



Boggabri Coal Mine Extension Project Proposal:

August 2011 review of Environmental Assessment - Appendix C (underground mining option), Appendix Q (economic assessment) and subsequent submissions by Gillespie Economics

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## Introduction

### Background

The proposed project extension of the Boggabri Coal Project involves the extension of an existing open-cut mine into farmland and the Leard State Forest, Narrabri Shire, NSW. In February 2011 the Maules Creek Community Council (MCCC) made a submission to the Department of Planning and Infrastructure NSW on the environmental assessment of the project. The MCCC are concerned that the proposal will have a negative effect on agriculture, the community and the forest, which contains nationally threatened ecosystems, habitat and fauna species.

As part of the MCCC's submission, Economists at Large conducted a review of *Appendix Q - Economic Assessment* of the environmental impact statement. This initial review highlighted problems in the economic assessment, particularly relating to:

- No economic analysis of alternative projects;
- Inappropriate treatment of mining profits and distribution of benefits and;
- Miscalculation and/or omission of external costs and benefits.

These issues have been explored in subsequent submissions by Gillespie Economics and Economists at Large and are further discussed in this report.

### What's new in this report?

This report includes analysis of material not covered in our earlier submissions.

- **Analysis of *Appendix C – Underground Concept Study*, confirming the consultant's conclusion that an underground mining option is viable.** From the consultant's figures we estimate the NPV of the underground option is \$1.8 billion, higher than the estimate of production benefits under the project proposal in *Appendix Q – Economic Assessment*, which was \$1.3 billion. We urge the proponents to publish their internal analysis of underground mining to enable the public to understand why this option is not being pursued and suggest that as the option is viable other parties may be interested in developing it.
- **Scrutiny of calculations in *Appendix Q – Economic assessment*.** The values presented in the cost-benefit analysis of the economic assessment do not correspond with values presented in the rest of the appendix. We show our calculations which result in a \$500 million dollar difference with the Economic Assessment. We urge the authors to explain this variation and publish their calculations for the NSW government and public to have confidence in their analysis.

- Response to Gillespie Economics' *Response to residual economic matters raised by Maules Creek Community Council*, in particular:
  - **Producer surplus:** Gillespie Economics have misinterpreted our suggestions. Our ideas are supported by Eggert (2001), which Gillespie Economics claim guided their analysis. We urge them to adjust their treatment of producer surplus in line with Eggert's and our suggestions.
  - **Project definition and scale:** We agree that a national level is appropriate for cost-benefit analysis. Again Eggert (2001) provides useful guidance on how the economic assessment should be revised for a national perspective.
  - **Opportunity cost:** We agree that if using a national-level approach our suggestion of incorporating investors' opportunity costs of capital is not appropriate and we make some suggestions for how to incorporate opportunity cost at a national scale.
  - **Distribution of costs and benefits:** We are in general agreement about how these will be distributed, and suggest some revision to the economic assessment in line with expert opinion.
  - **Benefits transfer:** We agree this can be a useful technique, but maintain the value being used needs to be appropriate.

We believe that all these issues need to be clarified and adjustments made to the economic assessment of the project to ensure a decision is made in line with the public interest. Doing so would not only allow for the best outcome in relation to this project, but could serve as a guide for other projects in the area and nationally. This is occurring at a time when the mining industry is perceived as lacking a "social licence to operate" in farming areas. Robust and transparent assessment of this project can help to address this issue.

## Analysis of Appendix C – Underground Concept Study

Appendix C of the original environmental assessment examined the option of extending the Boggabri Mine as an underground mine. The authors WDS Consulting found:

*“The study has identified that the utilisation of underground mining methods can be economically viable in the Boggabri resource.”* WDS Consulting (2009) p-7

However, the proponents of the project and Gillespie Economics have consistently claimed that underground mining is not feasible:

*This underground concept study concluded that alternative mining methods did not maximise the utilisation of the in-situ coal resource and was not a practical or feasible option due to the geological structure of the coal seams.* Response to submissions p52.

While underground mining may not maximise the volume of coal extracted from the Boggabri deposit, this is not the criteria by which the project should be assessed. Proper financial and economic analysis of all options should be conducted to enable the socially optimal option to be selected. Despite WDS’s considerable analysis and conclusion that underground mining could be viable, financial analysis that would enable comparison with the current proposal was not carried out:

*At the request of Idemitsu, a full financial analysis was not within our deliverable scope. Our primary financial deliverables, ... are to be integrated into Idemitsu cost models for internal economic analysis.* (p7-1)

As Idemitsu’s internal analysis is not available, we have made estimates from the findings of WDS’s study. From the data presented in Appendix C we have calculated the following values.

**Table 1 Net Revenue of underground option**

		Source
<b>Discount rate</b>	7%	Economic assessment p9
<b>Total estimated product (Mt)</b>	82.1	Appendix C p-4
<b>Operating years (2011 to 2032)</b>	22	Appendix C p4-21
<b>Average annual production (Mt)</b>	3.73	Based on visual estimates of Figure 4.2 Production Summary, Appendix C p 4-21. Note this is slightly lower than reported on p4-20, 4.0Mt, but in line with the production total on p-4. See Appendix for full modelling
<b>Assumed price of coal per tonne</b>	\$94	Economic assessment p9
<b>Present value revenue (\$M)</b>	\$3,730	Present value of yearly revenue based on production estimates on p4-21 and a \$94/tonne coal price.

<b>Estimated operating cost per production tonne</b>	\$32.47	Appendix C p7-7
<b>Present value operating costs (\$M)</b>	\$1,288	Operating cost per tonne multiplied by production estimates on p4-21
<b>Present value capital costs (\$M)</b>	\$652	Appendix C p7-15 outlines capital expenditures over the life of the mine, this distribution is discounted at 7%
<b>Net Present Value</b>	\$1,790	

The net present value of this option according to this analysis is higher than the “net production benefits” reported in table 2.2 of Appendix Q – Economic Assessment.

**Table 2 Comparison of underground and open cut proposal net revenue**

	<b>Appendix C - Underground option (\$m)</b>	<b>Appendix Q - Economic assessment (\$m)</b>
<b>Revenue</b>	\$3,730	\$5,343
<b>Other production benefits</b>	NA	\$54
<b>Capital costs</b>	\$652	\$778
<b>Operating costs</b>	\$1,288	\$3,328
<b>Other production costs</b>	NA	\$25
<b>NPV</b>	\$1,790	\$1,266

Idemitsu’s investors should be asking why this is the case. We call on Idemitsu to release their internal modelling to explain this discrepancy. If this project is to have social licence to operate, it is important for communities and the wider public to understand the project’s benefits and why a particular option is being pursued.

It is important to note that this analysis does not include external costs and benefits. The MCCC have indicated that they would support an underground mine, suggesting that the external costs of this option to the community are lower. The proponent’s cursory, dot-point explanations in section 4.12.6 (p43) of the Environmental Assessment of why they have rejected the underground option need considerable expansion if they are to contribute to the public’s understanding of the project.

In their latest response, Gillespie Economics are careful not contradict WDS’s conclusion that underground mining is viable, but correctly point out that alternatives must be feasible to the proponents. We agree. As the proponents are unable to present another proposal that is feasible to

them, we suggest the NSW government allow other parties to develop such proposals. These proposals might bring greater benefits to the state, the nation and the local community. We understand the lease on the area is due to expire shortly, providing a timely opportunity to investigate other options.

### Scrutiny of calculations in Appendix Q – Economic assessment

Having found net present value of the underground mining option to be higher than the project proposal, we re-examined the calculation of values presented in Table 2.2 of the Economic Assessment. The values presented in Table 2.2 do not correspond with values presented in the rest of the economic appendix. Both revenue and operating cost estimates are significantly higher. There is not enough information presented to calculate capital costs.

Table 3 Present values presented in Economic Assessment, table 2.2, p12

	Table 2.2
Revenue (\$M)	5,343
Operating costs (\$M)	3,328
Capital costs (\$M)	778
Net Revenue (\$M)	1,237

The following calculations show that these values are different compared to when these calculations are replicated using data in the text of the assessment.

## Revenue

From values in the text, we calculate the present value of revenue from the project to be \$6,801 million, higher than \$5,343 million as reported in the Economic Assessment Table 2.2. We arrived at our figure by using production levels based on page 8, where the assessment says:

*Open cut mining is assumed to ramp up to 7Mtpa of product coal by Year 5 and remain at this level until Year 21.*

By applying this increasing level of production to coal price as estimated on page 9 and the discount rate on p12 the following values are obtained.

**Table 4 Present value of revenue calculation**

Discount Rate <sup>1</sup>	7%
Coal Price <sup>2</sup> (\$/tonne)	94

Year <sup>3</sup>	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Coal Production (MTPA) <sup>4</sup>	5	5.4	5.8	6.2	6.6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Revenue (\$M)		508	545	583	620	658	658	658	658	658	658	658	658	658	658	658	658	658	658	658	658	658
PV annual revenue (\$M)		474	476	476	473	469	438	410	383	358	334	313	292	273	255	238	223	208	195	182	170	159
PV Revenue (\$M)	6,801																					

<sup>1</sup> p12

<sup>2</sup> p9

<sup>3</sup> p6

<sup>4</sup> p6&9

## Operating costs

From values in the text of the economic assessment, we calculate the present value of operating costs to be \$4,290 million, higher than the \$3,328 million as reported in Table 2.2. We arrived at our figure by finding the present value of average annual operating costs, as reported on page 8, where the assessment says:

*The operating costs of the Project include those associated with overburden stripping, mining, processing, rail and port charges, selling costs, rehabilitation, marketing and general administration. Average annual operating costs of the mine are estimated at \$370M*

Using the same discount rate, we find:

**Table 5 Present value of operating cost calculation**

Item																					
Discount rate <sup>5</sup>	7%																				
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Average annual operating cost <sup>6</sup> (\$M)	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370
PV of annual cost	370	346	323	302	282	264	247	230	215	201	188	176	164	154	143	134	125	117	109	102	96
PV of operating cost	4290																				

<sup>5</sup> p12

<sup>6</sup> p8

In summary, the net revenue for the project proposal as calculated from the values in the text is almost \$500 million higher than the values presented in the Economic Assessment Table 2.2. Below we have used the same capital cost value as there is no information in the economic appendix on the timing of these costs.

**Table 6 Comparison of net revenue**

	<b>Table 2.2</b>	<b>Calculated from text</b>
<b>Revenue (\$M)</b>	5,343	6,801
<b>Operating costs (\$M)</b>	3,328	4,290
<b>Capital costs (\$M)</b>	778	778
<b>Net Revenue (\$M)</b>	1,237	1,733

The point of this comparison is not to suggest that project is more valuable than was presented, but to show that the public can have no confidence in figures presented. We urge the proponents to explain how they arrived at their evaluation and to publish their full working and modelling. Without this transparency neither the public nor the NSW government can understand the benefits of this proposal and make a decision on whether to support it or not. This lack of transparency is a key reason the mining industry is losing its “social licence to operate”, particularly in farming areas.

## Response to Gillespie Economics' Response to residual economic matters raised by Maules Creek Community Council.

### Producer surplus benefits

We maintain that the financial benefits that accrue only to the project proponents are of limited relevance in trying to understand this project's impact on a local or state scale. Gillespie Economics have misinterpreted this point, suggesting that we believe "producer surplus benefits (mine profits) should not feature in BCA (cost-benefit analysis)" (p1). We fully agree that in analysing the full costs and benefits of a project, profit is an important calculation to consider. Our point is that profits that accrue to overseas shareholders do not accrue to the local community, or the state of NSW.

This point is made clear by Eggert (2001) who state that when considering the perspective of local communities "*an analyst must be careful to ... eliminate any net benefits that accrue to nonresidents of the community*" (p28).

Gillespie Economics claim to have taken an approach "exactly" in line to that outlined in Eggert (2001) – taking commercial evaluation of the project and making adjustments for externalities, taxes and social time preference. But beyond these points the analysis of Gillespie Economics departs from Eggert. Eggert devotes considerable attention to how benefits are accounted for in analysis of mining projects. It is worth quoting him at length:

*Let us now turn to ... issues that challenge and bedevil practitioners of social benefit-cost analysis. The first challenge is deciding "whose benefits and costs count" .... It sometimes is called the issue of standing--that is, who has standing in the analysis of benefits and costs? This is an issue of scope. Should the analysis include only those costs and benefits affecting residents of the local community? The state or province? The nation? The world? Whether the net benefits of a project are positive or negative often depends on how narrow or broad the scope of the study is. (p27)*

### Project definition and scale

Eggert's mention of scale or scope returns to one of our original points – the changing scope of the Economic Assessment. On page 2 of their *Response to residual economic matters*, Gillespie Economics say that cost-benefit analysis is generally undertaken at a national scale "*with the inclusion of all costs and benefits that are generated within a nation's borders from a development, regardless of who [sic] they accrue to.*" We are pleased that they have settled on a scale for the assessment and look forward to the following adjustments in their analysis:

- Reduction of net production benefits to reflect profits to overseas shareholders, in line with Eggert (2001) who points out "*a national government would consider profits sent abroad as a cost.*" (p27)
- Consideration of the opportunity cost of the mine from a national perspective – the value of the next best alternative project.

## Opportunity Costs

Opportunity cost is a concept in economics that incorporates the value of the foregone alternative in decision making. In other words, considering what are the cost and benefits of the next-best option available. In their original Economic Assessment, Gillespie Economics considered the opportunity cost of not proceeding with the mine from the perspective of the proponent – the sale of their equipment, some \$8m.

We suggested a global perspective, incorporating the opportunity cost of investors' capital at a global level, which would significantly reduce the net present value of the project, possibly to zero. This reinforces Eggert's idea that the net benefits of the project depend on the scope of the analysis, as opportunity costs are different at each level.

To consider the opportunity cost from a national perspective, the analysts need to consider what the net benefits of this mine are compared to another mine that may not be going ahead because of the time and resources devoted to the Boggabri project. We suggest that from a national perspective the next best coal mine will be similar to those of the Boggabri mine, again negating most of the production benefits of the mine.

The importance of opportunity cost in relation planning coal mines was demonstrated in Victoria recently by Mantle Mining. Mantle withdrew their application to explore for coal southwest of Melbourne in the face of community opposition. Mantle withdrew not only because of community opposition, but *"in order to focus its resources on other higher priority projects."* (Mantle Mining 2011)(p1) Mantle's opportunity cost was not the loss of time and equipment put into the application, but the profits of the mines that they would be unable to develop in order to slug it out with the community near Melbourne.

In the Economic Assessment of the Boggabri mine, however, consider opportunity cost at neither a national perspective, nor even the company-wide perspective of the proponents. Instead they use a site-specific scope, claiming that there are only two alternatives: the proposed mine or cessation of mining.

## Distribution of costs and benefits

We agree with Gillespie Economics the distribution of costs and benefits of the project and have revised our table:

	Benefits	Costs
<b>Global</b>	After tax profits	Greenhouse gasses
<b>National</b>	Company tax	
<b>State</b>	Royalties	Ecology
	Social benefits of employment	Heritage
<b>Local</b>	Unquantified and unspecified community support programs	Air quality
		Noise and vibration
		Groundwater
		Traffic
		Visual impacts
		Surface water
		Health impacts

We agree that if all externalities have been internalised then there is no need to estimate their values. The physical studies that the original economic assessment was based on estimated that externalities would be adequately offset, however many of these conclusions have since been questioned by experts in the relevant fields. See for example the submission by ecologist Wendy Hawes relating to the Environmental Assessment’s appendix J – Biodiversity assessment, which raised serious questions about the project’s ability to offset its impacts.

Given the disagreement between physical scientists, the economic assessment should be revised to include this uncertainty and risk, particularly if it is to incorporate the community and the state’s point of view, as can be seen in Table 1. The uncertainty relating to these costs makes it difficult to see if the community should support changing their landscape in exchange for \$9.7 million dollar contribution in the form of a statue of Ben Lexcen, public seating, a better caravan park, road improvements and a contribution to a community programme.

In considering this trade off, the community should recall the proponent’s response to submissions where they admit they did not include lost recreation value of the Leard State Forest. In their response the proponents calculated a “back-of-the-envelope” lost recreation value amounted of \$4 million in present terms. If the compensation package is worth \$9.7 million, this leaves \$5.7m to compensate the community for changes to their landscape and uncalculated environmental risk. As the proponents often point out, this pales in significance next to the estimated value of the project.

## Health Impacts

Gillespie Economics point out that there has been no research done on the health impacts of this project. It is not their responsibility to carry this out, and likely beyond their expertise. As the health impacts of coal mining can be considerable, this impact should be assessed in the overall assessment of the project. The economics assessment could then quantify the likely economic impacts of health effects. Note that a study is currently underway in the Hunter Valley on coal mining’s health impacts commissioned by local politician Tim Duddy. This follows studies such as Hendryx and Ahern (2009)

which found strong, negative health impacts of coal mining and increased mortality in the Appalachian Mountains of the United States. They found that the health impacts far outweighed the economic benefits of mines there.

### **Benefits transfer and social value of employment**

We agree that benefits-transfer is a useful technique, but one that needs to be used with great caution, or as a matter of last resort. We should clarify that our criticism of the use of benefits-transfer from another study to estimate the social value of employment was not a criticism of benefits-transfer per se, but a criticism of how it was done by Gillespie Economics. The study used was about an underground mine in a traditional mining area, whereas this mine is an open-cut mine in a more agricultural area.

## Conclusion

We call for greater transparency in the analysis of this and all major projects. At a time when mining projects in agricultural areas are causing great public and political debate, greater transparency is essential. The project proponents should release all modelling and analysis that enables the public to understand their decision to apply for this project using these means. Governments should require thorough, transparent analysis of all project options before making a decision. Where a proponent is not willing to pursue an option that is of greater benefit to the public, then other submissions should be sought.

In addition to publishing calculations and modelling to date, the proponents should adjust their economic analysis to reflect the following points:

- Appropriate treatment of profits/producer surplus/production benefits
- National scale of analysis
- Opportunity cost
- Disagreement among physical scientists over external costs
- Discussion of distribution of benefits

We look forward to these adjustments and continuing analysis of this and other projects.

## References

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## Appendix: Modelling of Underground option

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
<b>Production</b> see p4-21	0.3	1.9	4.5	4.8	4.5	4.6	3.7	3.8	3.8	3.9	4.2	3.3	2.9	4.1	5.1	4.8	3.3	2.9	4	3.8	4	3.9	
<b>revenue (\$M)</b>	28.2	178.6	423.0	451.2	423.0	432.4	347.8	357.2	357.2	366.6	394.8	310.2	272.6	385.4	479.4	451.2	310.2	272.6	376.0	357.2	376.0	366.6	
<b>discount rate</b>	7%																						
<b>disc rev (\$M)</b>	26.4	156.0	345.3	344.2	301.6	288.1	216.6	207.9	194.3	186.4	187.6	137.7	113.1	149.5	173.8	152.8	98.2	80.7	104.0	92.3	90.8	82.7	
<b>PV revenue</b>	3729.9																						
<b>Year OpX (\$M)</b>	9.7	61.7	146.1	155.9	146.1	149.4	120.1	123.4	123.4	126.6	136.4	107.2	94.2	133.1	165.6	155.9	107.2	94.2	129.9	123.4	129.9	126.6	
<b>disc OpX</b>	9.1	53.9	119.3	118.9	104.2	99.5	74.8	71.8	67.1	64.4	64.8	47.6	39.1	51.6	60.0	52.8	33.9	27.9	35.9	31.9	31.4	28.6	
<b>PV opX cost</b>	1288.4																						
<b>CapX</b>	53.6	249.4	357.7	70.8	27.5	27.5																	
<b>Disc CapX</b>	50.1	217.8	292.0	54.0	19.6	18.3																	
<b>PV CapX</b>	652																						
<b>NPV</b>	1790																						