

Tim Browne
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Dear Tim

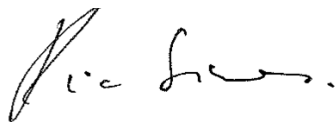
CIE Peer Review of Economic Assessment – Mount Owen Continued Operations Project

Thank you for requesting us to respond to the peer review of our cost benefit analysis and economic impact analysis of the Mount Owen Continued Operations Project.

We appreciate the thorough review that has been undertaken by the Centre for International Economics (CIE) and acknowledge their overall finding that the economic assessment has been undertaken in a manner that is consistent with the NSW Government Guidelines. Additionally, the CIE report supports the conclusion that the public benefits exceed public costs.

The attachment to this letter contains a response to the key points raised by the CIE in their review dated September 2015. As such, this letter and the attachment should be read in the context of the CIE report.

Yours sincerely,



Ric Simes
Director
Deloitte Access Economics Pty Ltd

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Attachment: Responses to CIE review

This attachment sets out our responses to the CIE's review. We have focussed on responding to the items which have been specified as requiring further clarification. This includes further explanation of our approach, and a number of additional sensitivity analysis scenarios.

This attachment should be read in the context of the CIE report. Further, both the CIE's report and our responses should be read in conjunction with our original economic assessment of the Mount Owen Continued Operations Project. The original economic assessment contains information that is important for understanding the context of these responses.

(1) The baseline case for the North Pit assumed is reasonable and consistent with current approvals. The baseline for BNP, Ravensworth East should include provisions under current approvals for additional production to 2022.

The purpose of cost benefit analysis (CBA) is to obtain a consolidated estimate of the net economic value of a project, by identifying the incremental costs and benefits of that project relative to the baseline case, and placing a quantitative value on these items wherever possible.¹ The definition of the baseline case and project case in a CBA is therefore important to clearly differentiate the additional net economic value associated with the project, from the value that would have otherwise been realised regardless of the project approval outcome.

Accordingly, from an economic perspective, adopting a typical approach for the base case for the economic assessment of the Mount Owen Continued Operations Project would include the mining activity at the Bayswater North Pit (BNP) between 2015 and 2022, as proposed by the CIE.

However, this approach was not considered feasible due to the scope of the Environmental Impact Statement (EIS) for the Project. Specifically, Mount Owen Pty Limited (Mount Owen) was instructed by the Department of Planning and Environment (DPE) that the EIS for the Project should allow for consideration of granting a consolidated consent following the surrender of the existing Mount Owen and Ravensworth East consents.

On this basis, a number of externalities associated with the Project that were quantified as costs in the CBA (such as carbon emissions, air quality and noise impacts) reflected the combined impacts of mining activity at both Mount Owen (the North Pit) and Ravensworth East (comprising the BNP and Ravensworth East Resource Recovery (RERR) Mining Area).

Therefore Deloitte Access Economics elected to include the full benefits and costs of mining activity at BNP from 2016 onwards under the Project case. To include this also in the base case would result in overestimating the additional economic costs associated with the Mount Owen Continued Operations Project, without accounting for the associated benefits of mining activity over the continuation period.

In contrast, the approach that we have taken in our economic assessment ensures consistency with the broader EIS prepared for the Project.

¹ NSW Treasury (2007) *NSW Government Guidelines for Economic Appraisal*,
http://www.treasury.nsw.gov.au/__data/assets/pdf_file/0016/7414/tpp07-5.pdf

In addition, the recently released draft *Guidelines for the economic assessment of mining and coal seam gas proposals* note that “the appraisal must focus on the whole proposed project for which approval is sought”.² Although we recognise that these draft guidelines do not bind on the Mount Owen proposal, the inclusion of this point indicates that the approach taken in our analysis is in line with the practical approaches that the authorities are pursuing for the economic assessment of coal projects.

Nevertheless, it is noted that excluding the revenue and operating costs associated with mining activity at the BNP from 2016 to 2022 (and consequently, overestimating the externality costs of the Project), has no significant impact on the net economic benefit of the Project, and does not impact the conclusion of our report. For example, subtracting the additional net revenue associated with production at BNP from 2016 to 2022 (\$240 million in NPV terms) from the net economic benefit of the Project in our central case analysis of \$758 million, still produces a substantial net economic benefit result of \$518 million. This is despite the fact that the adjustment has only excluded the revenue and operating costs associated with BNP, and has left in the externality costs that are created as a result of BNP production in the Project case.

(2) CIE recommend this [air pollution cost] calculation be checked.

As recommended by the CIE, we have reviewed our calculations for air pollution costs used in the CBA. The steps involved in these calculations are described below, to provide further clarification of our approach. It is important to note that the results of the Air Quality Assessment suggest that the predicted PM₁₀ annual average levels in Singleton are consistent with existing levels from current operations, hence the Project’s incremental change is minimal.

1. Obtain estimate of the health costs associated with increases in the concentration of PM₁₀ in Singleton

A report published by the Department of Environment and Conservation NSW (2005) presents estimates of the health costs of ambient air pollution in the Greater Sydney Metropolitan Region, for the purpose of assisting decision-making on proposals that have the potential to affect the air quality of the region.³

Table A.1 of that report indicates that the annual health costs per 10 ug/m³ increase in the concentration of PM₁₀ in the Hunter region range between \$174 million and \$1.36 billion, in 2003 prices. Adoption of these costs is considered appropriate as it is consistent with the outputs of the air quality dispersion modelling completed for the Project that identifies the predicted incremental impact as a concentration in ug/m³.

For the purpose of our analysis, we took the average of this range (\$767 million) and multiplied it by a factor of 1.3382 to convert the estimate to 2014 prices. This adjustment was based on ABS data on

² Department of Planning and Environment (2015) *Guidelines for the economic assessment of mining and coal seam gas proposals: draft for consultation*, <https://majorprojects.affinitylive.com/public/120e9db8db8d1aaefd38c041255ae5bd/Draft%20Guidelines%20for%20for%20the%20economic%20assessment%20of%20mining%20and%20coal%20seam%20gas%20proposals.pdf>

³ Department of Environment and Conservation (NSW) (2005) *Air pollution economics: health costs of air pollution in the Greater Sydney Metropolitan Region*, <http://www.environment.nsw.gov.au/resources/air/airpollution05623.pdf>

movements in the Consumer Price Index (CPI) to June 2014, the latest CPI data available at the time of the analysis.

The resulting estimate of \$1.026 billion per 10 $\mu\text{g}/\text{m}^3$ increase in PM_{10} concentration was then multiplied by 3.7%, being the proportion of the population of the Hunter region located within the Singleton LGA as at the 2011 Census.⁴

This implied that health costs of around \$3.8 million are generated for every 1 $\mu\text{g}/\text{m}^3$ increase in the concentration of PM_{10} in Singleton.

2. Obtain estimate of the PM_{10} concentration in Singleton attributable to Mount Owen in the baseline and Project cases

Data was provided by Pacific Environment Limited on the estimated increases in PM_{10} concentration attributable to Mount Owen at four receptor locations in Singleton Heights, the closest residential area in Singleton to the Mount Owen mine, for three representative years under the Project case. This data was drawn from the modelling undertaken as part of the Air Quality Assessment of the Project.

Deloitte Access Economics took the average increases across four representative receptors to develop estimates of the average increase in concentration across the Singleton area attributable to the Mount Owen mine in the Project case, for each of the three representative years. These calculations are reported in Table 1.1.

Table 1.1: Project contribution to annual average PM_{10} concentrations at Singleton Heights ($\mu\text{g}/\text{m}^3$)

Receptor	Year 1	Year 5	Year 10
1	0.63	0.65	0.53
2	0.53	0.55	0.46
3	0.61	0.62	0.52
4	0.66	0.65	0.55
Average	0.61	0.62	0.51

Source: Pacific Environment Limited

These average additional concentration levels were then attributed over the life of the Project, as reported in Table 1.2 below, and Chart 5.10 of our original report. It was assumed that the contribution from baseline case production from 2014 to 2018 is consistent with predicted contribution in Year 1 of the Project.

⁴ In calculating the share of the Hunter region population located in the Singleton LGA, it was assumed that the Hunter region comprised of the following LGAs: Cessnock, Dungog, Gloucester, Great Lakes, Lake Macquarie, Maitland, Muswellbrook, Newcastle, Port Stephens, Singleton and the Upper Hunter Shire.

Table 1.2: PM₁₀ concentrations in Singleton attributable to Mount Owen (ug/m³), 2014 – 2030

CBA Scenario	Time series assumptions
Baseline case	2014 to 2018: 0.61 ug/m³ per annum 2018 to 2030: Nil
Project case	2014 to 2019: 0.61 ug/m³ per annum 2020 to 2024: 0.62 ug/m³ per annum 2025 to 2030: 0.51 ug/m³ per annum

Source: Deloitte Access Economics, derived from Pacific Environment Limited (2014)

3. Calculate baseline and Project case health cost estimates

A profile of the health costs associated with the increases in PM₁₀ concentration in Singleton for both the baseline and Project cases was then developed by multiplying the estimates reported in Table 1.2 by the cost estimate of \$3.8 million per ug/m³ derived above.

This produced an annual health cost estimate of \$2.31 million per annum between 2014 and 2018 under the baseline case, and annual health costs ranging from \$2.35 million to \$1.95 million under the Project case.

These cost profiles were then converted into present values as at the end of 2014, using a 7% discount rate. This produced final estimates of \$10.1 million in the baseline case, and \$23.4 million in the Project case.

(3) This [residual value of land] calculation appears sound but DAE do not make the current ownership of the land clear meaning it is not possible to determine whether this is a public or private cost. This assumption appears to be inconsistent with the decision to exclude Bayswater North operations from the baseline.

The residual value of land estimates presented in our report combine estimates of the:

- opportunity cost borne by the mine owners as a result of revenue foregone from potential grazing activity on land at the North Pit; and
- opportunity cost borne by broader society as a whole, as a result of the Project's impacts on native woodland and forest vegetation and derived native grassland at the North Pit, relative to the base case.

Overall, as shown in Table 1.3, we estimate that 99% of these costs are borne by the public.

It is acknowledged that these costs were wholly attributed as a cost to Mount Owen in the subregional impact analysis presented in Section 5.5 of our original report, rather than as a cost to NSW as a whole. If these costs were assigned solely to the Singleton community, the net benefit for the community would be reduced from \$306 million to \$304 million.

Table 1.3: Final residual value of land estimates – proposed disturbance area

Land use	Baseline case (NPV \$m)	Project case (NPV \$m)	Net impact (NPV \$m)	Share of total impact
Native woodland and forest vegetation	\$1.23	\$0.15	-\$1.08	50%
Derived native grassland	*\$1.10	\$0.02	-\$1.07	49%
Potential cattle grazing	\$0.08	\$0.06	-\$0.03	1%
Total	\$2.41	\$0.23	-\$2.18	100%

Source: DAE estimates

* This table amends a typographical error reported in Table 5.4 of our report.

Note: NPVs are calculated using a 7% discount rate

The CIE notes that our analysis excludes estimates of the residual value of land at Ravensworth East from both the baseline and Project cases. This approach was taken because there was insufficient information available to estimate an appropriate residual value of land for Ravensworth East under the baseline case. In turn, it was deemed inappropriate to include an estimate for the residual value of land under the Project case based on planned rehabilitation activities at Ravensworth East, while assuming that the land would remain as a void under the baseline.

Overall, while alternative assumptions could have been made regarding the residual value of land at Ravensworth East under the baseline case, this would only have minor, immaterial impacts on the conclusions of our analysis, given the relative magnitude of the costs (\$2.18 million for the North Pit) relative to the net economic benefit of the Project (\$758 million). We therefore took the approach of excluding those costs from the estimates and noting this assumption in qualitative terms.

(4) Further clarification is required from DAE on the reasons for not utilising the more recent and relevant studies. Estimates of the impacts on 'rural amenities and culture' should also be presented utilising the 2012 study as sensitivity analysis.

Despite the conclusion in Appendix C of our report, we elected not to utilise the rural amenity and culture cost estimates produced by Gillespie and Bennett (2012) in light of criticisms that had been made in the Land and Environment Court regarding the choice modelling methodology employed in that study.⁵

These criticisms highlighted:

- the limited distribution of the choice modelling survey;
- deficiencies in the information provided to survey respondents such that they were not able to make informed and meaningful choices, with some of the information inaccurate and uninformative;
- inadequate attribution of values to each of the choices in the survey, failing to ask respondents what they were prepared to pay;

⁵ Gillespie and Bennett (2012) presents the results of a choice modelling study undertaken in 2009, which were incorporated into a cost-benefit analysis of the proposed extension of the Warkworth Mine. References to Gillespie and Bennett (2009) and Gillespie and Bennett (2012) are therefore references to the same choice modelling study that was criticised in the Land and Environment Court.

- exclusion of matters, such as biodiversity and ecological integrity from the survey;
- inadequate consideration of the polycentric nature of the issues that need to be considered; and
- failure to provide open ended options.⁶

As noted in the Judgment of Preston CJ:

"These deficiencies in the information provided to the survey respondents therefore materially affect the reliability of the choices made and values ascribed by the respondents." (Paragraph 474, [2013] NSWLEC 48).

While Gillespie and Bennett (2012) is the most recent choice modelling study on the valuation of non-market impacts in the context of proposed mining developments, in light of the findings of the Land and Environment Court it was not considered appropriate to transfer the results of this study into our CBA.

While acknowledging the broad range of assumptions involved in the application and transfer of choice modelling results, our analysis accordingly sought to provide an indicative value of the impact of the Mount Owen Continued Operations Project on rural amenity and culture by utilising the findings of Bennett, van Bueren and Whitten (2004). A similar approach of rejecting choice modelling undertaken by Gillespie and Bennett and suggesting the use of an indicative finding from alternative studies is also considered appropriate by others working in this area.⁷

(5) The sensitivity analysis applied to carbon emissions was not sufficiently broad.

The sensitivity analysis was intended to identify the effect that variability in the price of carbon could have on the modelling. We consider that the original range reported clearly demonstrates that the overall results are not highly sensitive to the price of carbon. However, the CIE raises a valid point in that the range of potential carbon prices is likely broader than that used in the sensitivity analysis.

As recommended by the CIE, we have undertaken additional sensitivity analysis for the CBA which uses a broader range for the cost of carbon emissions.

This analysis has been based on the variability in prices observed in the European market as reported by the CIE, of between €30 per tonne in 2008 and €5 per tonne in 2013. These cost estimates present a conservative range, given that the market price has generally varied between these levels, rather than at the high or low cost levels.

Nevertheless, these estimates were converted into Australian dollars using the average daily exchange rate for 2008 and 2013 respectively, as reported by the Reserve Bank of Australia.⁸ This produced an upper sensitivity case estimate of \$51.98 per tonne, and a lower sensitivity case estimate of \$6.86 per tonne.

⁶ See *Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Limited* [2013] NSWLEC 48 and *Warkworth Mining Limited v Bulga Milbrodale Progress Association Inc* [2014] NSWCA 105

⁷ See Economists at Large (2013), *Review of Stratford Extension Project Environmental Impact Statement Socio-Economic Assessment*

⁸ Reserve Bank of Australia (RBA) (2015) *Historical Data: Exchange Rates*, <http://www.rba.gov.au/statistics/historical-data.html#exchange-rates>

The overall results of the CBA using these inputs are presented in Table 1.4. It is noted that under all scenarios, the net benefits of the Project remain positive.

Table 1.4: Additional Sensitivity Analysis
– comparison of net benefits under different carbon cost assumptions

Scenario	Cost of carbon emissions (€/t)	Exchange rate (\$/€)	Cost of carbon emissions (\$/t)	Total Net Benefits (\$m)		
				4%	7%	10%
Central CBA	6.17	0.6926	8.91	988	758	589
Upper sensitivity	30	0.5772	51.98	833	637	492
Lower sensitivity	5	0.7293	6.86	995	764	593

Source: Deloitte Access Economics calculations, discounting back to end of 2014

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