



BIS OXFORD
ECONOMICS

FURTHER COMMENTS ON ECONOMIC IMPACT ASSESSMENT

HUME COAL AND BERRIMA RAIL PROJECT

OCTOBER 2018

BIS Oxford Economics

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TABLE OF CONTENTS

| | |
|--|----|
| Executive Summary | 1 |
| 1. Introduction..... | 4 |
| 2. Further comments on the EIA | 6 |
| 2.1 Response to previous BIS Oxford Economics report | 6 |
| 2.2 Risks associated with the mine volumes and prices..... | 7 |
| 2.3 Impact on water resources..... | 11 |
| 2.4 Impact on heritage | 14 |
| 2.5 Impact on local economy (mining vs other growth) | 15 |
| 2.6 Conclusion | 16 |

EXECUTIVE SUMMARY

Hume Coal Pty Limited (HC) has lodged development applications for the Hume Coal Project (the HCP), and the associated Berrima Rail Project (BRP). These projects are planned to be undertaken in the NSW Southern Highlands. Collectively these may be referred to as “the project”.¹

An Environmental Impact Statement (EIS) for the project was released in March 2017. As a part of this, an *Economic Impact Assessment Report* (“the EIA”) was prepared by BAEconomics. At the invitation of the Department for Planning and Environment (DPE), BIS Oxford Economics undertook a review of the EIA. Following a response by BAEconomics to certain questions, the *Review of Economic Impact Assessment: Hume Coal and Berrima Rail Project* (henceforth referred to as BISOE 2017) was released in December 2017.

Subsequent to this, and to community responses to the EIS, HC issued a *Response to Submissions* (RTS) in June 2018.

BAEconomics has also prepared a second response letter regarding (BISOE 2017), here referred to as “the Second Response”, dated 16 January 2018.

The DPE has invited BIS Oxford Economics to provide further comments on specific aspects of the HCP, taking into account the Second Response, the RTS and community submissions in relation to the following issues:

- whether the points made in the Second Response, relating to questions such as the wages, employment and the resulting tax take materially affect the issues raised in BISOE (2017). More specifically, whether a wage premium (i.e. higher wages for working in the mining industry) and a reduction in unemployment due to the operations of the HCP will produce higher income tax revenues which would back flow to NSW and should be allowed for in the analysis;
- the extent to which the risks associated with the pine-feather mining method suggested by HCP means that the potential royalties may not be realised, undermining the economic case for the HCP;
- the extent to which the cost of the groundwater take required by the HCP could mean that the project is not economically justified; and
- the extent to which issues such as impacts on local heritage and/or local growth may mean the project is not economically justified.

In short, the current report finds that:

- the issues raised in the Second Response to not appear to materially affect the findings of BISOE 2017 and the appropriate economic NPV for the project is \$127 million, as suggested in BISOE (2017);

¹ Most of the activity in the project relates to the HCP. The BRP will essentially consist of a rail spur to service the HCP and would not occur in the absence of the HCP.

- the pine-feather method may have risks, however, without considering the other downside risks mentioned below, the volume of coal extracted from the HCP would need to fall to an average of 227,000 tonnes per year (compared to an estimated average 1.6 million tonnes per year) before the project reached an economic break-even point (zero Net Present Value or NPV);
- the EIA already allows for a total of \$9.2 million in “make good” provisions and for the purchase of water licenses over the course of the HCP. Above and beyond this (and again in isolation from other downside risks) some 6,100 ha to 23,800 ha of agricultural land would need to be lost to production for a period of 46 years before the project reached a zero NPV;
- by one measure, (and without considering other downside risks) 196 heritage locations would need to be lost before the project recorded a zero NPV; and
- while there may be concerns around the growth generated by the HCP (as opposed to other local growth priorities such as tourism and nature-based activities), this in itself is not an economic issue. However, to the extent that it is felt that quality of life is impacted by the presence of the HCP, this could be quantified by further survey work.

None of the above mine production, groundwater, heritage and growth/quality of life issues are, *in isolation*, likely to make the HCP economically unviable (i.e. produce a project NPV below zero). Nonetheless, in each case, less severe impacts could act to reduce the economic case for the mine. Moreover, as indicated, all of these downside risks were considered in isolation to one another. Some of these factors could potentially act in combination with one another. If this were to be the case, it could substantially reduce the economic case for the HCP.

In considering the above findings, two broader additional points should also be made:

- While the two are interrelated, an economic assessment differs from a financial one. A financial assessment relates to the commercial viability of a given enterprise or initiative (such as the HCP). An economic assessment incorporates some of the data used in a financial assessment, but also adds additional community concerns such as social and environmental impacts. A project therefore may or may not be judged to be financially viable but this is separate to whether or not the project is seen to be economically viable. The current report relates to an economic assessment.
- The above findings should be qualified by gaps in the supporting financial and economic data provided by HC through the EIA. The EIA has indicated that full financial data cannot be provided to undertake work such as sensitivity testing due to concerns about commercial confidentiality. Nonetheless, the lack of more detailed supporting data – and, in particular, the lack of transparency about detailed project

costs and revenues - has made it difficult to make a full assessment of economic impacts of the HCP.

1. INTRODUCTION

Hume Coal Pty Limited (HC) has lodged development applications for the Hume Coal Project (the HCP), and the associated Berrima Rail Project (BRP). These projects are planned to be undertaken in the NSW Southern Highlands. Collectively these may be referred to as “the project”.²

An Environmental Impact Statement (EIS) for the project was released in March 2017. As a part of this, an Economic Impact Assessment Report (the EIA) was prepared by BAEconomics. BIS Oxford Economics undertook a preliminary review of BAEconomics Cost Benefit Analysis (CBA) and Local Area Analysis (LEA) in August/September 2017. Close attention was paid in this review to NSW Government (2015), *Guidelines for the economic assessment of mining and coal seam gas proposals* (“the Guidelines”) and to NSW Treasury (2017), *NSW Government Guide to Cost-Benefit Analysis, Policy and Guidelines Paper TPP 17-03* (“the Treasury Guidelines”). BIS Oxford Economics submitted a series of questions to BAEconomics (through the Department) as a result of this process. BAEconomics submitted a response to these questions (“the Response”) in October 2017.

BIS Oxford Economics final *Review of Economic Impact Assessment: Hume Coal and Berrima Rail Project* (henceforth referred to as BISOE 2017) was issued in December 2017.

Subsequent to this, and to community responses to the EIS, HC issued a *Response to Submissions* (RTS) in June 2018.

BAEconomics has also prepared a second response letter regarding (BISOE 2017), here referred to as “the Second Response”, dated 16 January 2018.

The Department for Planning and Environment (DPE) has invited BIS Oxford Economics to provide further comments on specific aspects of the HCP, taking into account the Second Response, the RTS and community submissions in relation to the following issues:

- whether the points made in the Second Response, relating to questions such as the wages, employment and the resulting tax take materially affect the issues raised in BISOE (2017). More specifically, whether a wage premium (i.e. higher wages for working in the mining industry) and a reduction in unemployment due to the operations of the HCP will produce higher income tax revenues which would back flow to NSW and should be allowed for in the analysis;
- the extent to which the risks associated with the pine-feather mining method suggested by HCP means that the potential royalties may not be realised, undermining the economic case for the HCP; and

² Most of the activity in the project relates to the HCP. The BRP will essentially consist of a rail spur to service the HCP and would not occur in the absence of the HCP.

- the extent to which the cost of the groundwater take required by the HCP could mean that the project is not economically justified and the extent to which issues such as impacts on local heritage and/or local growth may mean the project is not economically justified.

The results of the review are detailed in Chapter 2.

2. FURTHER COMMENTS ON THE EIA

2.1 RESPONSE TO PREVIOUS BIS OXFORD ECONOMICS REPORT

BIS Oxford Economics final *Review of Economic Impact Assessment: Hume Coal and Berrima Rail Project* (henceforth referred to as BISOE 2017) was issued in December 2017.

BAEconomics has prepared a second response letter regarding (BISOE 2017), here referred to as “the Second Response”, dated 16 January 2018. In this response, BAEconomics made the following key points:

1. The difference between the original project NPV claimed by BAEconomics (\$295 million) and that assessed by BISOE (2017), \$127 million was noted but given that the BISOE figure is still net positive this suggests the project should proceed.
2. There are no water externalities associated with the project, as these have all been accounted for through the purchase of groundwater licenses by HC.
3. As BAEconomics view it, the Guidelines suggest that higher wages are simply compensation for having to work harder in the mining industry than in other industries and therefore there is no wage premium and no benefit to NSW. Moreover, the Guidelines suggest that there is no benefit to NSW if workers move from elsewhere to take a job in the mining industry. BAEconomics state that while these considerations may be appropriate for Australia as a whole, the Commonwealth will collect taxes on the wage premium and a share of this will be passed back to NSW. Therefore, from a NSW perspective, wage premiums paid by the mining industry constitute a net benefit and should be counted in a NSW cost-benefit analysis. A similar argument applies if workers were previously unemployed.

With respect to Point 1, it is certainly true that the mine still records a positive NPV after taking into account the points made in BISOE (2017). Nonetheless, this is a much lower figure than previously claimed by HC. There appears to be no further challenge to the arguments made in BISOE 2017 and we therefore conclude that (at present) \$127 million is the appropriate base from which to consider the further issues relating to the HCP raised in this current report.

Point 2 is acknowledged. This issue is further examined in the context of local concerns in Section 2.3.

Point 3 is especially puzzling. By one interpretation, BAEconomics appear to be questioning the appropriateness of the Guidelines themselves. As indicated in BISOE (2017) a wage premium can only be asserted if there is some evidence that labour will become more productive in its new role than in its previous roles. No such evidence has been presented either in the EIA or in the Second Response. Likewise, since no good case for such a premium has been made, no tax allocations to NSW, based on such a premium can be asserted or allowed for.

In short, the Second Response does not materially change the findings of BISOE (2017).

2.2 RISKS ASSOCIATED WITH THE MINE VOLUMES AND PRICES

2.2.1 Volume risk

A pine-feather method has been suggested by HCP for the proposed mine. This method has been designed with local environmental and other concerns in mind. In particular, it is designed to ensure near zero surface subsidence. However, based on conversations with DPE, the effect is to limit the amount of coal extracted to around 35 percent of the available resource, below the amount which could be extracted from techniques such as longwall mining.

In essence then, the use of the pine-feather method could be seen as another internalisation of externalities associated with the mine, in the sense that a more obtrusive method might have increased the amount of coal which could be extracted from the mine at the cost of increased potential subsidence.

However, some concerns have arisen over the pine-feather mining technique. In particular, the pine-feather method of mining extraction is untested in Australia. This might give rise to uncertainties about the viability of this technique. Accordingly, there is uncertainty over whether the proposed quantum of coal (50 million tonnes (Mt) of run-of mine coal) could actually be extracted over the lifetime of the mine.

The DPE's Division of Resources and Geoscience (DRG) has conducted a *Resource and Economic Assessment* of the HCP. The review indicates that:

- Approximately 50 million tonnes (Mt) of Run-of-Mine and 40 Mt of product coal will be extracted during the mine's lifetime (approximately 2020-2040).
- The rate of maximum extraction would be 2.6Mt per annum (Mtpa).
- The DRG suggest an average coal price of A\$120 per tonne for coking coal and A\$70 per tonne for thermal coal over the lifetime of the project.
- Based on these parameters the DRG calculates that the NPV of the royalty stream would be \$110 million over the lifetime of the project, using a 7 percent discount rate.³
- The pine-feather system utilised by the mine will have a lower resource extraction than techniques such as longwall mining. This system has been adopted to ensure near zero surface subsidence. According to

³ By comparison the EIA (p.8) indicates that up to 3Mtpa of metallurgical and coking coal will be produced and for sale to international and domestic markets. It is not clear why the DRG and EIA estimated maximum production amounts differ. However, the estimated Present Value (PV) of royalty payments is similar – being \$114m in the case of the EIA (p.40). Apart from production volumes, assumptions about the flow of coal volumes during the lifetime of the project may also explain the differences between the two royalty assessments.

the proponent). That said, the DRG notes the appointment of an independent expert to examine whether the claims of zero subsidence are correct.

In a subsequent telephone call with BIS Oxford Economics on 31 August 2018, DRG staff based in the Hunter Valley and DPE staff in Sydney, DRE reiterated that the pine-feather method was untested in Australia. Consequently, they could not come to a definitive conclusion about the likelihood that this technique would extract the expected amount of coal in the context of the HCP.

This is not to say that the pine-feather technique cannot extract the coal suggested by the proponent – just that it is difficult to come to a definitive conclusion due to the uncertainties highlighted above. It should also be recognised that any coal mining project has some element of risk associated with extraction. At the same time, given the untested nature of the pine-feather method within Australia and the region, it could be argued that an additional element of extraction risk might be attached to this particular project.

In principle, one “top down” approach to dealing with this issue would be to examine the financial “break-even point” at which the NPV of the revenue from the amount of coal extracted falls below the NPV of costs. This might occur if a smaller than expected amount of coal is extracted from the mine rendering it *financially* unviable to continue production. Related to this, but on a broader level, an *economic* breakeven point could examine at what point the *economic* benefits (e.g. royalties, some taxes) fall below costs imposed on society. Such analysis could then serve as a guide to the magnitude of the risk associated with the mining technique.

However, as pointed out in BISOE (2017) the EIA does not provide a transparent identification of project revenues and costs. Without such information, it is therefore not possible to make a *direct* assessment of the financial or economic break-even point at which the amount of coal extracted falls below the level needed to sustain the operation.

The lack of a transparent breakdown of costs and revenues would appear to reflect concerns about commercial confidentiality. In reference to a related issue (the viability of mining in the face of changing world coal prices) the Guideline (p.18) state that:

In addition, sensitivity analysis should include:

- *output prices, using a wide range of estimates – where possible, regard should be had to historical pricing information over as long a period as possible in specifying the range of values tested and presented.*
 - *Where practicable, sensitivity analysis should identify how much output prices would need to fall for a project to have a zero NPV and report on whether such a scenario is either likely or unlikely.*

The EIA itself notes this requirement. However, it states that HC cannot do such price sensitivity testing because the results are commercial in confidence (p.42).

The grounds given are therefore on the basis of commercial sensitivity rather than practicality.⁴ However, in the absence of further information, this precedes a direct assessment of how sensitive the mine's financial and economic viability may be to changes in volumes as well as price.

Nonetheless, a rough attempt at an *indirect* economic assessment of volume risk has been attempted, as follows:

- Correspondence from Kylie Hargreaves of DRG to Paul Freeman of the DPE's Planning Services Division (*Hume Coal Project and Berrima Rail Project-Environmental Impact Statement Review*) includes an Appendix providing DRG's assessment of the extraction rate and royalties associated with the mine.
- This note assumes that mining takes place from 2020 to 2040, with peak production of 2.6Mtpa. Average coking coal prices are estimated to be \$120/tonne and thermal coal prices of \$70/tonne. Royalties are set at 7.2% of saleable production with allowable deductions for royalties assessed at \$4.50/tonne.
- This assessment suggests that the NPV of royalties is \$110 million over the course of the life of the mine, using a 7% discount rate. This is, in fact close to the \$114 million in royalties suggested by the EIA (p.40).
- While BIS Oxford Economics does not have details of the production profile which informed DRG's calculations, these elements allow for an analysis of the point at which coal royalties might fall such that the mine is not economically justified (i.e. Present Value (PV) of costs equates to PV of revenues or NPV equates to zero).
- These calculations used the mine life period and coal prices employed by DRG. A weighted average coal price of \$97/tonne was estimated based on the proportions of coking and thermal coal expected to be extracted, adjusted to \$92.50/tonne for the purposes of royalty collections, as per the deductions estimated by DRG.
- Abstracting from ramp up (and ramp down) considerations, and assuming a constant production profile, we estimate an average of some 1.5Mtpa would need to be produced to meet the \$110 million in royalties estimated by DRG.⁵
- However if production were to fall to 222,000tpa then royalties would equate to some \$16 million over the lifetime of the project (or only 14.6 percent of estimated total revenues). If the other benefits reported on

⁴ DPE may wish to consider separately as to whether commercial sensitivity is grounds for non-compliance with the Guidelines, in such instances. This argument would seem to preclude undertaking such testing for many such projects. However, this is a policy issue beyond the scope of this analysis.

⁵ The production period of 2020 to 2040 has been retained for this analysis, to be consistent with DRG, though note that the EIA (p.8) refers to a 19 year production period.

p.40 of the EIA (i.e. company income tax, shire rates land taxes and levies) were to be reduced proportionately then the project would an economic breakeven point (zero NPV)⁶.

Nonetheless, it should be noted that this is only a rough estimate. Moreover, while a production volume of below 222,000tpa would suggest that the mine records a zero NPV, the *financial* breakeven point may come at volumes well above this point. If so – and if the company were to cease operations – the (fixed) economic costs on the area and NSW might still be incurred but the full benefits would never be realised. However, such analysis would depend on access to more detailed financial estimates in respect of the mine’s operations.

Other approaches to assessing the viability of the HCP include the work of Alan Lindsay, a private individual with extensive experience in the mining and extraction industries. Correspondence sent by Mr Lindsay to Clay Preshaw and Paul Freeman of the DPE in an email dated 3 September 2018 includes detailed estimates of the finances of the HCP. This correspondence indicates that:

- The financial profitability of the HCP is questionable.
- As a consequence, the HCP may not pay company income tax.
- The HCP faces complex geological and production constraints.
- The company may approach government for a royalty holiday in the light of these difficulties.

However, as is noted above, no outside party has access to HC’s financial records. It is therefore inevitably speculative to claim that the HCP is not financially viable. Claims that the HCP would enjoy a royalty holiday are likewise speculative and cannot form part of an evidence based CBA. Finally, care should be taken to distinguish financial issues from economic ones, as the viability test differs between the two.

2.2.2 Price risk

DPE has also requested a review of the plausibility of the HCP’s suggested prices for the price of thermal and coking coal. The EIA (p.41) suggests an average price of US \$66.50/tonne for thermal coal and US \$110.90/tonne for coking coal over the life of the mine, based on Wood McKenzie forecasts, with an average US\$/A\$ exchange rate of 0.77. This translates to A\$144.03/tonne and A\$86.36/tonne, respectively.

The HCP coal price estimates are higher than those suggested by DRG above, though as noted above, other differences in the estimation process mean that mine life royalty estimates are remarkably similar.

⁶ That is other benefits initially estimated at \$34 million in PV terms (EIA p.40) under a full production scenario were reduced by 85 percent to some \$5 million, proportionate to the reduction in mining royalties. Adding \$5 million in other benefits to \$16 million in royalties equates to \$21 million. Given PV of costs of \$21 million, the PV of costs equates to the PV of benefits.

However, BIS Oxford Economics estimates of average coal prices over the lifetime of the project, sourced from the US Energy information Administration, suggest an average of US \$91/tonne for thermal coal and US \$95/tonne for coking coal. This equates to a weighted average price of some US \$93.16 over the lifetime of the project, given the split of thermal to coking coal (54%/46%). By comparison, HCP's equivalent weighted average coal price is US \$90.48/tonne over the lifetime of the project.

While the precise prices for thermal and coking coal differ, the HCP average price is therefore little different to the BIS Oxford Economics one. The EIA (p.42) has conducted sensitivity tests on a range of exchange rate and coal price scenarios. However, as indicated, the EIA does not undertake an analysis based on an NPV of zero due to reasons of commercial confidentiality.

2.3 IMPACT ON WATER RESOURCES

One of the most contentious issues surrounding the HCP has been the debate over its impact on local groundwater supplies. HC states that it has purchased 93 percent of the groundwater licences required for the project (RTS, Vol. 1, p.54). Nonetheless, there will be additional impacts on local landholder bores (or "externalities" in economic terms). HC suggests that the project may impact on some 94 private landowner bores on 72 properties in the local area, lowering the water table by some 2m or more. The median duration of the drawdown will be 46 years with full recovery taking 76 years after mining commences. (RTS, Vol.1, p.47).

The responses of various parties to the EIS and HCPs responses in turn have not, to date, resolved this debate. Some responses suggest that the impacts on groundwater have been underestimated and express concerns about the ability (and/or willingness) of HCP to implement "make good" compensation provisions to landowners particularly in conditions such as drought, to offer details of such make good provisos and/or provide full compensation under them. Others (including the Australia Institute) express concerns about the practicality of solutions such as trucking in water to affected property, offering access to properties to HCP and/or deepening bores.⁷

Still other concerns (by parties such as WaterNSW among others) have arisen over broader issues such as groundwater impacts on drinking water in the Sydney basin.⁸

This issue was also extensively discussed in BISOE (2017). In that document we referred to BAEconomics, response to BIS questions ("the Response") which noted that HCP had allowed for "make good" provisions to the value of \$4.4 million. These costs included:

⁷ See Australia Institute (2017), *For Hume the bell tolls: Local economic impacts of the Hume Coal project*; Exeter Village Association, *Hume Coal Project (SSD 7172) – EIS submission June2017*

⁸ See Wingecarribee Shire Council, *Submission to the Hume Coal Project, Environmental Impact Statement Coal Free Southern Highlands Inc (CFSH), Submission Regarding Environmental Impact Statement by Hume Coal Pty Ltd, SSD 15-7172, Water NSW, Hume Coal Project (SSD 7172) and Berrima Rail Project (SSD 7171), submission dated 30 June 2017.*

- Incremental pumping costs
- Deepening pumps
- Replacing stock and domestic bores (\$500,000)
- Replacing irrigation bores (\$150,000 per bore)

In response to community concerns, the HCP has published more details of the “make good” provisions (see RTS, Vol 2E, Appendix M). This indicates that options include:

- Financial compensation for increased operational costs
- Deepening of the pump in the bore
- Providing a functional replacement bore
- Providing alternative water supplies through enlarging or constructing farm dams or installing tanks.

However, it is not clear if any allowance has been made for a revised costing of such impacts as a consequence of such additional clarifications.

The Response also indicated that an additional \$4.8 million had been allowed for to account for the purchase of water licenses. In effect, this internalizes this externality (from BAEconomics’ point of view) by adding it to the cost side of the ledger. The sum of these equates to approximately \$9.2 million.

As indicated in BISOE (2017), the Australia Institute has published analysis indicating that groundwater impacts would total \$130.6 million. However, the derivation of this figure reflects several questionable assumptions and it may incorporate the \$9.2 million already allowed for in the BAEconomics assessment.

An alternative to some of the debates about groundwater costs, loss, the willingness/ability of HCP to make good, drought or other scenarios above could be to adopt a high-level economic analysis. Such an analysis poses the question: “How large would the loss to society due to the drawdown of bores need to be in order to for the project to record a zero NPV (i.e. reach an economic breakeven point) ?”

In one respect, the answer to this seems obvious. Based on the EIA and BIS Oxford (2017) the HCP has a NPV of \$127m. The NPV in turn is arrived at by subtracting \$21m in PV costs from \$148m in PV benefits. Therefore, in order for the project to reach a zero NPV due to economic losses caused by groundwater depletion *alone*, such depletion must result in an economic loss of \$127 million.

Considering this, the following logic may be applied:

- The next best alternative use value of the affected land would appear to be agricultural production (as evidenced by the fact that this land has been used for agriculture for many years).
- The value of the land can be determined by some of the figures presented in the EIA (p.36). This examined the forgone value of agricultural production from properties affected by the construction of the mine (separate from the actual drawdown of bores). This analysis suggests that the average value of agricultural land (as measured by

gross agricultural margins) is \$432-\$900 per ha per year for properties affected by the HCP although it is also suggested that typical properties in the area have a lower value of agricultural production (\$391-\$432 per ha per year) .

- Equivalently, the Australia Institute (p.29) reports that the sale value of two of the major properties acquired by Hume Coal for its mining operations (Mereworth and Evandale) equated to an average value of \$21,000/ha. These figures are also instructive. Given that the sale value of these properties could be seen as representing a stream of future benefits, this suggests a value of \$1,540 per ha per year if streamed over 46 years (the median duration of the water drawdown).⁹
- Depending on the value (and approach) chosen, the value of agricultural land in the region is therefore between \$391 and \$1,540 per ha per year.
- Based on this, and assuming that all of the land affected by groundwater deletion *has no use value whatsoever* over a period of 46 years (the approximate median duration of the drawdown) we estimate that between 6,100 ha (at \$1,540 per ha) and 23,800 ha (at \$391 per ha) would need to be lost to production such that the HCP records a zero NPV in economic terms.

The Figure below summarises these results, providing an indication of the amount of land which would be forgone such that the project NPV would equate to zero, given different estimates of land values.

Fig. 1. Land forgone such that project NPV equates to zero

| Scenario | Land value per ha (\$) | Ha forgone |
|--|------------------------|------------|
| Low land value (based on HC low estimate) | 391 | 23,800 |
| Midpoint | 966 | 9,600 |
| High land value (based on Australia Institute) | 1,540 | 6,100 |

Source: Oxford Economics

While the precise size of the area of affected properties in hectares is not clear to us, we note that the entire project area covers 5,051 ha (RTS, Vol. 1, p.285). Figure 11.9 in the RTS (Vol. 2A, p. 263) indicates the project area along with the affected properties. As indicated in this figure, some affected properties are within the project area, others lie outside it (but close to its boundaries), while other parts of the project area contain no affected properties.

Note that HCP's make good provisions do not include an offer to buy the affected land. However, as indicated above, this is an economic appraisal. The key question is not the precise financial transactions between the parties but whether, in isolation, the opportunity cost (in terms of lost economic value) is likely to exceed the value of the mine to NSW.

⁹ \$1,540 per year streamed over 46 years at a 7 percent discount rate equates to a present value of \$21,000

Nonetheless, if such depletion incurs a greater economic cost than forecast in the EIA, this would obviously *reduce* the economic case for the mine. Moreover, the above analysis does not take into account the broader issues noted by WaterNSW and others relating to the impacts of reduced water quantity across the Sydney catchment area in the circumstances such as water take exceeding allocations and/or in periods of extended drought.

Finally, it could be the case that additional water externalities act in combination with reduced coal take and/or lower prices scenarios discussed above. If this is the case then the economic case for the HCP could become more marginal.

2.4 IMPACT ON HERITAGE

A number of submissions have pointed to the unique heritage of the Southern Highlands region.¹⁰ Apart from broader concerns, these note in particular that the project is located some 3 km from the historic township of Berrima and would impact the properties of Mereworth and Evandale. The Mereworth property, in particular, is a heritage item listed in the Wingecarribee Local Environmental Plan (2010). In addition, several properties surrounding the mine area are included on the State Heritage Register (SHR) including the National Trusts' *Golden Vale Homestead*. More broadly, historic rural views in the area could potentially be interrupted by the development. HC has sought to allay these concerns in the RTS.

No definitive loss in local heritage value appears to have been quantified in these submissions. While, the mine site is located close to Berrima, there appears no direct impact on the town itself or other heritage sites. Likewise, impacts on the area's visual amenity would appear to be limited due to the nature of the operations in question.

Nonetheless, and acknowledging the difficulties of quantifying issues such as heritage, it is worth asking: "How much heritage would need to be lost to the community such that the NPV of the HCP would equate to zero?"

Few Australian studies have attempted to quantify the value of heritage with most analysis preferring to stress qualitative measures. Nonetheless, the Allen Consulting Group (ACG) undertook a major survey of Australian's willingness to pay (WTP) to protect heritage places some time ago. This work suggested an average WTP of \$5.53 per person per annum to protect 1,000 heritage locations.¹¹ If translated into current dollars this is equivalent to \$7.41 per person per annum to protect 1,000 heritage locations (or \$0.00741 per place per person per year).

This value can be used to determine at what point the loss of heritage would equate to the NPV of the HCP (\$127 million) as follows:

¹⁰ Perica & Associates, *Submission on Behalf of Battle for Berrima – Hume Coal Proposal* and EIS, 25 June 2017, Natural Trust of Australia, Southern Highlands Branch, *Hume Coal Project and Berrima Rail Project – SSD 15_7172 and SSD_7171*, 30 June 2017, Wingecarribee Shire Council, *Submission to the Hume Coal Project, Environmental Impact Statement*

¹¹ The Allen Consulting Group, *Valuing the Priceless: The Value of Historic Heritage in Australia*, Research Report 2, November 2005.

- The value of protecting a heritage place per year for the NSW population can be determined by multiplying the value per person per place per year (\$0.00741) by the NSW population aged over 18 (6,120,208 in June 2017).¹² This yields a figure of \$45,351 per place per year.
- The loss of heritage is assumed to occur in perpetuity, proxied here by assuming a stream of values over 100 years at a 7 percent discount rate.
- Given this, the permanent loss of one “average” heritage place would equate to \$647,121 to NSW citizens in PV terms (\$45,351 streamed over 100 years at a 7 percent discount rate).
- The loss of 196 heritage locations would equate to \$126.8 million in present value terms (or effectively equivalent to the project NPV).

It is acknowledged that this approach could be rather crude, as the ACG survey was conducted some time ago, was broad in nature, heritage locations will differ greatly in type and value and those in the shire of Wingecarribe may have particular significance.

Nonetheless, given that there is no question of local heritage being permanently lost to this extent as a result of the HCP, the above calculations provide an indication that, as it stands, heritage impacts alone are unlikely to be of sufficient magnitude to call the economic case for the project into question.

An alternative quantitative approach could be pursued through a specialist contingent valuation (CV) or stated preference (SP) survey of Wingecarribe shire residents. This could ask how much residents would be willing to pay to protect local heritage. It may be the case that local residents have much higher WTP than the NSW average – though it is equally the case that the reference population is much smaller. Such work could be conducted in conjunction with a broader study examining the value of preserving the character of the local region, as discussed below. However, pursuing such work is beyond the scope of the current report.

2.5 IMPACT ON LOCAL ECONOMY (MINING VS OTHER GROWTH)

A number of submissions have indicated that the HCP is not in keeping with the character of the Southern Highlands region¹³. Although mining has been a part of regional life for many years, the HCP greatly exceeds the scale of past mines. There is concern that the mine would alter the character of the region, which is increasingly focussed on growing industries which emphasise the

¹² Based on Australian Bureau of Statistics, *Australian Demographic Statistics*, December 2017, ABS Cat. No. 3101.0

¹³ Perica & Associates, *Submission on Behalf of Battle for Berrima – Hume Coal Proposal* and EIS, 25 June 2017, Natural Trust of Australia, Southern Highlands Branch, *Hume Coal Project and Berrima Rail Project – SSD 15_7172 and SSD_7171*, 30 June 2017, Wingecarribee Shire Council, *Submission to the Hume Coal Project, Environmental Impact Statement*, Exeter Village Association, *Hume Coal Project (SSD 7172) – EIS submission June2017*

area's unique natural beauty - such as tourism, wine, weddings, functions and nature based activities (e.g. hiking, cycling, horse riding).

As is the case with heritage values discussed above, many of these concerns are difficult to quantify in a tangible sense. The argument appears to be that other economic growth would be preferred to growth arising from mining. Externalities, aside, technically speaking, it is difficult to exclude benefits (or economic growth) within the context of a CBA based on the argument that they are the "wrong type" of economic growth. Perhaps the only exceptions to this are cases where certain benefits are deemed to be unacceptable as they fall outside society's definition of acceptable behaviour. In such cases an argument may be made that such benefits are not "given standing" within the context of a CBA – that is they should be excluded from such an assessment. For example, Boardman et. al. point to the profits of criminal enterprises being excluded from assessment of the impacts of crime (or crime reduction programs).¹⁴ However, it would not appear that mining would fall into such a category.

Moreover, it is also the case that mining and tourism have long co-existed in other regions – the Hunter Valley being an obvious example of this.

Nonetheless, as is the case for heritage above, if it is felt that this is a strong community preference then a CV or SP survey could be constructed to measure this. Such a survey could seek to gauge how much Southern Highlands residents are WTP to preserve the character and industrial base of the region as is, without the presence of the HCP (and the regional growth coming from such a project). While it has faced technical challenges in the past, such work is increasingly being accepted within the context of CBA. Accordingly, NSW Treasury CBA Guidelines, allow for the conduct of CV/SP work as long as certain technical procedures are adhered to.¹⁵ It should be noted however, that such work would need to be carefully constructed is still likely be the source of challenge, regardless of its outcomes.

2.6 CONCLUSION

The aims of this report were set out in the Introduction. Considering these, this report finds that:

- the issues raised in the Second Response to not appear to materially affect the findings of BISOE 2017 and the appropriate economic NPV for the project is \$127 million, as suggested in BISOE (2017);
- the pine-feather method may have risks, however, the volume of coal extracted from the HCP would need to fall to an average of 227,000 tonnes per year (compared to an estimated 1.6 million tonnes per year) before the project reached an economic break-even point (zero Net Present Value or NPV);

¹⁴ Boardman et. al. (2005) *Cost-Benefit Analysis: Concepts and Practice*

¹⁵ NSW Treasury (2017), *NSW Government Guide to Cost-Benefit Analysis, Policy and Guidelines Paper TPP 17-03, pp.33-41*

- some 6,100 ha to 23,800 ha of agricultural land would need to be lost to production for a period of 46 years before the project reached a zero NPV;
- by one measure, 196 heritage locations would need to be lost before the project recorded a zero NPV;
- while there may be concerns around the growth generated by the HCP (as opposed to other local growth priorities such as tourism and nature-based activities), this in itself is not an economic issue. However, to the extent that it is felt that quality of life is impacted by the presence of the HCP, this could be quantified by further survey work

None of the above mine production, groundwater, heritage and growth/quality of life issues are, *in isolation*, likely to make the HCP economically unviable (i.e. produce a project NPV below zero). Nonetheless, in each case, less severe impacts could act to reduce the economic case for the mine. Moreover, as indicated, all of these downside risks were considered in isolation to one another. Some of these factors could potentially act in combination with one another. If this were to be the case, it could substantially reduce the economic case for the HCP.



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