponent would not be seeking approval for their investment unless it was financially viable. Part of this presumption is the acknowledgment that the project proponent has a strong vested interest to make a complete and comprehensive assessment of future demand for their output. Considerations as to the potential for renewable energy to substitute for coal fired thermal power of the type explored by IFS and the PAC have thus been made by

Coalpac and they have concluded that there will be sufficient demand for their coal output across the projected life span of the mine. The role of the public sector decision maker is rather to assess the impacts of the proposed project on the well-being of the whole community, not just the financial impacts for the proponent.

3. The PAC report raises a number of concerns regarding the consistency with which the Gillespie Economics economic assessment applied the principles of CBA. As reported in my initial review of the Gillespie Economics economic assessment, I find no such inconsistencies. The use of the 'mine versus no mine' comparison is in accord with fundamental principles of CBA where the assessment is done 'at the margin': that is, the impact of the proposed mine is assessed as a change away from the situation that would occur through time if the proposal to mine was not allowed. As part of the PAC's concerns regarding inconsistency in application is the appropriate spatial scale of analysis. This concern particularly relates to the issue of costing greenhouse gas (GHG) emissions that arise from the proposal. The Gillespie Economics approach was to include only the GHG emissions involved in the mining process and the transportation of the coal to the power stations where it is to be burnt and to port where it is to be exported. The alternative approach is to widen the spatial scale of the analysis to include the GHG emissions arising from the consumption of the coal. As Gillespie Economics correctly points out, the latter approach is inappropriate because it involves the broadening of the definition of the project to include production and consumption of the coal. If that broadening of the project definition was to be made, the benefits of the electricity generated by the consumption of the coal would also need to be included in the CBA. This is clearly beyond the purpose of the project assessment at hand.
4. Gillespie Economics' treatment of the costs of offsets as surrogates for the costs of lost vegetation and biodiversity that results from mining is criticised by the PAC. I found in my review of the original assessment that the treatment was appropriate given the limits of data availability. The approach requires that the offsets proposed by the proponent are very good substitutes for the assets lost due to mining. Gillespie Economics is in no position to judge the ecology involved in this matter but quite correctly relies on the expertise of the NSW Government to set the level of offsets deemed to be sufficient to ensure 'no net loss' of biodiversity. I am satisfied that the Government officials are adequately qualified to make these decisions and that the consent conditions for the mine could be written to ensure the proponent meets the expectations of the offset programme. I therefore find, as I did previously, that the Gillespie Economics approach to costing biodiversity loss is satisfactory. Incorporating other measure of biodiversity loss in addition to offset costs would result in the 'double counting' the costs of biodiversity loss.
5. CBA involves the estimation of the true costs and benefits to the whole of society that result from a change in the use of resources. The values involved are measures of economic surplus both gained and lost. This type of analysis does not replicate an analysis of financial viability. In CBA, the transference of money between parties is not necessarily a measure of value. For example, even though the land resource used for the mine is owned by Coalpac and no money changes hands as a result of the

project, a resource cost is still registered in the CBA because the land resource with mining is no longer available for other uses. Similarly, prices paid in markets may not reflect the true value of resources. This can occur when market prices are distorted through factors such as a lack of competition. Hence, Gillespie Economics correctly uses a 'shadow price' of coal to reflect the true scarcity value of that resource. Because coal is traded on open and competitive international markets, the 'shadow price' can be observed as the world parity price, modified to take into account costs of transportation to port (the 'free-on-board' or FOB price). The use of the negotiated price between single seller and single buyer in the Coalpac case is thus inappropriate for inclusion in the CBA.

6. CBA is primarily focused on the efficiency consequences of alternative resource uses. Its application enables decision makers to assess if the benefits arising from the mine relative to the no-mine situation exceed the additional costs associated with the mining project. It is important to recognise that the equity or distributional impacts of the proposed project are not normally integrated into CBA. Gillespie Economics appreciates this in its review of the PAC findings and correctly notes that concerns regarding the impacts of the mine on individuals or groups within society as raised by the PAC are not matters for the CBA. The results of the CBA lead to the conclusion that there are sufficient gains to be enjoyed from the project that those incurring losses could be fully compensated and the beneficiaries would still enjoy net gains. The compensation payments in this CBA logic are hypothetical and the enforcement of actual payments is a matter for government policy.
7. Gillespie Economics makes comment on the PAC's discussion of the impact on the price of electricity resulting from changes to the electricity generation sector arising because of the potential removal of Coalpac coal from the market. The PAC argues that purchases of coal represent only one element of the costs of electricity generation and that there are many different sources of electricity to the grid. As such, the PAC concluded that there would be negligible impact on electricity prices from the withdrawal of Coalpac coal. I find this argument to be unconvincing and agree with Gillespie Economics that a move away from the proposed mine and the subsequent structure of electricity generation would be a movement away from the least cost solution to the provision of electricity problem. This implies a price rise for consumers given that the supply of domestic electricity is not infinitely elastic. Even if the changes in price involved are relatively small, the cumulative effects across the population of electricity consumers could well be significant. However, it should be noted that this debate is irrelevant to the CBA as it involves spill over effects into subsequent markets which are not included in the CBA.

5 REVIEW OF GILLESPIE ECONOMICS ECONOMIC ASSESSMENT OF THE CONTRACTED COALPAC PROJECT

In response to the PAC Report on the Coalpac proposal, a revised project has been advanced. Gillespie Economics has carried out an economic assessment of the revised project. I have read that economic assessment and my review of it is contained in this section.

Gillespie Economics uses the same approach for this assessment as was used for the initial proposal. Cost benefit analysis is the core method applied to assess the impact of the Contracted Project on the well-being of the Australian people. In addition, an input-output analysis is carried out to predict the project's effects on the structure of the regional and state economies.

The primary difference between the assessments of the initial and the revised projects is the reduction in the net social benefit predicted. While the initial project was assessed to produce a net social benefit under assumed conditions of around $1.5b, the Contracted Project is estimated to have net social benefits of around $1.3b. The difference arises because the Contracted Project does not include the mining of coal in areas identified by the PAC as having special environmental significance. Other causes of the difference are revisions to the cost structure of the project and the likely trajectory of the export price of coal.

Because the assessment performed by Gillespie Economics for the Contracted Project follows the same principles and practice as those used in the initial assessment, my findings are fundamentally the same for both.

It is however worth noting two additional points:

1. The treatment of the price of coal in the estimation of benefits in the Contracted Project assessment has been refined to provide a better representation of the shadow price of coal. Specifically the varying ash content in the differing types of coal that will be mined under the project has been recognised and accounted for through an adjustment in the free-on-board export price of the resource.
2. The changes in the mine plan caused by the additional environmental restrictions embedded in the Contracted Project will have the effect of reducing any uncompensated environmental costs relating to the Contracted Project. The decision facing policy makers is now whether or not any remaining and uncompensated environmental costs are sufficient to out-weigh the $1.3b net social benefits generated by the Contracted Project. This decision cannot be directed by the Gillespie Economics CBA alone as it involves a qualitative assessment of the remaining uncompensated environmental costs against the $1.3b net social benefit of mining. However, that qualitative assessment should be made recognising the compensation payments made to those experiencing noise and dust from the mining operation and the biodiversity offset measures proposed. Payments made for both of these elements of mining environmental impact are already included in the financial costs of the mine operation and are thus included in the Gillespie Economics estimate of mine net social benefit. The qualitative assessment of environmental costs should therefore exclude these elements. From my experience of applying non-market valuation techniques to estimate environmental benefits and costs in a variety of natural resource management contexts, including coal mining, in NSW and elsewhere in Australia, it is my opinion that the remaining and uncompensated environmental costs of the Contracted Project would be less than the $1.3b net social benefit of the Project as estimated by the Gillespie Economics CBA.

In summary, the Gillespie Economics economic assessment of the Contracted Project has used conceptually appropriate tools of economic analysis and that those tools have been applied in an acceptable manner. I therefore find that the assessment delivers an accurate picture of the economic impacts of the proposed mine. My opinion is that the environmental costs of the Contracted Project that are not incorporated into the Gillespie Economics CBA are less than the $1.3b net social benefit estimated by that CBA of the proposed mine.

Appendix 1 – Jeff Bennett abridged Curriculum Vitae

Current position:
Professor, Crawford School of Public Policy, Australian National University
Professional Qualifications and Affiliations:
1982 Doctor of Philosophy, Centre for Resource and Environmental Studies
Australian National University
1976 Bachelor of Agricultural Economics (1st Class Honours), University of
New England
Founding Member, Environment Institute of Australia and New Zealand
Member, Economics Society of Australia
Elected Member, Mont Pelerin Society
Distinguished Fellow and past President (2004), Australian Agricultural and Resource Economics Society
Fellow, Academy of Social Sciences in Australia
Expertise:
Environmental and resource economics and management
Current research interests focus on: Benefit cost analysis; the development and application of techniques to estimate the value of non-marketed environmental benefits and costs, and the analysis of alternative institutional structures that give private owners/managers of natural resources the incentive to provide environmental benefits.
External Committees:
Member, Editorial Committee of Australasian Journal of Environmental Management
Member, Academic Advisory Board, Centre for Independent Studies
Former Editor, Australian Journal of Agricultural and Resource Economics
Former Member, Editorial Committee of Agenda
Former Member, Editorial Committee of Ecological Management and Restoration
Former Board Member, Wetland Care Australia
Former Member, Science and Information Board, NSW Department of Infrastructure Planning and Natural Resources
Professional Experience:
2007-2011. Director, Environmental Economics Research Hub
2003-2008. Director, Environmental Management in Development Programme, ANU
2000-2008. Acting Director (periodic), Crawford School of Economics and Government, ANU
2008 Julian Simon Fellow, Property and Environment Research Centre, Montana
1999 Henry Schrapper Visiting Fellow, Department of Agricultural and Resource

Economics, University of Western Australia
1993. Visiting Professor, Institut fur Volkswirtschaftlehre, Universitat der Bundeswehr, Munchen, Germany
1990. Visiting Associate Professor, Department of Agricultural Economics and Rural Sociology, Ohio State University, USA
1986-2000. Senior Lecturer and subsequently Associate Professor, Department of Economics and Management, The University of New South Wales (ADFA)
1986. Visiting Fellow, Department of Economics, University of Southampton, U.K.,
1983-1986. Lecturer, Department of Economics, Faculty of Military Studies, The University of New South Wales
1981-1982. Lecturer, School of Business Studies, Darling Downs Institute of Advanced Education

Selected Consultancies

2012-13: NSW Department of Finance and Services
Benefit Cost Analysis of management strategies for the Hawkesbury Nepean River
2012-13: IFPRI
Assessment of water resource research program
2008-10: Part-time Commissioner, Planning Assessment Commission of NSW
2009-12: Standing Panel on Impact Assessment and various benefit cost analyses of environmental management initiatives, Collaborative Group on International Agricultural Research
2008-10: DEWHA
Estimation of the benefits of e-waste recycling; Biodiversity policy advice
2007 -10: Australian Farm Institute
Ecosystem Services provided by Australian Farmers; Environmental flow targets
2007: Victorian Department of Treasury and Finance
Report on Sustainable Consumption
2006-07: Victorian Environmental Assessment Council
Non-use values of the River Red Gum and east Gippsland Forests
2006: Collaborative Group for International Agricultural Research
External Program and Management Review of the International Water Management Institute
2005-2006: Victorian Department of Sustainability and Environment and Melbourne Water
Valuing healthy rivers
2002-2003: Murray Darling Basin Commission
Living Murray projects on environmental value estimation
2002-2003 Scottish Executive
Benefit-cost analysis of Natura 2000 sites
2003: Department of Environment, Water, Heritage and Environment
Benefit Cost Analysis of greenhouse gas abatement investments
2001-2002: Environment Australia
Handbook on wetland protection incentive measure
2001-2002 Queensland Department of State Development
Competitiveness of regions for mineral processing industry location
2000-2001 Australian Greenhouse Office
Benefit Cost Analysis of Greenhouse Gas Abatement proposals

1999-2001: National Land and Water Resources Audit
Estimating the non-market values of resource degradation
1998-1999: Victorian Department of Natural Resources and Environment
Management alternatives for Victorian National Parks
1998: Woodside Pty Ltd
Benefit Cost Analysis of Greenhouse gas emission reduction investments
1997 – 1998: AusAID
Appraisal of agricultural sector of PNG
1997: National Land and Water Resources Audit
Advisor on methodological development
1997 – 1998: Resource and Conservation Assessment Council
Threshold Value Analysis of forest protection in Eden forests
1990: Post Coupe economic recovery in Fiji
AusAID

Selected Research Projects

Current: Payment for Environmental Services in Lao PDR
Australian Centre for International Agricultural Research
2007-11: Environmental Values and Valuation over Time
DEWHA
2007-11: Integrating Environmental Values into Vegetation Planning
DEWHA
2002-2011: Sustainable Land Use Change in the North West Provinces of China
Australian Centre for International Agricultural Research
2004-2009: Managing Groundwater in Tay Nguyen, Viet Nam
Australian Centre for International Agricultural Research
2004-2007: Private Sector Conservation Enterprises
Rural Industries Research and Development Corporation
2000-2001: Estimating the Environmental Values of Rivers in NSW
NSW EPA, Land and Water Australia
1997-2001: The Private and Social Values of Wetlands
Environment Australia.
1996-2000: Using Choice Modelling to Estimate Non-market Values Land and Water Resources R&D Corporation, various Queensland and NSW government agencies
1992-1996: Socio-economic Analysis of Forest Conservation Proposals in Vanuatu
Australian Centre for International Agricultural Research

Countries of experience

Australia, New Zealand, PNG, Vanuatu, Fiji, Vietnam, China, Lao PDR, Malaysia, India, USA, UK

Recent Publications

For a full list of publications including more than 100 refereed papers in international journals and more than a dozen books, See:
http://crawford.anu.edu.au/crawford_people/content/staff/jbennett.php

Appendix 2: Review of the Gillespie Economics Economic Assessment of the Coalpac project as included in the Environmental Assessment

Mr Dorian Walsh
Hansen Bailey

E: dwalsh@hansenbailey.com.au

Dear Mr Walsh,

RE: Coalpac Consolidation Economic Assessment

In response to your request for an independent evaluation of the economic assessment of the Coalpac Consolidation Project undertaken by Gillespie Economics, I have now examined the relevant documentation. The purpose of this letter is therefore to provide you with my review.

Gillespie Economics uses two techniques to assess the economic impacts of the proposed Coalpac Consolidation Project (hereafter referred to as the Project): Cost Benefit Analysis (CBA) and Input Output Analysis (IOA). CBA is used to assess the Project's impacts on economic efficiency and the IOA to predict the changes to the structure of the regional and state economies that will result from the Project expenditures. Both of these techniques are appropriate to the tasks they address.

The CBA uses the Project's 'net production benefits' as its primary component. This amounts to the economic value of the coal less the costs of production. This represents an approximation of the producer surplus generated by the Project and is a valid inclusion in the CBA calculus.

The economic value of coal in the net production benefit is estimated on the basis of the projected world price of coal rather than the (lower) price that will be paid by the power station. This approach recognises the scarcity value of the coal resource as is required in an analysis of economic efficiency.

The costs included comprise capital and operating costs through the life span of the mine and incorporate the opportunity costs of land through the inclusion of the price of the land to be used, including the land already owned by the project proponent. This is the conceptually correct approach. The inclusion in the Gillespie Economics analysis of the value associated with forestry and agricultural alternative land uses demonstrates the value of the land used for the Project but correctly, is not included in the CBA. That would amount to double counting of the costs associated with the land resource used.

Also included as costs within the 'net production benefit' element are the expenditures incurred in 'internalising' the environmental 'externalities' caused by the Project. The assumption made here is that expenditures on operations such as noise and dust control are at least equal to the costs to the local residents of these environmental impacts. Expenditures of

this type are of two varieties. First there are the costs associated with nuisance minimisation (dust and noise suppression). Second, there are the costs of purchasing neighbouring properties that would experience noise and dust impacts above the established thresholds. The latter involves the assumption that the prices paid for the adjacent properties are greater than the environmental costs that would be incurred if the residents stayed in their properties. Given that the contribution to property value of the environmental characteristics associated with dust and noise are likely to be a fraction of the overall property price this is a reasonable assumption and one that is likely to overstate the true environmental damage costs.

Also included in the costs are the expenditures committed to the provision of environmental offsets. On the basis of government legislation that requires offsets to be environmentally enhancing, it can be assumed that the net position of the mine with regard to biodiversity is positive: That is, after the offsets have been made, the Project will involve a net improvement in biodiversity. Hence, by including the costs of the offsets, the CBA does not need to incorporate any biodiversity costs. The Gillespie Economics approach is thus acceptable in this regard.

Greenhouse gas (GHG) emissions costs are also included in the Gillespie Economics assessment. Only those GHGs which are created in the mining operation are included in the analysis. Each tonne of GHG emissions is costed using the tax rate being implemented in the Federal Government's climate change policy. The approach taken to the volume of GHGs is appropriate. The GHGs emitted during the burning of the coal should be a factor in the consideration of the investments involved in power generation. The treatment of the unit cost of GHG emissions is likely to overestimate the extent of the costs involved given that the tax rate planned for Australia is currently well in excess of the prices of carbon permits traded both in the US and Europe. Projecting those prices into the future is necessarily risky so the conservative approach taken by Gillespie economics is appropriate.

Ideally, a CBA of the Project would involve any residual environmental costs to be estimated and subtracted from the 'net production benefits' to determine if the Project yields a positive net present value. That would indicate that the Project would generate an improvement in the well-being of Australians relative to the case of not going ahead with the Project. The Gillespie Economics assessment does not use this approach due to constraints of time and other resources. Rather it adopts the threshold value approach. This involves the estimation of the net production benefits (inclusive of the 'internalised' environmental costs) and setting that value as a 'threshold' against which the residual environmental costs can be compared. If those residual environmental costs are considered by the decision makers to be worth more than the net production benefits, the implication is that the Project would not enhance the well-being of Australians. Alternatively, if the residual environmental costs are considered to be less than the 'threshold' of net production benefits, then proceeding with the Project would be economically efficient.

Given the constraints faced by the assessment, this approach is appropriate. It provides decision makers with the appropriate information on which to judge the relative merits of the Project. It is important therefore that decision makers consider the Gillespie Economics assessment alongside the bio-physical assessments of environmental impacts of the mine that

have not been ‘internalised’ by the inclusion of costs in the ‘net production benefits’. This will provide the appropriate information to allow the consideration of the threshold value test. An example of this would be any potential impacts of the mine on areas of the Gardens of Stone proposal.

The IOA is used to predict changes in the structure of the economy resulting from the Project. It relies on the use of input-output tables that reflect the current structure of the economy. Necessarily, the impact analysis is thus predicated on the current conditions. Given this caveat to the Gillespie economic assessment, the use of the technique is appropriate to the task. However, it is important for decision makers to recognise this limitation. The results of the analysis show that there will be increases in employment and other expenditures over the period of the mine’s life. This information is useful to those with responsibilities particularly for planning public infrastructure provision. The analysis does not provide an evaluation of the project as does the CBA but rather predicts expenditure impacts. This analysis appears to have been conducted in a competent manner by Gillespie Economics.

In summary, the Gillespie Economics analysis has used conceptually sound techniques that are appropriate to the tasks addressed. The analysis has been performed competently within the bounds of the constraints to data collection. Decision makers who are to judge the merits of the Project should feel confident of this analysis as a basis for their deliberations.

Professor Jeff Bennett
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1 June 2012