

## Gillespie Economics

Environmental and Resource Economics: Environmental Planning and Assessment

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Anthony

### **Re: Response to The CIE's Peer Review of the Bowdens Silver Project Economic Assessment**

Gillespie Economics has reviewed The Centre for International Economics' (The CIE's) peer review of the Bowdens Silver Project Economic Assessment. A summary of my response is provided below with more detailed assessment provided in **Attachment 1**.

The Economic Assessment prepared by Gillespie Economics concluded that *"the Project is estimated to have net social benefits to NSW of \$44M to \$146M net present value at 7% discount rate (the latter including employment benefits) and hence, relative to the "without Project" scenario, is desirable and justified from an economic efficiency perspective."*

The CIE concluded that:

*"Overall, the Project is estimated to deliver net benefits to NSW. At the upper end of the range, the benefits (associated with royalties, tax and residual producer surplus) is estimated at \$50m in present value terms. This would be partially offset by greenhouse gas emissions valued at between \$9m-\$36m. Commodity prices would need to fall by over 20% (compared to that assumed by Gillespie Economics) for the Project to result in net costs to NSW. This is unlikely based on current prices and available market forecasts over the next few years."*

Notwithstanding, The CIE's estimated range of the net benefits of the Project is lower than that estimated by Gillespie Economics because it:

- adopts a highly conservative lower bound estimate of production benefits based on inappropriate World Bank and International Monetary Fund price forecasts, rather than consensus pricing from financial institutions;
- ignores potential wage benefits, which the NSW Government (2015) Guideline recognises can be one of the major economic benefits from a project, and the CIE has previously included in its own cost benefit analyses (CBAs) of mining projects;
- ignores potential nonmarket employment benefits of the Project, which have a strong theoretical and empirical basis, although not recognised in the NSW Government (2015) Guidelines;
- ignores any potential supplier benefits, which are recognised in the NSW Government (2015) Guidelines, and The CIE has previously included in its own CBAs of mining projects; and

- includes greenhouse gas (GHG) costs that accrue to households outside of NSW, in a NSW CBA, thereby presenting an incorrect and greatly overstated cost to NSW for this environmental impact.

Leaving all other conservative assumptions of The CIE the same, and correcting for The CIE's incorrect inclusion of global GHG costs, the Project will have net production benefits to NSW of \$35M to \$50M, present value. Relaxing The CIE's conservative assumptions, the net benefits of the Project to NSW would be significantly greater.

It is clear that the Project will have significant and positive net benefits to NSW.

It also appears that The CIE has confused the methodology between the Local Effects Analysis (LEA) and Supplementary LEA, despite these being presented in two separate sections of the Economic Assessment and the difference in methodology being clearly outlined.

I would be happy to discuss any aspect of the issues raised by The CIE, or this response, with The CIE and/or the NSW Department of Planning, Industry and Environment.

Regards



Dr Rob Gillespie  
9 March 2021

## ATTACHMENT 1 – DETAILED RESPONSE TO THE CENTRE FOR INTERNATIONAL ECONOMICS

### INTRODUCTION

In May 2020, Gillespie Economics completed an Economic Assessment of the Bowdens Silver Project. The Economic Assessment concluded that *“the Project is estimated to have net social benefits to NSW of \$44M to \$146M net present value at 7% discount rate (the latter including employment benefits) and hence, relative to the “without Project” scenario, is desirable and justified from an economic efficiency perspective.”*

A peer review of the Economic Assessment by BDA Group Pty Ltd found that:

*“Gillespie Economics has prepared a sound report, employing methods and an approach to the presentation of the results consistent with best practice economic assessment principles.”*

The NSW Department of Planning, Industry and Environment (DPIE) engaged The Centre for International Economics (The CIE) to undertake a further peer review of the Economic Assessment of the Bowdens Silver Project.

CIE concluded that:

*“Overall, the Project is estimated to deliver net benefits to NSW. At the upper end of the range, the benefits (associated with royalties, tax and residual producer surplus) is estimated at \$50m in present value terms. This would be partially offset by greenhouse gas emissions valued at between \$9m-\$36m. Commodity prices would need to fall by over 20% (compared to that assumed by Gillespie Economics) for the Project to result in net costs to NSW. This is unlikely based on current prices and available market forecasts over the next few years.”*

Notwithstanding its conclusion that the Project is likely to generate net benefits, The CIE’s estimated range of the net benefits of the Project is lower than that estimated by Gillespie Economics. The CIE arrived at this lower estimate of the net benefits for the Project by reducing all categories of benefit and increasing the estimated GHG costs. An itemised comparison of the Gillespie Economics and The CIE results is provided in **Table 1**.

**Table 1 – Comparison of the Net Social Benefits of the Bowdens Silver Project to NSW**  
(\$M present value at 7% Discount Rate)

	Gillespie Economics	Centre for International Economics
<b>Production Benefits</b>		
Government royalties	21	17-24
Australian third party royalties	4	18-26
Company tax	15	
Residual producer surplus	4	
<b>Total production benefits</b>	<b>44</b>	<b>35 to 50</b>
<b>Public Benefits</b>		
Wage benefits to employment	25	0
Non-market benefits to employment	78	0
Greenhouse gas emissions	0	-(9 to 36)
<b>Total public benefits</b>	<b>103</b>	<b>-9 to -36</b>
<b>Net Benefits</b>	<b>44 to 146</b>	<b>0 to 41</b>

The CIE also made some minor comments on the Local Effects Analysis (LEA) prepared for the Project.

The CIE’s comments on each cost and benefit item and the LEA are discussed in detail below.

## APPLICATION OF GUIDELINE DOCUMENTS

### CIE Comment:

The CIE identifies that its review has been undertaken based on relevant guidelines including:

- NSW Government's December 2015 *Guidelines for the economic assessment of mining and coal seam gas proposals*; and
- NSW Government's April 2018 *Technical notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*.

### Response:

It is evident from The CIE review that it has also drawn heavily on elements of the draft NSW Government *Guidelines for economic assessment of mining and coal seam gas proposals*, that were not carried forward into final NSW Government (2015) Guidelines, and guidelines relating to road developments. Neither of these other guidelines are relevant and are in conflict with the actual NSW Government (2015) Guidelines and NSW Government (2018) Technical Notes.

## MINERAL PRICES AND ROYALTIES

### CIE Comment:

*"Gillespie Economics' estimates of royalty payments to state Government appear reasonable. However, given the uncertainty in commodity prices and exchange rate, it would be appropriate to present the potential benefits from royalties to NSW as a 'range'. A range of between \$17m-\$24m (in present value terms) is appropriate, although more recent price projections would suggest that royalties at the upper-end of this range are more likely."*

The following two reports are the basis for the lower estimate of silver, lead and zinc prices and hence royalties:

- the World Bank's commodity price forecasts (released April 2020) over the three years 2019, 2020 and 2021; and
- the International Monetary Funds' (IMF's) World Economic Outlook published in April 2020 that showed that prices for silver, lead and zinc decreased sharply between January 17, 2020 (pre—outbreak of Covid) and February 7, 2020).

The basis for the higher estimate of royalties, is a submission from Regional NSW which assumes higher mineral prices and a lower exchange rate assumption.

### Response:

The Economic Assessment of the Project was based on consensus forecasts in the Marketing and Product Handling chapter of the Project Feasibility Study (GRES, 2018). This consensus pricing was based on average price forecasts of multiple financial institutions. More recent consensus pricing provided to Bowdens Silver by Citi Australia (see Table 1) highlights that the Silver price (the key driver of the analysis) included in the Economic Assessment (USD20.91/oz) could be considered to be conservative.

**Table 1 - Recent Consensus Pricing for Silver**

US\$/oz		2021	2022	2023
Citi	Citi	26.50	26.00	22.00
BAML	Broker 1	31.25	31.00	30.16
Morgan Stanley	Broker 2	26.00	23.00	21.00
Barclays	Broker 3	23.13	21.88	
DB	Broker 4	23.80	22.00	
CIBC	Broker 5	32.00	31.00	30.00
JP Morgan	Broker 6	27.20	27.50	
CS	Broker 7	25.00	18.00	18.26
HSBC	Broker 8	21.50		
UBS	Broker 9	30.00	26.00	19.20
RBC	Broker 10	23.66	22.50	22.50
BMO	Broker 11	27.63	22.50	23.00
	<b>Average</b>	<b>26.47</b>	<b>24.67</b>	<b>23.27</b>

It is questionable whether the World Bank commodity price forecasting, could be considered a relevant source compared to consensus pricing from multiple financial institutions. World Bank and IMF forecasts are inherently conservative and are not used by the business community. The World Bank has consistently under forecast silver prices - October 2013 forecasts for 2014- 2019 being on average 22% below actual prices. Also, the April 2020 World Bank commodity price forecasts were at the time of the early panic around Covid-19 and can be considered highly pessimistic. As identified by The CIE the current price for silver reported by the World Bank is around USD26/oz, which is substantially higher than the World Bank's previous forecast.

The IMF's World Economic Outlook report published in April 2020 and referred to by The CIE, is reported as showing that prices for silver, lead and zinc decreased sharply since the release of the October 2019 World Economic Outlook. However, prices during a three-month period of a global crisis is hardly a basis for future prices. Since the World Bank April 2020 Report and the IMF April report, actual prices have rebounded. For silver, the main driver of the Economic Assessment, the World Bank Commodity Markets Outlook (October 2020) reports the August 2020, September 2020 and October 2020 monthly average silver price at USD27.0/toz, USD25.7/toz and USD24.2/toz, well above the value (i.e. USD20.91) assumed in the Economic Assessment.

Demand for silver, in particular, is expected to continue to be strong. Silver price tends to rise with gold, which usually climbs when economic or market concerns surface. History shows that, during times of economic uncertainty, market turbulence, or political conflict, investors turn to gold and silver as a hedge against the risks. Since there are now numerous financial and other risks around the world, demand for both metals is starting to rise (<https://longforecast.com/silver-price-today-forecast-2017-2018-2019-2020-2021-ounce-gram>). The forecast of the Economic Forecast Agency suggests silver prices well in excess of those assumed in the Economic Assessment out to the limits of its forecasting in 2025 (<https://longforecast.com/silver-price-today-forecast-2017-2018-2019-2020-2021-ounce-gram>).

Consequently, the central price for silver, used in the Economic Assessment can itself be considered to be conservative, and a lower bound for analysis, while that relied on by The CIE as a lower bound can be considered highly pessimistic and unreasonable.

In relation to royalties, it is noted that The CIE considers the AUD/USD exchange rate used in the Economic Assessment i.e. 0.75, to be reasonable, however small changes in the exchange rate can have large impacts on prices in AUD. In this respect, the exchange rate has been consistently below 0.75 since June 2018. Therefore, the adoption of a 0.75 exchange rate in the Economic Assessment provides conservatism to the royalty estimates.

While it is acknowledged that The CIE's role in reviewing the economic benefits of the Project is to consider the lower bound possibilities, the assumptions relied upon for the lower bound estimates for mineral prices and royalties appear unrealistic and overly conservative.

## **OTHER NET PREDUCTION BENEFITS**

### **CIE Comment:**

The CIE aggregates the benefit categories of royalty payment to third parties, income tax and residual producer surplus. It identifies that the key influence on these benefits is commodity price forecasts, discussed above. If, for example, commodity prices were 20% lower (based on the 22% lower forecasts of World Bank) than Gillespie Economics' assumptions then this would reduce the aggregate benefit to \$17M. However, if similar price assumptions to that presented above by Regional NSW are adopted this would increase Gillespie's benefit estimate for these items by 14% (to around \$26M).

### **Response:**

The CIE again draws on the questionable World Bank reference to provide a lower bound estimate of these other net production benefits. As discussed above, this forecast is considered highly spurious and unsuitable for use in The CIE's review. The prices used in the Economic Assessment are considered more reasonable and already suitably conservative. The fact that the upper bound estimates for production benefits presented by the CIE are higher than that estimated by Gillespie Economics supports the conclusion that the Gillespie Economics estimates are reasonable and not inflated.

## **COMPANY TAX**

### **CIE Comment:**

*"..., data on the tax payments from mining companies suggests that the actual tax payments could be significantly lower than estimated. However, this is more likely to be the case with large global mining companies that have greater scope to take actions to minimise tax payments. Given the limited foreign ownership of the Project, Gillespie Economics' estimate is within the range of observed tax payments."*

### **Response:**

The company tax estimate presented in the Economic Assessment is based on a detailed profit/loss analysis of the Project itself, that includes consideration of depreciation, the carrying forward of losses and the application of the ATO company tax rate. In some years there will be tax payable while in other years, because of losses and depreciation, there will be no tax payable. However, overall the Project is estimated to result in tax payments, distributed to NSW, of \$15M present value. This approach to the estimation of company tax is consistent with the approach outlined in the NSW Government (2015) Guideline, albeit more sophisticated as it includes consideration of depreciation and the carrying forward of losses.

The CIE initially suggests that the Gillespie Economics estimate of tax payment (accruing to NSW) can be considered an upper end estimate and provides an alternative value of \$7M to \$12M. The CIE approach to estimating company tax from the Project is based on examining ATO data for a group of mining companies (not projects) and estimating, for four individual years (2013-14 to 2017-18), the income tax paid across the group of companies as a percentage of total income. The CIE's lower estimate of company tax was estimated by applying the lowest average ratio of tax payable to total income i.e. 2.7%, for the four years of data, to The CIE's lower estimate of the present value of Project revenue. The upper level of The CIE's company tax was estimated by applying the **second** highest average ratio of tax payable to total income i.e. 4.4%, for the four years of data.

Notwithstanding, the final conclusion that The CIE reach, there are a number of substantive issues with The CIE approach:

- It is not based on the specific discounted cash flow analysis and profit/loss analysis of the Project itself.
- It is not consistent with the NSW Government (2015) Guideline, which specifies calculation of company tax based on revenues and costs of the specific Project.
- Taxes paid by any particular mining company in any particular year will be highly variable based on carrying forward of losses in early years, depreciation of upfront capital etc. and so taking a single year snapshot is not reflective of the overall tax liability of a company or group of companies.
- Different mining projects have different levels of profitability and hence referring to averages (expressed as a percent of revenue) across a group of companies to determine tax payments from the Project is highly spurious.
- Pooling numerous mining companies, each with projects in different phases of development compounds the spurious nature of the approach used by The CIE.
- The group of mining companies selected to analyse have no relevance to Bowdens Silver. They are all very substantial companies including some of the largest mining companies in the world. These companies have major capital spend/development programs and operate across multiple jurisdictions. The only precious metals company in the list is Newcrest which is the largest gold mining company on the ASX operating in Australia, PNG and the Americas.
- The CIE uses a single year's data with the lowest average level of tax to income ratio (2.7%) and applies it across every year of income from the Project.
- The CIE suggest that the Gillespie Economics estimate of \$15M company tax payment (which is estimated using an appropriate technical approach) should be considered an upper-end estimate. However, using The CIE's methodology, the upper tax to income ratio of 6.8% (based on 2013-14 ATO data) would have determined a higher company tax payment of \$18M (present value based on the discounted total revenue value reported by The CIE i.e. \$826M).
- The present value of revenue used by The CIE as the basis for its tax calculation is based on its questionable assumption of lower prices.

## **WAGE BENEFITS**

### **CIE Comment:**

The CIE's justification for a zero wage benefits includes that:

- *"The inclusion of the wage benefits of employment is allowed for under the CBA Guidelines, although the Guidelines suggest that a value of zero is appropriate in most cases."*

- Based on The CIE's experience e.g. the Rocky Hill coal mine, indirect benefits such as wage premiums to workers are typically small, relative to other benefits.
- *"In quantifying the wage premium, Gillespie Economics includes a range of unsubstantiated assumptions."* Gillespie Economics' approach to estimating reservation wages does not account for factors such as different skill levels, which would explain differences in wages. For currently employed workers using the average mining wages is the appropriate reservation wage because it accounts for other factors that explain wage differentials such as different skills and disutility of working in the mining sector.
- Gillespie Economics has not indicated that the Project will pay workers an amount greater than the average mine wage.
- Gillespie Economics has not provided any evidence to indicate that the new mine would draw labour from the currently unemployed. Notwithstanding, The CIE state that based on the Gillespie footnote about unemployment rates in NSW and the region, 4.5% and 5.4% respectively, an assumption that 5% of the direct workforce is unemployed is a more appropriate assumption.

### Response:

The CIE spends a considerable component of its review dismissing the potential employment benefits of the Project, even though it has itself included such benefits in its peer review assessment of the Rocky Hill coal mine. The Economic Assessment already recognises that there may be differing opinions around the inclusion and estimation of employment benefits in CBA and hence is careful to report the results "with" and "without" employment benefits – a fact overlooked by The CIE in relation to wage benefits. Decision-makers can include employment benefits in their judgments to the extent that they are persuaded by the arguments.

Notwithstanding, Gillespie Economics considers that there are strong arguments for the inclusions of wage benefits. These are already documented in the Economic Assessment but are synthesised and added to below, having regard to comments made by The CIE.

Wage benefits of projects are identified as a relevant category of benefit for inclusion in CBA in both the NSW Government (2015) and NSW Treasury (2017) Guidelines. Modern textbooks on CBA such as Boardman et al. (2001) *Cost Benefit Analysis: Theory and Practice*, acknowledge the potential for wage and other benefits to workers.

The NSW Government (2015) Guideline is ambiguous on the wage benefits to workers. It raises it as a key element of a CBA in Table 3.1, and in Table 3.7 the Guideline shows how to attribute economic benefits to workers to NSW residents. In Section 6.2 it states that *"An appropriate starting assumption should be that workers do not receive a wage premium"* and then states that *"Although a zero wage premium is a useful starting assumption, the appropriateness of this assumption must be assessed on a case by case basis. This is because benefits to workers **can be one of the major economic benefits** from a project"* (emphasis added). The latter statement is in contrast to The CIE's assertion that in its' experience these benefits are typically relatively small.

While the Guideline identifies a zero wage premium, as an appropriate starting point, the CIE has misquoted the Guideline when it states that *"the Guidelines suggest that a value of zero is appropriate in most cases."*

The CIE's assumption of no benefit to workers rests on highly unlikely assumptions of:

- **the economy is at full employment over the life of the project** –the NSW economy is NOT at full employment and is unlikely to be at full employment during the life of Project. The default

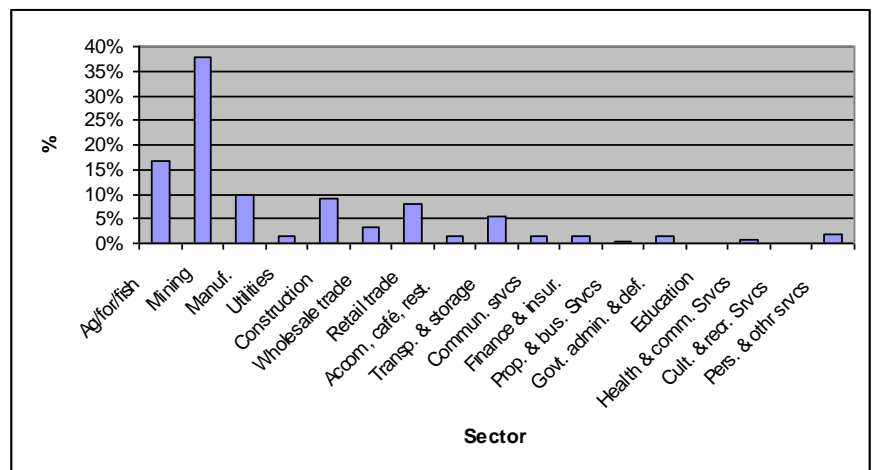


assumption of full employment essentially means that no new investment in the economy is ever required as everyone who wants to will always be employed, “with” or “without” additional investment. The simplifying approach of assuming full employment, biases decision-making against projects that have positive employment impacts and is at odds with the community and political concern for employment.

- **all labour is sourced from the existing mining industry with no premium paid in one mine compared to another** – this is another way of saying that there is full employment. However, it is simply not true that all labour is likely to be sourced directly from the existing mining industry. Skills of relevance to mining come from a range of sectors. Obviously, the exact industry sectors that the Project employees will be drawn from is not known at this stage. However, some guidance can be taken from a survey of workers at the Cadia Mines who were asked what industry sector they were employed in before working at the Cadia Mines (refer to the results in the below graphic). Only 38% came from mining with the remainder mainly from agriculture/forestry and fishing, manufacturing, construction, retail trade and transport/storage. A similar result is expected for the Bowdens Silver Project.

**ES Q24. Industry Sector Employed in Before Working At Cadia Mines n=308**

Sector	Percent
Ag/for/fish	16.6%
Mining	38.0%
Manuf.	9.7%
Utilities	1.3%
Construction	9.1%
Wholesale trade	3.2%
Retail trade	8.1%
Accom, café, rest.	1.3%
Transp. & storage	5.5%
Commun. svcs	1.6%
Finance & insur.	1.3%
Prop. & bus. Svcs	0.3%
Govt. admin. & def.	1.3%
Education	0.0%
Health & comm. Svcs	0.6%
Cult. & recr. Svcs	0.0%
Pers. & othr svcs	1.9%
<b>Total</b>	<b>100.0%</b>



Source: Gillespie Economics (2006) *Cadia Mines Community Impact Review*

More technically, those employed in a new mine can come from anywhere along the labour supply curve (see Boardman et al., 2001, p. 93). Even if all employment came from an alternative mine, there is occupational upgrading – people don’t move jobs just to earn the same wages – and job chain effects where occupation upgrading of one person leads to a sequence of occupation upgrading that can reach all the way down to new participants in the labour force or the unemployed. While job chain effects are not acknowledged in the NSW Government (2015) Guidelines, they are well recognised in the economics literature - see Bartik (2012) and Persky et al., (2004).<sup>1</sup>

<sup>1</sup> Bartik, T. (2012) Including Jobs in Benefit-Cost Analysis, Annual Review of Resource Economics. 2012.4:55-73; Persky, J., Felzenshtain, D. and Carlson, V. 2004. "What are Jobs Worth?" Employment Research 11(3): 1–3.

- **If a mine employs workers that are currently working locally, but not in the mining sector, higher wages may be required to compensate for more physically demanding work, tougher conditions etc** – people working locally (or elsewhere), but not in the mining sector are likely to be located lower down on the labour supply curve. It is true that they may require a higher wage to compensate for negative externalities of the mining industry, to the extent that they exist. However, it should be noted that much of the mining workforce is not at the mine face but involved in administration, provision of trade services, driving trucks, environmental management etc. It is unclear that there is any disutility for these workers. It is similarly not clear that there is any disutility to those at the mine face, particularly in open cut mines. Modern mining is highly regulated and safe compared to other sectors from which labour may be drawn. For instance, in 2017 Safe Work indicated a higher rate of fatalities per 100,000 workers in agriculture, forestry and fishing, transport, postal and warehousing, arts and recreation services, construction, wholesale trade, electricity gas, water and waste services. In 2018, Safe Work again indicated a higher rate of fatalities per 100,000 workers in agriculture, forestry and fishing, and transport, postal and warehousing. Notwithstanding, the inclusion of disutility in the labour supply curve, it would still be upward sloping, indicating wage surplus to all labour apart from those at the margin.
- **If some labour is sourced from other parts of NSW, it may be necessary to pay them more than they were earning in their existing or previous jobs so that they will relocate** – the Central West of NSW, particularly around Mudgee, is hardly a remote, harsh environment, but a highly desirable area to live with extensive health, education and personal services. Any such relocation premium is likely to be modest.

In contrast to the view expressed by The CIE, market wages are determined by BOTH supply and demand – not just supply-side factors of skill level, disutility in mining, and relocation premiums. Higher wages are paid to workers in mines (including the Bowdens Silver Project) than they may obtain from the same skills but in other sectors because of:

- the greater amount of capital available to the labour in the mining sector, and hence the increased productivity of labour in mining than elsewhere (holding skill level constant); and
- the higher value of the good being produced.

These factors are reflected in the demand curve for labour i.e. the willingness to pay for labour.

The estimation of wage premium benefits in the Economic Assessment, for those coming from the unemployment pool, is based on an approach used by the Resource Assessment Commission in its Inquiry into the forests of south eastern Australia. The assumption of 10% of future employment coming from unemployment pool is simply that, an assumption, to demonstrate the potential magnitude of benefits wage benefits. The CIE question the 10% figure suggesting that, because the unemployment rate in NSW and the region was 4.5% and 5.4%, a figure of 5% would seem more reasonable is itself questionable. The seminal work of Haveman and Krutilla (1967) *Unemployment, Excess Capacity, And Benefit-Cost Investment Criteria*, clearly indicates that the probability of a project drawing from the unemployment pool increases as the unemployment rate increases, but the percentage coming directly from the unemployment pool is higher than the actual unemployment rate. Direct application of their findings from the USA to Australia would suggest that at a 5% unemployment rate the percentage of jobs sourced from the unemployed due to a demand shock would be 9.5%, using a linear function. This is similar to the level that is assumed in the Economic Assessment. Notwithstanding, since the report preparation the unemployment rate in both NSW and the region has increased and is likely to stay high. 10% of workers being sourced from the unemployment pool is therefore not considered unreasonable.

For other workers not coming from the unemployment pool, The CIE is incorrect to say that Gillespie Economics assumes that “the Project will draw its workforce from the ‘average’ worker (e.g. a barista at a café in the township)”. As identified on page 59 of the Economic Assessment, and following the

approach of Boardman et al. (2001), Gillespie Economics assumes that “*the remaining workers, after job chain effects, are evenly located along the labour supply curve*”. Some workers will come from the mining sector and have a reservation wage approximating the wage offered by Bowdens Silver. Others will come from the agriculture sector and have a lower reservation etc. When it is assumed that workers will be evenly located along the labour supply curve, the average wage then gives an indication of the potential average reservation wage.

Arguments by The CIE that wage benefits are typically small in comparison to others benefits is in contrast to statements in the NSW Government (2015) Guideline as identified above, and is based on The CIE’s assessment of wage benefits, where it assumes full employment i.e. no drawing labour from the unemployment pool, no drawing of labour from along the labour supply curve and no job chain effects. It is therefore not surprising that, with these highly restrictive assumptions, it found small wage benefit effects. Notwithstanding, The CIE found wage benefits for the Rocky Hill Project that were 5% to 6% of other net production benefits. In contrast to The CIE view, other Economic Assessments such as Cadence Economics (2018) *Economic Impact Assessment of the Tahmoor South Project*, found that wage benefits were substantial at 77% of combined royalty and company tax benefits. BAEconomics (2018) *Updated Economic Impact Assessment of the Hume Coal Project* also found that wage benefits were a substantial component (42%) of the overall net production benefits of the project.

## **NONMARKET EMPLOYMENT BENEFITS**

### **CIE Comment:**

Given the highly contentious nature of the estimates of nonmarket values of employment and the lack of robust evidence provided to support the estimates, The CIE recommends that the nonmarket value of employment should be assumed as ‘zero’ for the economic analysis of the Project.

The CIE’s main arguments for exclusion of these benefits is:

- Gillespie Economics has previously criticised The CIE for not adequately specifying the good for which household’s willingness to pay (WTP) is being sought and that this criticism now applies to the nonmarket valuation of employment benefits.
- there are concerns regarding the validity of the results from the earlier choice modelling surveys – the motivation of respondents to the Bulli Seams choice modelling study is unknown. In other words, it is not known which outcomes the estimated ‘willingness to pay’ relates to. Respondent perceptions of the outcomes from jobs may be inaccurate, including in relation to the employment outcomes for workers if the jobs aren’t there.
- extrapolating the value from the choice modelling survey across all mining employment in NSW would be approximately \$1B;
- payments in the form of unemployment benefits if 20% of mining employees would otherwise have been unemployed is significantly lower than The CIE’s imputed willingness to pay levels when extrapolating values from the choice modelling survey to all mining employment in NSW;
- BDA (the reviewer engaged by the Proponent) points out that in the context of a fully employed economy these values may not be as pertinent.
- they are inconsistent with NSW Government (2015) Guideline.

### **Response:**

Appendix 7 of the Economic Assessment provides a comprehensive discussion of nonmarket values for employment, including a sample of studies in the academic literature that have found that people may hold a non-use value for the employment of others in a wide variety of contexts. It is evident from

academic research that people's utility (WTP) is not limited to nonmarket environmental values but extends to nonmarket social and cultural values.

The CIE in its dismissal of the nonmarket value for employment, focusses on the fact that the study from which the value used in the Economic Assessment is drawn, acknowledges that the actual reasons why people may hold a WTP for other people's employment is unknown. The CIE suggests, without evidence, that people's perceptions of outcomes from jobs may be inaccurate. However, this is the case with ALL nonmarket valuation. These studies do not attempt to discern people's motivations for valuing a specific outcome and indeed these motivations are likely to be highly heterogenous. If the lack of information on peoples motivations invalidates WTP for the employment of others, it invalidates all WTP studies, including those for the environment.

While it is not known what motivates people to hold these values, split sample analysis from the source study found that the values held were not sensitive to changes in the contextual information provided to respondents around re-employment prospects. The source study was from a survey of NSW households in relation to a mining project and hence is considered a reasonable study to be used for benefit transfer. The study was also published in a peer reviewed journal.

The CIE also contends that a criticism that Gillespie Economics made of a The CIE WTP study for Sydney Water (CIPA Phase 3 Report) also applies to the Gillespie Economics WTP study from which the nonmarket value of employment is drawn. However, this is not the case. The CIPA Phase 3 report asked people their WTP for reducing the release of untreated wastewater at Sydney cliff faces. In nonmarket valuation, this is a 'causally prior' attribute. The outcome of the untreated wastewater on the environment is not known. People have to infer what its implication is. However, the loss of jobs is not a causally prior attribute. It is a final outcome that has been used in numerous nonmarket valuation studies around the world.

The CIE extrapolates the nonmarket value for employment, that was gained from a study of a defined scope in terms of employment i.e. 1170 jobs for 30 years, to all employment in the NSW mining sector. However, it is inappropriate to extrapolate marginal values from nonmarket values outside the range of effects within which they were estimated. They are not average industry values to be extrapolated across the entire mining industry. This spurious extrapolation of marginal values, as average values, has been criticised in the literature most notably in relation to environmental non-use values as it fails to account for the variation in unit values as the scale of the analysis changes - see Pagiola, S., Ritter, K., and Bishop, J. (2004). *Assessment the Economic Value of Ecosystem Services*, World Bank Environment Department Paper No. 101. Recent literature highlighting this issue includes Rolfe, J., Windle, J., Bennett, J. and Mazur, K. (2013) *Calibration of values in benefit transfer to account for variations in geographic scale and scope: comparing two choice modelling experiments*, Contributed paper at the 57th Australian Agricultural and Resource Economics Society Conference, Sydney, Australia.

The CIE's subsequent comparison of the inappropriately extrapolated WTP values to unemployment benefits, is further compounded by the fact that unemployment payments are a function of government policy and have nothing to do with community WTP.

The CIE's reference to BDA Group's statement that in the context of a fully employed economy these nonmarket employment values may not be as pertinent, is not relevant given that the NSW economy is not at full employment and is unlikely to be during the life of the Project.

The inclusion of nonmarket values for employment in CBA is at the cutting edge of the academic literature and has not yet found its way into guidelines on CBA. The Economic Assessment recognises that there is likely to be some political contention around these values, even though they have a solid foundation in theoretical and applied economics. Consequently, the results have conservatively been reported "with" and "without" these employment benefits.

## SUPPLIER BENEFITS

**CIE Comment:** The CIE provides no comments on the potential supplier benefits of the Project apart from stating that indirect benefits are typically small.

**Response:** The NSW Government (2015) Guidelines include a potential benefit of increased producer surplus to suppliers. Conservatively, Gillespie Economics has omitted this potential benefit from the Economic Assessment.

Notwithstanding, The CIE's view that indirect benefits are typically small, in its study for Rocky Hill it found supplier benefits of 3% to 4% of net production benefits. Other Economic Assessments, Cadence (2018) found that these supplier benefits can be substantial i.e. 77% of direct net production benefits for the Tahmoor South Project.

Conservatively, Gillespie Economics did not include any estimate of supplier benefits. There is no acknowledgement of this conservative approach in The CIE's estimation of the net benefits of the Project or its review.

## GREENHOUSE GAS

### **CIE Comment:**

Gillespie Economics estimates the present value of the cost of GHG emissions and then apportions this cost to NSW by applying Australia's share of the global population and NSW's share of the Australian population.

The CIE considers that all the global costs of GHG emissions from the mine should be attributed to NSW, resulting in a cost of between \$9 million and \$36 million in present value terms. The CIE's justification for this is that:

- Gillespie Economics' approach is based on a misinterpretation of the NSW Government (2018) *Technical notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*;
- Gillespie Economics' approach is inconsistent with the 2015 draft guidelines, which required the attribution of the full global social damage cost of emissions to NSW;
- assigning 100% of emissions from the Project is consistent with NSW Treasury (2017) *Government Guide to Cost Benefit Analysis*;
- Gillespie Economics' approach is inconsistent with the NSW Government's Climate Change Framework which includes a goal to "reach net zero emissions by 2050"; and
- the approach of assigning 100% of emissions for the Project is consistent with CBA guidelines in other sectors such as AusRoads guideline for road projects.

### **Response:**

#### **Misinterpretation of the Guidelines**

A central issue in CBA is that of "standing" i.e. the society whose costs and benefits count. Conceptually, CBA can be undertaken from a range of different definitions of society. Whatever definition of society is used, only the costs and benefits to that society are included. In NSW, guidelines for CBA make it clear that the society of relevance for the assessment are the collective households in NSW.

NSW Treasury (2017, p. iii) states the following:

*"in terms of geographic scope, a CBA should focus on **impacts (costs and benefits) to the NSW community** (households, businesses, workers and/or governments)."*

The NSW Government (2015, p. 9) Guideline is also very clear that the CBA of mining Projects should be undertaken from a NSW perspective *"requiring benefits and costs to be estimated where possible as **those that accrue to the NSW community.**"*

In relation to addressing GHG emissions in CBA of mining projects, the NSW Government (2018, p. 48-49) *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*, state that:

*"project proponents should provide an analysis of:*

- *their business-as-usual (BAU) GHG emission output (central estimate) and the expected emissions profile of this central estimate (Scope 1 and 2);*
- *estimate **the economic impact** of GHG emission output **to NSW only** (emphasis added);*
- *undertake a sensitivity analysis on anticipated project GHG emissions output (Scope 1 and 2) at carbon prices below and above the central estimate price.*

*The **value of the externality is limited to the impact on NSW, consistent with the Guidelines and how all other costs/benefits are measured** within the CBA. As noted in the Guidelines, the focus is on **the costs and benefits of the project as they relate to the community of NSW**"* (emphasis added).

The Guidelines are clear and have not be misinterpreted by Gillespie Economics. It is only impacts/costs to NSW households that are relevant. The global social damage costs of GHG that The CIE wishes to have included in the analysis are not borne by NSW households.

Consequently, the Economic Assessment of the Project prorates the estimated global damage costs to NSW damage costs (i.e. costs accruing to NSW households) using Australia's share of the global population (around 0.3%) and NSW's share of the Australian population (32%).

The need for apportionment is recognised in other economic assessment of coal mining projects such as BAEconomics (2018) *Updated Economic Impact Assessment of the Hume Coal Project* and Cadence Economics (2018) *Economic Impact Assessment of the Tahmoor South Project*. BAEconomics (2019, p. 34, states that:

*"The 2018 Technical Notes require that the economic impact of GHG emissions should be estimated for NSW only".*

Cadence (2018, p. 27) states that:

*"On a global basis, the total estimated GHG cost is \$94.7 million in NPV terms. To maintain consistency with the CBA methodology, this figure needs to be attributed to NSW, specifically noting that the economic impacts of climate change are a global phenomenon."*

### **Inconsistent with Draft Guidelines**

The CIE's view is that apportionment of GHG costs is not consistent with the *draft NSW Government Guidelines for economic assessment of mining and coal seam gas proposals*, which included a step-by-step guide and required the attribution of the full costs. The CIE further states that if the final NSW

Government (2015) Guidelines intended to radically diverge from the approach in the draft guideline, there would have been a detailed/explicit discussion on the reasons for this.

While an alternative approach may have been included within the 2015 draft guidelines, these provisions were not carried through into the final guidelines and are therefore are not relevant to the review of the Bowdens Silver Project.

The draft Guideline was inconsistent with the approach to “standing” advocated by NSW Treasury (2017) and the general principle that costs and benefits need to be treated consistently. The process of finalising the draft Guideline included calling for submissions and considering the issues raised. This would have included issues raised with the treatment of GHGs. There was no discussion paper or notes released publicly on any matter that differed between the draft and final guideline.

### **Inconsistent with NSW Treasury Guidelines**

The CIE’s basis for considering that apportionment of GHG costs is inconsistent with NSW Treasury (2017) *Government Guide to Cost Benefit Analysis*, is a reference in the Treasury Guideline that uses GHG as an example of the steps to be taken in estimating externalities. See below.

#### **4.2 Valuation of Externalities (NSW Treasury CBA Guidelines)**

Externalities can be estimated drawing on market data, where it is available. For example, the valuation of externalities like greenhouse gas emissions is normally examined as part of an Environmental Impact Assessment which follows broadly similar steps:

- 1 Determine the scope of the impact (e.g. categories of externality and/or geographic coverage).
- 2 Measure the physical change (i.e. the volume of greenhouse gas emissions relative to the base case).
- 3 Derive from market data or reasonable proxies a market price or cost in dollars per unit of volume/impact (e.g. market prices of emissions trading certificates).
- 4 Undertake sensitivity analysis of key parameters.

However, the steps outlined by NSW Treasury reinforce Gillespie Economics’ approach. Step 1 clearly states that it is necessary to determine the scope of the impact e.g. geographic coverage. As identified elsewhere in the NSW Treasury (2017) Guideline the geographic scope of impacts is all costs and benefits that are borne by NSW households. Step 3 then suggest use of a market price or cost in dollars per volume/impact. There is a dollar price that reflects the global social damage cost, so this can be apportioned to represent the required geographic coverage.

### **Inconsistent with NSW Government’s Climate Change Framework**

The CIE notes that the NSW Government’s Climate Change Framework includes a “goal to reach net zero emissions by 2050”. The CIE then infers, without evidence, that this goal reflects the Government’s view of the potentially significant impacts to NSW of not lowering GHG emission. While not an unreasonable conclusion, it is not clear whether statement of a goal reflects the government’s view of the likely social damage costs to NSW as this is not stated in the Framework. Furthermore, it assumes that, in order to reach net zero emissions, NSW must address global social damage costs, something that is not inferred by the framework. As far as Gillespie Economics is aware there has been no CBA of actions to achieve the stated goal of net zero emission by 2050 and therefore it is not reasonable to associate the framework with CBA in NSW.

However, what can be stated with certainty is that various studies have suggested values for the damage costs to the world from additional GHG emissions. These estimates of global social damage costs were relied upon by Gillespie Economics. The damage costs to NSW from these emissions will only be a fraction of those that accrue globally. This is the approach used by Gillespie Economics.

### **Inconsistent with other CBA Guidelines**

The CIE considers its approach of assigning 100% of emissions for the Project to be consistent with CBA guidelines in other sectors such as AusRoads guideline for road projects.

Whether this is the case or not is moot. AusRoad guidelines are not relevant to the Bowdens Silver Project. The relevant guidelines for assessment of mining projects in NSW are:

- NSW Government (2015) *Guidelines for economic assessment of mining and coal seam gas proposals*;
- NSW Government (2018) *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* and *NSW Government Guide to Cost-Benefit Analysis*

As identified above, these clearly identify that assessment should be based on costs and benefits to NSW households and that global GHG costs need to be apportioned.

### **General**

Consistent with the focus of NSW CBAs on the costs and benefits that accrue to NSW households, the production benefits of the Project i.e. residual producer surplus, company tax and third party royalties, that accrue to household outside of NSW are excluded. There is no justification for treating the costs of GHG emissions differently to the net production benefits of the Project.

Notwithstanding, the Economic Assessment also reports the results of a CBA of the Project at the global and national level. At the global level, all costs and benefits are accounted for, including global GHG damage costs and producer surplus benefits that accrue to people outside of NSW. This found that the Project would have a global net social benefit of \$78M to \$181M, present value (at 7% discount rate).

In The CIE's Peer Review of the Economic Assessment undertaken by Gillespie Economics for the Wallarah 2 Project, The CIE similarly expressed the view that global social damage costs should be included in a NSW focused CBA. However, the (then) NSW Department of Planning and Environment in its Residual Matters Report for the Wallarah 2 Coal Project (p. 22) directly addressed this issue by stating that:

*"In relation to greenhouse gas emission, the Department must note that the CIE estimates considered by the Commission's 2017 Review were global costs, rather than the NSW-only approach, the latter being the Department's preferred approach."*



## LOCAL EFFECTS ANALYSIS

### CIE Comment:

Gillespie Economics has conducted the LEA using the standard input-output methodology.

### Response:

This not completely correct. The LEA reported in Section 5 of the Economic Assessment was conducted using the specific LEA method outlined in the NSW Government (2015) Guideline. In addition, the Economic Assessment included a supplementary LEA in Section 6 of the Economics Assessment using the more standard input-output methodology. This is an important distinction because as will be shown below, The CIE confounds the two methods.

### CIE Comment:

*"The multipliers appear to have been estimated with respect to the net income and employment numbers, which is interpreted as for example, additional wages paid in the economy due to the (net) income in the mining sector increasing by \$1M. This is different to the conventional multiplier approach which estimates the additional value-added, output and employment generated by a particular industry increasing its output by \$1M..."*

### Response:

As identified in Section 6.4.1 of the Economic Assessment, the Supplementary LEA uses Type 11A ratio multipliers. As described in Section 5.4.1 of the Economic Assessment and Annexure 5, ratio multipliers are derived from conventional multipliers but summarise the total impact on all industries in an economy in relation to the initial own sector effect e.g. total income effect from an initial income effect and total employment effect from an initial employment effect, etc.

### CIE Comment:

Table 5.1 measures the average increase in net income job by using the difference between the average net income in construction and mining and the average net income in other industries. It is not immediately clear that this is a reasonable assumption. Using 'Average net income in other industries' as a comparator assumes that people employed elsewhere in the region, potentially doing different activities/roles, could gain employment in mine construction or operation. A better comparison, if the data were available, would be to use average incomes from other heavy construction/mining activities.

### Response:

Table 5.1 of the Economic Assessment applies the exact LEA method outlined in the NSW Government (2015) Guideline. An extract from page 22 of the NSW Government (2015) Guideline is reproduced below. As can be seen the suggested comparator c) is Average net income in other industries.

**Table 4.2: Analysis of net income increase**

	Ordinarily reside in locality
a) Direct employment during operations phase	185
b) Average net income in mining industry (\$/year)	\$100,000
c) Average net income in other industries (\$/year)	\$65,000
d) Average increase in net income per employee (b-c)	\$35,000
e) Increase in net income per year due to direct employment (\$m) (a*d)	\$6,475,000
f) FTE equivalent (e/b)	64.75

Note: this table shows hypothetical data

**CIE Comment:**

*"Table 6.1 suggests an average income of \$106,979 for the mining sector and \$73,557 for all industries, which is higher than \$91,803 and \$46,203 assumed in Table 5.1. Estimates given in Table 6.2 also imply an average increase in net income per job at \$33,422 which is considerably different to \$45,600 as noted in Table 5.1. These differences are significant and have not been addressed with an explanation."*

**Response**

The references to Table 5.1 in Section 5 of the Economics Assessment relate to the LEA method prescribed by the NSW Government (2015) Guideline, while the reference to Tables and data in Section 6 relate to the supplementary LEA using input-output analysis.

Table 6.1 is an aggregated input-output table in which any reference to income refers to gross income, whereas incomes in Table 5.1 are net incomes. They are not directly comparable.

Net income changes assessed in Table 5.1 were not based on the input-output table reported in Section 6, but were based on:

- specific information on construction and mining wages for the Project; and
- ABS data on average income across all sectors i.e. ABS Cat. no. 6524.0.55.002 - Estimates of Personal Income for Small Areas, 2011-2016.

This is made clear in the footnotes to Table 5.1.

The input-output model was prepared for the specific purpose of assessing flow-on effects associated with the Project. As identified in Annexure 8, the GRIT procedure for generating input-output tables provides a generally accurate representation of the economy but does not guarantee the accuracy of any particular cell. It is therefore more appropriate to use Project specific data and ABS data rather than input-output table data for the purpose of estimating the direct incremental net incomes associated with employment from the Project.

**CIE Comment:**

In Section 6.4, the local area impact is estimated based on employment of 131 workers during the construction phase and 210 workers during the operation phase. However, the analysis assumes that *"...future employees residing in the local area are already employed and that job vacancies created by these people filling the mining and construction positions remain unfilled."* This implies that the flow on impact, especially those driven by consumption, may be overstated.

**Response:**

The Section 6.4 analysis referred to by The CIE relates to the input-output analysis, while the "assumption" of the analysis that The CIE refers to is from Section 5 of the Economic Assessment and relates to the LEA using the method prescribed in the NSW Government (2015) Guideline. The LEA method and input-output method are underpinned by different assumptions and should not be confused. These differences in methodology are clearly outlined within the Economic Assessment.