Peer review of the economic impact assessment reports related to the Bowdens Silver project

31 May 2021

Building a better working world

Notice

Ernst & Young was engaged on the instructions of Bowdens Silver Pty Limited ("Client") to perform a peer review of the CIE peer review of the Economic Assessment undertaken by Gillespie of the Bowdens Silver mine ("Project"), in accordance with the engagement agreement 17 March 2021.

The results of Ernst & Young's work, including the assumptions and qualifications made in preparing the report, are set out in Ernst & Young's report dated 31 May 2021 ("Report"). The Report should be read in its entirety including this notice, the transmittal letter, the applicable scope of the work and any limitations. A reference to the Report includes any part of the Report. No further work has been undertaken by Ernst & Young since the date of the Report to update it.

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Building a better working world

Anthony McClure
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Peer review of the economic impact assessment reports related to the Bowdens Silver project

Dear Anthony,

In accordance with our Engagement Agreement dated 17 March 2021 ("Agreement"), Ernst & Young ("we" or "EY") has been engaged by Bowdens Silver Pty Ltd ("you", "Bowdens" or the "Client") to provide a peer review (the "Services") in relation to the CIE Peer review of the Economic Assessment of the proposed Bowdens Silver Project (the "Project").

The enclosed report (the "Report") sets out the outcomes of our work. You should read the Report in its entirety. A reference to the report includes any part of the Report.

Purpose of our Report and restrictions on its use

Please refer to a copy of the Agreement for the restrictions relating to the use of our Report. We understand that the Report will be used for the purpose of a peer review of the CIE peer review of the Economic Assessment, as undertaken by Gillespie Economics (the "Purpose").

This Report was prepared on the specific instructions of Bowdens solely for the Purpose and should not be used or relied upon for any other purpose.

This Report and its contents may not be quoted, referred to or shown to any other parties except as provided in the Agreement. We accept no responsibility or liability to any person other than to Bowdens or to such party to whom we have agreed in writing to accept a duty of care in respect of this Report, and accordingly if such other persons choose to rely upon any of the contents of this Report they do so at their own risk.

Nature and scope of our work

The scope of our work, including the basis and limitations, are detailed in our Agreement and in this Report.

Our work commenced on 22 March 2021 and our research was completed on 31 May 2021. Therefore, our Report does not take account of events or circumstances arising after 31 May 2021 and we have no responsibility to update the Report for such events or circumstances.

In preparing this Report we have considered and relied upon information from a range of sources believed to be reliable and accurate. We have no reason to believe that any information supplied to us, or obtained from public sources, was false or that any material information has been withheld from us. Further, we have been provided with various assessments and reports undertaken and

prepared by other consultants and advisors. We have included extracts from those assessments and reports purely to present the key findings of those assessments and reports. It was not within our scope nor have we undertaken a review of such assessments and reports to ascertain their suitability or accuracy. Therefore, we do not take any responsibility or liability for the contents extracted from such assessments and reports and included in this Report.

We do not imply and it should not be construed that we have verified any of the information provided to us, or that our enquiries could have identified any matter that a more extensive examination might disclose.

The work performed as part of our scope considers information provided to us and a combination of input assumptions relating to future conditions, which may not necessarily represent actual or most likely future conditions. Additionally, modelling work performed as part of our scope inherently requires assumptions about future behaviours and market interactions, which may result in forecasts that deviate from future conditions. There will usually be differences between estimated and actual results, because events and circumstances frequently do not occur as expected, and those differences may be material. We take no responsibility that the projected outcomes will be achieved.

We highlight that our analysis and Report do not constitute investment advice or a recommendation to you on a future course of action. We provide no assurance that the scenarios we have modelled will be accepted by any relevant authority or third party.

Our conclusions are based, in part, on the assumptions stated and on information provided by Bowdens and other information sources used during the course of the engagement. The modelled outcomes are contingent on the collection of assumptions as agreed with Bowdens and no consideration of other market events, announcements or other changing circumstances are reflected in this Report. Neither Ernst & Young nor any member or employee thereof undertakes responsibility in any way whatsoever to any person in respect of errors in this Report arising from incorrect information provided by Bowdens or other information sources used.

This letter should be read in conjunction with our Report, which is attached.

Thank you for the opportunity to work on this Project for you. Should you wish to discuss any aspect of this Report, please do not hesitate to contact Nicolas Anjinho on 0423 003 740.

Yours sincerely

Steve Brown

Partner

1. Overview

Bowdens Silver Pty Ltd ('Bowdens") is seeking an independent assessment of the Centre for International Economics (CIE) peer review of the Economic Assessment undertaken by Gillespie Economics (the "Economic Assessment"). The Economic Assessment and peer review form part of the submissions required for approval of State Significant Developments (SSD), in this case, SSD. 5765 (the "Project"). The purpose of this analysis will be to review critical areas of judgement of the economic impact assessment and determine whether these are reasonable and in line with good practice.

We have assessed what we consider to be the critical areas of the Economic Assessment and the CIE peer review, and whether they were in line with our own interpretation and application of economic impact assessments. This has included a consideration of the reasonability of the input assumptions and processes undertaken to complete the analysis and support conclusions. Our assessment has been done by considering key guidelines applicable to the mining sector as well as the core principles associated with Cost Benefit Analyses.

In this case, we have considered the relevant NSW planning guidelines, including:

1. NSW Government (2015) Guideline for the economic assessment of mining and coal seam gas proposals.
2. NSW Government (2018) Technical Notes supporting the Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals.
3. NSW Treasury (2017) NSW Government Guide to Cost-Benefit Analysis (CBA).

We have referenced our own experience and methodologies typically used in developing economic assessments of this nature.

As part of this assessment, we have considered the following additional reports, which have been supplied by Bowdens:

1. The peer review commissioned by Bowdens Silver and prepared by BDA Group.
2. The final draft response to the CIE peer review prepared by Gillespie Economics.

1.1 Background

Mining approvals in New South Wales (NSW) require a CBA to be undertaken based on a set of Guidelines published by the State in 2015[1]. At the outset, it is important to recognise that while it is common for government to undertake a CBA when considering public expenditures such as large infrastructure developments of programs, it is less common for government to undertake CBA of private sector investments. The Guidelines were developed, partly, in recognition of the relatively unique role that the CBA plays in the NSW approvals process. At the same time, much of the common literature and practices of CBA are often highly theoretical and (rightly) rooted in the conservatism of government decision making. Indeed, a key reason for this conservatism is the concern of government not to crowd out or displace private sector investment.

The Guidelines explicitly recognise a range of potential beneficiaries from a mining project, along with the direct and indirect costs. The key beneficiaries (NSW governments through tax and royalty collection, workers at the mine and suppliers to the mine) are appropriate for decision makers to consider when assessing private investment.

[1] https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/guidelines-for-the-economic-assessment-of-mining-and-coal-seam-gas-proposals-2015-12.pdf?la=en

What we observe in the approvals processes broadly, and in the documents relating to this specific development, is that much of the commentary around the merits of this analysis calls for the exclusion of key benefits. Exclusion of benefits, such as worker benefits, are based on highly theoretical arguments, with little supporting evidence, that are made in CBA relating to government expenditure and can only be justified under the most restrictive of circumstances.

It is against this background that these comments are made with the overriding approach of starting with the proponent's analysis, in this case, the Economic Assessment by Gillespie Economics, and asking in relation to any calculation:

- Is the approach taken to measurement consistent with the Guidelines?
- Is there sufficient detail presented to ascertain the underlying assumptions, data, and parameters?
- What evidence has been presented to support the analysis?
- Has there been sufficient acknowledgement of underlying uncertainties and are these accounted for in the sensitivity analysis?

1.2 Summary of our findings

Overall, the analysis of the project undertaken by Gillespie is in accordance with the NSW Government (2015) guidelines for the economic assessment of mining and coal seam gas proposals ("the Guidelines"). The information provided by Gillespie has allowed us to both ascertain the assumptions utilised in the analysis and allowed us to broadly replicate the results. Furthermore, where applicable, Gillespie has provided clear evidence to support the analysis undertaken in the Economic Assessment. It is also noted that sensitivity analysis has been applied where relevant. We have identified a few areas where input assumptions could be adjusted (such as in estimating worker benefits), while the addition of supplier benefits could be considered as part of the Cost Benefit Analysis (CBA).

Accordingly, the critiques raised by the CIE surrounding the inclusion of worker benefits, the use of a higher greenhouse gas (GHG) emissions cost and lower tax benefits are not supported, as they do not apply a consistent and holistic approach that aligns to the Guidelines in calculating the costs and benefits of the project.

We provide a summary of our findings and commentary on the critical assumptions below.

Table 1: Overview of EY's and The CIE's findings on Gillespie's methodology

Subject matter	CIE findings	EY Findings
Worker Benefits	The estimated benefits arising to workers should be zero.	The Guidelines allow for the inclusion of worker benefits, and we find the evidence presented by Gillespie to substantiate the inclusion of worker benefits to be reasonable. However, the approach to limit the estimation of benefits to 3 years appears conservative, as workers employed at the mine will be earning a significant wage premium throughout the lifetime of the mine. It is therefore reasonable to expect that the calculation can be extended and align with the operating life of the mine.
Non-market valuation of employee benefits	The non-market valuation of employee benefits should be zero.	The inclusion of non-market valuation of employee benefits is uncommon, but Gillespie provides a sound evidence base for these. Further, Gillespie has provided the results both with and without the inclusion of worker benefits in the Economic Assessment.

Subject matter	CIE findings	EY Findings
Greenhouse gas (GHG) emissions	The full costs of the GHG emission externalities should be apportioned to the project	We find that Gillespie's method of apportionment for GHG emission externalities is consistent with the Guidelines and has been accepted in other projects by the Department.[2]
Commodity prices	The estimated commodity prices, and the assumption of a constant exchange rate are considered too aggressive and therefore overestimate revenue.	We find that Gillespie's commodity price forecasts and exchange rate assumptions are in line with spot prices and exchange rates prevailing in the market today. Moreover, Gillespie has tested a range of downside risk through a sensitivity analysis.
Taxes	On the basis of a review of taxes paid by a selection of mining companies recently in Australia, Gillespie may be overestimating the potential tax benefits that will accrue to the NSW government.	We find that Gillespie's estimation of the tax benefits that will accrue to the NSW government are consistent with the Guidelines as these are calculated on the basis of the profitability of the Project itself.
Supplier benefits	No supplier benefits were estimated in the cost benefit analysis. The CIE did not make any significant comments on this matter.	We believe that Gillespie has adopted a conservative position by assuming that there would be no benefits arising to suppliers due to the project. An analysis of net benefits of the project should include the spending to suppliers in NSW on goods and services. An estimate of the impact can be calculated based on an increase in producer surplus that results from the Projects' operations.
Computable general equilibrium (CGE) modelling	CGE modelling was not undertaken. The CIE did not make any comments on this matter.	We believe that, in future, the inclusion of CGE modelling would be a useful complement to the analysis undertaken for CBA.

1.2.1 Worker benefits

Worker benefits are a key area of disagreement in many mine applications. The Guidelines are not prescriptive in their treatment of workers benefits, which has contributed to these ongoing issues. The Guidelines, however, are explicit in their allowance of positive worker benefits and recognizes that such benefits can represent a major proponent of the overall benefits for a project, provided there is sufficient evidence to support it. In this respect, some fundamental questions need to be answered:

- How many workers will a project employ?
- From which sectors and geographies are they coming from?
- How much will they be paid?
- Is there a premium to their reservation wage, and if so, what are the drivers of this premium?

In Gillespie's paper, it is assumed that the Project will employ 210 workers, of which 10% (21 workers) workers will be drawn from the unemployment pool, and the rest (189 workers) will be drawn from across the general labor pool of currently employed people. Gillespie assumes that the reservation wage for unemployed persons is $47,526 and $64,500 for those drawn from the pool of employed people, and worker benefits are only applied for the first three years of operations.

The reservation wage for unemployed persons was estimated based on unemployment benefits plus income taxes payable on minimum wages, while the reservation rate for employed people was the average wage rate in NSW.

[2] NSW Government Planning & Environment (2017) Residual Matters Report: State Significant Development Wallarah 2 Coal Project (SSD 4974), page 22

Further, Gillespie assumes an additional 10% increase in the reservation wage to account for the disutility of working in a mine, even though there is not strong evidence to corroborate this. Lastly, the workers are assumed to be predominately drawn from the region.

This methodology results in an estimate of market-based potential benefits of employment at approximately $25 million over the lifetime of the mine (at a 7% discount rate, as required by the Guidelines).

Thus, Gillespie has provided information in the Economic Assessment to allow us to both ascertain the assumptions used in the analysis and to broadly replicate the results.

The CIE argues that worker benefits should be zero for the purposes of the CBA. The key justifications used are that:

1. The average wage benchmark is inappropriate because the mine in question will simply employ workers from another mine.
2. That the wage premium paid simply covers the disutility of working in the mine.

In contrast to the findings raised by the CIE, we find that the Guidelines are clear in their allowance for the use of worker benefits as part of the CBA on the basis that sufficient evidence is presented. Further, the justification given by Gillespie for the inclusion of worker benefits appears to be in-line with the Guidelines. The methodology used by Gillespie to account for the worker benefits based on a reservation wage for the unemployed and workers from the rest of NSW represents a reasonable proxy for the additional benefit that would accrue to the new jobs that are created at the mine. Gillespie's survey, which was completed over a small sample, and internal research which tracks inter-industry migration of workers from census data, corroborates the notion that many workers in the mining sector today are from other industries. Movements in workers can be assessed through information published in the Census. Our analysis of several iterations has demonstrated that a significant portion of workers currently employed in the mining sector have transferred from other sectors of the economy.

Furthermore, it is unclear whether there is any disutility in working in this mine, given that it is an open cut mine and that a sizeable portion of the workforce will not be working at the mine face. In this respect, we believe that the wage premium paid to workers at the mine face would be driven primarily by the highly capital-intensive nature of the mining sector, which results in a higher average labour productivity for workers in the sector. The high capital requirements of the sector imply that mining firms would be willing to pay a wage premium to ensure that vacancies are minimised and to reduce the level of turnover in staff.

Gillespie follows the general approach of Streeting and Hamilton (1991)[3] in estimating the magnitude and the length of time that worker benefits would accrue to workers. Streeting and Hamilton's approach to limit the estimation of benefits to 3 years appears conservative, as workers employed at the mine will be earning a significant wage premium throughout the lifetime of the mine. It is therefore reasonable to expect that the calculation can be extended and align with operations and is a generally adopted practice when undertaking cost-benefit analyses. An extension in accounting for worker benefits in the CBA would have a material impact on results. For example, extending the estimation of worker benefits to encompass using Gillespie's methodology for the entire operating life of the project would increase the potential benefits from $25 million to circa $90 million.

We find that Gillespie' assumption that 10 per cent of the workforce will be drawn from unemployment pool appears to be reasonable based on the available evidence. Apart from the

[3] Streeting and Hamilton (1991) An Economic Analysis of the Forests of South-Eastern Australia, Resource Assessment Commission, Research Paper Number 5.

literature cited, according to the Social Impact Study completed for Bowdens,[4] the characteristics of towns surrounding the project are reported to both have a significant proportion of workers employed in the mining industry, as well as having a higher unemployment rate, on average, than broader NSW. Given these characteristics, it's reasonable to assume that a portion of the workforce will be sourced locally, and of those, a higher rate would be drawn from the unemployment pool than the overall Mid-Western LGA unemployment rate would suggest.

Furthermore, Gillespie conducted a sensitivity analysis around the proportion of workers that are sourced from the unemployment pool, which encompasses both the long-term NSW and Mid-Western LGA unemployment rates. As is shown in the Economic Assessment, this sensitivity does not have a material impact on the results.

1.2.2 Non-market valuation of employee benefits

Gillespie economics estimates that the Project may provide 210 direct jobs during operations, over 15 years, resulting in an estimated $78 million in NPV terms for the non-market benefits of employment (at a 7% discount rate, as required by the Guidelines). This estimate is calculated off choice modelling surveys, which measured a community's willingness to pay for the benefits of employments due to various mining projects.

This methodology results in an average non-market value of employment in the region of $41 000 per employee (based on the estimated NPV value with a 15-year operating life and an average of 210 workers on the mine).

We find that Gillespie has provided information in the Economic Assessment to allow us to confirm the basis of the assumptions used in the analysis.

The CIE writes that such an estimate should be assumed to be zero, because:

- Gillespie's analysis does not appear to consider the existing employment status of employees, nor the impacts of potential 'crowding out' of existing jobs.
- That they are inconsistent with NSW Government Guidelines.
- That extrapolating the value from the choice modelling surveys across all mining employment in NSW would result in approximately $1 billion of benefits.
- Lastly, there are concerns regarding the validity of the results from earlier choice modelling surveys, as respondents' perceptions of the outcomes from jobs may be inaccurate and subject to heterogeneity.

Gillespie argues that such benefits are on the cutting edge of CBA and in the applied economics literature, however he cedes that such measures have not made their way into guidelines for CBA and has therefore shown the results both with and without these benefits. However, we are in agreement with Gillespie's responses to CIE's comments regarding the extrapolation of choice modelling surveys across all mining employment and the concerns regarding the validity of the results on choice modelling surveys. It is inappropriate to extrapolate marginal values from non-market valuation estimates to outside the range of effects within which they were estimated, as they are not average industry values to be applied to the whole mining industry. Secondly, the claim that the validity of the results is of concern may be unfounded, given that there is support in academic literature for the existence of a willingness-to-pay for non-market environmental values. The chosen values utilised in the Economic Assessment are derived from academic articles which have undergone a peer review process.

In accordance with our view, Gillespie believes that these results may be contentious and reports the net benefits with and without 'total employment benefits'. However, to use a consistent approach, we believe that the non-market valuation of benefits should be treated separately from

[4] Part 17 Social Impact Assessment State Significant Development No. 5765 (2020)

the 'Total Employment benefits' in the results of the Economic Assessment. Given that that there is a strong case for the inclusion of wage benefits to employment, we recommend that the CBA results should report net social benefits, with and without the estimate of non-market valuation of employment.

Additionally, we note that there is a high degree of variation in the results of the studies measuring the non-market value of worker benefits, as highlighted by Gillespie in Annexure 7 of the Economic Assessment, and therefore the estimates should be subject to sensitivity testing in the analysis. Accordingly, we note that Gillespie has recognised this and has adopted a conservative position in utilising the lowest "willingness-to-pay" values in the estimation of the non-market valuation of employment benefits across the various reports sited in his analysis.

1.2.3 Greenhouse gas emissions

The Guidelines state that the cost of Scope 1 & 2 emissions be apportioned to account for the costs that are only borne by NSW households. Consistent with the measurement of other benefits, a CBA should include all first-round impacts, but not secondary impacts.

Gillespie Economics estimates that the present value of the costs of greenhouse gas (GHG) will range between $9 million and $36 million.

Three shadow prices were used to price the GHG externality ($/tonne):

- Forecast European Union Emission Allowance Units price
- Australian Treasury Clean Energy Future Policy Scenario
- The US EPA Social Cost of Carbon.

The total costs of GHG emissions were apportioned by using Australia's share of the global population (0.31%) and NSW's share of the Australian population (32%), resulting in:

- A present value attributed to Australia at between $27,000 and $111,000
- An attribution to NSW of between $9,000 and $36,000.

Thus, Gillespie has provided information in the Economic Assessment to allow us to both ascertain the assumptions used in the analysis and to broadly replicate the results.

The CIE states that the entire cost of the greenhouse gas (GHG) externality should be apportioned to the Project resulting in a range of net costs of $9 million to $36 million in net present value (NPV) terms. The CIE argues that Gillespie has misinterpreted the Guidelines and has understated the cost of the externalities due to GHG emissions by apportioning the full costs to NSW's relative share of the global population. To support this, CIE draw attention to the *draft* guidelines for the assessment of mining and coal seam projects, and other guidelines surrounding CBA for different kinds of projects.

CIE expressed similar concerns about the method of apportionment for GHG emissions and offered similar recommendations to those found in their Peer Review of the Economic Assessment undertaken by Gillespie Economics[5] for the Wallarah 2 Project. In their conclusions, the NSW Department of Planning and Environment responded in their Residual Matters Report for the Wallarah 2 Coal project[6] by noting that the "CIE estimates considered by the Commission's 2017 Review were global costs, rather than the NSW-only approach", with Gillespie's approach being the preferred method of apportionment by the Department.

[5] The CIE (2016) Peer review of the economic assessment Wallarah 2 Coal Project

[6] NSW Government Planning & Environment (2017) Residual Matters Report: State Significant Development Wallarah 2 Coal Project (SSD 4974)

In contrast to CIE's observations, we find the methodology used by Gillespie in accounting for the local impact of GHG is reasonable. Whilst other guidelines may state that the full costs of GHG emissions should be attributed to the project, the relevant guidelines that should be used for CBA on mining projects are the "Guidelines for the economic assessment of mining and coal seam gas proposals (2015)." Additionally, the Technical Notes supporting the Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals (2018) are clear in emphasising that the economic impact of GHG emission externalities should be apportioned to the impact of NSW only. These Guidelines recognise that greenhouse gas emissions causing climate change are a global problem, not local.

Furthermore, apportioning the full costs of the scope 1 & 2 GHG to the project would be inconsistent with the way benefits have been apportioned to the project. GHG emissions are in effect, a global externality, and therefore the value of these externalities should be apportioned by the share of the NSW collective households relative to the rest of the world in the same way profits from these projects are appointed to capital owners (many foreign) and corporate taxes allocated to NSW from an Australia-wide pool.

1.2.4 Commodity prices

In the Economic Assessment for Bowdens Silver, Gillespie reviewed available forecasts for silver, lead and zinc from major financial institutions, resulting in prices for:

- silver, at USD 21.42/oz, USD 21.5/oz and USD 22.00/oz for 2019-2021
- lead, calculated as the average of 2019-2021 consensus pricing, at USD 1.00/lb
- zinc, where the rounded average consensus forecasts were USD 1.25/lb between 2019-2021.

Gillespie assumes the AUD:USD exchange to be constant at 0.75, which is based on the long-term consensus forecast. Together, this results in an estimated average annual revenue of AUD 119m off the basis of expected production volumes of lead, silver and zinc estimated from the mine.

Again, Gillespie has provided information in the Economic Assessment to allow us to both ascertain the assumptions used in the analysis and to broadly replicate the results.

The CIE highlights that based on the World Bank and IMF forecasts, Gillespie has overstated the estimated price of the concentrates by around 30%. Moreover, CIE argues that using a constant estimate of USD/AUD of 0.75 may be unreasonable, as over the past two to three years, the Australian dollar has seen significant volatility (ranging between 0.56 and 0.81 USD).

Given the combination of the above findings, CIE recommended a lower input price should be used, which would result in lower benefits.

There are two main factors that should be accounted for when assessing price assumptions:

- The US dollar price of silver and other commodity prices prevailing in international markets.
- The exchange rate between the Australian and US dollar.

A decrease in the price of the commodity can either reflect a reduction in world prices, or an appreciation of the Australian dollar relative to the US dollar, or some combination of both.

We find that spot prices for zinc and lead today are broadly in line with the forecasts used by Gillespie in the CBA[7]. Moreover, demand for silver has resulted in a higher spot price of silver than

[7] World Bank (April 2021) Commodity Markets Outlook: Causes and Consequences

used by Gillespie in the CBA[8]. Therefore, based on current forecasts, the input assumptions used by Gillespie are reasonable.

However, when viewing the assumption of a constant exchange rate in conjunction with the current economic climate, the increased volatility of the prices of precious metals and the volatility of the AUD:USD exchange rate, we recommend that for future analysis, the range of the sensitivity analysis be increased from +/- 20% to +/- 25% to more broadly account for the uncertainty in commodity markets and exchange rates.

1.2.5 Taxes

The production benefits related to taxation estimated by Gillespie are based on a bottom up estimate of costs, and:

- 32% of third-party royalties attributed to NSW's share of the Australian population
- 30% corporate tax rate of taxable income attributed to NSW's share of the Australian population.

Gillespie's procedure for estimating company tax is calculated by subtracting operating costs (including royalties) and capital allowances from revenue, and then applying any relevant forward tax losses. This resulted in an estimated $15 million to NSW's share of Net Production Benefits attributable to company tax over the life cycle of the project.

Gillespie has provided information in the Economic Assessment to allow us to both ascertain the assumptions used in the analysis and to broadly replicate the results. Overall, the CIE finds the methodology for calculating taxes and the tax estimates given by Gillespie to be reasonable. However, the CIE argues that Gillespie is potentially overestimating the benefits which would accrue to the state of NSW through taxation. The CIE argues that the actual tax paid by mining companies tends to be much lower than the assumed rate that is required in the Guidelines.

In alignment with Gillespie's response to the CIE critique, we find that the evidence provided by the CIE is unsubstantiated and is inconsistent with the approach outlined in the Guidelines. The premise of the CBA is based on a consideration of the direct project costs relative to the case where the project does not exist, or an extension is not granted. Therefore, the estimate of taxes that result directly from the operations of the project, as applied by Gillespie, is reasonable.

However, we note that there are a range of uncertainties inherent in estimating forecast revenues and costs. Gillespie has recognised this and tested the impact of various upside and downside sensitivities (+/- 20%) and presented these as part of the Economic Assessment. This is a reasonable range to test, but for future analysis, we recommend extending the sensitivity analysis on to estimated benefits arising due to taxation to be +/-25%.

1.2.6 Supplier benefits

Gillespie writes that the focus of CBA is generally on the first-round impacts of a project. Secondary net benefits that accrue to firms that sell or buy from a project are ignored. Therefore, Gillespie adopts a conservative stance in the estimation of supplier benefits and includes no secondary benefits accruing to suppliers in the analysis.

The CIE highlights that supplier benefits will typically represent a small proportion of the total benefits of a project, while Gillespie has limited the estimate of supplier benefits to the Local Effects Analysis (LEA). The results of the LEA, which include a measure of supplier benefits using IO analysis of the operating expenditure of the mine in the local region are presented separately and

[8] https://markets.ft.com/data/commodities/tearsheet/summary?c=Silver+5000oz

are not estimated as part of the CBA. In this instance, the Economic Assessment clearly lays out the approach and input assumptions surrounding the estimate of supplier benefits in the LGA, as well as a detailed summary of the critique and arguments for the use of IO modelling to establish the broader benefits of the project.

From our assessment of other mining projects, we find that one of the key benefits of private sector investment is through the establishment of supply chain networks that act to disperse the economic benefits of projects to a myriad of businesses. Indeed, Gillespie writes in his response to the CIE that supplier benefits can represent a major proportion of the total benefits of a project. We, therefore, believe that Gillespie has adopted a conservative approach in the estimation of supplier benefits, and recommend that an estimate of supplier benefits should be added to the CBA.

An analysis of net benefits of the project should include the spending to suppliers in NSW on goods and services that would take place under the Project. An estimate of the impact can be calculated based on an increase in producer surplus that results from the Projects' operations.

This approach has been followed in a range of approved projects, and in its peer review of Tahmoor South coal project in 2020, which estimated significant positive effects to suppliers, Oxford Economics writes that the approach to incorporating supplier benefits appears to be broadly consistent with specifications in the Guidelines.

1.2.7 CGE modelling

As a final comment we note that a typical, and preferred, way for governments to assess the impacts of large projects is using Computable General Equilibrium (CGE) modelling. This type of modelling was not undertaken by Gillespie, even though the Economic Assessment makes reference to using this type of modelling as an option for further quantifying the economic impact of the Project.

A CGE model is based on a more detailed representation of the economy, including the complex interactions between different sectors, such as labour market displacement associated with the increased demand associated with the Project, and takes into account international ownership (which results in the expropriation of profits).

This kind of modelling, in our view, is a useful complement to the rather narrow focus of CBA, expanding the lens of the economic assessment to consider economic welfare more broadly. We believe this kind of analysis is useful to compare and corroborate the results of the economic impact assessment undertaken using CBA and as such would recommend its inclusion in the analysis.

2. Key findings raised by the CIE

We have summarised critical aspects of the methodology below, as contained in the Economic Assessment undertaken by Gillespie and the peer review by the CIE. We have concluded on each of the key areas based on our understanding of the Guidelines and on our experience in other assessments in the mining sector.

Table 1: Overview of key findings raised by CIE

Gillespie methodology	CIE findings	Gillespie response to CIE findings	EY comments and findings
Worker benefits			
Worker benefits are included in the estimation of net benefits of the project. Worker benefits are based on estimating the difference in wages paid to workers between the project case, where the mine is operational, and the alternative, where the mine does not get the necessary approval to operate. This is done assuming that: ► 10% of the direct workforce would otherwise have been unemployed. ► There is no disutility of working in the mining sector. ► There are no additional skills needed to work in a mine in an average job. ► The reservation wage for unemployed persons is AUD 47,526 applied to 21 mine workers, and AUD 64,500 (the average wage in NSW), applied to 189 mine workers. ► The project will draw its workforce from the average worker, not existing mining workers currently employed on another mine.	CIE argues that a value of zero is appropriate for worker benefits, and that the Guidelines (2015) also suggest that a value of zero is generally appropriate. In computing the wage premium, the CIE argues that Gillespie Economics includes a range of unsubstantiated assumptions. These include: ► The unemployment rate in the region is significantly lower than 10%, sitting at 4.5% (as at March 2019). Thus, Gillespie overestimated the unemployment rate, and therefore has overstated the number workers that would be drawn out from unemployment and into the mine. ► Wage rates should clear in equilibrium. Given that there is a substantial difference between the wages for the average job and mining job, factors such as the additional hardship and additional skills needed to work in the mine would explain the wage differences. ► The CIE argues that for currently employed workers, using the average mining wage is an appropriate reservation wage because it accounts for	Gillespie Economics responded to each point raised by the CIE and provided the following evidence to support the methodology applied in the economic assessment of the mine. NSW government guidelines state that benefits to workers "can be one of the major economic benefits from a project" and that the guidelines identify that a zero-wage premium should be used as a starting point. The CIE's assumption of zero worker benefits relies on two assumptions: ► That the economy is at full employment over the life of the project. ► All labour is sourced from the existing mining industry with no premium paid in one mine compared to another. The NSW economy is not at full employment and is unlikely to be at full employment over the life cycle of the project. A related survey at the Cadia Mine (2006)[12] as undertaken by Gillespie Economics focussed on	The Guidelines are clear in their allowance for the use of worker benefits as part of the CBA. We find that the justification given by Gillespie for the inclusion of worker benefits is in line with the Guidelines. The methodology used by Gillespie to account for the worker benefits based on a reservation wage for unemployed and workers from the rest of NSW is a reasonable proxy for the additional benefit that would accrue to the new jobs that are created at the mine. While the survey undertaken at the Cadia mine was completed over a small sample, this corroborates the notion that many workers in the mining sector today are from other industries. Further, extending the argument on the project employing workers from other mines is flawed as these mines themselves will seek to fill the vacancy, which will eventually result in workers either from the unemployment queue, or other sectors being hired, as there is a net increase in the total number of people employed in the mining sector. This justifies using the average wage rate in

[12] Gillespie Economics (2006) Cadia Mines Community Impact Review

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► The workforce would be predominately drawn from the region (i.e. NSW). This approach resulted in an estimate of the market-based potential benefits of employment at $25 million in present value terms (at a 7% discount rate). With regards to the non-market valuation of worker benefits, Gillespie writes that there may be spill over effects and externalities since the mine would employ people who would otherwise be unemployed. This is a public good value. Spill-over effects referred to in the literature relate to empathy-based losses to family or friends of impacted workers, because of an increased propensity for unemployed workers commit crime, as well as cause community dislocation. Gillespie argues that such spill-over effects can be generalised more broadly into the value that a community places in giving employment to the unemployed. Gillespie cites evidence from three choice modelling studies of mining projects in NSW: ► Metropolitan Colliery in the Southern Coalfields, Gillespie Economics (2008)[9], providing an estimated value	the other factors which explain the wage differential. Using the average mining wage as the reservation wage should therefore result in much lower proposed wage benefits than was outlined by Gillespie. The CIE argues that, given the highly contentious nature of the estimates of nonmarket values of employment, and the lack of robust evidence to support the estimates, that the nonmarket value of employment should be assumed as 'zero' for the economic analysis. They justify their recommendation by arguing that: ► Gillespie's analysis does not appear to consider the existing employment status of employees, nor the impacts of potential 'crowding out' of existing jobs. ► They are inconsistent with NSW Government Guidelines. ► That extrapolating the value from the choice modelling surveys across all mining employment in NSW would be approximately $1B, implying that it would be unreasonable that NSW residents would pay the equivalent of $371 per household per year to attain the non-market benefit of employment. ► That there are concerns regarding the validity of the results from earlier choice	the industry of previous employment for workers. The results indicated that 25% of its work force was drawn from the agriculture, forestry and fishing, manufacturing and construction industries. Even if an entire project sources its employees from an alternative mine, there is occupational upgrading. Since people will rarely move laterally for similar wages. The probability of a project drawing from the unemployment pool also increases as the unemployment rate increases, but the percentage coming directly from the unemployment pool is higher than the actual unemployment rate. Employing people in a new project will also result in job chain effects where the occupation upgrading of one person can lead to a sequence of occupation upgrading that reaches all the way down to new participants in the labour force or unemployed. On the concept of worker disutility, Gillespie argues that: ► Whilst workers may require a higher wage to compensate for the negative externalities of the mining industry, much of the mining workforce is not at the mine face.	the rest of NSW as a good proxy for a minimum reservation wage. We believe that Gillespie's treatment of the portion of unemployed workers (10%) being hired at the mine can be considered reasonable. As was shown in the Social Impact Study completed for Bowdens,[13] the characteristics of towns surrounding the project are reported to both have a significant proportion of workers employed in the mining industry, as well as having a higher unemployment rate, on average, than broader NSW. For the studied towns, the unemployment rate ranges from 16.5 per cent for Kandos, to 5 per cent for Lue. Moreover, around 15 per cent of residents within the Mid-Western Regional LGA are employed in the mining sector, relative to the 0.9 per cent employed in NSW.[14] Given these characteristics, it's reasonable to assume that a significant portion of the workforce will be sourced locally, and of those, a higher rate would be drawn from the unemployment pool than the long-term Mid-Western LGA unemployment rate would suggest. Gillespie tests a wide range of assumptions regarding the proportion of individuals that are drawn from the unemployment pool. The sensitivity analysis covers the ranges that include the Mid-Western Regional LGA unemployment rate of 5.4%, from a Survey in March-19 from the Department of Employment, Skills, Small and Family Business (2019). In addition to:

[9] Managing the Impacts of a Mine in the Southern Coalfield: A Survey of Community Attitudes

[13] Part 17 Social Impact Assessment State Significant Development No. 5765 (2020)

[14] Australian Bureau of Statistics (2016)

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to the community of 320 jobs over 23 years, and an estimated present value of $756 million for the community. ► Bulli Seam operations, Gillespie Economics (2009a),[10] which provides 1,170 jobs over 30 years, at an estimated community value of $870 million. ► Warkworth Mine extensions, Gillespie Economics (2009b),[11] which provides 951 jobs for 9 years, at an estimated value to the community at $286 million. The Project will provide 210 direct jobs during operations, over 15 years, resulting in an estimated $78 million for the non-market benefits of employment. Gillespie presents the results of the CBA with and without worker benefits. In addition to including the Wage Benefits, at $25 million NPV, the total worker benefits include 'non-market benefits of employment', valued at $78 million NPV, resulting in a total of $103 milion NPV.	modelling surveys, as it is not known which outcomes the estimated 'willingness to pay' comes from. As respondent perceptions of the outcomes from jobs may be inaccurate.	► 2017 and 2019 safe work survey demonstrates lower average fatality rates in the mining sector, relative to industries such as Construction and Agriculture, Forestry & Fishing. Gillespie highlighted this evidence to support the methodology employed in estimating and including worker benefits in the assessment. Gillespie writes that there is support in the academic literature showing that people may hold a non-use value for the employment of others in a wide variety of contexts. And that the study utilised to calculate the non-market benefits of employment was published in a peer reviewed journal. Gillespie argues that in The CIE's dismissal of non-market values for employment due to the inability of people to consistently estimate the outcomes of employment is unfounded and provides no evidence in support of this idea. Furthermore, The CIE extrapolates the non-market value for employment, that was gained from a study of defined scope, to all employment in the mining sector. Gillespie writes that it is inappropriate to extrapolate marginal values from nonmarket values outside of the range within which they were estimated.	► The long-term unemployment rate in NSW, 5.3%,[15] ► As well as average unemployment rate for 2020 range from 6.1% and 6.5% for NSW and Australia respectively. Additionally, as is shown in the Report, adjusting the assumption surrounding the proportion of employees that are drawn from the unemployment pool do not have a material effect on the estimation of worker benefits. Turning towards The CIE's assumption of wages clearing in equilibrium, the longer-term unemployment rate in NSW and the fluctuations therein (this rate ranged from 4% to 7.2% over the last 10 years) indicate that such an assumption requires evidence to demonstrate that it is reasonable. For example, in 2017, the RBA estimated that the NAIRU for Australia is in the region of 5%.[16] Lastly, the argument made by the CIE that wages should clear in equilibrium and should be equal across industries (unless there are other external factors) does not take into consideration the highly capital-intensive nature of the mining sector, which results in a higher average labour productivity for workers in the sector. This implies that mining firms would be willing to pay a wage premium to both ensure that vacancies are quickly filled, but also to reduce the level of turnover. The impact of higher vacancy rates in a mine is more significant than comparable positions in other sectors substantiating the wage premium. However, the approach taken by Gillespie to limit the estimate of the benefits to 3 years is conservative.

[10] Gillespie Economics (2009a) Socio-economic assessment: Bulli Seam Operations. Prepared for BHP Billiton Pty Ltd

[11] Gillespie Economics (2009b) Economic Assessment of the Warkworth Project. Prepared for Coal and Allied Pty Ltd

[15] Department of Education, Skills and Employment (March 2020)

[16] https://www.rba.gov.au/publications/bulletin/2017/jun/pdf/bu-0617-2-estimating-the-nairu-and-the-unemployment-gap.pdf

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		Lastly, the inclusion of nonmarket values for employment is CBA is considered at the cutting edge of academic research, and it has not yet found its way into guidelines on CBA. However, it is recognised that these results may be contentious, and therefore Gillespie has included results which have been reported "with" and "without" worker benefits.	Workers employed at the mine will be earning a significant wage premium throughout the lifetime of the mine, and it is therefore reasonable to expect that the calculation can be extended and align with operations. An extension in accounting for worker benefits in the CBA would have a material impact on results. For example, using Gillespie's method for estimating worker benefits for the operating life of the project would increase benefits from $25 million to circa $90 million. Our findings are in line with those noted by the BDA group in their peer review of the Gillespie Economic Assessment. Lastly, the use of worker benefits has been used in a range of other project assessments where DPIE has approved these, as precedent. Turning towards the non-market valuation of employment, and despite showing support in academic literature for such non-market valuation of employment, the Guidelines are clear in which benefits should be included when calculating the benefits of a project. We find the inclusion of these benefits under 'total employment benefits' as an aggregate to be inconsistent with the Guidelines and should be presented as separate items, as these are in effect community wide benefits, whereas wage benefits accrue to the specific employees. Moreover, we recommend that the results of the CBA be presented with and without these specific benefits. To the extent that decision makers would be influenced by these figures, we also suggest that the non-market valuation of benefits to workers be subject to sensitivity testing. As was noted by Gillespie and is shown by the references in the Economic Assessment, existence values

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			display a large degree of variance, which should be accounted for in the analysis.
Greenhouse gas emissions			
Gillespie Economics estimates that the present value of the costs of greenhouse gas (GHG) will range between $9 million and $36 million. Three shadow prices were used to price the GHG externality ($/tonne): ► Forecast European Union Emission Allowance Units price ► Australian Treasury Clean Energy Future Policy Scenario ► the US EPA Social Cost of Carbon. The total costs of GHG emissions were apportioned by using Australia's share of the global population (0.31%) and NSW's share of the Australian population (32%), resulting in: ► A present value attributed to Australia at between $27,000 and $111,000 ► Attributed to NSW at between $9,000 and $36,000.	The CIE agreed with the approach taken to estimate the global value of GHG emissions, which is consistent with the Guidelines. However, the CIE argues that the full cost of the GHG emission externality should be attributed to the Project, because: ► Gillespie's approach misinterprets the 2015 Guidelines for the attribution of GHG emissions, which require a full attribution of GHG damage to the project. ► Assigning 100 per cent of emissions from the Project would be consistent with the NSW Government Guide to Cost-Benefit Analysis (2017), and with the attribution method for the AusRoads guidelines (2008) for road projects. ► Gillespie's approach would be inconsistent with the goals of the NSW Government's 2050 Climate Change Framework. CIE Recommends that the full cost of the externalities be attributed to the Project, at between $9 million and $36 million.	Gillespie argued in turn that the CIE has misinterpreted the Guidelines and noted: ► In NSW, the Guidelines are clear that the society of relevance for the assessment are the collective households in NSW. ► The NSW Government (2015, p. 9) Guideline states that an analysis "requiring benefits and costs to be estimated where possible as those that accrue to the NSW community." ► Gillespie's method of apportionment is considered the preferable method for apportioning the costs of GHG externalities across the project, as was noted by the NSW Department of Planning and Environment, in their Residual Matters Report for the Wallarah 2 Coal Project. With regards to the value of the GHG externality - "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." The CIE recommendations are inconsistent with the Guidelines as the draft Guidelines were 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 methodology used by Gillespie to estimate the cost of GHG emissions is reasonable, as noted by CIE. In contrast to CIE's observations, we find the methodology used by Gillespie in accounting for the local impact of GHG is reasonable. Whilst other guidelines may state that the full costs of GHG emissions should be attributed to the project, the relevant guidelines that should be used for CBA on mining projects are the "Guidelines for the economic assessment of mining and coal seam gas proposals (2015)." The guidelines state that analysis of the costs and benefits of a project "should be focused on the collective public interest of households in NSW." A CBA should include all first-round impacts, both direct and indirect, but not secondary impacts. That means that apportioning the full costs of the Scope 1 & 2 GHG emissions to the project is inconsistent with the way benefits have been apportioned to the project. GHG emissions are, in effect, a global externality, and therefore the value of these externalities should be apportioned by the share of the NSW collective households relative to the rest of the world. For example, if the full costs of the externalities were assigned to the project, even simply under the assumption that the totality of these costs should be borne by Australians, then the benefits of a project should also be treated the same way, for example

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		The CIE recommendations are also inconsistent with NSW Treasury Guidelines due to: ► The steps outlined by NSW Treasury reinforce Gillespie Economics' approach. Step 1 states that it is necessary to determine the scope of the impact e.g., geographic coverage. ► In the NSW Treasury Guidelines (2017), the geographic scope of impacts is should be defined as those that are borne by NSW households. The CIE recommendations are inconsistent with NSW Government's Climate Change Framework: ► The NSW Government's Climate Change Framework includes a "goal to reach net zero emissions by 2050". However, it is not clear whether the statement of a goal reflects the government's view of the likely social damage costs to NSW due to GHG emissions, and ► Since there have been no CBA of actions to achieve the stated goal of net zero emissions, it should not be reasonable to associate the framework with CBA in NSW. Lastly, the AusRoad guidelines are not relevant to the Bowdens Silver Project.	not attributing benefits, such a company income tax, to the proportion of NSW residents to Australia. A note in confirming methodology from other CBA guidelines: ► TPP17-03 NSW Government Guide to Cost-Benefit Analysis makes it clear that "in terms of geographic scope, a CBA should focus on impacts (costs and benefits) to the NSW community". ► The treasury guidelines state that "to fully inform NSW decision-makers, the CBA can also include an analysis of local and/or multi-jurisdictional impacts". ► In cases where an initiative generates costs or benefits to neighbouring Australian jurisdictions, the CBA should report both a central estimate showing the costs and benefits to the NSW community, and separate results showing any interstate costs and benefits. ► Even if the NSW Treasury guidelines were to be used in CBA of mining projects, the CIE's recommendations would still mean that multi-jurisdictional impacts were being borne only by NSW residents, therefore over emphasising the value of the externality relative to the benefits.
Commodity prices			
The main economic benefit of the Project is the market value of the metals recovered in concentrates – silver, zinc, and lead.	The CIE notes that price information from sources such as the World Bank indicates that expected commodity prices are around 20% below forecasts utilised by Gillespie Economics. However, more recent market	In response to the comments raised by the CIE, Gillespie argues:	There are two main factors that should be accounted for when assessing price assumptions.

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Bowdens Silver reviewed available price forecasts for Silver from major financial institutions, which is priced at USD 21.50/oz, 22.00/oz and, USD 22.50/oz. Lead price was calculated as the average of 2019 – 2021 consensus pricing, which gave a price of USD 1.00/lb. A similar approach was taken to zinc, the rounded average consensus forecasts for zinc were USD 1.25/lb for 2019 – 2021. The AUD:USD exchange rate was assumed to be 0.75. Resulting in an assumed Average Annual Revenue of AUD 119m.	forecasts are in line (or higher) than forecasts assumed by Gillespie Economics. The AUD/USD exchange rate is highly volatile and has ranged from AUD 0.56 US cents to AUD 0.81 US cents over the past 2-3 years and therefore a consistent exchange rate forecast of AUD 0.75/USD is unlikely.	► 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. ► Gillespie argues that demand for silver in particular is expected to continue to show strength, as the price of silver is generally correlated with gold, and usually climbs when economic or market concerns surface. ► Due to the recent strength shown by silver, the central price for silver used in the Economic Assessment can itself be considered conservative.	► The US dollar price of silver and other commodity prices prevailing in international markets. ► The exchange rate between the Australian and US dollar. A decrease in the price of the commodity can either reflect a reduction in world prices, or an appreciation of the Australian dollar relative to the US dollar, or some combination of both. The exchange rate forecast used by Gillespie is considered to be reasonable. According to KPMG in the February 2021 exchange rate forecasts, the long-term median forecast is 0.75 AUD per USD.17 The commodity price forecasts used by Gillespie are considered to be reasonable and the range tested through the sensitivity analysis that has been covered by Gillespie is sufficient to cover current forecasts. According to recent World Bank data (October 2020)[18] the forecasts for Silver, Zinc and Lead for 2021 are: ► That Zinc will trade in the region of USD 1.04/lb ► Lead will have a price of around USD 0.86/lb ► Silver will trade in the region of USD 18.1/oz. Spot prices for Silver, Lead and Zinc as of March 2021[19] are USD 25.6/oz, USD 0.88 /lb and USD 1.26/lb, respectively.

[17] https://assets.kpmg/content/dam/kpmg/au/pdf/2021/coal-price-fx-market-forecast-december-2020-january-2021.pdf

[18] https://pubdocs.worldbank.org/en/478961602618430208/CMO-October-2020-Forecasts.pdf

[19] World Bank, *Commodity Markets Outlook: Causes and Consequences*, (April 2021)

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			Therefore, the current forecasts for Zinc and Lead are broadly in line with the current spot price. However, current silver prices are significantly higher than the 5-year average. Having traded at between USD 15/oz and USD 20/oz for over five years prior to 2020.[20] Given the current economic climate, and the resulting increase in the volatility of the price of precious metals and the volatility of the exchange rate, for future analysis, we recommend that the range of the sensitivity analysis should be increased to +/- 25% to more broadly account for the uncertainty in the commodity and exchange markets.
Taxes			
As per the NSW Guidelines (2015) the production benefits related to taxation estimated by Gillespie are based on a bottom up estimate of costs, and: ► 32% of third-party royalties are attributed to NSW I.e., NSW's share of the Australian Population. ► 30% corporate tax rate of taxable income attributed to NSW's share of the Australian Population. Gillespie's procedure for estimating company tax is calculated by subtracting operating costs (including royalties) and allowable capital allowances from revenue,	While there is uncertainty regarding the different parameters, Gillespie Economics' estimate of $21 million is reasonable and in line with NSW Government estimates of $24 million. A range of between $17-$24 million (in present value terms) in royalty benefits to the NSW Government is appropriate, although more recent price projections would suggest that royalties at the upper-end of this range are more likely. In aggregate, Gillespie's estimate of $23 million (in present value terms) is reasonable. Assuming alternative commodity prices (similar to that used for royalty estimates, discussed above), it is reasonable	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 Australian company tax rate. The methodology used in estimating company taxes and royalties 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.	Gillespie's approach to estimating the tax benefits of the Project is reasonable, and consistent with the Guidelines. The argument made by CIE in critiquing the likelihood of actual taxes paid through the project, however, is methodologically inconsistent with the Guidelines, and is questionable. The fundamental basis of the CBA compares a project case to a base case where the project either does not exist or extension is not granted. Assessing broader company tax liabilities is inconsistent with this approach. In extending this argument, while liabilities or tax payments may be offset by other assessed losses in larger firms, these are irrelevant for the assessment of the merits of the project. Whether taxes are paid or used to offset other losses is immaterial, as the actual operation of the project relative to the base case (where no project exists)

[20] https://markets.ft.com/data/commodities/tearsheet/summary?c=Silver+5000oz

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then applying any relevant forward tax losses. For the project Gillespie assumes that the Project would have relevant tax losses of AUD 42m at the start of production and have been applied to reduce taxable income. The total benefits attributed to company tax were estimated at $15 million over the lifetime of the project. Gillespie estimates royalties at 4% minus allowable deductions, resulting in an average annual royalty of $2.3 million.	to assume a benefit range of around $18 million -$26 million associated with these three items. However, data on the tax payments from mining companies suggests that the actual tax payments could be significantly lower than estimated. 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.		means that these tax liabilities will be created and should be recognised as part of the benefits of the project. Further, Gillespie's approach in constructing a profit and loss statement on the basis of actual costs that are expected to be incurred at the mine is consistent with the guidelines and is more accurate than the benchmarks used by the CIE in comparing average taxes paid by a range of companies over a 3 year period. However, it is noted that there are a range of uncertainties inherent in estimating forecast revenues and costs. Gillespie has recognised this and tested the impact of various upside and downside sensitivities (+/- 20%) and presented these as part of the Economic Assessment. This is a reasonable range to test, but for future analysis, this range could be extended to +/-25% in line with our recommendations for changes in commodity prices.
Supplier Benefits			
Gillespie highlights that the focus of CBA is generally based on the primary costs and benefits, in essence, the first-round impacts. Secondary net benefits that accrue to firms that sell to or buy from a project are ignored. Therefore, Gillespie adopts the stance that no secondary benefits to the economic assessment are included. However, the economic activity to suppliers form the Project is examined in	CIE did not raise any findings regarding supplier benefits for the CBA assessment, other than stating that indirect benefits are typically small. In its review of the Economic Impact Assessment for Rocky Hill, the CIE finds that supplier benefits totalled around 3% to 4% of net production benefits. In the CIE review of DAE's Rocky Hill Coal mine assessment, they write that DAE's analysis is conservative as it "assumes no	Gillespie writes that other Economic Assessments, such as Cadence (2018)[21] find that supplier benefits can be substantial, i.e. 77% of direct net production benefits of the Tahmoor South Project. *Local effects analysis:* Gillespie writes that the LEA reported in Section 5 of the CBA was conducted using the specific LEA method outlined in the Guidelines, and that the in Section 6, a supplementary LEA was	One of the key benefits of private sector investment is through the establishment of supply chain networks that act to disperse the economic benefits of projects to a myriad of businesses. The Guidelines are clear in their allowance for the use of supplier benefits as part of the CBA. Consistent with the Guidelines, an estimate of the producer surplus associated with supplier spend can be developed using the additional demand for inputs into production. Therefore, an extension of the analysis of the net benefits of the project could, and should include the spending on goods and services that will take place under the project,

[21] Cadence Economics (2018) *Economic Impact Assessment of the Tahmoor South Project*

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the Local Effects Analysis and Supplementary Local Effects Analysis. Gillespie defines the local area as the Mid-Western Regional LGA for both these analyses. The secondary effects of the Project are examined in two sections, Section 5 uses the LEA approach as outlined by the Guidelines, and Section 6 utilises an input-output analysis. These sections are used to identify the gross economic footprint associated with the Project on the local economy. Gillespie categorises the local area effects of the project into two phases, the construction and operation phases of the project.	additional surplus for landholders, worker or suppliers." *Local Effects Analysis:* Gillespie Economics has conducted the LEA using the standard input-output methodology. The CIE writes that the multipliers appear to have been estimated with respect to the net income and employment numbers, which 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 $1 million. Table 6.1 of the Gillespie Economic Assessment 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. These differences are significant and have not been addressed with an explanation.	included which utilised the standard input-output methodology. Gillespie argues that CIE has conflated the two methods outlined in Sections 5 and 6, and that the methodology used in section 5.1 is in accordance with the Guidelines related to LEA. The differences in wages identified by CIE in Tables 6.1 and 5.1 relates to the different ways which income was treated in the LEA analysis in Section 5 and the Supplementary LEA in Section 6.	and accounting for the gross operating surplus to derive the increase in producer surplus that results from the projects' operations. The quantum of these benefits should further be tested in the sensitivity analysis. This approach was followed in a range of approved projects, and in the peer review of the Tahmoor South project, which included supplier benefits, Oxford Economics (2020)[22] argues that the approach in incorporating supplier benefits appears to be broadly consistent with the specifications in the guidelines.
Overall conclusion			
The estimated Net Social Benefits of the Project to NSW are between $44 million and $146 million, present value at 7% discount rate (the latter including employment benefits).	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)	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	Overall, the analysis of the project undertaken by Gillespie is in accordance with the guidelines.

[22] Oxford Economics (2020) Peer Review of Economic Impact Assessment Tahmoor South Coal Project

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Consequently, as well as resulting in net benefits to Australia, the Project would also result in net benefits to NSW.	are estimated at $50 million in present value terms. This would be partially offset by greenhouse gas emissions valued at between $9 million - $36 million. 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.	reducing all categories of benefit and increasing the estimated GHG costs.	We have identified a few areas where input assumptions could be adjusted (such as in estimating worker benefits), while the addition of supplier benefits could be considered. Accordingly, the critiques raised by CIE surrounding the inclusion of wage benefits to employment, the use of a higher GHG emissions cost and lower tax benefits do not apply a consistent and holistic approach that aligns to the Guidelines in calculating the costs and benefits of the Project. However, given the contentious nature of the non-market valuation of employment, coupled with its inconsistency with the Guidelines, we suggest that the CBA results be presented with and without these values.

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