

APPENDIX F: ECONOMIC PEER REVIEW

Economic Peer Review – The Centre for International Economics

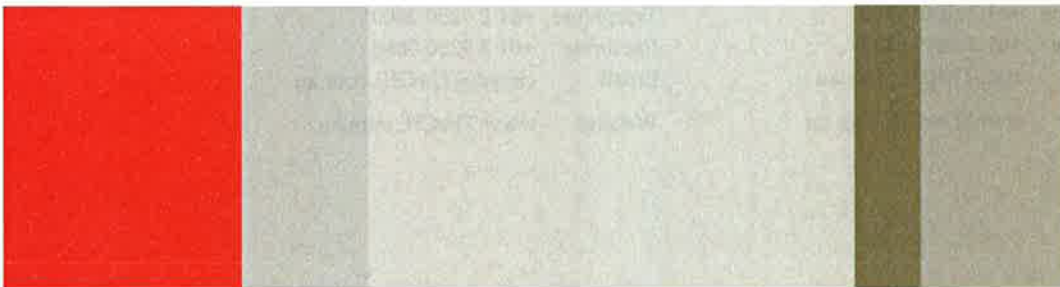
1. Peer Review Report dated May 2016
2. Response from WCPL dated 20 June 2016
3. Final Peer Review Report dated July 2016



REPORT

Peer review of economic assessment

Wilpinjong Extension Project



*Prepared for
NSW Department of Planning and Environment
May 2016*

The Centre for International Economics is a private economic research agency that provides professional, independent and timely analysis of international and domestic events and policies.

The CIE's professional staff arrange, undertake and publish commissioned economic research and analysis for industry, corporations, governments, international agencies and individuals.

© Centre for International Economics 2016

This work is copyright. Individuals, agencies and corporations wishing to reproduce this material should contact the Centre for International Economics at one of the following addresses.

CANBERRA

Centre for International Economics
Ground Floor, 11 Lancaster Place
Canberra Airport ACT 2609

GPO Box 2203
Canberra ACT Australia 2601

Telephone +61 2 6245 7800
Facsimile +61 2 6245 7888
Email cie@TheCIE.com.au
Website www.TheCIE.com.au

SYDNEY

Centre for International Economics
Suite 1, Level 16, 1 York Street
Sydney NSW 2000

GPO Box 397
Sydney NSW Australia 2001

Telephone +61 2 9250 0800
Facsimile +61 2 9250 0888
Email ciesyd@TheCIE.com.au
Website www.TheCIE.com.au

DISCLAIMER

While the CIE endeavours to provide reliable analysis and believes the material it presents is accurate, it will not be liable for any party acting on such information.

Contents

Summary	1
1 Introduction	4
About the project	4
Scope of review	5
2 Cost benefit analysis	6
Features of a CBA	6
Defining the scope of the project	6
Quantifying and valuing the changes	9
Benefits category	12
Cost category	16
3 Uncertainty and sensitivity analysis	27
What are the main uncertain quantified costs and benefits?	27
What degree of variability is indicated by the results?	28
Was the methodology used appropriate?	29
4 Regional Economic Impacts	30
Regional Cost benefit analysis	30
Computable General Equilibrium analysis	31
CGE sensitivity analysis	32
BOXES, CHARTS AND TABLES	
1 Magnitude of the incremental costs and benefits quantified	2
2.1 Key features of a CBA	7
2.2 Benchmarking the identified costs and benefits	10
2.3 Qualitative assessments in the CBA	25
3.1 Parameters included in sensitivity analysis	28
3.2 Variability in NPV and royalties in sensitivity analysis	29

Summary

The CIE has been commissioned by the NSW Department of Planning and the Environment (the Department) to peer review the Cost Benefit Analysis (CBA) produced by Deloitte Access Economics (DAE) for the Wilpinjong Mine Extension (the Project). The Project involves expansion of the footprint of current mining operations, construction of a new pit, and extension of operations from 2026 to 2033. The proponent of the Project is Wilpinjong Coal Pty Ltd (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (Peabody Energy)

DAE have estimated a Net Benefits (in present value terms) of the Project of \$735 million, with an associated cost benefit ratio (CBR) of 1.43. The analysis quantifies a range of impacts, but excludes a number of potential environmental and social impacts where data was not readily available. In these cases, qualitatively assessed impacts were also considered to be unlikely to have a significant impact on the evaluation of the Project – these assessments were made by either WCPL or as assessed in through specialist reports attached to the Environmental Impact Statement (EIS).

The CIE's review tests the reasonableness of the CBA undertaken by DAE and its consistency with NSW Government guidelines in relation to undertaking CBAs.

- **In general, we conclude that the CBA has been undertaken in a manner that is broadly consistent with the 2012 NSW Government guidelines for conducting mining related applications.**

While the analysis is broadly consistent, the individual components and parameter estimates warrant testing. Some of these estimates are difficult to test, particularly where there is limited publicly available data on, for example, the cost of the operations. Further, the CBA requires DAE to develop assumptions regarding future factors, such as the future price of coal, which are difficult to predict.

Therefore, for the analysis we have focused on the key factors that drive the results and which can be readily tested. On the benefits side, at a minimum, the Government would receive royalty payments. On the cost side, there are a range of externalities that need to be accounted for. In some instances, these externalities have been mitigated (in full) by the actions of the company. However, there are instances where there are residual impacts that are not fully mitigated. These unmitigated impacts need to be accounted for. We have relied on the findings presented in the EIS documents and NSW Government agency submissions to the process.

Table 1 presents the DAE estimate of the net benefits as well as an alternative *lower bound* estimate of the net benefits to the NSW community. The lower bound estimate assumes that the only benefits derived are based on the royalties generated combined with upper bound estimates for environmental impacts. That is, it illustrates that even if there are no

other public benefits (e.g. tax payments to government, economic benefit to wage earners) aside from royalties and the costs are at the high end of current estimates that the Project still delivers net benefits to the NSW community.¹ The net benefits could be higher, although it is difficult to test in a robust manner the extent to which the net benefits are close to that estimated by DAE.

1 Magnitude of the incremental costs and benefits quantified

Parameter	DAE	Minimum threshold
	\$m (present value)	\$m (present value)
Benefit to NSW		
Royalty payments	190.5	162 - 231
Other benefits ^a	556	Assumed to be zero
Cost to NSW		
Residual value of land	2.45	2.45
Off-site agricultural revenue	0.18	0.18
Air pollution - carbon emissions	6.66	6.66 - 25.7
Air pollution - particulate emissions	1.16	1.16 - 10 ^b
Noise pollution	0.11	0.11
Traffic	0.02	0.02
Net quantified public benefit to NSW	735	123 - 220

^a Other benefits include, for example, company income tax, net producer surplus, and economic benefit to existing landholders.

^b As noted later, the estimate of \$10million is used as an illustration of a possible upper bound impact, although the estimate of \$1.16million is in line with current best estimates.

Source: DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project, Appendix M

■ **The analysis suggests that, at a minimum, the Project is expected to deliver net benefits in the order of \$123m to \$220m to the NSW community. There are expected to be additional benefits, although the quantum of these additional items is difficult to test without further detailed data.**

Nevertheless, there are a number of issues raised in the submissions that need further investigation

- NSW Office of Environment and Heritage (OEH) has highlighted a number of errors and revisions to the Biodiversity Assessment Report provided as part of the EIS. In light of this, it is important to ensure that any revisions to biodiversity impact management are appropriately reassessed, re-costed and incorporated in any revised CBA (where relevant).
- The site remediation costs of the mine are assumed to be met by the proponent. Where a proponent is in financial stress there is a bond held that is intended to cover the full remediation liability. To the extent that the bond does not cover the full remediation costs, or where these obligations can be avoided, these liabilities are likely to fall on the public. If this occurred it could significantly reduce the net benefits

¹ The other benefits categories are summarised on page 14 of the NSW Government's draft *Guidelines for the Economic assessment of mining and coal seam gas proposals* issued in October 2015.

derived from the project. The Government needs to be satisfied that the mining bond is sufficient to cover any potential liabilities arising from the Project.

- Any other impacts that have been qualitatively considered as not of a sufficient scale to alter the net benefit result presented above.

1 Introduction

About the project

The Wilpinjong Coal Mine is an open cut coal mining operation located in the Western Coalfield, approximately 40km north-east of Mudgee, located within the Mid-Western Regional LGA in central NSW.

Under the planning system the proposed extension to the Wilpinjong Coal Mine, the Project, is considered to be a separate State Significant Development application.

The Project includes:

- physical extensions to the mine footprint to gain access to additional run-of-mine (ROM) coal reserves – approximately 800 ha of open cut extensions comprising 500 ha of extension to current pits, and 300 ha of new open cut pit; and
- an extension to the approved life of the mine².

A range of capital investment and infrastructure upgrades are included in the Project to support the production of an additional 65 Mt of saleable coal through the extension, as follows.

- Relocation of a section of the TransGrid Wollar to Wellington 330 kV ETL to facilitate mining in Pit 8
- Various local infrastructure relocations to facilitate the mining extensions (e.g. realignment of Ulan-Wollar Road and associated rail level crossing, relocation of local ETLs and services)
- Construction and operation of additional mine access roads to service new mining facilities located in Pits 5 and 8
- Construction and operation of new ancillary infrastructure in support of mining including: mine infrastructure areas, ROM pads, haul roads, electricity supply, communications installations, light vehicle roads, access tracks, remote crib huts, up-catchment diversions, dams, pipelines and other water management structures
- Other associated minor infrastructure, plant and activities.³

The Proponent of the Project, Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited (Peabody Energy) commissioned Deloitte Access Economics (DAE) to undertake a CBA and economic impact analysis of the Project as part of the Environmental Impact Statement (EIS).

² DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M, p i

³ DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M, p 16

Scope of review

The CIE has been engaged by the NSW Department of Planning and the Environment (the Department) to peer review the economic assessment produced by DAE for the Wilpinjong Coal Mine extension project (the Project). The scope of the review includes an assessment of:

- Whether assumptions presented are reasonable, appropriate and suitably justified
- Whether the cost benefit analysis aligns with current best practice
- The adequacy of the methodology, analysis and assessment presented in evaluating the economic costs and benefits of the proposed development (for the Proponent, the local, regional and State areas)
- The identification of any areas of deficiency (including inconsistencies, overlaps or “double counting”) and recommendations to improve or resolve these issues in the assessments, and
- Consistency of the assessment with any relevant Government guidelines (e.g. NSW Treasury (2007) Guidelines for economic appraisal and/or the NSW Government (2012) Guideline for the use of CBA in mining and coal seam gas proposals).

2 *Cost benefit analysis*

Features of a CBA

A CBA framework is a widely used tool for deciding *ex-ante* between alternative options (policies or projects). It allows decision makers to consider trade-offs arising from different options in order to assist decisions of whether community as a whole is better off or worse off by adopting an option.

A CBA framework is focussed on the aggregate welfare of the community, rather than the welfare of individual groups. It should take account of the full range of potential benefits and costs of the options, including environmental, health and other social impacts as well as the economic impacts. Where benefits exceed costs, the options are deemed to deliver a net benefit to the community as a whole.

Impacts are often not known with certainty.⁴ In these circumstances the CBA needs to be presented as an expected value taking account of the range of possible outcomes (each with a known probability of occurrence). In some circumstances, not all impacts can be readily quantified and valued in a robust manner. Decision makers will need to draw on other information to complement the result of the CBA and to assist in deciding on whether society is better off from adopting an option.

The NSW Government's November 2012 Guidelines specifies the key features of a CBA in mining and coal seam gas proposals. These are summarised in Box 2.1.

Defining the scope of the project

The NSW Government's Guidelines for Economic Appraisal provides the following guidance for defining the scope of a project:⁵

The scope of the project to be evaluated is also an important issue. Projects or programs will contain a range of elements related to one another and the point at which a discrete project can be identified will require careful judgement.

⁴ For the purposes of our analysis we use the term risk and uncertainty interchangeably. In theory, risk refers to events where a probability distribution can be developed whereas uncertainty refers to situations where the probability of outcomes cannot be estimated.

⁵ NSW Treasury, NSW Government Guidelines for Economic Appraisal, 2007.

2.1 Key features of a CBA⁶

- Scope – A CBA should include all first round (primary) impacts both direct and indirect but not secondary impacts.
- Estimating costs and benefits – A net public benefit or cost of a project can be calculated through the net benefit of a project less any associated public expenditure and any negative social, health or environmental impacts.
- Discount rate - A discount rate of 7 percent per annum with sensitivity testing at 4 per cent and 10 per cent per annum.
- Timeframe - A term that reflects the time horizon of the impacts of a proposal. Long-term projects should use a 50 year timeframe and a residual value where applicable, but this does not preclude a longer time-frame.
- Risk and Uncertainty - A 'risk neutral' approach to expected costs and benefits.

Unquantified factors - Decisions based on the quantified expected net benefits in conjunction with information on any impacts that cannot be valued

Taking this into consideration, our review of the definition of the scope of the project was guided by four questions:

- Was the scope of the CBA appropriate?
- How was the project defined and was this reasonable?
- Were the characteristics and elements of the project identified in sufficient detail to enable a robust analysis?
- Were alternative scenarios identified and considered?

Scope of the CBA

The NSW Government Guidelines provide the following guidance for defining the scope of the CBA:⁷

These benefits and costs should be estimated where possible as those that accrue to New South Wales. In the first instance, it will generally be most practical to assess all major costs and benefits to whoever they accrue and then adjust to estimate the proportion of these attributable to residents of the State.

The scope of the CBA should include all first round effects but not secondary impacts.

DAE noted that:

As the CBA is being developed to assist with NSW Government assessment processes, the scope of the CBA will generally be the State of NSW. However, the fact that the guidelines and requirements discussed in Section 2 do not fit neatly into a traditional CBA framework

⁶ NSW Government (2012), *Guideline for the use of Cost Benefit Analysis in mining and coal seam gas proposals*, November, p2.

⁷ NSW Government (2012), *Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals*, November, p.5.

means that the analysis will sometimes require consideration of effects for particular groups within the scope. This report therefore provides a whole-of-project CBA [...] and a subregional analysis CBA.⁸

There are three types of analysis presented by DAE.

- The main body of the CBA presents the first round effects of the Project from the perspective of NSW residents in most cases by virtue of the fact that the majority of external costs only affect residents near the mine and presents the direct impact only. The benefits from increased coal production accrue to the owners of the factors regardless of their location.
- The Regional Cost Benefit Analysis attempts to incorporate second round, or indirect effects, of the Project along with the CBA findings to disaggregate costs and benefits at the LGA level, the State level and the “rest of world” level. This disaggregation was done manually.
- A computable general equilibrium (CGE) model was used to estimate wider employment and wage effects from the Project, including both direct employment effects and secondary, or indirect employment effects of mine suppliers.

Project definition

The definition of the Wilpinjong Extension Project (the Project) includes the expansion, construction and operation of the mine, as well as a number of on-site and off-site infrastructure projects. In particular, the project scope included but was not limited to:

- the expansion of existing pits, and construction of a new pit, and operation of the mine facility,
- infrastructure constructed within the Mine Area,
- the upgrade, relocation and realignment of public off-site infrastructure.

Detail of project characteristics

The characteristics and elements of the Project that were included in the articulation of the proposal included the:

- mine’s location
- type of mine
- duration of the construction and operation phases
- expected extraction rates
- a range of on-site and off-site infrastructure projects
- rehabilitation activities.

In particular, the main capital expenditure activities for the Project will occur in 2017, with reduced levels in 2016 and 2018, and much reduced expenditure over 2019, 2020, 2022, 2024, 2027-29. The operational phase is anticipated to extend from 2017 to 2033.

⁸ DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M, p 8

Alternative scenarios

DAE considers only the baseline scenario and the proposed project in this analysis. A number of project alternatives were reportedly considered prior to the development of the CBA, but were found to be sub-optimal due to issues such as feasibility and/or the nature of broader impacts.

It is not clear whether the preceding evaluations of alternative scenarios were undertaken by DAE or whether evaluation was undertaken by WCPL and the findings reported to DAE. As stated by DAE, the alternative scenarios assessed as not being suitable for a CBA analysis are as follows.

- Project location: the location of the Projects has been determined with reference to the presence of coal seams able to be economically mined in the vicinity of the Wilpinjong Coal Mine and within WCPL's mining tenements. The Project seeks to maximise the use of the existing CHPP and other supporting facilities, and to provide new mining areas that are largely contiguous with approved mining areas, potentially minimising new disturbance areas.
- Scale: resource definition and exploration drilling conducted by WCPL indicates that the proposed scale of the Project (approximately 95 Mt of ROM coal) is optimal within WCPL's existing mining tenements.
- Mining method: it is considered that open cut mining is more suitable than underground methods, due to the shallow coal seams relative to the land surface and the relatively low strip ratios.
- Mining and processing rate: similar processing rates to the current approval (ROM coal production up to 16 Mtpa and coal transport of approximately 13 Mtpa) have been proposed in consideration of the existing CHPP facilities, coal quality and the extent of the open cut extension areas.
- **While the EIS presents a single option (the Project), from the perspective of the NSW community, it is possible that there are alternative options that have not been presented here that may deliver greater net benefits to the community.**

Quantifying and valuing the changes

Our review of the values attributed to cost and benefit categories identified was guided by four questions:

- Was the baseline adequately established?
- What cost and benefit categories were identified, and were these appropriate?
- What cost and benefit categories quantified and valued and how was this done?
- Were the estimated values benchmarked?

Establishing the baseline

The NSW Government Guidelines provide the following definition of the baseline or 'base case':

The 'base case' is typically a projection of the current land use case including current and committed policy settings. The base case effectively describes a business as usual scenario.

The baseline as described by DAE consists of mining operations continuing as per current approvals. The elements of the baseline that are pertinent to the current CBA include:

- Current approvals to produce 16 Mtpa of ROM coal and transport 12.5 Mtpa of thermal coal products
- 78.8 Mt of product coal projected to be produced over the period 2016-2026
- Coal product predominantly sold under contract to the domestic market, with only 5.8 Mt of thermal coal to be transported for export to the Port of Newcastle between 2016-2017
- Employment projected to decline from 497 FTEs in 2017 to 150 FTEs in 2026
- Decommissioning phase 2027 and 2028
- Progressive rehabilitation activities to take place up until 2026, consistent with requirements of current approval, including
 - Minimisation of the extent of final voids
 - Establishment of final landforms that are generally consistent with the topography of the surrounding area
 - Establishment of agricultural land in specific areas and restoration of the ecosystem function in the adjacent Enhancement and Conservation Areas and Regeneration Areas⁹

Cost and benefit categories identified

The NSW Government Guidelines include a list of cost and benefit categories that determine the net public benefit of a major project. ¹⁰ Table 2.2 compares this list to the cost and benefit categories identified and valued by DAE.

All required elements were covered by DAE, with a range of environmental and social external impacts considered qualitatively.

2.2 Benchmarking the Identified costs and benefits

Parameter	NSW Guidelines	Deloitte	
		Identified	Valued
Benefits			
Gross mining revenue	Yes	Yes	Yes
Any other revenues from land use during or after mining	Yes	Yes	Yes

⁹ DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M, p 15

¹⁰ NSW Government, Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals, 2012, p.5.

Parameter	NSW Guidelines	Deloitte	
		Identified	Valued
Costs			
Exploration costs	Yes	Yes	Yes
Capital investment costs	Yes	Yes	Yes
Operating costs	Yes	Yes	Yes
Rehabilitation costs	Yes	Yes	Yes
Public expenditure	Yes	Yes	No
Off-site agricultural revenue	Yes	Yes	Yes
Environmental and social impacts			
Water quality	Yes	Yes	No
- groundwater quality		Yes	No
- surface water quality		Yes	No
Streams, alluvial aquifers, or alluvial soils, including subsidence	Yes	Yes	No
Carbon emissions	Yes	Yes	Yes
Air pollution	Yes	Yes	
- Particulate matter (via Health costs)		Yes	Yes
- Other pollutants		Yes	No
Noise pollution	Yes	Yes	Yes
Visual amenity	Yes	Yes	No
Traffic impacts	Yes	Yes	Yes
Biodiversity	Yes	Yes	Yes, via purchase of offsets
Conservation	Yes	Yes	No
Quality of open spaces	Yes	Yes	No
Rural amenity and culture	Yes	Yes	No
Aboriginal and historical heritage	Yes	Yes	No
Other effects identified			
Increase in mine worker's wages	Yes	Yes	Yes
Profits of mine suppliers	Yes	Yes	Yes
Impacts on farms not elsewhere included (as other revenues from land use during or after mining)	Yes	Yes	Yes
Impact on labour supply	Yes	Yes	Yes
Tourism	Yes	No	No
Decommissioning costs		Yes	Yes
Residual land value		Yes	Yes
Residual capital value		Yes	Yes

Source: DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M and NSW Government, Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals, 2012,

Source: DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M

Benefits category

The benefits of the Project arise from the amount of saleable coal and the price of this coal. For a CBA, this provides benefits attributable to NSW in the form of royalty payments, company income tax, net producer surplus, economic benefits to existing landholders, economic benefits to workers and economic benefits to suppliers.¹¹

Revenue categories

The revenues generated from the mining activities are expected to result in benefits to the mining company and its shareholders, government (in the form of royalties and taxes) and the broader community (e.g. in the form of economic benefits to workers). This section discusses the assumed production volumes and prices used to estimate revenues.

Production volumes

DAE was provided with projections of saleable coal from the Project by WCPL. The projections indicate that in total an additional 65.3Mt of saleable coal would be extracted from the Wilpinjong Coal Mine.

Under the base line scenario, 78.8 Mt of saleable coal is projected to be produced between 2016-2026, predominantly for the domestic market.

The additional 65.3 Mt projected increase through the Project is anticipated to be made up of 27 Mt of mid ash thermal coal, produced between 2017 and 2026 and 38 Mt of high ash thermal coal.

The NSW Department of Resources and Energy (DRE) note that should the Project be approved as proposed, the combined Wilpinjong Coal Mine operations would be the largest producing coal mine in the Western Coalfield area, and the fourth largest in NSW.

The DRE have also verified the 95 Mt of projected ROM coal, and 65 Mt of saleable coal product from the extension Project, noting that “a review of available coal information suggests this product mix is achievable and maximises product tonnages from the Project”.¹²

Ultimately, the expected production profile from the mine will depend on a range of factors including the expected international demand for coal as well as the price for coal.

The Commonwealth Department of Industry notes, “the outlook for growth in Australia’s thermal coal exports is moderate because of lower or slowing import demand

¹¹ NSW Government (2015), Draft guidelines for the economic assessment of mining and coal seam gas proposals, Oct, p.14.

¹² NSW DIRE (2016) Wilpinjong Extension Project (SSD 6764) Review Environmental Statement, letter to NSW Department of Planning and Environment

in major importing countries such as China, Japan and India".¹³ There are a range of factors known to be affecting import demand for coal internationally, including:

- 30 per cent reduction in China's thermal coal imports in 2015 due to moderating electricity consumption, increased renewable electricity generation and increased use of domestic coal; and
- The rise of India as the world's largest coal importer in 2015, prompted by development of coal fired electricity generation capacity and an inability of domestic supplies to keep pace and government policies pushing for generalised access to electricity across the country¹⁴

In recent years, Australia's trading partners of China, Korea and Taiwan have shown a preference for cost competitive higher ash content coal products.¹⁵ While this would indicate a reasonable source of demand for the Project, there are reports that as of 2015, China was seeking to restrict the importation and local sale of high ash content coal as part of wider environmental and air quality policies.¹⁶ It is not clear how such policies would affect the overall demand for production from the Project in the near to medium term.

- **While there is uncertainty regarding how the future production profile from the mine will be affected by changes in the international market, it is expected that there will be a sustained demand for the product over the timeframe of the project.**

Coal prices

DAE have drawn on a Consensus Economics report from 2015 for projected thermal coal spot prices. Discounts were applied to the projected market prices to account quality attributes of mid ash and high ash coal – 8 per cent and 26 per cent respectively. These discount factors were provided by WCPL.

While exact prices were not provided in the CBA, a visual inspection of chart 5.3 in the DAE report indicate the longer term coal prices used in the CBA are:

- Approximately A\$79 per tonne for mid ash
- Approximately A\$63 per tonne for high ash

The use of spot prices in the CBA is appropriate if China is the target market for the Project, as exports to China from Newcastle tend to be denominated in spot terms.¹⁷ In

¹³ Department Industry, Innovation and Science (2016) Resources and Energy Quarterly, March 2016, p58

¹⁴ Department Industry, Innovation and Science (2016) Resources and Energy Quarterly, March 2016, p60-62

¹⁵ <http://www.platts.com/price-assessments/coal/newcastle-5500>

¹⁶ <http://www.cnbc.com/2014/09/15/china-to-ban-imports-of-high-ash-high-sulphur-coal-from-2015.html>

¹⁷ <http://www.platts.com/price-assessments/coal/newcastle-5500>

contrast, coal exports to Japan and Korea tend to be on long term contracts with yearly pricing.¹⁸

DAE assume a short term upswing in coal prices from 2016 before the longer term fixed prices above are settled on from 2021 forwards. A peak price of approximately A\$84 per tonne of mid ash coal is reached in 2020, and a peak price of approximately A\$68 per tonne for high ash coal is also reached in 2020.

Long-term forecasts of coal prices are hard to benchmark given the limited availability of publicly available forecasts. Recently, both coal prices and the Australian exchange rate have been trending down.

The Commonwealth Department of Industry provide the most recent forecasts of future coal prices, although these forecasts only extend to 2021 and are focussed on thermal coal contract prices. That said, the short term trend forecast by the Department of Industry is for a short term dip in prices from 2015 and 2016 levels, with 2021 prices projected to be almost 20 per cent below 2015 prices in real terms.¹⁹

While price estimates used by DAE in the CBA appear to be higher than that published by the Commonwealth Department of Industry, the estimates are broadly in line with that assumed by the NSW Department of Resource and Energy (in its submission to this review) in the range of A\$75 to A\$100 per tonne. The DRE noted that the export thermal coal prices for NSW between June 2014 to June 2015 was around A\$80 per tonne.

Accounting for the 8 per cent and 26 per cent discounts for ash content, this figure aligns with DAE's price estimate. The DRE note, "coal prices have declined significantly over the last three years and it appears that the bottom of the price cycle (in \$A terms at least) may have occurred over this period, the falling \$A has assisted in keeping NSW export thermal prices from falling further in \$A terms."²⁰

In its submission to the review, The Australia Institute argues that "coal prices assumed are also substantially above current prices and many analysts' long-term forecasts of thermal coal prices". TAI notes that "the latest long term forecasts, such as that by Goldman Sachs of \$USD42.50 per tonne for Newcastle benchmark coal".²¹

- **While there is uncertainty regarding future coal prices, the assumptions used by DAE are in line with that assumed by the NSW Department of Resources and Energy. Nevertheless, sensitive testing of alternative prices is required to test the impact on royalties (as conducted below).**

¹⁸ Reserve Bank of Australia (2013) Statement on Monetary Policy, Box A: Thermal Coal Prices. Available at <http://www.rba.gov.au/publications/smp/2013/feb/box-a.html>, accessed on 19/04/2016

¹⁹ Dept Industry, Innovation and Science (2016) Resources and Energy Quarterly, March 2016, p70

²⁰ NSW DIRE (2016) Wilpinjong Extension Project (SSD 6764) Review Environmental Statement, letter to NSW Department of Planning and Environment

²¹ TAI (2016), Wilpinjong Extension Project Submission, March, p.1.

Public benefits

There are a range of public benefits that should be incorporated into the CBA including

Royalties

Based on WCPL's production estimates, and price projections made by DAE and WCPL in conjunction, DAE estimate a total royalty payment for the Project of \$190.5 million in NPV terms.

This figure is based on a \$3.50 per tonne total allowable deduction (for a full wash cycle) on approximately 32 Mt of saleable coal, and a \$0.50 per tonne total allowable deduction (for product coal that is crushed and screened by not washed) for 2 Mt of saleable coal. Total deductions of \$112.9 million on gross mining revenue were used by DAE to then apply an 8.2 per cent royalty rate.

DAE note that further potential deductions for insurance, bad debts and bank commissions were not included due to difficulty in forecasting and the assumption that these deduction are unlikely to have a large impact on final royalty payments.

DRE has reviewed the royalty calculations and assume allowable deductions for royalty of \$4.50 per tonne. It confirms that a royalty rate of 8.2 per cent applies to the net disposal value (the price received per tonne less any allowable deductions). It assumes that, if the Project is approved, around 65 Mt of product coal would be economically mined from the area between 2017 and 2033. It estimates that royalties would amount to around \$300m (in present value terms using a 7% real discount rate), based on future coal price estimates of between A\$75 to \$110 per tonne.

A key driver of the royalties is the assumed future coal price. As noted above, at the lower end a price of \$USD42.50 per tonne is one alternative price (as suggested by The Australia Institute). Assuming that the 65Mt of product coal is produced equally over the period 2017 to 2033 this would result in a royalty of \$162m (in present value terms).²² An alternative of A\$80 per tonne (based on current prices) would generate royalty revenues of around \$231m (in present value terms).

- **Based on alternative estimates of future coal prices it is reasonable to assume conservative estimates for royalties in the range of \$162m to \$231m.**

Other benefits

As noted above, the production and sale of the coal generates a range of benefits that are relevant for a CBA, including royalty payments discussed earlier. These other benefits categories include company income tax, net producer surplus, economic benefits to existing landholders, economic benefits to workers and economic benefits to suppliers.

It does not appear that these benefits categories have been separately estimated in the CBA. However, in aggregate these other benefits amount to around \$556m.²³

²² Assuming an USD:AUD exchange rate of 0.74.

²³ This has been back-calculated from table 5.5 of DAE's CBA.

- **At this point in time (and based on the use of the royalties as the minimum threshold), there is limited gain from conducting additional analysis to further disaggregate these other benefits into the component parts.**

Cost category

There are a wide range of costs associated with the Project, ranging from direct operating and capital costs, to more external costs such as those impacting land values, environmental values and heritage values. Some 'externalities' have not been quantified.

In many instances there is limited data available on which to test assumptions submitted. Given this, our focus is on testing those items that form part of the public costs to be included in the CBA.

Operating costs

The Wilpinjong Mine has been noted to be a very low cost mine internationally.²⁴

FOB operating costs are not reported explicitly in the analysis. Instead, visual comparisons of graphs of total FOB expenses and annual production estimates have been combined to calculate implied operating costs here.

Charts 5.1 and 5.7 in the Economic Impact Analysis document indicate average operating costs of:

- approximately \$27/t under the baseline
- approximately \$36/t for the combined expanded Project.

The estimates of operating costs were drawn from an econometric analysis of open cut mining in Australia conducted by Shafiee, Nehring and Topal (2009). WCPL provided DAE with Project specific parameters to estimate operating costs.

Beyond the econometric analysis estimates, DAE utilised the following premiums on the estimates:

- \$5 per tonne for full cycle wash and \$1 per tonne of bypass product coal to reflect the additional CHPP costs
- \$5 per tonne to account for overheads
- \$12 per tonne of exported product coal, to account for distribution and selling expenses.

A further 10 per cent discount on these estimates was then applied to account for reports that Wilpinjong is considered to be a low cost operation. DAE notes that WCPL considers the operating costs are more likely to be in line with a 20 per cent discount, but without further substantiation, DAE proceeded with a 10 per cent discount.

²⁴ <http://www.peabodyenergy.com/content/405/australia-mining/new-south-wales/wilpinjong-mine> and <http://www.woodmac.com/reports/coal-wilpinjong-coal-mine-16457566>

The Australia Institute argues that “that there are very few mines in the world that can produce at below \$US40 per tonne”, utilising data from the Queensland Resources Council.

Exploration costs

Three years of exploration and preparatory costs are expected by WCPL should the Project proceed. These costs are estimated to amount to \$8.52 million in NPV, with nominal costs of:

- \$2.5 million in 2016
- \$1.8 million in 2017
- \$6.2 million in 2018.

There is no further information provided on what these preparation and/or exploration costs consist of, or why they peak in 2018, after production is anticipated to have begun.

Capital investment costs

Capital costs are estimated to amount to a total of \$80.2 million in net present value terms over the period of the Project. DAE do not provide a breakdown of the allocation of these capital costs, and note the range of capital expenditure items required under the combined baseline and Project scenario.

The bulk of capital expenditure is anticipated to peak in 2017 with almost \$80 million to be spent in nominal terms.

Residual value of capital

The residual value of capital is an internal accounting principle for WCPL. There is insufficient information to make a judgement on the residual capital value estimates provided in the CBA.

However, it is noted that the Project is expected to require an additional \$80.2 million in capital investment costs in NVP terms an increase of 163 per cent over the baseline. In contrast, the residual value of capital for the Project is estimated in the CBA to be \$12.3 million less than in the baseline case.

This situation could occur if:

- Capital investment activities cover investments that are not included in the final residual value of capital calculation and/or
- Capital is worked significantly more intensively over the Project than was expected in the baseline scenario.

Ultimately, this measure is of concern for the economic viability of the Project, and is not an issue when considering the external benefits of the Project to NSW.

Decommissioning costs

DAE note that under the Project, the profile of decommissioning costs and post-closure monitoring costs would be faced seven years later than under the baseline.

The CBA assumes that the same nominal value of decommissioning and post-closure monitoring costs would be faced under the baseline and Project scenarios, in which case a time delay benefit would be achieved.

Other onsite agricultural revenue

Assessment of the change in potential agricultural income from land within and adjacent to the Project site draws on the following assumptions:

- 1022 ha of land would be removed from potential agricultural use because of the Project over the period 2017-2033
- 346 ha of additional land would be permanently sterilised and removed from potential agricultural use
- Land and Soil Assessment estimates of gross margins for regional agricultural use at \$53.06 per ha per year.

There is no further information on where the estimates of land scale have been derived from. However, DAE state that they are likely to be overestimates of the quantity of land affected that could derive a gross margin due to topography (vegetated ridgelines) or the potential for some land to be available for agriculture at different times over the 2017-2033 period.

The \$53.06 per ha per year, was referenced in the Land and Soil Assessment for the Project, but was originally reported in the NSW Department of Primary Industries (2012) Gross margin budget for 'North Coast Weaners – Unimproved Land' which provided an estimate for weaner production. The Land and Soil assessment further notes that the open cut extension areas are not considered to be highly productive agricultural land.

Overall \$0.79 million of agricultural revenue, in net present value terms is projected to be forgone due to the Project. The estimates of foregone agricultural revenue appear to be reasonable and conservative.

Residual value of land

DAE have estimated that the residual value of land would be reduced by \$2.45, or 38 per cent, due to solely to a delay in returning land to other uses.

The methodology uses on an estimated land area of 5 695 ha of affected land – current approved DA Area of 4 045 ha and an additional 1 650 of adjacent land that would not be impacted except for the proposed Project activities – and an underlying land value of \$2 750 per ha.

While the additional 1 650 ha of land would not be affected under the baseline scenario, to ensure comparability of estimates, the same land area is used in both scenarios to estimate a net impact on residual land value because of the Project.

The value of land used by DAE, as provided by WCPL appears to be quite high. A 2014 media release from the Office of the NSW Valuer General reported average rural land values for the Mid-Western Region LGA of approximately \$1220 per ha. Even allowing for inflation, this figure is not consistent with the \$2 750 per ha figure used.²⁵

That said, the use of a higher land value conservatively inflates the effect that the Project may have on residual land values. Using a lower number, effectively halving the assumed value of land, also halves the cost of delaying the land release to other purposes.

Overall, the effect is not significant in the context of the CBA and any changes to assumptions would not materially change the results.

Rehabilitation costs

DAE have drawn on estimates provided by WCPL to estimate a NPV of rehabilitation costs under the baseline and Project scenarios. As rehabilitation work is scheduled to be undertaken progressively over the period 2016 to 2026 under the baseline and 2016 to 2033 under the Project scenario, the major differences in rehabilitation costs can be summarised as:

- A two year delay in peak rehabilitation activities (\$3.3 m) occurring in 2024 under the baseline and in 2026 in the Project scenario.
- An extended tail of lower cost rehabilitation activities occurring over the period 2026 to 2033.

Of note, the Project is anticipated to increase the footprint of the mining operations by 800 ha, and increase rehabilitation costs by a nominal total of \$5.4 million, or 30 per cent. In NPV terms, the increase in rehabilitation costs is much lower, \$1.86 million or 16 per cent.

While information on the range of rehabilitation activities that are planned for the Wilpinjong site are provided in the Rehabilitation Strategy, no explanation is provided on the method of calculating the costs for rehabilitation activities.

The peak rehabilitation costs are only accounted for in 2024 or 2026, should the mining operations cease before then, or financial difficulties of Peabody Energy in the United States affect operations at Wilpinjong, there may be difficulties in securing resources upfront for rehabilitation activities.²⁶

For a CBA, the rehabilitation costs would typically form part of the mining company's ongoing costs. Changes in the rehabilitation costs would flow through to the company profit and impact on the income tax revenue to Government from the Project.

²⁵ NSW Valuer General (2014) Land values issues for Mid Western Regional. 30 January 2014

²⁶ We note that Peabody Coal has filed for bankruptcy protection in the United States, although this is not expected to impact on its Australian operations at this stage.
<http://www.abc.net.au/news/2016-04-13/peabody-energy-files-for-bankruptcy-protection/7324534>

There have been recent examples in Australia and overseas where the rehabilitation of sites has been left to the public, particularly in the event of bankruptcy.²⁷ In this context, a consideration for a CBA is whether or not the bond held is sufficient to cover any future site remediation liabilities should the company become insolvent at a future point in time. The Australia Institute note that “Peabody has stated that the rehabilitation bond for the project is in the vicinity of \$58 million.”

The security amount is determined and held by DRE to provide and maintain security funding for the DRE to fulfil obligations in the event that the title is cancelled or the titleholder fails to comply with rehabilitation requirements. The deposit is calculated in accordance with the Rehabilitation Security Deposits Policy²⁸ and environmental guidelines for rehabilitation²⁹.

- **For the purposes of our review we assume that the security bond held is sufficient to ensure that any future liability associated with the Project can be appropriately managed in the event of adverse financial position of the company.**

Biodiversity (flora and fauna) impacts

Costs to manage impacts to biodiversity have been considered as operational costs within the CBA. Therefore, no additional, external costs associated with impacts to the flora and fauna biodiversity have been quantified.

The management costs are intended to provide an equivalent increase in biodiversity to offset the losses from vegetation clearing at the mine site. This provides a reasonable proxy for estimating the biodiversity costs, as long as:

- All biodiversity impacts have been adequately identified and
- Sufficient management and mitigation activities are undertaken such that there is no net impact on biodiversity – that is, all of the costs are accounted for and covered by WCPL in their operational activities.

It should be noted that the OEH has raised a number of concerns with the biodiversity assessment of the Project, and as such, there is a risk currently that the costs put aside for biodiversity impacts in the operational budget may not be sufficient.

Where agreement is reached between OEH and WCPL in measuring, managing and mitigating these effects, the costs should continue to be counted as operational costs, and not external costs considered separately.

- **Further refinement may be required at a later stage to incorporate any additional information regarding biodiversity impacts, following any further input from OEH.**

²⁷ See, for example, <http://www.vox.com/2016/4/13/11420882/peabody-energy-bankruptcy-coal>

²⁸ <http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-policies>

²⁹ <http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines>

Carbon emissions

In estimating and valuing carbon emissions from the Project, DAE has applied the valuation approach outlined in the draft *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015).

Based on work undertaken as part of the review of the NSW Energy Saving Scheme, the guidelines suggest using the European Emission Allowance Unit price forecasts. Given uncertainty about the appropriate carbon costs to use for NSW appraisals, the guidelines also suggest undertaking sensitivity analysis using carbon price estimates from the Australian Treasury as well as the US EPA social cost of carbon estimates.

DAE follows the guidelines directly and uses the emissions price estimates provided in the Greenhouse Gas Valuation Workbook that accompanies the guidelines.

While these guidelines are still in draft form, it is appropriate for DAE to use them given that any number of approaches could be taken and the guidelines provide a guide to NSW government expectations about carbon emission valuations.

This implies that the additional cost of carbon emissions under the Project case is \$6.66 million. Consistent with 2015 draft Guidelines sensitivity testing was also conducted using two alternative prices, that estimated by the US EPA Social Cost of Carbon and the Australian Treasury for the Clean Energy Future Policy Scenario. Under these alternative prices, the additional cost of carbon under the Project case would increase to \$12.7 million and \$25.7 million respectively.

- **The valuation of carbon emissions has been undertaken as suggested in the draft guidelines for the economic assessment of mining and coal seam gas proposals. Sensitivity testing of alternative carbon prices provides a further upper bound cost that could be utilised in the CBA. Based on this the cost of carbon could range between \$6.7 million to \$25.7 million (in present value terms).**

Air pollution – particulate matter

DAE relies on a study into particle pollution undertaken by PAEHolmes for the NSW EPA (PAEHolmes 2013), as presented in the draft *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015). Using this, DAE estimate the value of the impacts of around \$1.16 million (in present value terms).

The PAEHolmes work is one of the few studies where particle emissions cost estimates have been derived for the Australian context. The international work from which the PAEHolmes estimates derive was focused on transport related particle emissions and mainly applied to urban centres. In this sense the PAEHolmes estimates of damage from particulates (\$ per tonne of PM2.5 emitted) need to be seen as a proxy for mining related emissions.

There are limitations in the use of the PAEHolmes study for mining related impacts. For example, there are differences in composition and hence toxicology of particulates from mining and transport means that damage estimates cannot easily be transferred. Further,

the composition of PM10 and PM2.5 as a share of all particular emissions may differ between transport to mining projects.

While there are limitations in the applicability of the PAEHolmes (2013) study to air pollution from the mining sector, it provides a basis on which to estimate a range of potential impacts. DAE's current estimates are based on PM2.5 emissions which comprise 4.68 per cent of Total Suspended Particles (TSPs).

If, instead, the combination of PM2.5 and PM10 are used as proxy particles this would comprise around 39 per cent of TSPs. This would equate to around \$10 million (present value terms) of particulate emission damages. Even if this is could be considered as an upper bound of particulate emission damages, as noted in the conclusions, the public costs associated with the Project do not exceed the public benefits.

- **The DAE estimates of the cost of particle pollution of \$1.16 million are consistent with the draft 2015 guidelines issued by the NSW Government. While these guidelines may be refined further, the DAE estimates provide the current best estimates of the cost of air pollution associated with particulate matter.**

Air pollution – other pollutants

Other pollutants were not assessed quantitatively due to the qualitative assessment presented in the Air Quality and Greenhouse Gas Assessment, which found:

- Offsite impacts of emissions of carbon monoxide, nitrogen dioxide and sulfur dioxide from diesel powered equipment being considered to be too low to generate significant results
- The impacts of blasting activity on carbon monoxide and oxides of nitrogen were only assessed qualitatively in the Air Quality and Greenhouse Gas Assessment, limiting the analysis that DAE could undertake
- **Based on the qualitative assessment of these emissions in the Air Quality and Greenhouse Gas Assessment, it is reasonable that DAE applied a qualitative assessment in the CBA.**

Noise pollution

The noise pollution assessment focussed on the eight identified residential properties within the Noise Management Zone (35 to 40 db(A)) expected to be affected for an additional seven years of mining operation.

The Noise and Blasting Impact Assessment noted that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions that occur at night.
- PSNLs and the existing noise limits would be exceeded during the evening and night.³⁰

³⁰ SLR Global Environmental Solutions (2015) Wilpinjong Modification 6: Noise and Blasting Impact Assessment, p.47.

In its submission, NSW EPA noted that

The EPA considers the EIS appears to present a reasonable worst case assessment of the noise impacts of the project.

However, it did also recommend seeking clarification of the following:

1. Clarification regarding the process used to determine whether the low frequency noise modifying factor adjustment should apply; and
2. Further assessment to determine whether a low frequency noise modifying factor adjustment should apply to the modelled noise levels based on the difference between the Mine's contributed $L_{Ceq(15min)}$ minus $L_{Aeq(15min)}$.

From the perspective of the CBA, further clarification should also be provided on how the impacts were quantified and valued.

- **While the value of noise pollution impacts of \$0.11 million is relatively small, the figures should be updated where changes to the noise modelling is required to address the NSW EPA comments. Further, clarification is also required of how the impacts were calculated for the CBA.**

Ground water quality

DAE have not quantified an external ground water cost associated with the Project, based on findings in the Groundwater Assessment which find, amongst other things:

- WCPL currently holds sufficient licences to cover ground water extraction for the Project, and
- There is no long term change in ground water quality expected due to the Project, with one of the main factors contributing to this finding being the underlying poor water quality dating back to 2006.

Assuming these licences were correctly priced to cover all environmental impacts associated with full extraction against the licences, then it is appropriate to determine there would be no additional external costs associated with the Project operating within these licence conditions.

In response to the EIS, the NSW Department of Primary Industries note the following:

- Increasing salinity levels have been observed at several NSW DPI monitoring bores over the period 2007 to 2013
 - In response, NSW DPI requests that additional analysis be undertaken and reported to support the use of a Level 1 impact classification that “no increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity”
- Where Level 2 impacts have been noted likely at the Wollar Public School Bore, the EIS states that Make Good Provisions will cover these effects
 - NSW DPI has requested that these Make Good Provisions be detailed to ensure they are adequate and cover any inhibition of water take from the bore
 - As long as the Make Good Provisions are developed adequately, it is appropriate not to include adverse impacts as an external ground water cost of the Project

- WAL 21499 is a jointly held licence with Peabody Pastoral Holdings,
 - NSW DPI has asked for clarification of the allocation of extraction across the Project and agricultural activities to ensure there is no double counting and that total extraction rates remain within licenced limits.
- **Based on the findings of the Groundwater Assessment, the findings of no quantifiable ground water cost associated with the Project are appropriate if:**
 - **Licences were adequately priced to cover all extraction activities and wider interactions in the ground water system**
 - **The additional processes and information requested by NSW DPI are provided and demonstrate adequately developed and costed make good provisions.**

Surface water quality

DAE have not quantitatively assessed any surface water quality impacts from the Project, based on findings from the Surface Water Assessment. While a range of surface water impacts were discussed in the Surface Water Assessment, it was concluded that these effects were likely to be negligible overall, and not significant when considered in light of the estimated net benefits of the Project.

NSW DPI in reviewing the EIS have noted a number of areas in which additional information is required to support these findings, including:

- Estimated water loss from Wollar Water Source, noting that there is a joint licence held with Peabody Pastoral Holdings Pty Ltd, to ensure use is within licenced limits
- Quantified analysis that supports the conclusion that “all streams potentially diverted by the Project ... are second order or below”
- Description of the separation and management of clean and dirty water streams
- Site water balance to support finding that “during mining, flow reductions in Wilpinjong Creek are counteracted to varying extents by the approved water discharges from the treatment facility...”
- Ongoing water licencing requirements of rehabilitation and ongoing monitoring of the final voids in relation to water quality after operations have ceased
- Identification of Water Access Licences that cover reduced baseflow from the Project
- **Based on the findings of the Surface Water Assessment, the findings of no quantifiable surface water cost associated with the Project are appropriate if**
 - **the additional information requested by NSW DPI is provided and**
 - **demonstrates adequately developed and costed activities that preclude notable, persistent changes in surface water quality or availability.**

Traffic

While the Road Transport Assessment for the Project found no indications of substantial impacts on the operation of the surrounding road system, DEA have included a brief quantification of potential traffic impacts.

The quantification is focussed solely on delays at railway level crossing due to increased railway traffic due to the Project.

The methodology used to quantify the traffic delays is reasonable, returns a negligible cost in the scheme of the Project returns to NSW (\$20 000 in NPV terms), and is likely to be an over estimate of total costs due to the assumption that all cars are always stopped for a maximum period of time at each peak hour crossing delay.

Qualitative assessments in the CBA

Table 2.3 provides a summary of the factors that were assessed qualitatively in the CBA and for which there were not identified any particular concerns with the findings.

2.3 Qualitative assessments in the CBA

Factor	Discussion of potential impacts
Visual amenity	
Discussion of potential impacts	The CBA considers the "degree to which the visual aesthetics of a landscape are valued from a human point of view". Examples were given of spoil heaps and artificial light directly visible from properties. Of note, no private residences were identified as having views of the proposed open cut extensions which drives the finding of minimal impacts.
EIS indication for qualitative or unquantified assessment	Marginal visual impacts from the Project will be in line with current visual impact of the Wilpinjong Mine.
Considerations	Qualitative assessment is reasonable.
Conservation	
Discussion of potential impacts	Conservation impacts considered in relation to the Munghorn Gap Nature Reserve, further due to anticipated biodiversity offset area, any impacts are not quantified to avoid double counting under biodiversity heading.
EIS indication for qualitative or unquantified assessment	Impact on the MGNR likely negligible as activities will not encroach on the area of the reserve. Progressive mining of pits also noted to delay and limit timing of impacts - Pit 1 extension not anticipated to occur until 2028 followed by rehabilitation and Pit 5 only in early years, followed by progressive rehabilitation.
Considerations	OEH request that the boundary with Munghorn Gap Nature Reserve be identified and a minimum 50m buffer be maintained between any open cut mining operations or infrastructure to ensure there are no external costs imposed.
Quality of open space	
Discussion of potential impacts	The Project will be approximately 1.5 km from the boundary of the Village of Wollar. Assessment considered the impact of the Project on accessibility to open spaces and reserves and references benefits of a new sealed road.
EIS indication for qualitative or unquantified assessment	Not referenced in CBA
Considerations	Given the difficulty associated with estimating willingness to pay for open spaces, and assurances that Project operations will not impede access to open spaces, the qualitative finding of negligible impacts is reasonable.
Aboriginal heritage	
Discussion of potential impacts	As part of the EIS, an additional 137 Aboriginal sites identified in the Heritage Study Area as likely to be affected by the Project.

Factor	Discussion of potential impacts
EIS indication for qualitative or unquantified assessment	The CBA notes that South East Archaeology Pty Ltd (2015) 'has developed a range of management and mitigation measures for the Project that have been adopted by WCPL'. To the extent that these management actions mitigate impacts on Aboriginal heritage, it is appropriate to consider qualitatively the potential for small external costs. Further, the Aboriginal Cultural Heritage Assessment noted moderate to low local impacts if Project activities were not managed or mitigated.
Considerations	OEH question whether it is possible to establish a cumulative estimate of the impacts of the combined Wilpinjong Mine operations on Aboriginal heritage.
Historical heritage	
Discussion of potential impacts	Historical Impact Assessment identified a number of markers of historical heritage that may be impacted by the Project.
EIS indication for qualitative or unquantified assessment	The CBA notes that Niche Environment and Heritage (2015) have developed a range of management and mitigation measures for the Project that have been adopted by WCPL. To the extent that these management actions mitigate impacts on Aboriginal heritage, it is appropriate to consider qualitatively the potential for small external costs.
Considerations	The difficulties in quantifying the value of recognised local heritage sites is noted, as is the difficulty of extrapolating quantifications from one area to another. Given the nature of the heritage artefacts considered in the Historical Impact Assessment and the application of mitigation activities, it is appropriate to qualitatively assess these costs.
Rural amenity and culture	
Discussion of potential impacts	Estimating the impact on rural amenity and culture based on the social costs of families relocating out of the area. Noted difficulty in obtaining estimates as it is not clear how many families would move because of the Project.
EIS indication for qualitative or unquantified assessment	The Social Impact Assessment found contrasting expectations of the Project from residents in the immediate local area compared to residents in the wider LGA and nearby regions. Highly localised concerns and negative impacts on the remaining population were found in regards to amenity, quality of life, wellbeing and sense of place. These impacts were due to declining population, attributed to continued and expanding operations of the mine. For the wider region, increased employment opportunities and employment stability were considered counterbalancing effects, particularly for the larger regional centres.
Considerations	Appendix C in the CBA notes a study that found that 'a 1% increase in "the proportion of jobs held by people who don't live in the town" was equivalent to a reduction in welfare of \$41.88'. This highlights the difficulties in measuring rural amenity and cultural impacts at a fine local scale (town), compared to wider regional area, especially when costs are likely to be borne in the immediate area, but benefits accrue at the LGA level. Any additional insight into immediate local effects would be of interest to a localised cost benefit assessment, but unlikely to have a noticeable impact on the Project evaluation.

Source: DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M, and associated Appendices to the Environmental Impact Statement

3 *Uncertainty and sensitivity analysis*

The NSW Government (2012), “Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals” provides the following guidance for conducting sensitivity analysis:³¹

The CBA should also provide sensitivity tests that show the outcome of a project may vary with plausible alternative estimates of the main uncertain quantified costs and benefits and for a range of discount rates.

Sensitivity tests show the estimated outcomes may vary with variations in key assumptions. To be useful, these tests should indicate how likely the tested scenarios are. Sensitivity tests are useful if there is a plausible likelihood of the alternative estimates being correct.

A discount rate of 7% should be used and tested at 4% and 10%. All costs and benefits should be discounted by the same rate.

Taking this into consideration, our review of the sensitivity analysis conducted was guided by three questions:

- What are the main uncertain quantified costs and benefits?
- What degree of variability is indicated by the results?
- Was the methodology used appropriate?

What are the main uncertain quantified costs and benefits?

There are four parameters included in the sensitivity analysis, as summarised in table 3.1.

Export coal prices were investigated based on an assumption that there is a higher chance of upwards movements in coal prices than downwards over the projection period, 30 per cent increase compared to a 15 per cent decrease. This degree of variability was justified based on observations of historical prices and assumes that future prices are likely to follow the same distribution as was observed over the period 1995 to 2015.

There was no explanation provided around the 25 per cent sensitivity bound placed on capital investment, however, this scale is in line with previously prepared economic impact analyses.

The operating costs of the base case were adjusted by 11 per cent, up and down. This scale as based on firstly, removing the discount applied to the Project in the base case, which was intended to reflect the low cost operations of the Wilpinjong mine in general. Secondly, the discount was doubled, to more closely reflect WCPLs projected operating costs for the project.

³¹ NSW Government, Guidelines for the use of Cost Benefit Analysis in mining and coal seam gas proposals, 2012, p.8.

The social cost per tonne of carbon emissions were only tested against upwards pressure. The first sensitivity analysis was based on Australian Treasury Clean Energy Future Policy scenarios which indicated a 288 per cent increase in social costs compared to the base case. The second sensitivity analysis was based on the social cost of carbon utilised by the United States Environmental Protection Agency, representing an 87 per cent increase over the base case.

Two alternate discount rates of 4 per cent and 10 per cent were also tested in line with NSW Guidelines.

3.1 Parameters included in sensitivity analysis

Parameter	Variation in parameter	Justification for variation
Export coal price forecasts	+30%, -15%	Probability bounds on historical coal prices
Project capital investment	±25%	Nil
Operating costs per tonne	±11%	Removal of discount applied in central model, and doubling of discount as advised by WCPL
Social cost per tonne of carbon emissions	+288%, +87%	Utilising Australian Treasury Clean Energy Future Policy scenario and the US EPA Social Cost of Carbon
Discount rate	4%, 7% and 10%	As recommended in NSW Government Guidelines for Economic Appraisal

Source: Deloitte Access Economics (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project

What degree of variability is indicated by the results?

There is limited discussion provided on the results of the sensitivity analysis or the implications of these results for the operation of the Project. That said, any change in market conditions similar to those tested in the sensitivity analysis would likely elicit an operational or management response that is beyond the scope of this peer review or the original CBA.

However, discussion around the relative sensitivity of the Project NPV to changes in the identified parameters can provide insight into the overall sensitivity of the project, as well as the sensitivity of NSW royalty payments to changing market conditions.

Table 3.2 provides a summary of the relative sensitivity of the NPV to selected parameters, as well as the sensitivity of NSW royalty payments. Notably, the NPV of the Project is more sensitive to price movements than are NSW royalty payments. That is, as long as the Project continues to operate, the NSW government faces a lower price risk than do mine operators.

3.2 Variability in NPV and royalties in sensitivity analysis

Parameter	Variation in parameter	Variation in NPV	Variation in NSW royalties
Export coal price forecasts	+30%, -15%	More than proportional impact on NPV, 100% increase from 30% price uplift and 50% decrease from 15% price fall. Note: 30% decrease in prices returns nil NPV	Proportional impact on NSW royalties, +30% or -15%
Project capital investment	±25%	Marginal impact on NPV with ±4.3% movement from ±25% movement in capital investment	Nil
Operating costs per tonne	±11%	More than proportional impact on NPV, with ±23% movement from ±11% movement in operating costs	Nil
Social cost per tonne of carbon emissions	+288%, +87%	Very limited impact on NPV	Nil
Discount rate	4%, 7% and 10%	Slightly more sensitivity to reduced discount rate than higher, but limited effect on CBR indicates costs and benefits are evenly distributed over the project timeline	N/A

Source: Deloitte Access Economics (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project

Was the methodology used appropriate?

There is limited background information provided on the methodology used for the sensitivity analysis. However, replications of the calculations indicate that a static method was used whereby individual parameters are changed individually, and the resulting NPV reported.

Taking such an approach implicitly assumes that the tested parameters are uncorrelated with each other, and that, for example, it would be possible for the Project to experience a reduction in prices of up to 15 per cent, without an associated change in production volumes.

An alternate, more complete methodology would be to utilise a risk analysis that is able to account for correlations in parameters, and develop a risk profile of the NPV for the Project that accounts for the probability of different changes in parameters.

Such risk analysis is able to develop a sensitivity analysis that includes:

- An indication of correlation across the parameters
- A risk profile for individual parameters, indicating the assumed likelihood of different parameter values being observed
- A risk profile for the Project that would indicate, given the assumed risk profiles of individual parameters, the probability the Project would achieve different levels of NPV.

4 *Regional Economic Impacts*

DAE has applied two methodologies to assessing the regional economic impacts of the Project – a manual regional disaggregation of the CBA elements and a wider **general** equilibrium (CGE) model to estimate flow on impacts of the Project.

Regional Cost benefit analysis

To provide an indication of the regional distribution (at the Mid-Western Regional LGA level) of economic impacts from the Project, DAE have presented a middle ground regional CBA, straddling the baseline CBA and including supplier benefits from mine operations, derived from a CGE model.

This analysis is part way between the baseline CBA and the later CGE evaluation because:

- The CBA analysis does not include flow on benefits to mine suppliers, restricting the analysis to direct economic impacts
- CGE analysis is most effective when using much wider regional areas and cannot accurately determine distribution effects on a small regional scale
- The CGE analysis does not capture environmental and other externality costs that are captured as part of the CBA
- The regional disaggregation combines CGE generated estimates of benefits to suppliers, the individual CBA elements and a manual attribution of effects to regional, State and “Rest of World” areas.

The results indicate that the majority of net benefits are likely to accrue to the wider NSW and Australian (rest of world) economies, with 13 per cent of total net benefits accruing to the regional area.

The results indicate that:

- The majority of the operational benefits from the Project - \$804 million of \$1,465 million – are attributed to the wider NSW economy, with \$168 million attributed to the local economy
- Half of the wages associated with the Project accrue to labour located outside of the local region
- There is a total of \$4.5 million in external costs associated with the Project, but these are not cross referenced or distinctly accounted for against the externalities quantified in the CBA.

Computable General Equilibrium analysis

CGE models utilise a national accounting framework to model the economic impact of changes in sectoral output and/or productivity. A CGE model is able to take account of a range of more complex issues that are not considered in a CBA analysis including:

- Allowing for interrelated systems of demand and supply across multiple sectors/industries
- Estimating the flow-on or indirect effects of the project
- Allowing for more realistic and complex economic relationships such as restrictions in availability of factors of supply, the potential for crowding out of investment or employment effects in other sectors/industries

In this case, DAE have utilised a CGE model that:

- Utilises increased mining output as an impact variable
- Focuses uncertainty in the Project on coal prices

Wage impacts

Across the two regional economic evaluations, there are a number of pieces of information presented on the effect the Project is anticipated to have on wages and employment:

- Regional cost benefit analysis allows for payments for wages as follows:
 - \$267 m to the Mid-Western Regional LGA
 - \$297 m to the wider NSW area
 - \$563 m wage benefit in total
- The CGE analysis reports employment and wage impacts of:
 - Largest uplift in net employment anticipated in 2019 with an additional 278 full time equivalent positions across NSW
 - More than 70 per cent of the FTE positions generated by the Project are modelled to be located in the “Broader Region” area of Bathurst Regional, Lithgow, Mid-Western Regional, Muswellbrook, Singleton and Upper Hunter LGAs
 - Pattern of real wage impacts follow the production cycle of the Project, with a peak of approximately 2.8 per cent in 2019 and another peak of approximately 2.25 per cent in 2027

Due to the different regional areas being considered in the two analyses, it is not possible to determine the regional areas from which the additional labour is expected to be drawn from.

When considering proportional impacts on wages, it is important to ensure that the baseline wage that is used for the analysis is the average wage from which the employee is coming from, not necessarily the average wage in the local area in which employment takes place.

The Social Impact Assessment prepared for the EIS surveyed of 325 existing WCPL employees and reported that 55 per cent lived in Mudgee, 13 per cent in Gulgong and 3

per cent near Wollar. Assuming that the new employment opportunities from the Project will draw employees from a similar locational distribution, the findings of approximately half of the wage payments and minimal, temporary uplift in average wages for the region appear reasonable.

CGE sensitivity analysis

DAE have presented a sensitivity analysis on the CGE modelling results, considering the effect of a 15 per cent fall in coal prices, as well as a 30 per cent increase in coal prices. It is assumed, reasonably, that the main source of uncertainty in the model is the coal price.

The results of the sensitivity analysis show a directly proportional change in Gross Regional Product from the price changes. That is, GRP in the Broader Region, the Rest of NSW and total NSW all move either down by 15 per cent, or up by 30 per cent depending on the price shock tested in the sensitivity analysis.

These results indicate that there are no complexities included in the CGE model that account for complexities in Project implementation, such as:

- correlated movements in price and production output, as the model has not allowed for any change in production rate in response to either the increase or decrease in prices
- the impact of fixed costs in estimating Project profits in response to price changes, as additional benefits from a price increase are distributed in exactly the same proportion as benefits in the central case



THE CENTRE FOR INTERNATIONAL ECONOMICS
www.TheCIE.com.au



WILPINJONG COAL PTY LTD

ABN: 87 104 594 694

100 Melbourne Street
South Brisbane Qld 4101

Locked Bag 2005
Mudgee NSW 2850
Australia
Tel + 61 (0) 2 6370 2500
Fax + 61 (0) 2 6373 4524

20 June 2016

NSW Department of Planning and Environment
22 – 33 Bridge Street
Sydney NSW 2001

Attention: Mike Young
Director, Resource Assessments

Dear Mike,

**RE: WILPINJONG EXTENSION PROJECT (SSD 6764) – ECONOMIC
ASSESSMENT PEER REVIEW – STAGE 1**

The report entitled *peer review of economic assessment Wilpinjong Extension Project* (CIE, May 2016) that was provided by the Department for consideration by Wilpinjong Coal Pty Ltd (WCPL) raises a number of issues, or makes key statements of findings, that have been considered by WCPL and are addressed in turn below.

General Comments

The CIE report concludes that the Deloitte Access Economics (DAE) Wilpinjong Extension Project Economic Assessment (DAE, 2015) has been undertaken in a manner that is broadly consistent with the *Guidelines for the use of Cost Benefit Analysis mining and coal seam gas proposals* (NSW Government, 2012).

Notwithstanding the above, the CIE report goes on to reflect a number of issues raised in various submissions. To a large extent these have already been comprehensively addressed and/or resolved in WCPL's Response to Submissions (RTS) document (WCPL, 2016) that is available on the DP&E website. WCPL suggests CIE review the RTS and consider revising relevant aspects of its peer review report accordingly.

In particular, WCPL suggests that CIE reviews the RTS for responses to issues raised by The Australia Institute and other submitters regarding WCPL's future operating costs, coal price projections, rehabilitation costs, and other issues raised such as operational noise impact assessment, potential biodiversity impacts and offset liabilities, water resources impacts and associated water licensing.

Specific issues/statements regarding the DAE economic assessment as summarized by CIE are provided as italicized quotes below and addressed in turn.

Overall Project Net Benefits

CIE Comment

The analysis suggests that, at a minimum, the Project is expected to deliver net benefits in the order of \$123m to \$220m to the NSW community. There are expected to be additional benefits, although the quantum of these additional items is difficult to test without further detailed data.

WCPL Response

WCPL notes that the CIE concludes that the Project would result in minimum net benefits in the order of \$123M to \$220M to the New South Wales (NSW) community. This conclusion (i.e. significant positive net benefits to the NSW community) is arrived at despite adopting the following highly conservative approach:

- adopting a *lower bound* future coal price to estimate royalties;
- ignoring all other potential benefits (e.g. company tax, employment benefits); and
- adopting *upper bound* impact costs (e.g. conservatively multiplying the estimated air pollution – particulate matter impact costs by a factor of approximately 10).

WCPL suggests that CIE makes very clear the highly conservative approach that has been adopted in the CIE report summary (Table 1).

Project Alternatives

CIE Comment

While the EIS presents a single option (the Project), from the perspective of the NSW community, it is possible that there are alternative options that have not been presented here that may deliver greater net benefits to the community.

WCPL Response

The purpose of the Environmental Impact Statement and DAE's economic assessment is to assess WCPL's proposed Wilpinjong Extension Project.

Alternatives considered are provided in Section 6.7.7 of the Environmental Impact Statement.

Future Market for Project Coal

CIE Comment

While there is uncertainty regarding how the future production profile from the mine will be affected by changes in the international market, it is expected that there will be a sustained demand for the product over the timeframe of the project.

WCPL Response

WCPL concurs with this comment. Further discussion on future coal market for Project product coal is provided in the RTS.

Future Coal Prices

CIE Comment

While there is uncertainty regarding future coal prices, the assumptions used by DAE are in line with that assumed by the NSW Department of Resources and Energy. ...

TAI notes that "the latest long term forecasts, such as that by Goldman Sachs of \$USD42.50 per tonne for Newcastle benchmark coal".

WCPL Response

WCPL concurs with this comment.

In addition, WCPL is of the opinion that CIE should be highly cautious of quoting The Australia Institute as a credible source regarding long term coal price forecasts. Particularly, when The Australia Institute's suggested price is then connected to CIE's calculations of a lower bound future estimate of royalty payments to NSW (refer below).

Further discussion on long term coal price projections and response to The Australia Institute submission, including long term coal price forecasts, is provided in the RTS.

Future Project Royalties

CIE Comment

Based on alternative estimates of future coal prices it is reasonable to assume conservative estimates for royalties in the range of \$162m to \$231m.

WCPL Response

Refer to the response above regarding The Australia Institute submission on future coal prices.

In addition, WCPL notes that the Division of Resources and Energy (DRE) submission contemplates some potential for higher royalties to be generated than the range quoted by CIE.

If The Australia Institute suggested price is going to be taken by CIE as the *lower bound* of a future price range, alternative *much higher* future coal price projections should also be identified by CIE and adopted to form the *upper bound* of the royalty range presented in CIE's report (i.e. CIE's report has adopted a *lower bound* from The Australia Institute, but has not correspondingly adopted a similar *upper bound* price for the calculation of the potential range of royalties generated – which skews the presented range downwards).

Benefits Apart from Royalties

CIE Comment

At this point in time (and based on the use of the royalties as the minimum threshold), there is limited gain from conducting additional analysis to further disaggregate these other benefits into the component parts.

WCPL Response

WCPL notes that the DAE report and the DRE submission also raise a number of other benefits, and suggests that CIE makes clear the highly conservative approach that has been adopted in the CIE report summary (Table 1), of ignoring all potential benefits except royalties.

Security Bond

CIE Comment

For the purposes of our review we assume that the security bond held is sufficient to ensure that any future liability associated with the Project can be appropriately managed in the event of adverse financial position of the company.

WCPL Response

WCPL suggests that CIE should not infer (as done on page 2 of the review) that under the NSW system mine site rehabilitation financial obligations can be avoided. Given the NSW bond system is specifically set out (and administered by the DRE) to categorically avoid this outcome.

It is noted that the RTS provides further discussion on rehabilitation bonds and associated calculations under the NSW system, and comprehensively addresses the issues as raised by The Australia Institute and others on this subject.

Biodiversity Impacts

CIE Comment

Further refinement may be required at a later stage to incorporate any additional information regarding biodiversity impacts, following any further input from OEH.

WCPL Response

WCPL notes that DAE included a highly conservative estimate (\$24M) of potential costs associated with biodiversity offsets in the WEP economic assessment as a future Project capital cost.

This conservative allowance was adopted to address offset liability uncertainty at the time of the assessment, and is considered sufficient to meet the entire offset credit liability derived from application of the NSW Offsets Policy (should this liability be imposed by the determining authority).

Further discussion on calculation of biodiversity offset liabilities is provided in the RTS.

Price of Carbon

CIE Comment

The valuation of carbon emissions has been undertaken as suggested in the draft guidelines for the economic assessment of mining and coal seam gas proposals. Sensitivity testing of alternative carbon prices provides a further upper bound cost that could be utilised in the CBA. Based on this the cost of carbon could range between \$6.7 million to \$25.7 million (in present value terms).

WCPL Response

Noted.

Particulate Matter

CIE Comment

The DAE estimates of the cost of particle pollution of \$1.16 million are consistent with the draft 2015 guidelines issued by the NSW Government. While these guidelines may be refined further, the DAE estimates provide the current best estimates of the cost of air pollution associated with particulate matter.

WCPL Response

Noted.

Other Air Quality Pollutants

CIE Comment

Based on the qualitative assessment of these emissions in the Air Quality and Greenhouse Gas Assessment, it is reasonable that DAE applied a qualitative assessment in the CBA.

WCPL Response

Noted.

Noise

CIE Comment

While the value of noise pollution impacts of \$0.11 million is relatively small, the figures should be updated where changes to the noise modelling is required to address the NSW EPA comments. Further, clarification is also required of how the impacts were calculated for the CBA.

WCPL Response

DAE is quite transparent on how the noise impacts of the Project have been costed, and the conservatism of the approach adopted.

It is noted that the noise related value of Project impacts could be increased tenfold before the impacts could be considered in any way material from an economic assessment perspective. WCPL suggests that this is acknowledged by CIE.

Notwithstanding, WCPL has also addressed the Environment Protection Authority's comments in the RTS.

Groundwater Impacts

CIE Comment

Based on the findings of the Groundwater Assessment, the findings of no quantifiable ground water cost associated with the Project are appropriate if:

- *Licences were adequately priced to cover all extraction activities and wider interactions in the ground water system.*
- *The additional processes and information requested by NSW DPI are provided and demonstrate adequately developed and costed make good provisions.*

WCPL Response

Please refer to WCPL's RTS response to DPI Water's comments, including discussions on make good provisions for the Wollar Public School bore.

Notwithstanding, any assumptions on costs associated with groundwater licensing are highly unlikely to be material to the economic assessment findings. WCPL suggests that this could be acknowledged by CIE.

Surface Water Impacts

CIE Comment

Based on the findings of the Surface Water Assessment, the findings of no quantifiable surface water cost associated with the Project are appropriate if:

- *the additional information requested by NSW DPI is provided; and*
- *demonstrates adequately developed and costed activities that preclude notable, persistent changes in surface water quality or availability.*

WCPL Response

Please refer to WCPL's RTS response to DPI Water's comments.

Notwithstanding, any assumptions on costs associated with surface water licensing or minor incremental potential downstream impacts are highly unlikely to be material to the economic assessment findings. WCPL suggests that this could be acknowledged by CIE.

Please do not hesitate to contact me on (02) 6370 2528 if you would like to discuss.

Yours sincerely,



Ian Flood
Manager Project Development & Approvals
Wilpinjong Coal Mine
Peabody Energy Australia Pty Ltd



REPORT

Peer review of economic assessment

Wilpinjong Extension Project - Response to Submissions



*Prepared for
NSW Department of Planning and Environment
July 2016*

The Centre for International Economics is a private economic research agency that provides professional, independent and timely analysis of international and domestic events and policies.

The CIE's professional staff arrange, undertake and publish commissioned economic research and analysis for industry, corporations, governments, international agencies and individuals.

© Centre for International Economics 2016

This work is copyright. Individuals, agencies and corporations wishing to reproduce this material should contact the Centre for International Economics at one of the following addresses.

CANBERRA

Centre for International Economics
Ground Floor, 11 Lancaster Place
Majura Park
Canberra ACT 2609

GPO Box 2203
Canberra ACT Australia 2601

Telephone +61 2 6245 7800
Facsimile +61 2 6245 7888
Email cie@TheCIE.com.au
Website www.TheCIE.com.au

SYDNEY

Centre for International Economics
Suite 1, Level 16, 1 York Street
Sydney NSW 2000

GPO Box 397
Sydney NSW Australia 2001

Telephone +61 2 9250 0800
Facsimile +61 2 9250 0888
Email ciesyd@TheCIE.com.au
Website www.TheCIE.com.au

DISCLAIMER

While the CIE endeavours to provide reliable analysis and believes the material it presents is accurate, it will not be liable for any party acting on such information.

Contents

Overview of the Project	4
The Project	4
The CIE's May 2016 review	5
Peabody's Response to Submission	6
CIE Response	7
Adoption of the lower bound estimate of Net Benefits	7
Mine site rehabilitation	8
Environmental impacts	9
BOXES, CHARTS AND TABLES	
1 Magnitude of the incremental costs and benefits quantified	5

Overview of the Project

The Project

The Wilpinjong Coal Mine is an open cut coal mining operation located in the Western Coalfield, approximately 40km north-east of Mudgee, located within the Mid-Western Regional LGA in central NSW.

Under the planning system the proposed extension to the Wilpinjong Coal Mine, the Project, is considered to be a separate State Significant Development application.

The Project includes:

- physical extensions to the mine footprint to gain access to additional run-of-mine (ROM) coal reserves – approximately 800 ha of open cut extensions comprising 500 ha of extension to current pits, and 300 ha of new open cut pit; and
- an extension to the approved life of the mine¹.

A range of capital investment and infrastructure upgrades are included in the Project to support the production of an additional 65 Mt of saleable coal through the extension, as follows:

- Relocation of a section of the TransGrid Wollar to Wellington 330 kV ETL to facilitate mining in Pit 8
- Various local infrastructure relocations to facilitate the mining extensions (e.g. realignment of Ulan-Wollar Road and associated rail level crossing, relocation of local ETLs and services)
- Construction and operation of additional mine access roads to service new mining facilities located in Pits 5 and 8
- Construction and operation of new ancillary infrastructure in support of mining including: mine infrastructure areas, ROM pads, haul roads, electricity supply, communications installations, light vehicle roads, access tracks, remote crib huts, up-catchment diversions, dams, pipelines and other water management structures
- Other associated minor infrastructure, plant and activities.²

The Proponent of the Project, Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited (Peabody Energy) commissioned Deloitte Access Economics (DAE) to undertake a CBA and economic impact analysis of the Project as part of the Environmental Impact Statement (EIS).

¹ DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M, p i

² DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M, p 16

The CIE's May 2016 review

The CIE has been engaged by the NSW Department of Planning and the Environment (the Department) to peer review the economic assessment produced by DAE for the Wilpinjong Coal Mine extension project (the Project). In May 2016 the CIE completed a review of DAE's economic assessment report.³ CIE noted that, in general, the CBA has been undertaken in a manner that is broadly consistent with the 2012 NSW Government guidelines for conducting mining related applications.

DAE's estimates of the Net Benefits of the Project is presented in table 1. The table also includes CIE's estimate of a *lower bound* of the net benefits to the NSW community, based on a range of very conservative assumptions. The results highlight that *even if* very conservative assumptions are adopted that the Project would still deliver Net Benefits to the community of over \$123m in present value terms over the life of the Project. This provides the rationale for project approval, recognising that the Net Benefits are expected to be higher under less conservative estimates.

1 Magnitude of the incremental costs and benefits quantified

Parameter	DAE	Minimum threshold
	\$m (present value)	\$m (present value)
Benefit to NSW		
Royalty payments	190.5	162 - 231
Other benefits ^a	556	Assumed to be zero for threshold analysis
Cost to NSW		
Residual value of land	2.45	2.45
Off-site agricultural revenue	0.18	0.18
Air pollution - carbon emissions	6.66	6.66 - 25.7
Air pollution - particulate emissions	1.16	1.16 - 10 ^b
Noise pollution	0.11	0.11
Traffic	0.02	0.02
Net quantified public benefit to NSW	735	123 - 220

^a Other benefits include, for example, company income tax, net producer surplus, and economic benefit to existing landholders.

^b The estimate of \$10million is used as an illustration of a possible upper bound impact, although the estimate of \$1.16million is in line with current best estimates.

Source: DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project. Appendix M

In its review the CIE also noted that there were a number of issues raised in the submissions that need further investigation related to the biodiversity management plan and the site remediation cost.

³ DAE (2015) Cost Benefit Analysis and Economic Impact Analysis of the Wilpinjong Extension Project, Appendix M.

Peabody's Response to Submission

Peabody Energy, the parent company of Wilpinjong Coal Pty Ltd (WCPL) has since provided a response to issues raised by Government agencies and other stakeholders.⁴ It has also provided a separate letter (dated 20 June 2016) addressing specific issues raised by CIE in its May 2016 review.

In regards to the issues raised in the CBA,

...WCPL suggests that CIE reviews the RTS for responses to issues raised by The Australia Institute and other submitters regarding WCPL's future operating costs, coal price projections, rehabilitation costs, and other issues raised such as operational noise impact assessment, potential biodiversity impacts and offset liabilities, water resources impacts and associated water licensing.

Other specific comments include:

- greater clarity on the conservative assumptions used to provide an indicative lower bound of the Net Benefits.
- concern regarding the use of The Australia Institute's forecast of long term coal projections to estimate the lower bound estimate of future royalty payments to NSW.
- inclusion of an upper bound estimate of royalties is required to provide a balance against the presented lower bound estimate.
- concern regarding the inference that under the NSW system mine site rehabilitation financial obligations can be avoided.
- note that in DAE's original economic assessment that a highly conservative assumption of the potential costs associated with biodiversity offsets was adopted, given some uncertainty regarding the policy stance at the time.
- regarding noise pollution, groundwater impacts and surface water impacts WCPL suggest that CIE acknowledge that these costs do not have a material impact on the results.

CIE's response to each of these issues is discussed below.

⁴ Peabody Energy (2016), Wilpinjong Extension Project, Response to Submissions, May.

CIE Response

This chapter presents the CIE's response to issues raised by the Proponent, as noted above. In doing so, we have drawn on information presented in the RTS, particularly section 3.4 (Socioeconomics).

Adoption of the lower bound estimate of Net Benefits

Purpose of the lower bound estimate

In undertaking a CBA it is important to recognise that there is often uncertainty regarding the quantification and/or valuation of impacts. There are a number of ways in which the risk and uncertainty can be treated in a CBA, depending on the specific circumstance.⁵

In this particular case, a single option (the Project) is being compared to the 'without Project' (or 'base case') option. The incremental benefits and costs of the Project (relative to the base case) are estimated to calculate the Net Benefits (in Present Value terms) over the life of the Project. Where the Net Benefits are positive, the community is expected to be better off by approving the Project.

From the perspective of the decision to approve or reject the Project, the key point is to understand whether the Net Benefits are positive or negative. The quantum of the Net Benefits is of less relevance here. In other circumstances where there are multiple options being considered the quantum of Net Benefits is more relevant as it allows options to be ranked relative to each other.

Given this, the CIE has focused on presenting a lower bound threshold of the Net Benefits.

Peabody Energy's RTS requests that CIE provide an upper bound estimate of royalties. There is limited value in seeking to endorse some upper bound estimate. From the perspective of assisting decisions makers, the lower bound estimate based on conservative assumptions provides sufficient information for decision makers to understand that the Project is expected to deliver Net Benefits to the community.

⁵ Strictly speaking the term 'uncertainty' is used where the probability distribution of future events is not known. The term 'risk' refers to where there is some information on the probability distribution. In practice the two terms are commonly used interchangeably to refer to events where the future events are not known with certainty.

- **The lower bound estimate is not intended to be a precise estimate or taken to be CIE support for each of the assumptions that underpin the lower bound estimate. Rather, it is intended to highlight that, even if, very conservative assumptions were adopted that the Project would deliver Net Benefits to the Community. In this case, there is limited value to decision makers of seeking to present an upper bound estimate.**

Export coal prices

The RTS (pp.81-82) presents further details regarding the export coal price assumptions used in the economic analysis. The RTS notes that

....the export the export coal prices adopted for the Economic Assessment were derived from the independent consensus forecast for thermal coal spot prices and exchange rate forecasts reported by the Department of Industry and Science. Discounts were then applied to the consensus thermal coal spot price forecasts to take into account differences in the quality of the Project export product coal, relative to the standard thermal coal exports from the Port of Newcastle.

The economic assessment presented a sensitivity range (+30% and -15%) for the export coal prices which the RTS states covers 67 per cent of the the range of historical monthly thermal coal prices over the period from January 1995 to September 2015.

As noted in the CIE's previous report, in its submission to the review, The Australia Institute argues that "coal prices assumed are also substantially above current prices and many analysts' long-term forecasts of thermal coal prices". TAI notes that "the latest long term forecasts, such as that by Goldman Sachs of \$USD42.50 per tonne for Newcastle benchmark coal".⁶

- **The presentation of TAI's assumptions should not be taken as the CIE endorsement of these assumptions. Similarly, we have not 'endorsed' the assumptions presented in Deloitte's economic assessment. Rather we utilise these alternative assumptions of future export coal prices to demonstrate that the Project generates Net Benefits to the community irrespective of which of these price assumptions is used.**

Mine site rehabilitation

The CIE's original review (p.2) stated

The site remediation costs of the mine are assumed to be met by the proponent. Where a proponent is in financial stress there is a bond held that is intended to cover the full remediation liability. To the extent that the bond does not cover the full remediation costs, or where these obligations can be avoided, these liabilities are likely to fall on the public. If this occurred it could significantly reduce the net benefits derived from the project. The Government needs to be satisfied that the mining bond is sufficient to cover any potential liabilities arising from the Project.

⁶ TAI (2016), Wilpinjong Extension Project Submission, March, p.1.

Peabody Energy has raised concerns regarding the inference that under the NSW system mine site rehabilitation financial obligations can be avoided. The RTS (p.82) reiterates that

The existing rehabilitation security deposit is based on a rehabilitation cost estimate prepared in accordance with the *Rehabilitation cost estimate guidelines* (Department of Industry and Investment, 2012) for the current MOP period.

- **The intention of the CIE's analysis was to highlight the assumptions underpinning the economic assessment, in particular, that the rehabilitation costs are assumed to be covered in full by the security bond. This should not be taken to infer that WCPL intends to avoid its financial obligations.**

Environmental impacts

In its original review the CIE noted that

NSW Office of Environment and Heritage (OEH) has highlighted a number of errors and revisions to the Biodiversity Assessment Report provided as part of the EIS. In light of this, it is important to ensure that any revisions to biodiversity impact management are appropriately reassessed, re-costed and incorporated in any revised CBA (where relevant).

Some issues raised by OEH include, for example:

- the potential impacts to Eastern Bentwing-bats. OEH recommended that WCPL explore engineering solutions to ensure the integrity of the adit entrance is maintained in as a natural state as possible.
- mitigation Measures for the Eastern Bentwing-bat to minimise the potential for disturbance during the breeding season, including potential blasting limits.

In its response Peabody Energy notes that in its original analysis, that the economic assessment adopted a “highly conservative estimate (\$24m) of potential costs associated with biodiversity offsets”.

We assume that the mitigation measures proposed by the Proponent fully offset the biodiversity impacts. Where there are additional costs incurred (in addition to the \$24m noted above) to meet the obligations noted above then this would increase operating costs of the Proponent, thereby reducing the profitability of the Project. This would not impact on the royalty revenues generated (to the extent that production is maintained).

We understand that NSW Government agencies are reviewing the additional information submitted by Peabody Energy in response to issues raised in their original documentation, particularly relating to potential groundwater/surface water impacts and air pollution. While the agencies reviews have not been formally completed we understand that the quantum of impacts are not likely to be of sufficient scale to impact on the results of the CBA. Where agencies impose additional requirements to monitor and mitigate impacts, this would result in additional costs to the Proponent which reduce the profitability of the Project. This would not impact on royalty revenues generated.