COMMERCIAL IN CONFIDENCE

REPORT

Review of Economic Analysis supporting the Mount Owen Continued Operations Project

Prepared for
NSW Department Planning and Environment

July 2016

THE CENTRE FOR INTERNATIONAL ECONOMICS
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About the Project

The Mount Owen mine complex is located 20 kilometres northwest of Singleton and is the most north-easterly coal mine in the Hunter Valley Coalfields. The complex is owned by Mount Owen Pty Ltd, a subsidiary of Glencore Pty Ltd, and comprises the existing Mount Owen, Ravensworth East and Glendell open cut coal mines. In order to sustain the ongoing operation of the existing Mount Owen Complex, Glencore is seeking approval for a proposed expansion to the Mount Owen and Ravensworth East mines.

The expansion Project comprises of

> ….to extract additional mineable coal tonnes through continued open cut methods. This involves:
>
> - continuation of mining activity at the Mount Owen North Pit beyond 2018 to 2030, extracting an additional 74 Mt of ROM coal
> - continuation of mining activity at the Bayswater North Pit, Ravensworth East, beyond 2015 to 2022, extracting an additional 12 Mt of ROM coal
> - sequential mining on the Ravensworth East Resource Recovery from 2022 to 2027, extracting an additional 6 Mt of ROM coal .[1]

The Project involves the expansion of the North Pit by 381 hectares together with a number of infrastructure upgrades, including:

- expansion of existing stockpile
- upgrade and extension of the Mount Owen mine infrastructure
- provision of an additional rail line and northern turn-out
- construction of a rail overpass and removal of the existing level crossing
- construction of a new bridge.

The Project also includes the consolidation of the develop consents for the Mount Owen expansion and Ravensworth East operations.

The CIE's review

In September 2015 the CIE completed a review of the CBA conducted by Deloitte Access Economics (DAE) in relation to the Project. The CIE concluded that the analysis was undertaken in a manner that was consistent with the NSW Government's November 2012 *Guideline for the use of Cost Benefit Analysis in mining and coal seam gas proposals*.

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1 Deloitte Access Economics (2014), *Cost Benefit Analysis and Economic Impact Analysis of the Mount Owen continued operations Project*, prepared for Umwelt (Australia) Pty Ltd, p. 16.

However, the CIE also noted that it was difficult to verify the quantum of some of the benefit items (e.g. tax revenue to governments) without a detailed review of the potential profitability of the mine including access to potentially commercially confidential information. In this context, the CIE focused on verifying the royalty calculations which provided a *minimum level of benefits* that could be expected. That is, the benefits would be greater than just the royalties, however, it was unclear how much greater it would be. Deloitte estimates royalties of around $260m in present value terms.

The CIE's analysis compared the benefits from royalties against the *unmitigated impacts* of the mine extension, primarily related to environmental impacts. Based on the estimates of the unmitigated impacts presented in DAE's analysis (of around $50m in present value terms), royalty revenue would outweigh the value of the unmitigated impacts.

The CIE's analysis did, however, identify a number of areas that required further clarification and additional sensitivity testing.

The PAC review

In November 2015, the Department of Planning and Environment (the Department) released its Secretary's Environmental Assessment Report (SEAR). The SEAR draws on agency submission and other reviews of the material provided in the January 2015 Environmental Impact Statement (EIS) conducted by Umwelt (Australia) Pty Ltd. The SEAR took account of the findings of the CIE's review (completed in September 2015) of the economic analysis undertaken in support of the mine extension.

In February 2016 the Planning Assessment Commission (PAC) released its review of the Project. The PAC noted that

> …the Secretary's Environmental Assessment Report (SEAR) for this project does not present a full assessment on a number of key areas including air quality impacts, biodiversity offsets and final landform.

In making its recommendations, the PAC took account of information presented in the SEAR as well as views expressed at the public hearing and submissions received. The PAC considered

> …that key issues which require further information and consultation with relevant agencies include air quality, the proposed offsets package and regeneration measures, and the proposed mine plan, including final landform and rehabilitation.

The PAC made specific recommendations regarding each of these areas including:

- ensuring that residual issues regarding the assessment of air quality impacts are satisfactorily dealt with;
- requesting that further offset opportunities be examined;
- recommending minimising the impact of final voids, the incorporation of micro-relief, and further consideration of a range of post-mining land use options; and
- seeking additional information in relation to biodiversity, the discharge of surplus water and the cost benefit analysis.

In relation to the CBA, the PAC had noted the concerns raised by the CIE in its initial review of the CBA and also noted that the Proponent had provided a response to the CIE review. The PAC noted that it

> …has sought clarification from the Department on a number of points related to the peer review and the CBA. Overall, the Commission is not yet satisfied that the concerns raised in the CIE peer review have been fully addressed. The Commission is therefore not in a position to express a final position about the likely economic benefits of the project until these issues have been resolved.[2]

2 PAC (2016), *Review Report on Mount Owen Continued Operations Project*, p.26.

Refined Project

In its response to the PAC's review, Glencore has proposed a number of changes to its operations and which would reduce the potential negative externalities arising from the Project. These include:

- Lowering the ROM coal extraction from 92 Mt to 86 Mt. This is intended to address the PAC's concerns by accelerating the rehabilitation in the RERR Pit, providing one less final void and reducing noise and air quality impacts in the later years of the Project.
- Incorporating additional micro-relief across the proposed final landforms for the Mount Owen and Ravensworth East mines, including in and out of pit overburden emplacements and final voids.
- Further post-extraction works to improve the landform of the Bayswater North Pit final void.
- Revised rehabilitation plans and vegetation corridors to improve final landform connectivity
- Tailings emplacement updated to reflect Modification 6 to Ravensworth East Mine.

These changes are designed to minimise impacts. Some of these changes are expected to result in higher operating costs for the company due to the fact that there are additional costs of mitigation, reducing the profitability of the mine. The reduction in ROM coal extraction would reduce the benefits, such as a reduction in coal royalties.

DAE has responded to the CIE's September 2015 review as well as provided a revised CBA to reflect the Refine Project.

DAE response to September 2015 CIE review

DAE has provided a response to the CIE's review, addressing a number of specific areas including:

- **The baseline including the Bayswater North Pit.** DAE has noted that DPE had previously instructed that the EIS for the Project should allow for the consideration of granting a consolidated consent following the surrender of the existing Mount Owen and Ravensworth East consents. On this basis, DAE had included costs in the CBA that reflected the combined impact of mining activity at both the Mount Owen North Pit and Ravensworth East area. For consistency, benefits have also included benefits of mining activity over the continuation period.

- **Air pollution.** CIE requested greater transparency in calculation of air pollution impacts. DAE has provided further details to explain how it has calculated the air pollution impacts.
- **Residual land value.** CIE requested clarification of ownership of land and consistency with inclusion of Bayswater North operations from the baseline. DAE has provided further clarification and conducted some additional calculations of the potential impact on residual land values. Overall, these changes do not have a material impact on the CBA results.
- **Rural and amenity values.** CIE requested explanation of the reason for not utilising more recent choice modelling results. A clear explanation was provided and additional analysis undertaken to demonstrate the impacts if a more recent study was utilised. The changes do not have a material impact on the CBA results.
- **Sensitivity analysis regarding carbon prices.** DAE has conducted additional sensitivity analysis to test a broader range of cost of carbon emissions. Alternative estimates ranging between $51.98 and $6.86 per tonnes of carbon emissions were tested, compared to $8.91 per tonne assumed in the central case CBA. Under the alternative high end carbon price this would reduce net benefits by around $120 million in present value terms (assuming a 7 per cent discount rate).

Updated CBA (May and June 2016)

A revised CBA has been prepared by DAE in response to the proposed changes to the Project as noted above. In undertaking the revised analysis, DAE took account of the comments provided in the CIE's September 2015 review, the comments in the SEAR and the findings of the PAC. The revised CBA is based on the Refined Project which incorporates the changes in ROM coal extraction, additional mitigation actions and measures.

The revised analysis is summarised in chapter 9 of Glencore's response, with further details provided in Appendix 7.[3]

1 Environmental externalities, key changes in Refined Project

Environmental aspect	Assessment
Noise	Noise impacts associated with the Refine Project have been remodelled to consider changes in landform and mining areas
Air quality	Air quality impacts associated with the Refined Project have been remodelled to consider changes in landform and mining areas. Additional analysis associated with updated air quality monitoring and additional cumulative assessment sensitivity analyses are presented.
Surface water	The Refined Project will result in an altered landform due to the removal of the RERR void and landform changes to the BNP void. As such further consideration of the design of the surface water management system is required.

3 Glencore (2016), *Response to PAC review*, May.

Environmental aspect	Assessment
Groundwater	The Refined Project is unlikely to significantly affect the inflow and regional drawdown impacts outlined in the EIS. However, there will be a reduced number of final voids in the final landform which may result in some reductions to impacts and therefore a Refined Project assessment has been completed.
Greenhouse Gas and Energy	Due to the removal of the RERR mining area the Refined Project will have a lower energy use and emissions profile. A revised assessment has been undertaken to identify and calculate emissions associated with Refined Project.
Rehabilitation and Closure	The Refined Project will result in changes to the out of pit overburden emplacement areas and a reduction in the number of voids in the final landform.

Source: Umwelt (2016), Response to PAC Review Report, p106-107.

The revised analysis is expected to deliver Net Benefits to NSW of $186m in present value terms, as presented in table 2 (taking account of changes in market conditions). The estimate of royalty revenue to the NSW Government has fallen compared to the earlier analysis presented, reflecting largely changes in market conditions.

2 Comparison of estimated Net Benefits to NSW

Item	2014 Study	2016 Revised	2016 Revised (with updated market data)
	PV $m (real $2014)	PV $m (real $2015)	PV $m (real $2015)
Total benefits			
Royalties	258	259	197
Company tax to NSW	- [a]	71	6
Total benefits	**258**	**330**	**203**
Costs			
Air quality	13.24	4.59	4.59
Carbon emissions	25.12	11.14	11.14
Noise	0.12	0.10	0.10
Rural amenity and culture	8.04	2.75	2.75
Traffic	-0.77	-0.79	-0.79
Residual value of land	2.31		
Total costs	**48.06**	**17.79**	**17.79**
NET BENEFIT	**210**	**312**	**186**

[a] Other benefits to NSW were not explicitly presented in the 2014 Study.

Note: There are some slight differences between the two studies which reflect that the more recent study is presented in 2015 dollars. The estimates related to the 2016 study need to reflect both changes to the Refined Project as well as updated market conditions.

Source: DAE (2014), *Cost Benefit Analysis and Economic Impact Analysis of the Mount Owen Continued Operations Project*, October, p.61. and DAE (2016), *Updated Cost Benefit Analysis*, p. v. Appendix 7. Additional information provided 24 June 2016 using updated market data.

Aside from royalties, there are also benefits associated with company tax revenue, of which a portion is accrued to NSW. In the revised analysis this is estimated to be $6m. The 2014 study did not provide a breakdown of the other benefits to NSW (aside from

royalties). In the revised study the estimated Net Benefit is $186m (in present value terms), reflecting changes to the Refined Project and market conditions.[4]

- **Once updated information on market conditions are incorporated, the Net Benefits are estimated to be $186m (in present value terms).**

Royalties estimate

The difference in market conditions noted above is likely to mainly reflect changes in estimates of future prices for thermal and semi soft coking coal (adjusted for quality variations based on predicted energy content). Chart 5.2 in the 2014 study and chart 7.1 in the 2016 study highlight the differences in the assumptions. While global commodity prices have changed, there has also been changes in the exchange rate which has increased the AUD price of coal.

- **Revised data provided by DAE indicate that (using updated market data) the royalty estimate from the mine is $197m in present value terms.**[5]

Cost estimates

In regards to the estimate of costs, there is a reduction in the environmental impacts due to the changes in mine operations and additional mitigation activity adopted. The two key impacts are attributed to the air quality impacts and carbon emissions.

Air quality

In regards to air quality, the Department had previously engaged Todoroski Air Services to undertake a peer review of the Air Quality Impact Assessment undertaken by Pacific Environment Limited (as presented in the proponent's EIS). In its deliberations, the PAC noted that it

> …does not consider that it is in a position to undertake a proper assessment of the potential air quality impacts of the project at this stage due to the uncertainties arising from the concerns raised in the peer review and agency submissions.

In its response to, the Proponent had engaged Pacific Environment Limited (PEL) to undertake further analysis to address issues raised by the PAC and the peer review. In its revised analysis PEL notes that,

> While mining in the RERR Pit was originally proposed, this aspect of the development no longer forms part of the Project being assessed. This analysis therefore only considers the economic costs of incremental air quality impacts from the emissions associated with the Project which, for the purposes of this assessment, are taken to be the impacts associated with

4 There appears to be a higher level of benefits than this presented in table 5.9 on p.61 of the revised CBA. We have assumed the lower benefit estimate for our analysis.

5 DAE (2016), *Additional information for use in peer review*, Letter from DAE to Umwelt dated 24 June 2016.

mining the in the North Pit Continuation area over the period 2019 to 2030 and BNP from 2016 to 2022.[6]

Using the revised Project, PEL estimate the economic impacts of air pollution using two alternative methods:

- Method 1: Using the 'unit damage cost approach' specified in the draft Guidelines 2015. Alternative assumptions relating to the population density in nearby areas were tested.
- Method 2: A method that approximates an 'impact pathway' approach.

Method 1 requires an estimate of the population density in nearby areas that would be exposed to the emissions. A tonne of emissions occurring in a more densely populated area would result in higher economic costs compared to a less densely populated area. The PAEHolmes (2013) study includes unit damage costs for a range of different Significant Urban Areas (SUA) as well as one for 'Not in any Significant Urban Area' which is the least densely populated areas.

PEL notes that the Project is located within less than 20-25 km of towns/villages and the use of 'Not in any Significant Urban Area' would, therefore, underestimate the impacts. Using the Singleton SUA is an alternative approach given that Singleton Heights is the closest suburb to the mine, although it is approximately 15kms from the nearest emitting activities. PEL estimates the incremental economic costs (in present value terms) over the life of the Project of:

- $0 using Not in any Significant Urban Area
- $39.9m using the Singleton SUA.

PEL argues that there are limitations of using the PAEHolmes damage cost estimates given that it assumes that the emissions are spatially proximate to the population. In the case of coal mining the residences are located some distance from the source and particulate matter has settled out before it reaches nearest residences.

Given this, PEL has used an approximation of the impact pathway approach (Method 2) which seeks to overcome some of the problems noted above. Using this approach, it estimates the incremental economic costs (in present value terms) over the life of the Project of $4.9m. This estimate has been incorporated into the DAE's revised CBA.[7]

- **While there are limitations of the alternative approaches, the information presented by PEL provides useful evidence for decision makers to consider the Net Benefits associated with the Project. Specifically, whether the estimated impact is closer to $4.9m (supported by PEL) or as high as $39.9m using the Singleton SUA, the Project still delivers Net Benefits to the community.**

6 PEL (2016), Economic costs of air quality impacts, May, (p.2) in Appendix 8 of Glencore's Response to PAC Review Report.

7 As noted earlier, DAE present a figure of $4.59m, rather than $4.9m.

Carbon emissions

The costs presented in table 2 above in DAE's revised analysis present the share apportioned to NSW. Table 6.3 of DAE's revised CBA indicate that the incremental cost to Australia is $34.8m, however, only 32 per cent ($11.14m) of this is attributed to NSW. DAE has argued that,

> The attribution of greenhouse gas emissions to NSW is challenging and reflects the broader challenge of conducting a regionally focussed cost benefit analysis. The challenge in attributing greenhouse gas emission costs within a regionally focussed cost benefit analysis comes from the underlying way in which the costs of emissions are often estimated. Most approaches to estimating the value of carbon emissions ultimately rely on modelling that estimates the social cost of carbon or on market prices that derive from restrictions on carbon emissions – often these restrictions are made with a social cost of carbon in mind. The social cost of carbon is normally assessed at a global scale, not a regional scale.
>
> Given these considerations and the lack of clear guidance on how to apportion these costs geographically, we have assumed that all costs of carbon emissions can be attributed to Australia. This cost can then be apportioned to NSW based on NSW's share of Australian population.

This approach is inconsistent with the 2015 draft Guidelines which require the attribution of the full global cost. This is also inconsistent with the approach adopted in a large number of economic analyses, particularly in the context of a cap on emissions which means that the carbon price of $23/tonne of CO_2 emissions previously estimated by the Australian Treasury reflects the opportunity cost to Australia of the additional tonne of emissions. Similarly, the current price of around $12/tonne under the Emissions Reduction Fund (which potentially includes projects in NSW) could also be seen a representing the value of emissions from a domestic perspective.

Having said this, we recognise that there is debate in the economic literature regarding the extent to which the global social cost of carbon is appropriate for the use in the benefit cost analysis of domestic policy options.[8]

Notwithstanding this, for the purposes of the review the CIE the choice between allocating the full costs of carbon of $34.8m or only 32 per cent of this does not change the conclusions.

- **That is, if we assume that the full carbon emissions costs, the Project would still deliver a Net Benefit to the community of around $162m in present value terms.**

Rural amenity and culture

Similar to the estimate of the cost of carbon emissions, the DAE study estimates costs of $8.6m associated with "Rural amenity and culture" of which 32% is attributed to NSW. The explanation of this allocation to NSW is not clear. It appears that this allocation is

8 See for example Kotchen, M (2016), *Which Social Cost of Carbon? A theoretical Perspective*, National Bureau of Economic Research, May, Working Paper 22246, http://www.nber.org/papers/w22246

due to the nature of the choice modelling study used to place values on these impact, however, the rationale for this decision has not been articulated.

- **The rationale for decision to allocate a portion of the total impact to NSW has not been articulated. However, given the relatively small impact there is limited merit in seeking to further clarification on this. The full costs could be used as part of an upper bound test.**

Sensitivity analysis

In the PAC's recommendations it requested additional sensitivity analysis and a further understanding under what conditions the "project would generate a zero net present value".

Revised sensitivity analysis is presented in table 1.4 of the DAE's revised response to report, using the $185.7m Net Benefits to NSW as the central case. Lowering the export coal price by 20 per cent would lower the Net Benefits to $136.2m.[9] Even if the export coal price would need to fall by more than 50 per cent, the Project would still deliver Net Benefits to the community assuming production is maintained and the royalty stream continues.

Having said this, if the export coal price (in Australian dollar terms) fell substantially, the Project may not be financially viable. Where the Project is not financially viable over a sustained period, the Proponent may choose to cease production. In these circumstances the Project would generate zero net benefits to the community.

Conclusions

Overall we are satisfied that DAE's response has addressed all of the issues you raised in the CIE's September 2015 review.

DAE estimates the revised Project to deliver Net Benefits to the community in the order of $185.8m in present value terms over the life of the Project. Even if export coal prices fell by 20 per cent, 100 per cent of the cost of greenhouse gas emissions were attributed to NSW and the air pollution costs were the high end of $39.9m then the Net Benefits of the Project would around $70m in present value terms.

This suggests that even under more 'extreme' assumptions that the Project would still deliver Net Benefits to the NSW community of at least $70m in present value terms. The expected Net Benefits are expected to be higher than this, although the precise quantum will depend on a range of factors, such as the export coal prices in the future.

9 DAE (2016), *Additional information for use in peer review*, Letter from DAE to Umwelt dated 24 June 2016.

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