



## **APPENDIX 30**

### Economic Impact Assessment

# Economic impact assessment of the Glendell Continued Operations Project

Glendell Tenements Pty Limited

29 October 2019

## Release notice

Ernst & Young ("EY") was engaged on the instructions of Umwelt (Australia) Pty Ltd ("Client") to perform an economic impact assessment in relation to the proposed Glendell Continued Operations Project ("Project"), in accordance with the engagement agreement dated 29 August 2018, including the General Terms and Conditions ("the Engagement Agreement").

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 29 October 2019 ("Report"). The Report should be read in its entirety including 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.

Ernst & Young has prepared the Report for the benefit of the Client and has considered only the interests of the Client. Ernst & Young has not been engaged to act, and has not acted, as advisor to any other party. Accordingly, Ernst & Young makes no representations as to the appropriateness, accuracy or completeness of the Report for any other party's purposes.

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David Holmes  
Principal Environmental Consultant  
Umwelt  
75 York Street, Teralba  
NSW 2284

29 October 2019

## **Economic impact assessment of the Glendell Continued Operations Project**

Dear David

In accordance with our Engagement Agreement dated 29 August 2018 ("Agreement"), Ernst & Young ("we" or "EY") has been engaged by Umwelt (Australia) Pty Ltd ("you", "Umwelt" or the "Client") to provide economic impact assessment services (the "Services") in relation to a proposed Glendell Continued Operations 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 deliverable by EY will be used for the purpose of outlining the net economic impact of the Project to NSW (the "Purpose").

This Report was prepared on the specific instructions of Umwelt 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 Umwelt 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 29 August 2018 and was completed on 29 October 2019. Therefore, our Report does not take account of events or circumstances arising after 29 October 2019 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 after due enquiry 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.

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. However, we have evaluated the information provided to us by Umwelt as well as other parties through enquiry, analysis and review and nothing has come to our attention to indicate the information provided was materially mis-stated or would not afford reasonable grounds upon which to base our Report.

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 Umwelt and other information sources used during the course of the engagement. The modelled outcomes are contingent on the collection of assumptions as agreed with Umwelt 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 Umwelt 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 George Michalas on 02 6279 4525.

Yours sincerely

Steve Brown  
Partner

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# Executive summary

## Executive summary

Glendell Tenements Pty Limited (Glendell), a subsidiary of Glencore Coal Pty Limited (Glencore) is seeking approval to extend operations at the Glendell Mine, which is part of the Mount Owen Complex (MOC). The open cut operations at the Glendell Mine are currently undertaken in accordance with the Glendell Mine consent (DA 80/952) (Approved operations). Under current Approved operations, planned operations at Glendell, will extract up to 4.5 Mtpa of ROM coal over the period to 2044.

Glendell is seeking approval for the Glendell Continued Operations Project (the Project) to extract an additional approximately 135 Mt of ROM coal over a period of 24 years. This assessment has assumed that the Project will commence in 2021 with mining finishing in 2044.

Glendell Continued Operations will use existing mining facilities, including the Mount Owen coal handling and preparation plant and transport infrastructure for the life of the operations. The assessment has assumed that the operation of the Mount Owen CHPP and rail loading facilities continues to 2044.

### The analysis

Glencore has provided EY with the information required to complete an economic analysis of the Project. This data includes capital costs, employment and the costs to mitigate against potential environmental impacts. In addition, Glencore has provided the project physicals for the Project as well as an estimate of mining, processing, operational and capital costs.

This report provides an Economic Impact Assessment (EIA) for the Project based on the information provided to us and follows the economic assessment framework set out in the Guidelines for the economic assessment of mining and coal seam gas proposals (the Guidelines) released by the New South Wales (NSW) Government in December 2015.<sup>1</sup>

In addition, the Guidelines require an estimate of the potential costs generated by the Project. These costs may include residual public infrastructure costs and environmental, social and transport-related costs.

To estimate the environmental, social and transport-related costs, the EIA uses the methods outlined in the Technical Notes supporting the guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals.<sup>2</sup>

Consistent with these Guidelines, the EIA includes a Cost Benefit Analysis (CBA) and a Local Effects Analysis (LEA). The CBA provides an estimate of the net benefits of the Project to NSW. The LEA is based on analysis for the Lower Hunter region (as defined by the Australian Bureau of Statistics SA3 10604 region).

### Results of the CBA

The Project is estimated to provide a net benefit to NSW, it is estimated to be \$1,149.9 million in net present value (NPV)<sup>3</sup> terms, as shown in Figure 1. The estimated net benefit is comprised of \$398.0 million and \$754.3 million in potential direct and indirect benefits respectively. Incremental indirect costs of the Project are \$2.4 million in NPV terms.

These estimates are based on central case assumptions in relation to the proposed expansionary and sustaining capital of \$515.3 million in NPV terms and average real coal prices of \$118.5 and \$96.6 Australian dollars per tonne of semi soft coking coal and thermal coal respectively.

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<sup>1</sup> NSW South Wales Government (2015)

<sup>2</sup> Department of Planning and Environment (2018)

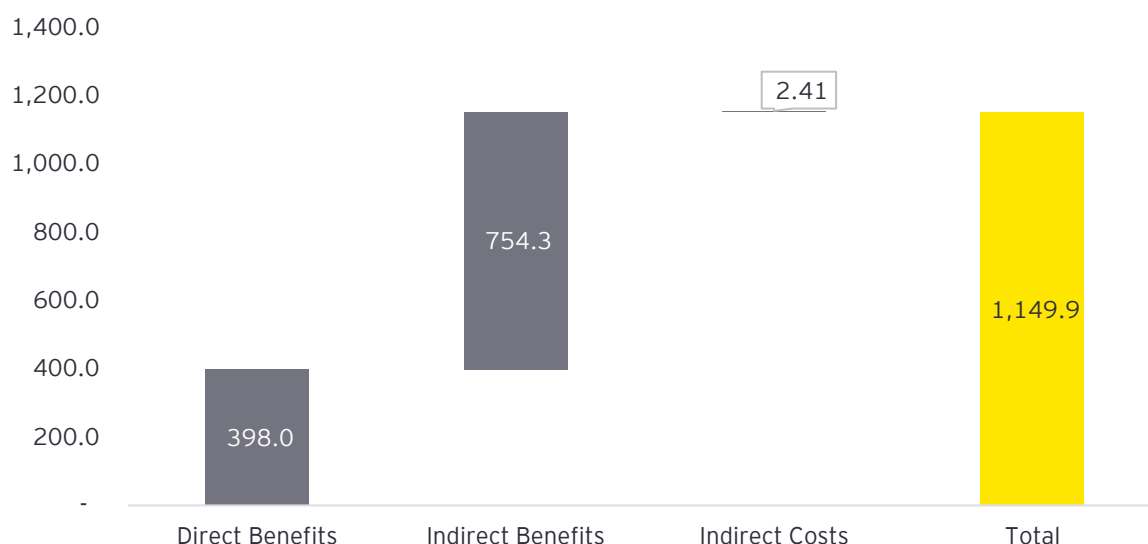
<sup>3</sup> All NPV figures reported are in 2019 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated), as required by the Guidelines



The **direct benefits** of the Project are a function of its profitability which, in turn, depends on the prevailing coal price. The Project is estimated to generate potential:

- ▶ Total corporate taxes of \$202.1 million in NPV terms for Australia, of which \$64.7 million is attributed to NSW
- ▶ \$333.3 million in other government revenue for NSW in NPV terms, the largest component of this being royalties of \$296.1 million, and net payroll taxes of \$37.2 million.

Figure 1 CBA summary of potential net benefits under central case assumptions, (\$ million NPV\*)



\* Net Present Value in 2019 Australian dollars calculated over the period 2019 to 2044 using a 7 per cent real discount rate.  
Source: EY estimates based on the Environmental Impact Statement, and information provided by Glendell.

The **indirect benefits** of the Project are related to the linkages that it will have to the NSW economy through both the labour market and suppliers. The analysis shows that of the \$754.3 million in estimated potential indirect benefits:

- ▶ Worker benefits are estimated to be \$468.0 million in NPV terms, from the additional ongoing employment attributable to the Project; and
- ▶ Supplier benefits are estimated to be \$286.3 million in NPV terms based on the NSW-based supplier inputs over the life of the Project of \$1,418.8 million in NPV terms.

The Project is expected to result in indirect costs on the NSW community of \$19.0 million, of which the majority are borne by Glendell (and accounted for in the operating costs of the Project). In terms of incremental indirect costs, those not borne by Glendell, these total \$2.3 million in NPV terms, through travel time costs, loss of surpluses to other sectors and greenhouse gas emissions.

Consistent with the Guidelines, systematic sensitivity analysis of the estimated net benefits is undertaken in this report. This sensitivity analysis shows that the estimated net benefits are robust in the sense that they remain (strongly) positive after testing all key assumptions underpinning the analysis.

In isolation, the estimated net benefit of the Project is most sensitive to the coal price assumptions, but even assuming coal prices are 15 per cent lower than under the central case assumptions the potential net benefits are estimated at \$1,054.5 million in NPV terms.

The lower bound estimate of net benefits, which takes the most pessimistic assumptions around coal prices, capital expenditure, operational expenditure as well as worker and supplier benefits, yields an estimated potential net benefit of \$938.4 million in NPV terms.

The upper bound estimate of potential net benefits, based on the most optimistic assumptions, is \$1,297.6 million in NPV terms.

## Results of the LEA

The LEA considers the costs and benefits of the Project on residents of the Lower Hunter region of NSW. The analysis shows an estimated potential net benefit of \$446.7 million to the region in NPV terms. This is driven largely by:

- ▶ Benefits to local workers of \$314.7 million in NPV terms based on Glendell employment data that 67 per cent of the mine's direct employees continue to be drawn from the region
- ▶ Benefits to local suppliers of \$134.3 million in NPV terms which is based on information from Glendell that 38 per cent of the inputs to production are supplied from the region.

Again, the report shows that the estimated local effects are robust under the sensitivity analysis conducted with a lower bound estimate of potential net benefits of \$384.7 million and upper bound estimate of \$466.2 million in NPV terms.

## Economy-wide modelling of the Project

The key macroeconomic variables projected for the scenario is shown in Table 1. In the Lower Hunter region, the Project is projected to increase Gross Regional Product (GRP) by \$2,522.4 million in NPV terms. Gross Regional Income (GRI) or regional welfare, is projected to increase by \$2,902.4 million in NPV terms. The projected increase in GRI is significant to the relatively small Lower Hunter region. In total, the Project is projected to increase welfare for each person in the Lower Hunter by \$27,654 in NPV terms.

For NSW, the projected increase in Gross State Product (GSP) is \$3,001.9 million in NPV terms. Gross State Income (GSI) is projected to increase by \$4,514.8 million in NPV terms.

Table 1 Project economy-wide impacts of the Project, 2021 - 2044

Variable	Description	Lower Hunter	NSW Total
Real GRP/GSP^	NPV* - \$m	2,522.4	3,001.9
Real GRI/GSI^	NPV* - \$m	2,902.4	4,514.8
Employment	Average - FTE^^	403.7	488.1
Real Wages	Average - Per cent^^	2.25	0.031
Real GRI per person^	NPV* - Dollars	27,654	492

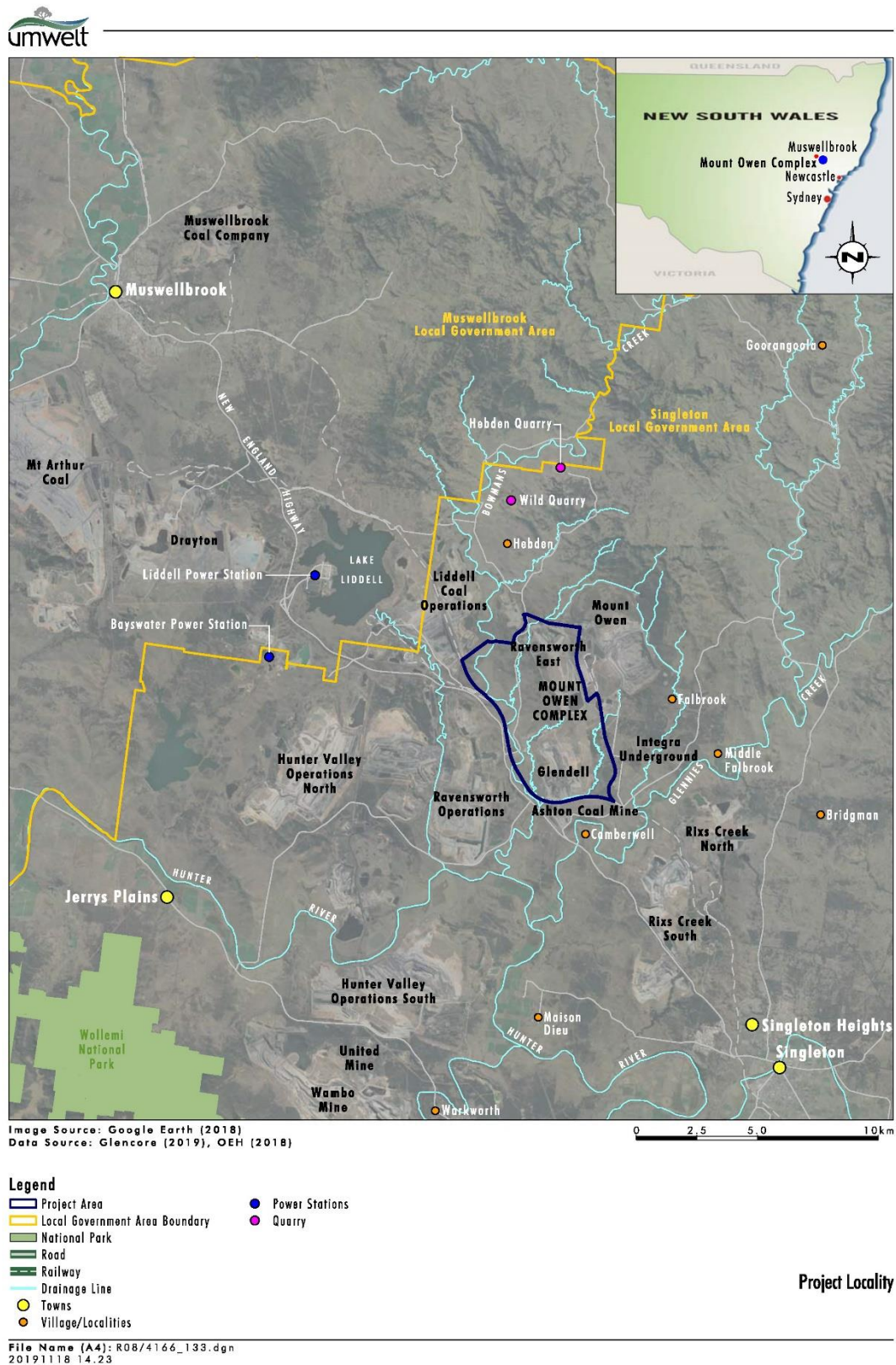
Source: EY estimates based on information provided by Glendell. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate. ^^ Average over the period 2021 to 2044.

# 1. Introduction

EY was commissioned by Umwelt to undertake an Economic Impact Assessment (EIA) of the Glendell Continued Operations Project (the Project). Glendell operates the Glendell Mine on behalf of Glencore Coal Pty Limited (Glencore). The Glendell Mine is part of the Mount Owen Complex (MOC). Tenements to be mined by the Project are owned by Glencore and its joint venture partner Mitsui Matsushima.

The MOC has approved open cut operations in three pit areas, including Mount Owen (North Pit), Ravensworth East (Bayswater North Pit) and Glendell (Glendell Pit - also known as the Barrett Pit). The MOC is located in the Hunter Coalfields in the upper Hunter Valley in New South Wales (NSW), approximately 20 kilometres (km) to the north-west of Singleton and 24 km to the south-west of Muswellbrook. The MOC is located in the Singleton Local Government Area (LGA) (see Figure 2).

Figure 2 Mount Owen Coal Complex



Source: Umwelt

Open cut mining at the Glendell Mine has been carried out since 2008. Glencore was granted approval for the Glendell Mine under the Glendell Mine consent (DA 80/952) which allowed ongoing operation of the Glendell Mine until June 2024. The North Pit and Bayswater North Pit are both approved under the Mount Owen Continued Operations Project consent (SSD 5850).

## 1.1 The Project

Open-cut operations at the Glendell Mine are currently undertaken in accordance the Glendell Mine consent (DA 80/952) (Approved operations). Over the period 2019 to 2024, approved operations will see up to 4.5 Mtpa of ROM coal extracted. The Project will seek approval to extract approximately 135 Mt of additional ROM coal reserves extending the mining life to 2044.

Glendell Continued Operations will use existing mining facilities, including the Mount Owen coal handling and preparation plant and transport infrastructure for the life of the operations.

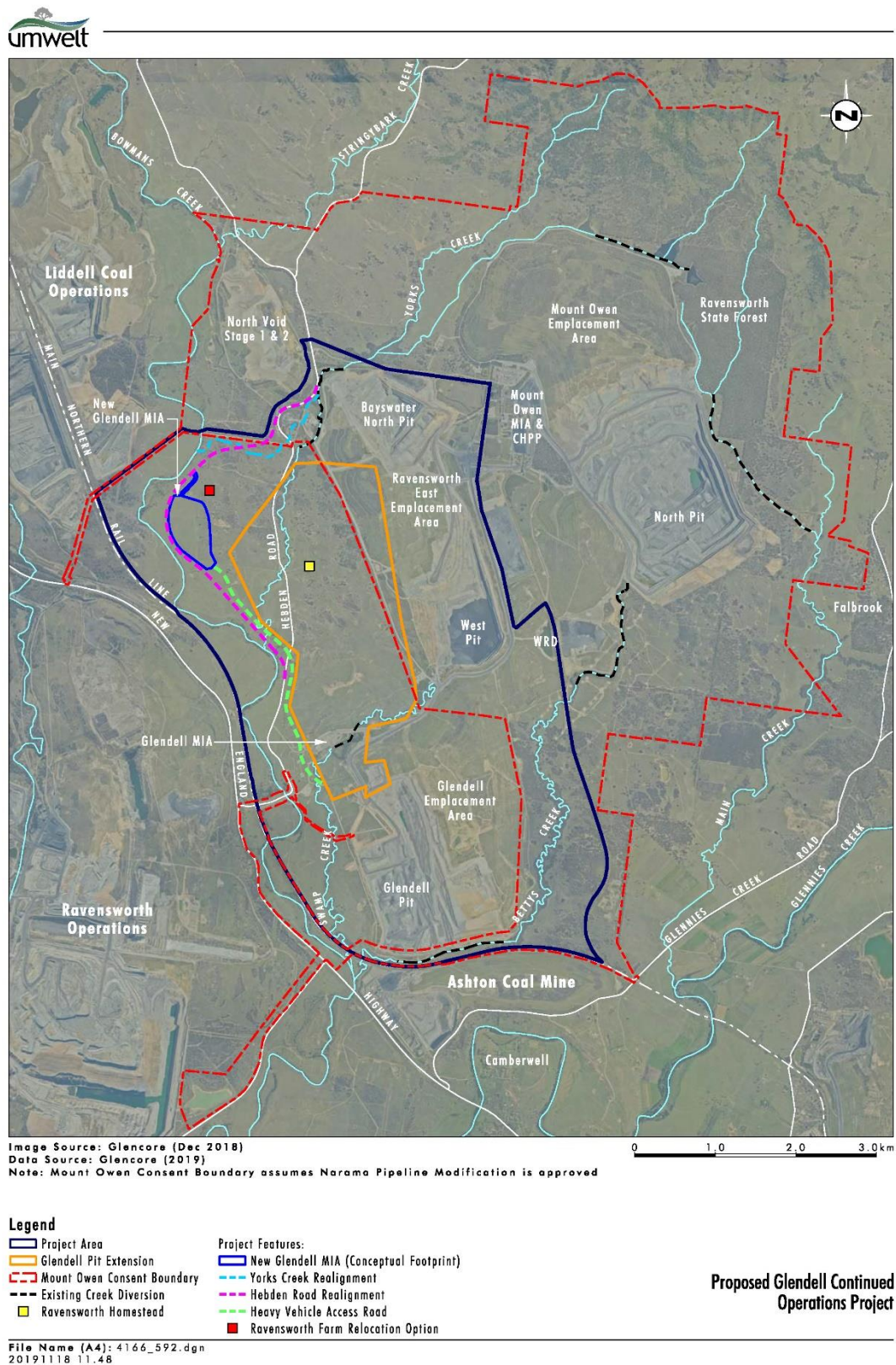
The Project generally comprises:

- ▶ Mining the additional coal reserves including establishment of overburden emplacement areas
- ▶ Extending the mining life of Glendell Mine to 2044
- ▶ Increasing the annual production rate during stages of the Project up to 10 Mtpa of ROM coal, but with no change to the overall annual production rate from the Mt Owen Complex as a whole
- ▶ Utilising existing infrastructure at the Mount Owen Complex
- ▶ Constructing a new Mine Infrastructure Area (MIA)
- ▶ Relocation of the Ravensworth Homestead
- ▶ Realigning the lower section of Yorks Creek
- ▶ Realigning part of Hebden Road ,and
- ▶ Relocating powerlines.

The use of existing infrastructure reduces the need for additional processing and coal handling facilities to be built and enables the Project to access the Greater Ravensworth Area Water and Tailings Scheme (GRAWTS) which minimises the needs for additional water management infrastructure to be constructed. This integration reduces the area of additional disturbance that would otherwise be required for a project of this scale and also reduces capital expenditure requirements.



Figure 3 Key features of the proposed Project



## 1.2 Approach to assessment

This EIA is based on a cost benefit analysis (CBA) and local effects analysis (LEA) prepared under the framework established in the *Guidelines for the economic assessment of mining and coal seam gas proposals* (the Guidelines) released by the New South Wales (NSW) Government in December 2015.<sup>4</sup> The CBA requires an assessment of the net benefits that accrue to the proponent, government, workers and suppliers of the Project.

In addition, the Guidelines require an estimate of the potential costs generated by the Project. These costs may include residual public infrastructure costs and environmental, social and transport-related costs. To estimate the environmental, social and transport-related costs, we have incorporated into our analysis the Technical Notes supporting the guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals.<sup>5</sup> This report uses several approaches to assess the potential costs generated by the Project. These include quantifying the costs such as the transport impacts or the loss of surpluses to other industries, or assessing the costs qualitatively, like visual amenity.

The CBA presented in Chapter 2 measures the net benefits of the Project to the NSW community. The LEA, which focusses on the benefits accruing to the region (the Lower Hunter Statistical Area, as defined by the Australian Bureau of Statistics), is presented in Chapter 3. In addition to the CBA and LEA, the report also contains an assessment of the economic impacts of the Project on the region based on computable general equilibrium (CGE) modelling. This modelling is presented in Chapter 4.

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<sup>4</sup> New South Wales Government (2015)

<sup>5</sup> Department of Planning and Environment (2018)

## 2. Cost-benefit analysis

The Guidelines set out the CBA framework to measure the net benefits of the Project to the NSW community. Table 2 provides a summary of how these net benefits are measured.

Table 2 Cost Benefit Analysis framework as defined in the Guidelines

Direct Benefits	Indirect Benefits	Indirect Costs
The net benefits that accrue to NSW from the direct operations of the proposed mine	The net benefits that are generated for parties that economically interact with the proposed mine	Social costs generated by the proposed mine, borne by the NSW community
Includes: <ul style="list-style-type: none"> <li>▶ Net producer surplus attributable to NSW</li> <li>▶ Royalties payable</li> <li>▶ Company tax attributable to NSW</li> </ul>	Includes: <ul style="list-style-type: none"> <li>▶ Net economic benefits to landowners</li> <li>▶ Net economics benefits to NSW employees</li> <li>▶ Net economic benefits to NSW suppliers</li> </ul>	Includes: <ul style="list-style-type: none"> <li>▶ Net environmental, social and transport-related costs</li> <li>▶ Net public infrastructure costs</li> <li>▶ Loss of surplus to other industries</li> </ul>

Source: NSW Government (2015)

The direct benefits are those that accrue to the proponent in terms of both producer surplus and payments made to government that can be attributed to NSW.

The indirect benefits are those that accrue to economic agents that engage with the Project proponent. These include employees, suppliers and land owners.

The indirect costs are the costs borne by the community of NSW, through environmental and social impacts or public infrastructure costs.

The data inputs for the analysis presented in this report are derived primarily from:

- ▶ Financial and other information provided by Glencore, which includes the Project overburden volumes, ROM coal tonnes, saleable coal by type and relative quality, operating and capital costs and employment
- ▶ Assessment findings arising from the various technical studies undertaken for the *Glendell Continued Operations Project* Environmental Impact Statement (EIS) prepared by Umwelt and environmental technical consultant reports including the:
  - ▶ *Greenhouse Gas and Energy Assessment, Glendell Continued Operations Project* (GHGEA), prepared by Umwelt
  - ▶ *Air Quality Impact Assessment, Glendell Continued Operations Project* (AQIA), prepared by Jacobs
  - ▶ *Groundwater Impact Assessment, Glendell Continued Operations Project* (GWIA), prepared by AGE
  - ▶ *Surface Water Impact Assessment, Glendell Continued Operations Project* (SWA), prepared by GHD
  - ▶ *Biodiversity Development Assessment Report, Glendell Continued Operations Project* (BDAR), prepared by Umwelt
  - ▶ *Noise Impact Assessment, Glendell Continued Operations Project* (NIA), prepared Umwelt
  - ▶ *Traffic and Transport Impact Assessment, Glendell Continued Operations Project* (TTIA), prepared by Puliypang
  - ▶ *Agricultural Impact Statement, Glendell Continued Operations Project* (AIS), prepared by Umwelt



- ▶ *Aboriginal Cultural Heritage Assessment, Glendell Continued Operations Project (ACHA)*, prepared by Australian Cultural Heritage Management which includes the *Aboriginal Archaeological Impact Assessment, Glendell Continued Operations Project (AAIA)*, prepared by OzArk
- ▶ *Heritage Impact Statement, Glendell Continued Operations Project (HIS)*, prepared by Lucas Stapleton Johnson & Partners
- ▶ KPMG, *Coal Price and FX consensus forecasts* KPMG June/July 2019 (KPMG)
- ▶ NSW Department of Primary Industry, *Beef stocking rates and farm size - Hunter Region*
- ▶ Transport for NSW (2016) *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives Transport Economic Appraisal Guidelines*
- ▶ Various data from the Australian Bureau of Statistics (ABS) including most recent Census data.

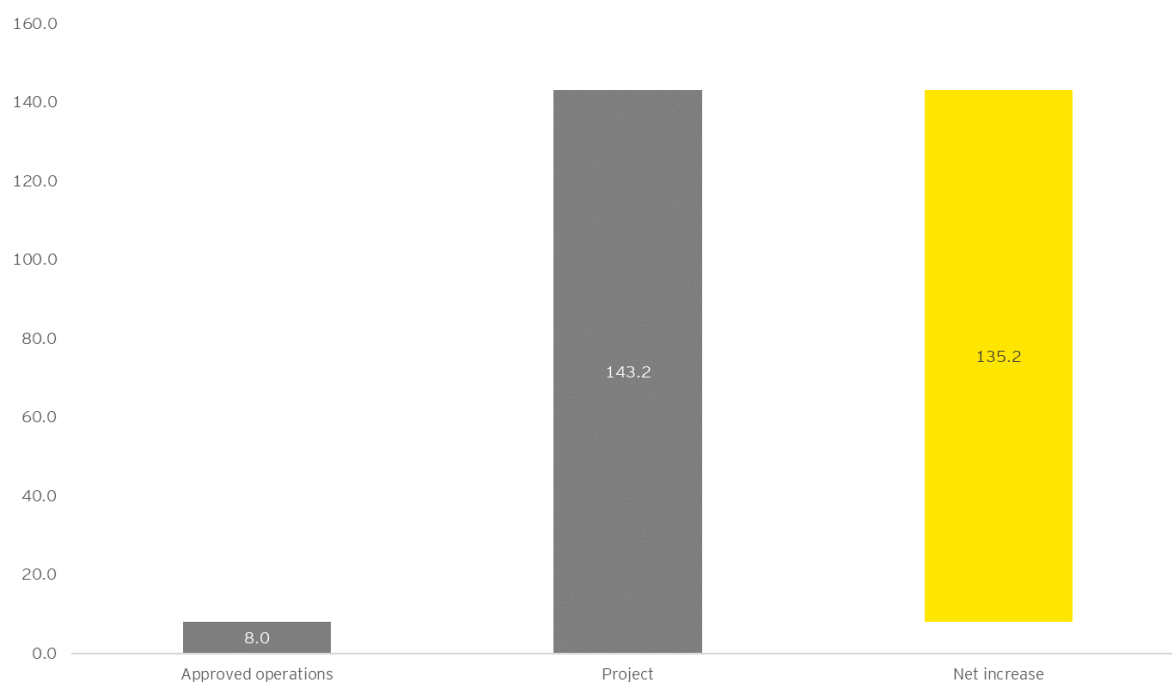
The information underpinning this assessment therefore is a combination of confidential Glencore operational data, publicly available information and commissioned expert studies assessing the environmental impacts of the Project (which will also be publicly available following exhibition of the EIS).

EY has not verified the information in the studies provided as they have been prepared by relevant experts in the field. Where there is uncertainty around key assumptions, such as the coal price, sensitivity analysis has been conducted to test the robustness of the assessment to these key assumptions.

As outlined above, Glendell has provided EY with confidential operating costs, which includes the cost of extraction, processing, distribution and selling, overheads, decommissioning, rehabilitation and the cost of environmental management for the Project case and Approved operations.

To evaluate the potential net benefits of the Project, the economic analysis needs to consider the counterfactual or baseline operations. In this case the counterfactual is the existing Approved operations and includes ongoing production from the Approved operations. The assessment has assumed that the Project will commence in 2021 and considers the counterfactual from this date. The Approved operations are planned to extract 8.0 Mt of ROM coal over the period 2021 to 2023. This baseline activity will generate potential costs and benefits and should be excluded from the calculation of costs and benefits attributable to the Project. The Project seeks to extract 143.2 Mt of ROM coal over the period 2021 to 2044, or 135.2 Mt of additional ROM coal, as summarised in Figure 4.

Figure 4 Approved operations, Approval case, and net increase ROM coal output (Mt), 2021 to 2044



Source: Information provided by Glendell

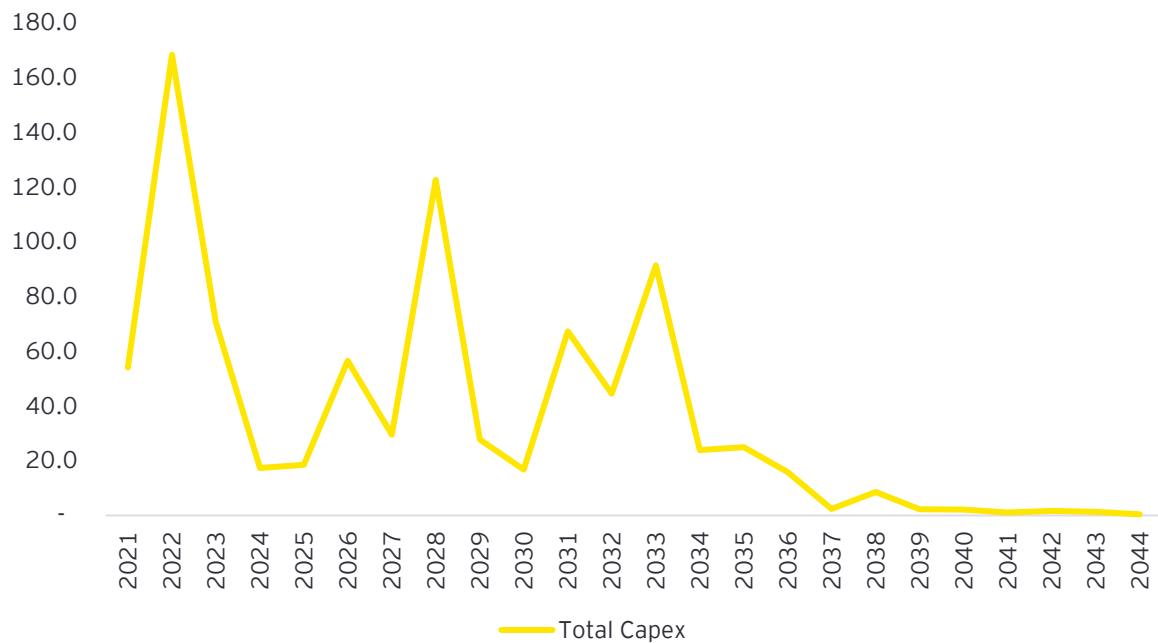
## 2.1 Project - central case assumptions

The following analysis sets out the financial assumptions underpinning the Project, including the capital expenditure, the output and price assumptions and the operating cost assumptions, including labour input costs and intermediate inputs. These assumptions are used to estimate the potential direct and indirect benefits to NSW and form the basis of the LEA presented later in the report.

### 2.1.1 Capital costs

Glencore provided EY with the capital expenditure profile of both the Approved operations and Project case. In net terms, the Project will require \$515.3 million (in NPV terms) of additional capital expenditure over the period 2021 to 2044, or \$869.6 million undiscounted, compared with the Approved operations case. Figure 5, provides a summary of capital expenditure.

Figure 5 Project - Capital expenditure, 2021 - 2044 (2019 dollars)



Source: Glendell

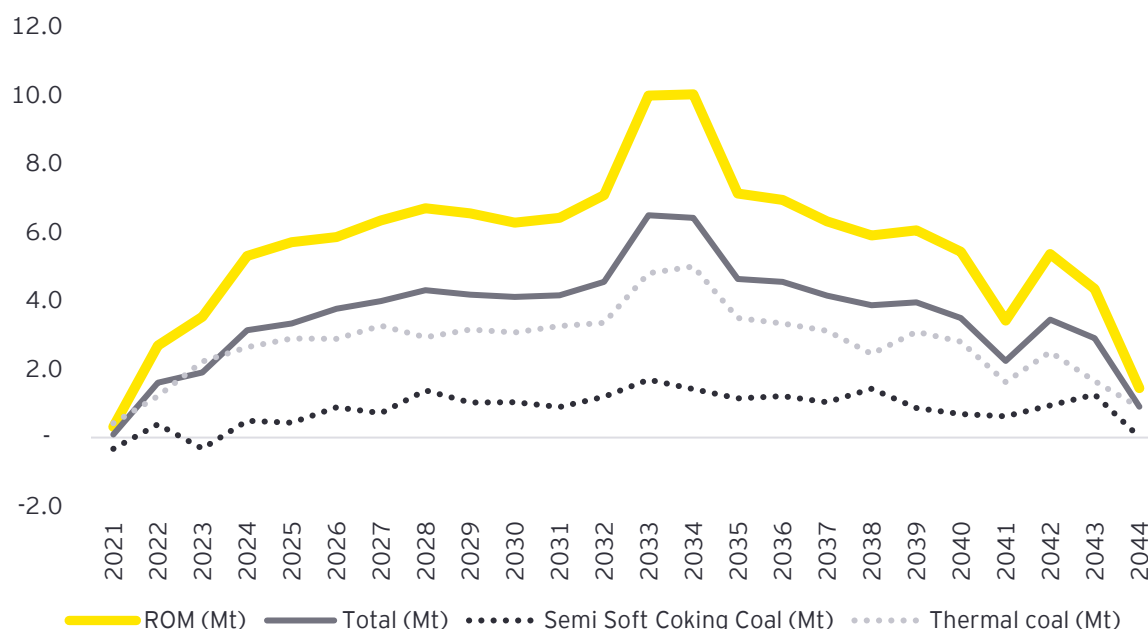
The Project will also utilise the existing Mount Owen CHPP located to the east of the Project Area. As these are owned by Glencore, no expansionary capital has been allocated to these operations however operating costs and sustaining capital associated with the additional coal being processed at the Mount Owen CHPP is included in the analysis.

### 2.1.2 Production profile

In net terms, Glencore advises that the Project production schedule generates 135.2 Mt of additional ROM coal which equates to an estimated 86.1 Mt of additional saleable coal. The additional production is expected to peak in years 2033 and 2034, as outlined in Figure 6.

Most of the additional production (66.1 Mt) is of thermal coal, where the remaining, 20.1 Mt is of semi-soft coking coal.

Figure 6 Key production figures under the Project (Mt), 2019 to 2044

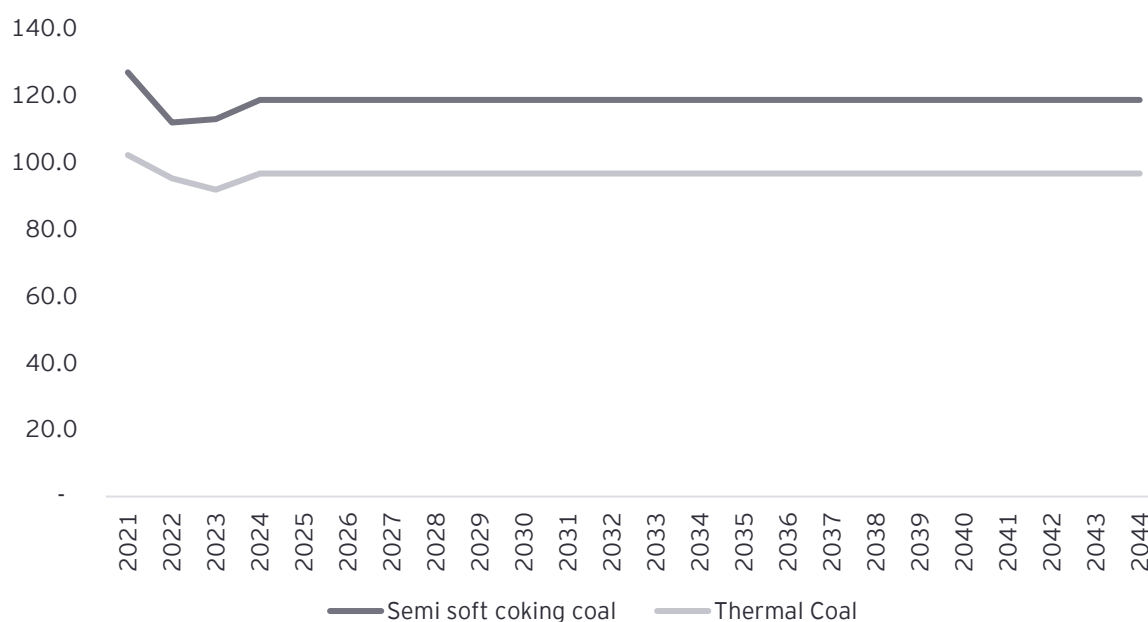


Source: Glendell

### 2.1.3 Price assumptions

The analysis uses information from KPMG published *Coal Price and FX consensus forecasts June/ July 2019* to estimate the coal price assumptions. Figure 7 provides an account of the prices used for the economic analysis. On average, over the life of the Project the thermal coal price is \$96.6 AUD per tonne. The price peaks in 2021 at \$102.2 AUD declining to about \$96.7 AUD per tonne from 2024. On average, the semi soft coking coal price is \$118.5 AUD per tonne. The price peaks in 2021 at \$126.9 AUD declining to about \$118.7 AUD per tonne from 2024.

Figure 7 Glendell Project, output prices, real 2019 Australian dollars, 2021 to 2044



Source: EY estimates based on, KPMG published *Coal Price and FX consensus forecasts June/ July 2019*

KPMG publishes *Coal Price and FX consensus forecasts* in nominal US dollars out to 2023. The semi-soft coking coal and thermal coal price forecasts are converted to nominal Australian dollars. The conversion is completed using the exchange rate forecasts from the KPMG report. The exchange rate varies between \$0.75 and \$0.78 US dollars per AUD until 2023 and then is fixed long term at \$0.75 US dollars per AUD. All nominal coal price forecasts are converted into real 2019 AUD using The Treasury *Budget 2019-20* (April 2019) consumer price index forecast.

From 2024 and onward, we assume the coal prices and exchange rate remain at the published long-term rates.

## 2.2 Projected revenue and project financials

Based on the production profile outlined in Figure 6 and the real price assumptions in Figure 7, the Project is expected to generate additional real revenue of just over \$8,964.4 million in undiscounted 2019 AUD. This equates to \$3,737.7 million real revenue in NPV terms based on a 7 per cent real discount rate as shown in Table 3. In the context of this analysis, these are deemed to be **central case assumptions**, and subject to sensitivity analysis presented later in this report.

Table 3 Central case assumptions – coal production, real prices<sup>^</sup> and total revenue

	Total	2021	2026	2033	2038
<b>Production (Mt)</b>					
Semi Soft Coking Coal (Mt)		-0.3 <sup>^^</sup>	0.9	1.7	1.4
Thermal coal (Mt)		0.4	2.9	4.8	2.4
<b>Real price (2019 Australian dollars)</b>					
Semi soft coking coal		126.9	118.7	118.7	118.7
Thermal Coal		102.2	96.7	96.7	96.7
<b>Total Sales Revenue</b>	8,964.4	2.9	393.8	679.6	411.9
<b>Total Sales Revenue - NPV</b>	3,737.7				

Source: Glencore and EY estimates <sup>^</sup> Real prices in 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate <sup>^^</sup> relative to Approved operations

Based on information provided by Glencore, the incremental operating costs of the Project are summarised in Table 4. Total costs are, \$2,817.8 million, which includes operating costs of \$2,545.0 million in NPV terms, which includes coal extraction, processing, transportation to port, overheads, environmental management and monitoring and progressive rehabilitation. Royalties are based on standard NSW Government royalty rates of 8.2 per cent ad valorem for open cut mines. A discount of \$3.50 per ROM tonne is applied for washing as is allowed by the NSW Government.

Based on this data, using the approach outlined in the Guidelines, the Project is estimated to generate \$662.3 million in profit in NPV terms. These are deemed to be central case assumptions, and subject to sensitivity analysis, presented later in this report.

Table 4 Central case assumptions – Project financials (\$ million^)

	NPV*	2021	2026	2033	2038
Revenue					
Revenue from coal sales	3,737.7	2.9	393.8	679.6	411.9
Residual value of capital	25.8	0.0	0.0	0.0	0.0
<b>Total Revenue</b>	<b>3763.5</b>	<b>2.9</b>	<b>393.8</b>	<b>679.6</b>	<b>411.9</b>
Costs					
Operating costs	2,545.0	29.8	252.2	432.9	271.4
Royalties	296.1	0.2	31.2	53.9	32.7
Closure Costs	-25.4	0.0	-15.5	0.0	0.0
Biodiversity offsets	16.6	0.0	0.0	0.0	0.0
<b>Total operating costs</b>	<b>2,832.4</b>	<b>30.0</b>	<b>267.9</b>	<b>486.7</b>	<b>304.1</b>
Depreciation	272.0	2.7	19.4	39.4	43.2
<b>Profit</b>	<b>659.1</b>	<b>-29.8</b>	<b>106.5</b>	<b>153.4</b>	<b>64.6</b>

Source: EY estimates based on information provided by Glencore. ^ Real 2019 Australian dollars. ^^ Includes intermediate inputs and labour costs, \* NPV in 2019 Australian dollars based on a 7 percent real discount rate.

Glencore has advised that, in the event that the Project does not go ahead, \$62.0 million (undiscounted) will be expensed over the period 2024 to 2027 in closure costs. Where the Project is approved, Glencore advises that \$85 million will be spent rehabilitating the Glendell mine. The delay of the rehabilitation activity, in NPV terms, will generate a saving of \$25.4 million.

## 2.3 Direct benefits

Based on the Guidelines, the direct benefits to NSW of the Project are derived from three sources:

- ▶ The net producer surplus generated by the Project that is attributable to NSW (estimated using cash outlays and revenues).
- ▶ The share of company tax payments that are attributable to NSW.
- ▶ Other tax payments such as royalties and payroll tax that are paid to the NSW and local government.

Each of these direct benefits are dealt with below.

### 2.3.1 Net producer surplus attributable to NSW

Consistent with the Guidelines, the net producer surplus of the Project represents the private benefit, or operating surplus, generated that is attributable to NSW.

The Project is estimated to generate an operating surplus of \$702.4 million in NPV terms, see Table 5.

The operating surplus is estimated using cash earnings and cash cost – cash costs are made up of both capital expenditure and operating costs (excluding depreciation). As outlined in the section below, \$202.1 million in NPV terms is payable in the form of corporate taxes, leaving a net producer surplus of \$500.3 million in NPV terms.

In this case, the net producer surplus that is attributable to NSW is assumed to be zero, as Glencore (and the JV partner) is 100 per cent foreign owned. While it is possible that NSW residents have some ownership of these shares, it is not possible to ascertain the level of this ownership.

Table 5 Central case - estimate of potential net producer surplus attributable to NSW (\$ million^)

Key data	NPV*
Total revenue	3,763.5
Cash costs	3,061.1
Operating surplus	702.4
Company tax^^	202.1
Net Producer Surplus	500.3
NSW share of Project ownership	0%
Value of net producer surplus attributable to NSW	0.0

Source: EY estimates based on information provided by Glencore. ^ Real 2019 Australian dollars. ^^ Based on a 30 per cent company tax rate. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

## 2.3.2 Company tax attributable to NSW

Consistent with the Guidelines, the company tax payments made to the Australian Government are levied on the profits generated for the Project as summarised in Table 6. A company tax rate of 30 per cent<sup>6</sup> is used to estimate the tax payments made to the Australian Government under the assumption that all the profit generated by the mine is subject to company tax in Australia (for example, ignoring financing costs, as we were not provided this information).

Consistent with the Guidelines, company tax attributable to NSW is based on the State's share of the national population, which is 32 per cent, as specified under the Guidelines.<sup>7</sup>

As summarised in Table 6, it is estimated the Project will generate \$659.1 million in total profit in NPV terms over the period 2021 to 2044. At a company tax rate of 30 per cent, the company tax estimate is \$202.1 million in NPV terms, of which \$64.7 million is attributable to NSW.

Table 6 Central case - company income tax attributable to NSW (\$ million^)

Company tax attributable to NSW	NPV*
Total profit	659.1
Company tax^^	202.1
NSW Share^^^	64.7

Source: EY estimates based on information provided by Glencore. ^ Real 2019 Australian dollars. ^^ Based on a 30 per cent company tax rate. ^^ Based on a 32 per cent population share. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate

## 2.3.3 Payments to the State and the local Council

Under the Project, various payments will be made to the NSW Government to extract and process coal in the State.

These are made up of three types of payments: coal mining royalties and payroll tax paid to the NSW Government. Umwelt advises that there are no net additional Council rates or land taxes payable as a result of the Project (i.e. relative to the Approved operations). Over the life of the Project, a total of \$333.3 million in NPV terms of payments will be made to the NSW Government, see Table 7. This is comprised of \$296.1 million of royalty payments and \$37.2 million in net payroll tax.

<sup>6</sup> This information does not constitute tax advice

<sup>7</sup> New South Wales Government (2015)

Table 7 Central case - Project payments to State government (\$ million^)

Corporations tax paid to NSW	NPV*
Coal sales revenue	3,737.7
Total Royalties paid	296.1
Payroll tax	37.2
Council rates and land tax	-
Total Payments	333.3

Source: EY estimates based on information provided by Glencore. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

## 2.4 Indirect benefits to NSW

Based on the Guidelines, the indirect benefits to NSW of the Project are derived from three sources:

- ▶ The net economic benefit to workers in NSW
- ▶ The net economic benefit to suppliers in NSW
- ▶ Any land owner premiums attributable to the project

### 2.4.1 Benefit to workers

Consistent with the Guidelines, a key factor in determining the benefit to workers are defined as the:

- ▶ Wages earned in the mine
- ▶ Minus the opportunity cost of labour for working in the mining sector, that is compared to working in non-mining sectors (or being unemployed)
- ▶ Minus the wage difference due to skills and the disutility to work in the mining industry

Glencore provided EY with the full-time equivalent employment under both the Approved operations and Project scenarios, as well as the average wages paid per employee.

Over the period 2021 to 2044 Glencore advises that the Project will employ additional FTEs compared to the Approved operations. During this period, employment increases up to 687 FTE in 2033, as outlined in Table 8. Glencore advises that the average pre tax wage (including leave entitlements and superannuation) for a full-time equivalent employee at the Glendell Mine is \$176,299.0 per annum on average upon commencement of the Project (which has been assumed to remain fixed over the period). The total of wages paid to employees is estimated at \$756.2 million in NPV terms.

Table 8 Central case - wages paid to those employed under the Project

Employees	NPV*	2021	2026	2033	2038
Employment (FTEs)		75.6	429.0	687.0	423.0
Average wage (\$ per annum^)		176,299.0	176,299.0	176,299.0	176,299.0
Total wages paid (\$ million^)	756.2	13.3	75.6	121.1	74.6

Source: Glendell, ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

To measure the **opportunity cost** compared to the non-mining sector, the wages earned by Glendell Mine workers was compared to the average wage paid on average in NSW. This implies that should the Project not go ahead, those who would have been employed by Glendell would find alternative work at the average wage paid in NSW. The average wage across NSW is \$67,193 per annum based on the 2016 Census data (updated to 2019 dollars using ABS cat. no. 6401.0).

**Assuming no disutility of working in mining**, this results in an estimated worker benefit of \$468.0 million, in NPV terms, over the life of the Project, as shown in Table 9.



Table 9 Central case – estimated NSW worker benefit

Employees	NPV*	2021	2026	2033	2038
Average wage (\$ per annum^)	-	67,193	67,193	67,193	67,193
Mining wage (\$ per annum^)	-	176,299	176,299	176,299	176,299
Total wages based on average wage (\$ million^)	288.2	5.1	28.8	46.2	28.4
Total mining wages paid (\$ million^)	756.2	13.3	75.6	121.1	74.6
Estimated worker benefit (\$ million^)	468.0	8.2	46.8	75.0	46.2

Source: Glendell, ABS Census (2016) Occupational Total Personal Income (Weekly) by Hours Worked, and EY estimates. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

As shown above, there is a significant premium incorporated in mining wages compared with the average wage paid in NSW and the local region. There are a number of likely reasons for this premium that might be explained by relative skill and productivity levels. In relation to the latter, mining employees are more productive than workers in other industries as they operate with higher levels of capital (for example, based on capital stock figures produced by the ABS, miners work with over 10 times the amount of capital than average employees across Australia).

Any metrics around the disutility of working in mining are very difficult to ascertain in both an absolute (mining specific) or relative (compared with other industries) way. One source of information considered in this analysis was any documented 'hardship' allowances recognised in mining awards. However, these allowances appear to be relatively minor. For example, the Black Coal Mining Industry Award 2010 does provide for the payment of an Underground allowance (Electrical/ Mechanical) of 0.23% per day or shift (above the standard rate/ reimbursement) to an adult employee who works underground on any shift. In addition, there is a Confined space allowance of 0.08% and a Dirty work allowance of 0.23%, that may apply to underground workers. To put this into context, the First Aid Officer Allowance is 0.76% per day or shift above the standard rate.

In addition, a further consideration is whether workers would experience more or less disutility being employed by Glendell compared with any alternate employment. In this context, as the assumption is made that any worker employed in the Project would find alternative employment if the project did not go ahead it is the relative disutility of mine work versus non-mine work that is a key consideration. Given the minor allowances for working in a coal mine and the measurement difficulties associated with measuring these disutilities generally, we have assumed the disutility for workers under the Project case is zero. This implies, effectively, that those workers employed by the Project experience no additional disutility from working in the mine compared with any alternative employment they would have secured in the absence of the Project.

## 2.4.2 Benefit to suppliers

Consistent with the Guidelines, the economic benefit to suppliers is estimated as a producer surplus generated from goods and services provided from NSW firms to the Project. As summarised in Table 10, the Project is estimated to require \$1,751.6 million (in NPV terms) in intermediate inputs. Glendell has advised that currently, almost 81 per cent of the inputs to the mine are sourced from NSW-based suppliers, or \$1,418.8 million (in NPV terms) for the Project.

The estimated economic benefit to suppliers (producer surplus) is based on the EY Regional Input-Output Model (EYRIOM). This model was customised to generate a NSW-specific Input-Output table so as to not include benefits generated in other Australian states.

The producer surplus estimates are based on Type I multipliers which limit the benefit to direct value added generated by NSW suppliers. This methodology does not account for second round, nor induced consumption effects that are captured within the CGE modelling. Using this relatively conservative technique, the potential total supplier benefits are estimated to be \$286.3 million in NPV terms.

Table 10 Central case – estimated supplier benefits

Indirect benefits –suppliers	NPV*
Total intermediate inputs (\$ million^)	1,751.6
Share from NSW (Per cent)	81.0
Total intermediate inputs supplied from NSW (\$ million^)	1,418.8
Gross operating surplus ratio	0.2
Total benefits to suppliers (NPV*)	286.3

Source: EY estimates based on information provided by Glencore. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

## 2.5 Indirect costs to NSW

Consistent with the Guidelines, the indirect costs of the Project are classified as:

- ▶ Net public infrastructure costs
- ▶ Estimated loss of surplus to other industries
- ▶ Net environmental, social and transport-related costs
- ▶ Net environmental costs

A detailed description of each cost is provided in Appendix A.

### 2.5.1 Net environmental, social and transport-related costs

The Project is expected to generate relatively minor environmental, social and transport-related costs, above those generated by the Approved operations.

Table 11 provides a summary of the environmental, social and transport-related impacts predicted by the technical assessments undertaken for the Project.

The indirect costs have been assessed either quantitatively or qualitatively. Specifically, greenhouse gas emissions, transport/ traffic impacts, the biodiversity impact and the loss of surplus to other industries have been assessed quantitatively. The remaining impacts have undergone a qualitative assessment. The Project is estimated to generate a total of \$19.1 million in NPV terms in indirect costs.

As part of the CBA, selected costs have been internalised as management, monitoring and mitigation costs, including the costs for biodiversity offsets. These management, monitoring and mitigation costs are included in the operating and capital costs. As a result, the total incremental cost of the Project used in the CBA is \$2.4 million in NPV terms.

Some of the environmental, social and transport-related costs have been assessed qualitatively. These include visual amenity, and Aboriginal cultural and historical heritage. A full discussion of the environmental, social and transport-related costs are outlined in more detail in Appendix A.

Table 11 Summary of indirect costs

Scope of environmental costs	Discussion	NPV*
Greenhouse gas emissions	As outlined in the Technical notes the analysis is based on scope 1 and 2 greenhouse gas emissions generated by the Project.	0.1
Transport/ traffic impacts	The realignment of Hebden Road is expected to accommodate future traffic growth. The traffic impacts relate to blast delays and increased travel time from the realignment.	1.6
Biodiversity impact	The disturbance area of the Project which requires consideration for offsetting purposes in accordance with NSW Government Policy is 614 hectares. The Project will require 5972 ecosystem credits and 3309 species credits.	16.6
Loss of surplus to other industries	The Project is expected to generate a loss of surplus to the agriculture industry.	0.7
<b>Total (\$m)</b>		<b>19.1</b>
Air quality	Glendell is taking steps to reduce the potential air quality impacts through several management and mitigation steps in accordance with the current Air Quality Management Plan. Potential acquisition costs associated with cumulative impacts are included in capital costs.	
Ambient noise impact	The Project's noise impacts will be managed to meet relevant noise trigger levels. The Project does not trigger any noise management or acquisition rights at any privately-owned properties.	
Surface water	The Project requires the realignment of Yorks Creek which is included as a capital cost. The Project will implement water management practices to ensure that surface water quality is not adversely affected. Additional surface water take associated with the Project will be licensed and these costs are included in assumed operational costs.	
Groundwater	Additional groundwater take associated with the Project will be licensed and these costs are included in assumed operational costs. The Project is not predicted to adversely impact on groundwater quality.	
Aboriginal cultural heritage	The Project will impact 91 (55 artefacts scatters and 36 isolated finds) sites. The cost of salvaging these sites are included in the Other management, monitoring and mitigation costs. Impacts on the heritage values of Aboriginal artefacts and sites impacted by the Project are considered qualitatively in Appendix A.	
Historic Heritage	The Project includes the relocation of the Ravensworth Homestead and the archaeological salvage of various heritage sites impacted by the Project. These costs associated with the relocation of the homestead and archaeological salvage works are included in capital and operating expenditure costs. Impacts on the heritage values of Ravensworth Homestead are considered qualitatively in Appendix A.	
Visual amenity	The Project will generate minor changes to the visual amenity of the locality. It is noted that visual amenity of the locality is already extensively modified by mining and power generation related activities.	
Net public infrastructure cost	The Project is not expected to generate residual public infrastructure costs. The Project's capital costs include the realignment of Hebden Road, powerlines and telecommunications infrastructure.	

Source: Based on information provided in the EIS and various consultant reports. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

## 2.6 Net benefit analysis results

Consistent with the Guidelines, the CBA is based on comparing the net direct and indirect benefits and subtracting the indirect costs of the Project compared against the baseline scenario or the Approved operations where the Project does not occur. The results are summarised in Table 12.

Based on the CBA methodology outlined in the Guidelines, and information provided by Glencore, the Project is estimated to provide a net benefit to NSW. This potential net benefit is estimated to be \$1,149.9 million in net present value (NPV) terms. This is comprised of \$398.0 million and

\$754.3 million in direct and indirect benefits respectively. The incremental indirect costs of the Project are estimated to be \$2.4 million.

Table 12 Central case - estimated potential net benefits of the Project (\$ million^)

Benefits	NPV*	Costs	NPV*
Direct benefits		Direct costs	
Net producer surplus attributed to NSW	-		
Royalties, payroll tax and Council rates	333.3		
Company income tax apportioned to NSW	64.7		
Total direct benefits	398.0	Total direct costs	-
Indirect benefits		Indirect costs	
Net economic benefit to landholders	-	Air quality^^	-
Net economic benefit to NSW workers	468.0	Greenhouse gas emissions	0.1
Net economic benefit to NSW suppliers	286.3	Noise impact ^^	-
		Transport impact	1.6
		Net public infrastructure cost	-
		Surface water impact	-
		Groundwater^^	-
		Biodiversity impact ^^	16.6
		Loss of surplus to other industries	0.7
		Visual amenity	-
		Aboriginal cultural heritage^^	-
		Historical heritage ^^	-
		Other	-
Total indirect benefits	754.3	Indirect Costs	19.1
Total Project economic benefit	1,152.3	Total incremental cost of project	2.4
NPV of project - (\$m)	1,149.9		-

Source: EY estimated based on information from various sources. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate. ^^ Management and mitigation costs are included in the operating and capital cost

## 2.6.1 Summary

The estimates presented in this section are based on central case assumptions of the Project, as outlined above.

The direct benefits of the Project are a function of its profitability which, in turn, depends on the prevailing coal price. The Project is predicted to generate potential:

- ▶ Total corporate taxes of \$202.1 million in NPV terms for Australia, of which \$64.7 million is attributed to NSW
- ▶ \$333.3 million in other government revenue for NSW in NPV terms, the largest component of this being royalties of \$296.1 million with payroll taxes contributing \$37.2 million in NPV terms

The indirect benefits of the Project are related to the linkages that it will have to the NSW economy through both the labour market and suppliers. The analysis shows that of the \$754.3 million in estimated potential indirect benefits:

- ▶ Worker benefits are predicted to amount to \$468.0 million in NPV terms for the directly employed Project workers over the period 2021 to 2044; and

- ▶ Supplier benefits are predicted to amount to \$286.3 in NPV terms. Almost 81 per cent of the inputs to the mine are sourced from NSW-based suppliers, or \$1,418.8 million (in NPV terms) for the Project.

The Project is expected to result in indirect costs on the NSW community of \$19.1 million, of which the majority are borne by Glendell (and accounted for in the operating and capital costs of the Project). In terms of quantifiable incremental indirect costs, those not borne by Glendell (i.e. the externalities), total \$2.4 million in NPV terms, through travel time costs, loss of surpluses to other sectors and climate change impact costs associated with greenhouse gas emissions.

## 2.7 Net benefits – Sensitivity analysis

Consistent with the Guidelines, this section outlines a summary of the systematic sensitivity analysis undertaken for the Project. The sensitivity analysis considers all key areas of the CBA, particularly coal prices, key costs (both capital expenditure and operating costs) as well as worker benefits. Where there are considered to be higher levels of uncertainty with the figures, a range of plus/minus 25 per cent is used. In areas where the figures are deemed more certain, a range of plus/minus 10 per cent is used. The sensitivity analysis is comprised of the following:

- ▶ Revenue sensitivity
  - ▶ Higher price assumptions, where coal prices are increased by 15 per cent over the central case assumptions for the life of the Modification
  - ▶ Lower price assumptions, where coal prices are decreased under the central case assumptions by 15 per cent
- ▶ Cost-base sensitivity
  - ▶ Higher operational expenditure (increased by 10 per cent over the central case)
  - ▶ Lower operational expenditure (decreased by 10 per cent under the central case)
  - ▶ Higher capital expenditure (increased by 10 per cent over the central case)
  - ▶ Lower capital expenditure (decreased by 10 per cent under the central case)
- ▶ Worker and Supplier assumptions
  - ▶ Increased disutility of mining wage premium by 25 per cent on central case assumptions
  - ▶ Reduced supplier benefits of 10 per cent from central case assumptions
- ▶ Environmental impact costs increased by 10 per cent over the central case
- ▶ Discount rate sensitivity, using a 4% and a 10% real discount rate (see Appendix B).

In addition, upper and lower bound estimates are undertaken which assume:

- ▶ 'Worst-case' scenario, the coal price is reduced by 15 per cent, operational and capital expenditure are increased by 10 per cent, the disutility of the mining wage premium is set to 25 per cent and supplier benefits are lowered by 10 per cent compared with central case assumptions. Environmental costs are increased by 10 per cent over the central case.
- ▶ 'Best case' scenario, the coal price is increased by 15 per cent, operational and capital expenditure are decreased by 10 per cent, the disutility of the mining wage premium is set to zero and supplier benefits are increased by 10 per cent compared with central case assumptions. Environmental costs are decreased by 10 per cent over the central case.

Consistent with the Guidelines, the revenue sensitivity undertaken considers the impact of higher or lower prices on the results of the CBA denominated in Australian dollars. There are two main factors effecting the price assumptions. First is the US dollar price of coal prevailing in international markets. Second is the exchange rate between the Australian and US dollar. A decrease in the price of coal can either reflect a reduction in world prices or an appreciation of the Australian dollar

relative to the US dollar. As such, a 25 per cent reduction in coal prices can either be interpreted as:

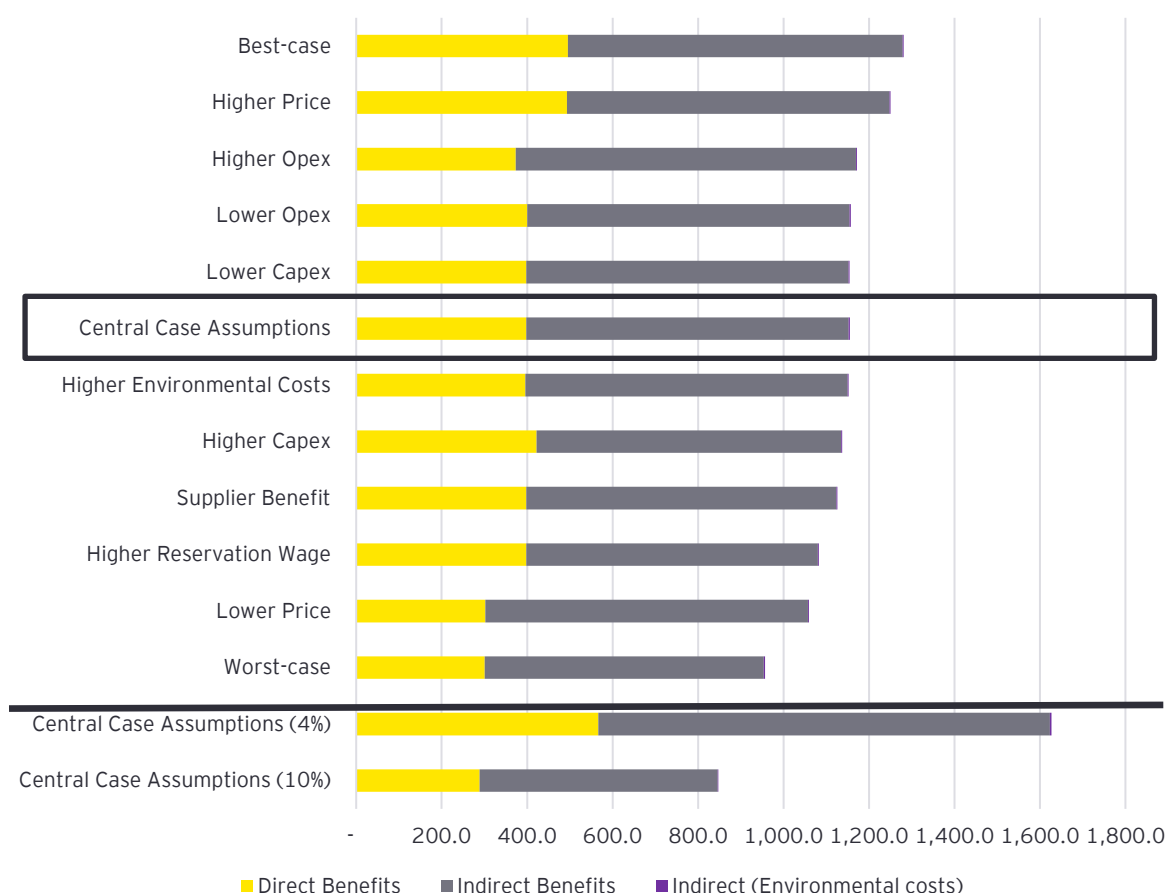
- ▶ A 15 per cent reduction in the prevailing international coal price (denominated in US dollars with no change to the exchange rate)
- ▶ A 15 per cent appreciation in the Australian dollar relative to the US dollar (with the prevailing international price of coal unchanged)
- ▶ Some combination of both.

## 2.7.1 Results of sensitivity analysis

The results of the systematic sensitivity analysis are summarised in Figure 8. This sensitivity analysis shows that the estimated potential net benefits are robust in the sense that they remain (strongly) positive after testing all key assumptions underpinning the analysis.

In isolation, the estimated net benefit of the Project is most sensitive to the coal price assumptions underpinning the analysis, but even assuming coal prices are 15 per cent lower than under the central case assumptions the potential net benefits are estimated at \$1,054.5 million in NPV terms.

Figure 8 Systematic sensitivity analysis of the CBA to key assumptions (NPV\*, \$ million^)



Source: EY estimates based on information from various sources. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated).

The lower bound estimate of net benefits (Worst-case), which takes the most pessimistic assumptions around coal prices, capital expenditure, operational expenditure as well as worker and supplier benefits, yields an estimated potential net benefit of \$951.4 million in NPV terms.

The upper bound estimate of potential net benefits (Best-case), based on the most optimistic assumptions, is \$1,276.3 million in NPV terms. In isolation, assuming higher coal prices of 15 per cent, to those in the central case, the potential net benefit of the Project (higher price) is \$1,245.3 million in NPV terms.

The robustness of the results to the sensitivity analysis is a reflection of the high quality (and therefore value) of the coal reserve and the utilisation of existing Mount Owen Complex infrastructure and the relatively low level of indirect costs (externalities) attributable to NSW.

It can also be inferred from the sensitivity analysis how large the qualitatively assessed negative externalities would need to be before the Project is no longer a net benefit to the NSW community. Using the most conservative estimate, the worst-case assumptions, these externalities would need to be \$951.4 million in NPV terms before the Project would return a net negative return to NSW.

As a result of the majority of incremental benefits accruing after Approved operations cease, the net benefits are sensitive to the discount rate used for the analysis. Under the Central case assumptions, the Project is expected to generate \$1,149.9 million of potential net benefit using a 7 per cent discount rate. Using a 4 per cent discount rate increases the potential net benefit increases to \$1,619.8 million. Conversely a 10 per cent discount decreases the potential net benefit to \$844.0 million.

### 3. Local effects analysis

Consistent with the Guidelines, the local effects analysis (LEA) uses a similar framework to the CBA presented in the previous section but is focussed on the net economic impacts to the local community. The Guidelines refer to the local area as being consistent with the relevant Statistical Area (SA3) as defined by the Australia Bureau of Statistics. In the case of the Project the location used for the LEA is the Lower Hunter SA3.

The Lower Hunter region is located to the west of Newcastle, as outlined in Figure 9, and includes Singleton and Cessnock

Figure 9: Lower Hunter SA3 region



Source: ABS Maps (<https://itt.abs.gov.au/itt/r.jsp?ABSMaps>)

The Lower Hunter SA3 is part of the Hunter Valley coal producing region, which has numerous coal mines producing coal for export and electricity generation, and includes the Glendell mine.

The Glendell Mine, part of the Mount Owen Complex, is located to the north west of Singleton and to the south east of Muswellbrook, in the western sector of the Lower Hunter SA3.

#### 3.1 Local effects analysis

The LEA accounts for the economic benefits to the Lower Hunter region only. It does not include any economic benefits that may accrue to the major regional centres that are located adjacent, including Maitland and Newcastle or the broader Hunter region.



Underpinning the LEA are the assumptions that:

- ▶ No net producer surplus accrues to the region
- ▶ No company income tax accrues to the Lower Hunter SA3 region
- ▶ Based on the current Approved operations, the Project is assumed to supply 67 per cent of the workforce requirement of the Project and 38 per cent of intermediate inputs will be supplied from the SA3 region
- ▶ The average gross wage in the Lower Hunter SA3 is \$67,193 per annum (based on 2016 Census data updated to 2019 Australian dollars)

As a result of these assumptions, it is expected the Project will generate additional potential indirect benefits to local suppliers and employees of \$134.3 million and \$314.7 million respectively in NPV terms above the Approved operations, as outlined in Table 15. The incremental indirect cost of the Project is \$2.3 million in NPV terms.

Based on these assumptions, the Project is estimated to confer a potential net benefit on the Lower Hunter SA3 region of \$446.7 million in NPV terms.

Table 13 : Estimated Local Effects Analysis of the Project (\$ million<sup>^</sup>)

Benefits	NPV*	Costs	NPV*
Direct benefits		Direct costs	
Net producer surplus attributed to NSW	-		
Royalties, payroll tax and Council rates	-		
Company income tax apportioned to NSW	-		
<b>Total direct benefits</b>	<b>-</b>	<b>Total direct costs</b>	<b>-</b>
Indirect benefits		Indirect costs	
Net economic benefit to landholders	-	Air quality <sup>^^</sup>	-
Net economic benefit to NSW workers	314.7	Greenhouse gas emissions	0.0
Net economic benefit to NSW suppliers	134.3	Noise impact <sup>^^</sup>	-
		Transport impact	1.6
		Net public infrastructure cost	-
		Surface water impact	-
		Groundwater <sup>^^</sup>	-
		Biodiversity impact <sup>^^</sup>	16.6
		Loss of surplus to other industries	0.7
		Visual amenity	-
		Aboriginal cultural heritage <sup>^^</sup>	-
		Historical heritage <sup>^^</sup>	-
		Other	-
<b>Total indirect benefits</b>	<b>449.0</b>	<b>Incremental Indirect Cost</b>	<b>19.0</b>
<b>Total Project economic benefit</b>	<b>449.0</b>	<b>Total incremental cost of project</b>	<b>2.3</b>
<b>NPV of project - (\$m)</b>	<b>446.7</b>		

Source: EY estimated based on information from various sources. <sup>^</sup> Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate. <sup>^^</sup> Management and mitigation costs are included in the operating and capital costs

## 3.2 Sensitivity analysis

As outlined above the LEA relies on a number of modelling assumptions. Consistent with the Guidelines, Figure 10 provides a summary of the systematic sensitivity analysis undertaken for the Project. The sensitivity analysis tests the same assumptions outlined in the CBA.

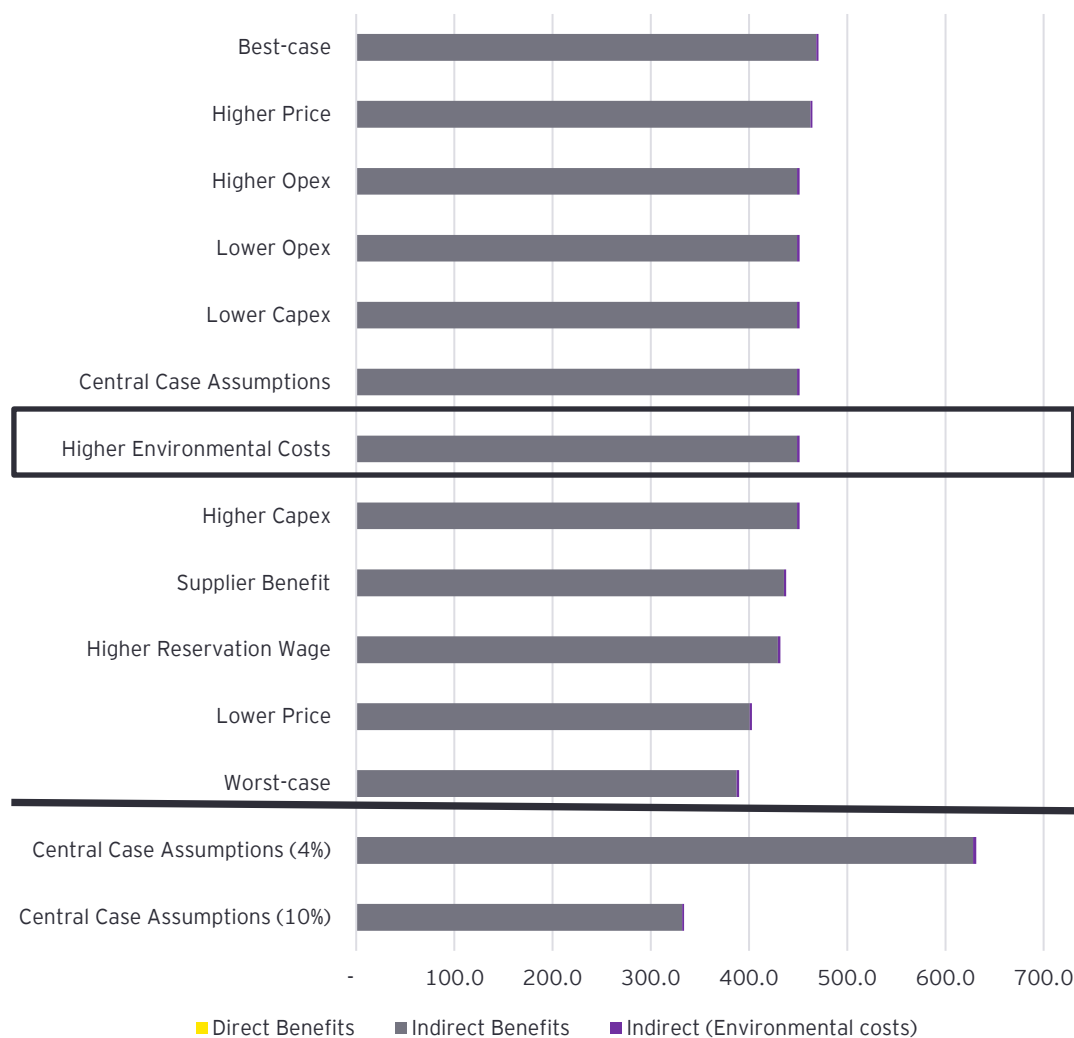
The main drivers for the regional impact are the supplier and employee benefits. Those sensitivities that change the supplier benefits through lower operational costs, lower supplier benefit or employee benefit have the greatest impact on the regional net benefit.

The results of the systematic sensitivity analysis are summarised in Figure 10. This sensitivity analysis shows that the estimated net benefits are robust in the sense that they remain (strongly) positive after testing all key assumptions underpinning the analysis. Full detail of the sensitivity analysis is presented in Appendix B.

The lower bound, or worst-case, estimate of net benefits, which takes the most pessimistic assumptions around coal prices, capital expenditure, operational expenditure as well as worker and supplier benefits, yields an estimated potential net benefit of \$384.7 million in NPV terms. The potential upper bound, or best-case, estimate based on the most optimistic assumptions, is \$460.4 million in NPV terms.

As a result of the majority of incremental benefits accruing after the Approved operations cease the net benefits are sensitive to the discount rate used for the analysis. Under the Central case assumptions the Project is expected to generate \$446.7 million of potential net benefit to the local area using a 7 per cent discount rate. Using a 4 per cent discount rate increases the potential net benefit to \$624.7 million. Conversely a 10 per cent discount decreases the net benefit to \$330.3 million.

Figure 10 Systematic sensitivity analysis of the LEA to key assumptions (NPV\*, \$ million^)



Source: EY estimated based on information from various sources. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated).

## 4. CGE modelling

The economy-wide impacts of the proposed development have been undertaken using a CGE model of the regional and NSW economy.

The aim of an economic impact study based on applied CGE modelling is to estimate the potential net benefit of the proposed development on economic activity and the living standards of those residing within the Lower Hunter SA3, the same region used for the LEA analysis, and in NSW.

CGE modelling is the preferred technique to assess the impacts of large projects as they are based on a more detailed representation of the economy, including the complex interactions between different sectors of the economy.<sup>8</sup> A CGE model is able to analyse the impacts of the proposed development in a comprehensive, economy-wide framework meaning the modelling captures:

- ▶ Direct increases in demand associated with the proposed development (short term construction activity) as well as the assumed increases in output attributable to increased coal production
- ▶ Indirect increases in demand, or flow-on effects associated with increased economic activity relating to both the construction phase of development and additional coal production
- ▶ Labour market displacement caused by the direct increase in demand from a project of this nature (and the associated investment) on other sectors of the economy bidding up wages and 'crowding out' other sectors of the economy
- ▶ Revenue leakage associated with the expropriation of profits from the Project to overseas interests (in this case, Glencore).

### 4.1 About the EY CGE model

The estimates are based on the Ernst & Young General Equilibrium Model (EYGEM). EYGEM is a large scale, dynamic, multi-region, multi-sector model of the global economy, with an explicit representation of the Lower Hunter SA3 and the NSW economy. EYGEM is based on a substantial body of accepted microeconomic theory.

The model projects change in macroeconomic aggregates such as real gross state product (real GSP) which is an output measure of the NSW economy and real gross state income (real GSI) which is a welfare measure for NSW residents. At a regional level the model projects change in real gross regional product (real GRP) and real gross regional income (real GRI). The model also projects state-wide and regional employment, export volumes, investment and private consumption. At the sectoral level, detailed results such as output, exports, imports and employment are also produced. A brief description of the model is presented in Box 1.

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<sup>8</sup> See for example the Policy & Guidelines Paper produced by the NSW Treasury (2009).

#### Box 1: An overview of EYGEM

EYGEM is a multi-commodity, multi-region, dynamic model of the world economy. Like all economic models, EYGEM is based on a range of assumptions, parameters and data that constitute an approximation to the working structure of an economy. Its construction has drawn on the key features of other economic models such as the global economic framework underpinning models, such as GTAP and GTEM, with state and regional modelling frameworks such as Monash-MMRF and TERM.

Labour, capital, land and a natural resource comprise the four factors of production. On a year-by-year basis, capital and labour are mobile between sectors, while land is mobile across agriculture. The natural resource is specific to mining and is not mobile. A representative household in each region owns all factors of production. This representative household receives all factor payments, tax revenue and interregional transfers. The household also determines the allocation of income between household consumption, government consumption and savings.

Capital in each region of the model accumulates by investment less depreciation in each period. Capital is mobile internationally in EYGEM where global investment equals global savings. Global savings are made available to invest across regions. Rates of return can differ to reflect region specific differences in risk premiums.

The model assumes labour markets operate in a model where employment and wages adjust in each year so that, for example, in the case of an increase in the demand for labour, the real wage rate increases in proportion to the increase in employment from its base case forecast level.

EYGEM determines regional supplies and demands of commodities through optimising behaviour of agents in perfectly competitive markets using constant returns to scale technologies. Under these assumptions, prices are set to cover costs and firms earn zero pure profits, with all returns paid to primary factors. This implies that changes in output prices are determined by changes in input prices of materials and primary factors.

In terms of specifying the elasticity of labour supply, this analysis follows the lead of the Australian Treasury and use a labour supply elasticity assumption of 0.15, which indicates a relatively 'inelastic' response from workers.

Importantly, in terms of interpreting the results as well as for consistency with the CBA analysis, real GSI represents the preferable welfare measure to the commonly reported change in real GSP (a measure of production). As a measure of income, Pant et al (2000) show how the change in real GSI is a good approximation to the equivalent variation welfare measure in global CGE models such as EYGEM. This measure is widely used by practitioners and can also be decomposed into various components to assist in the analysis of results. Real GSI is computationally more convenient than (say) an equivalent variation, and a more familiar concept to explain to decision makers (Layman, 2004).

As noted by Pant et al (2000), in considering welfare results in global CGE such as EYGEM, the main components are the change in; output (measured by real GSP), terms of trade and payments to foreigners. Of relevance in the discussion around estimating the net benefits of the proposed development are the terms of trade effects. These can be closely linked to changes in labour market conditions because any increase in real wages as a result of higher levels of coal exports will result in an improvement in the terms of trade and, hence, welfare.

That noted, real GSI does not capture some non-market effects that can impact on the living standards of NSW residents. These could include impacts such as the noise impacts for residents or pollution as considered in the detailed CBA above.

EYGEM is a recursive dynamic model that solves for each year over a specified timeframe, in this case each year from 2021 to 2044. The model is used to project the relationship between variables under different scenarios over a predefined period. A typical scenario is comprised of a reference case projection (or the Base case scenario) that forms the basis of the analysis. In this instance, the reference case assumes no proposed development investment or coal output from the Project. Set against this scenario is the policy scenario (or the Project case) under consideration.

## 4.2 Overview of scenarios

The economy-wide impacts outlined in the below use the central case assumptions used in the CBA analysis above, including:

- ▶ Capital expenditure of \$515.3 million in NPV terms
- ▶ Coal revenue of \$3,737.7 million in NPV terms

Our scenarios factor in the potential benefits that flow from the Project outside of the Lower Hunter region and the NSW economy. This includes, the repatriation of profits out of the region to foreign shareholders, along with wages and the payments out of the region for royalties to the NSW Government and corporations tax to the Australian Government. EY have conservatively assumed these royalty payments accrue to the rest of NSW.

In addition, EY has factored into our scenarios the level of migration of workers from the rest of NSW into the Lower Hunter SA3. As outlined above, 67 per cent of the workers at the Glendell Mine reside in the Lower Hunter SA3, where the remainder are sourced from the Rest of NSW. This represents a migration into the region, increasing the labour supply in the Lower Hunter and reducing the labour supply in the Rest of NSW.

### 4.3 Economy-wide economic impacts of the Project

The key macroeconomic variables projected for the scenario is shown in Table 14. In the Lower Hunter region, the Project is projected to increase Gross Regional Product (GRP) by \$2,522.4 million in NPV terms. Gross Regional Income (GRI) or regional welfare, is projected to increase by \$2,902.4 million in NPV terms. The projected increase in GRI is significant to the relatively small Lower Hunter region. In total, the Project is projected to increase welfare for each person in the Lower Hunter by \$27,654 in NPV terms.

For NSW, the projected increase in Gross State Product (GSP) is \$3,001.9 million in NPV terms. Gross State Income (GSI) is projected to increase by \$4,514.8 million in NPV terms.

Table 14 Project economy-wide impacts of the Project, 2021 – 2044

Variable	Description	Lower Hunter	NSW Total
Real GRP/GSP^	NPV* - \$m	2,522.4	3,001.9
Real GRI/GSI^	NPV* - \$m	2,902.4	4,514.8
Employment	Average - FTE^^	403.7	488.1
Real Wages	Average - Per cent^^	2.25	0.031
Real GRI per person^	NPV* - Dollars	27,654	492

Source: EY estimates based on information provided by Glendell. ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate. ^^ Average over the period 2021 to 2044.

## References

- Australian Bureau of Statistics (2016), 2016 Census QuickStats, Available at, [http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2016/quickstat/10603?opendocument](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/10603?opendocument), Accessed on 15-07-2019
- ABS cat. no. 6401.0, *Consumer Price Index, Australia, June 2019*
- Australian Cultural Heritage Management (2019), *Aboriginal Cultural Heritage Assessment Glendell Continued Operations Project*
- AGE (2019), *Groundwater Impact Assessment Glendell Continued Operations Project*
- Department of Primary Industries (2006), *Beef Stocking Rates and Farm Size - Hunter Region*
- GHD (2019), *Surface Water Assessment Glendell Continued Operations Project*
- Jacobs (2019) *Air Quality Impact Assessment Glendell Continued Operations Project*
- KPMG (2019), *Coal Price and FX consensus forecasts KPMG June/July 2019*, accessed at <https://home.kpmg/content/dam/kpmg/au/pdf/2019/coal-price-fx-consensus-forecast-june-july-2019.pdf>
- Lucas Stapleton Johnson & Partners (2019) *Heritage Impact Statement Glendell Continued Operations Project*
- Meat and Livestock Australia (2019), *Market Report & Prices, for Singleton*, accessed on 18-09-2019, accessed at <https://www.mla.com.au/prices-markets/market-reports-prices/#>
- NSW Government, Department of Planning & Environment (2015), *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*
- NSW Government, Department of Planning & Environment (2018), *Technical Notes supporting the guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*
- NSW Treasury (2009), 'Guidelines for estimating employment supported by the actions, programs and policies of the NSW Government', Accessed at [https://www.treasury.nsw.gov.au/sites/default/files/pdf/TPP09-7\\_Guidelines\\_for\\_estimating\\_employment\\_supported\\_by\\_the\\_actions%2C\\_programs\\_and\\_policies\\_of\\_the\\_NSW\\_Government.pdf](https://www.treasury.nsw.gov.au/sites/default/files/pdf/TPP09-7_Guidelines_for_estimating_employment_supported_by_the_actions%2C_programs_and_policies_of_the_NSW_Government.pdf).
- Pant, Brown, Buetre and Tulpulé (2000) *Measurement and decomposition of welfare changes in GTEM*, paper presented to the Third Annual Conference on Global Economic Analysis, Monash University, Melbourne, 27-30 June 2000 <http://www.copsmodels.com/2000gtapconf.htm>
- Puliyapang (2019), *Traffic Impact Assessment Glendell Continued Operations Project*
- Transport for NSW (2016), *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives Transport Economic Appraisal Guidelines*
- The Treasury, *Budget 2019-20 Overview Our plan for a stronger economy, (April 2019)*
- Umwelt (2019), *Greenhouse Gas and Energy Assessment Glendell Continued Operations Project*
- Umwelt (2019) *Biodiversity Development Assessment Glendell Continued Operations Project*
- Umwelt (2049), *Noise Impact Assessment Glendell Continued Operations Project*
- Umwelt (2019), *Agricultural Impact Statement Glendell Continued Operations Project*

## Appendix A Indirect costs

This Appendix provides a detailed description of the indirect costs associated with the Project. The quantitative and qualitative analysis draws on information provided in the technical assessments undertaken for the Project, as listed in Chapter 2.

### Greenhouse gas emissions

Consistent with the Guidelines and the Technical Notes and Australia's international obligations under the United Nations Framework Convention on Climate Change the level of greenhouse gas (GHG) emissions attributable to the Project is measured by the:

1. **Scope 1** emissions, representing the direct GHG emissions from, for example, the use of diesel in plant and equipment and fugitive emissions; and
2. **Scope 2** emissions, representing the indirect emissions from purchases of inputs, generally associated with the purchase of electricity.

As outlined in the Guidelines and the Technical Notes, Scope 3 emissions are excluded from the analysis. The Greenhouse Gas and Energy Assessment (GHGEA) of the Project was undertaken by Umwelt Australia.

In total Umwelt estimates that the Project will generate 10.4 Mt of scope 1 and scope 2 emissions, see Table 15.

Australia's national climate change policy has a number of components, this includes the Emissions Reduction Fund (ERF) and the Safeguard Mechanism.

Under the safeguard mechanism the (project) mine will be assigned an emissions baseline that it will need to maintain emission levels to. It is only when the mine exceeds this emission baseline that there is any carbon cost incurred and then it is only for the portion of total emissions which exceed the assigned baseline. It should be noted that baselines under the safeguard mechanism are calibrated to align with Australia's national emission reduction target and commitments under the Paris Agreement.

The Emissions Reduction Fund provides financial incentive for the deployment of low cost abatement projects in Australia.

To price the GHG emission we have applied the latest carbon price resulting from the most recent (June 2019) auction undertaken by the Clean Energy Regulator (CER) under the Emissions Reduction Fund (ERF).<sup>9</sup> The results of this auction yielded an average carbon price of \$14.17 (in 2019 Australian dollars) per tonne of CO<sub>2</sub>e abated. While this is an average figure, it represents a useful proxy to the marginal cost of abatement under Australia's current emission abatement policy represented by the ERF.

The carbon costs outlined below assume that all of the projects total emissions will be exposed to the carbon price, as under the Guidelines and Technical Notes the economic analysis is required to assess the net additional Project GHG emissions. This is conservative given the above commentary in relation to how the safeguard mechanism operates in practice.

The externalities arising from GHG emissions associated with the Project are derived by taking the year-on-year emissions and multiplying these figures by the \$14.17 carbon price under the ERF over the life of the Project.

The impact of GHG emissions are global in nature, as a result, apportioning the whole costs of CO<sub>2</sub>e associated with the Project overstates the cost to NSW. To estimate the impacts on NSW, it is appropriate to apportion a component of the total global costs to NSW. The approach adopted is to

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<sup>9</sup> The results of this auction are summarised at <http://www.cleanenergyregulator.gov.au/ERF/Auctions-results/june-2019> which was accessed in September 2019 for this analysis.



apportion the global GHG costs estimated to NSW using the ratio of NSW population to global population.

On a global basis, the total estimated GHG cost is \$62.3 million in NPV terms. Attributing the GHG costs based on the NSW population, consistent with the Guidelines, results in an attributed GHG cost of \$0.07 million to NSW in NPV terms.

Table 15 Greenhouse gas emissions attributable to the Project

	NPV*	Total	2021	2026	2033	2038
Tonnes of GHG (Mt)						
Scope 1	-	9.9	0.0	0.4	0.7	0.4
Scope 2	-	0.4	0.0	0.0	0.0	0.0
<b>Total</b>	<b>-</b>	<b>10.4</b>	<b>0.0</b>	<b>0.4</b>	<b>0.8</b>	<b>0.5</b>
Price Path (\$ per tonne^)	-	14.2	14.2	14.2	14.2	14.2
Global Impact (\$ million^)	62.3	146.8	0.3	6.4	10.9	6.4
NSW (\$ million^)	0.07	0.2	0.0	0.0	0.0	0.0

Source: EY estimates based on Umwelt, Greenhouse Gas and Energy Assessment. ^ Real 2019 Australian dollars.

\* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

## Air quality

The AQIA for the Project was undertaken by Jacobs. The AQIA takes into account background emissions from the existing environment, emissions from surrounding mining operations, wind erosion and the combustion of diesel on site have all been used to develop and calibrate an air quality model for the area. The model is used to predict air quality emissions from the proposed Project.

This model builds upon the previous air quality models used for the Mount Owen Continued Operations Modification 2 Project and the assessment of the Glendell Mine Modification 4 Project. The model predicts Project and cumulative impacts of dust in various particle size fractions including Total Suspended Particulates (TSP), PM10, PM2.5 and depositional dust and also nitrogen oxides in the areas surrounding the Project and then compares these to government health and amenity criteria.

Modelling has been undertaken for four stages of the Project, nominally Project Years 1, 6, 13 and 18 and includes predicted impacts for the operations when closest to Camberwell Village, impacts when operating at maximum production and predicted impacts when operating closest to the Hebden area.

Worst case predicted impacts from potential blast fume events have also been modelled to identify appropriate management measures to be implemented for blasts at Glendell to ensure that blast fumes do not present a public safety risk. The modelled predictions of impacts are compared to government health and amenity impact assessment criteria which are based on National Guidelines and Standards. The modelling methodology and results have also been peer reviewed.

The modelling indicates that the Project will have similar air quality impacts to the existing Approved operations with impacts in Camberwell and the Middle Falbrook area declining as operations extend towards the north. The Project is not predicted to result in any exceedance of the applicable annual average and incremental 24-hour average PM10 and PM2.5, TSP or dust deposition criteria at any residences that do not currently have acquisition rights under existing consents during all stages of the Project.

It is anticipated that 24-hour PM10 and PM2.5 concentrations will continue to be variable from day to day due to existing dry conditions, activities at other contributing operations and extreme regional events such as bushfires. Mining operations will continue to be managed in a way which minimises the contribution to off-site PM10 and PM 2.5 levels.

Properties with acquisitions rights due to predicted air quality impacts under the current Glendell Consent and Mount Owen Consent will continue to have these rights under the Project. Air quality is presently managed in accordance with the approved Air Quality Management Plan currently implemented at the existing Glendell Mine and are included in the operating costs of the Project.

Umwelt advises that, the Project's incremental contribution to air quality impacts in larger residential areas (e.g. Singleton, Singleton Heights and Muswellbrook) is considered to be negligible. Due to the low population density in other areas around the Project area and the low predicted incremental impacts at these locations, quantification of the economic impacts associated with the adverse health impacts associated with the Project is not considered appropriate.

## **Ambient noise impact**

A detailed Noise Impact Assessment (NIA) that assesses potential impacts on sensitive receptors, particularly in the Hebden, Camberwell and the Middle Falbrook areas, has been undertaken by Umwelt for the Project, the findings of which are outlined in the NIA. Detailed modelling of different operating scenarios has been considered in both the design of the Project and the development of assessment of reasonable and feasible management measures.

This modelling has indicated that the Project can be managed such that noise levels in the surrounding areas are predicted to remain within relevant assessment criteria. The Project's noise levels will be similar to, or in some locations less than, the Approved Operations.

Noise levels from the Project experienced in the Hebden area are expected to increase as a result of the Glendell operations progressing to the north, however modelling predicts that this will occur during the later stages of the Project when cumulative impacts from Glencore's Liddell and Mount Owen operations have either ceased or substantially reduced. As a result, noise impacts in the Hebden area will remain below relevant noise assessment criteria at all private residences.

The NIA concludes that there is no predicted exceedances of the sleep disturbance criteria and no significant changes to current road traffic noise.

Glendell Mine will continue to utilise the Mount Owen Complex CHPP and associated rail infrastructure for coal processing and transport. Although the Project seeks to increase the rate of mining from 4.5 Mtpa of ROM coal up to approximately 10 Mtpa of ROM coal, this increase coincides with the decrease in production rates at the other Mount Owen Complex pits maintaining the currently approved throughput at the Mount Owen CHPP. Therefore, there will be no increase in train movements or previously predicted rail noise impacts.

As a result of the relatively minor impacts to noise, as outlined above, the economic assessment qualitatively assesses the ambient noise impacts.

## **Surface water**

As outlined in the Surface Water Impact Assessment (SWIA), the Project is located in the catchment of Bowmans Creek and its ephemeral tributaries of Yorks, Swamp and Bettys Creek. The Project requires the realignment of the lower portion of Yorks Creek and will mine through remnants of Swamp Creek located immediately north of Glendell Pit. While the Project will directly impact on Swamp Creek and Yorks Creek, the mining area does not directly impact on Bowmans Creek with the Glendell Pit Extension offset at least 200 metres from the high bank of Bowmans Creek.

To capture and contain mine affected water and protect downstream watercourses from potential water quality impacts, the existing extensive water management system at the Mount Owen Complex will be extended, incorporating additional dirty and mine water storage dams, pumps and pipelines to capture and contain mine affected water and protect downstream watercourses from potential adverse water quality impacts. Results of flow regime modelling indicate that the reductions in the total catchment area of Bowmans Creek during the operation of the Project and in the conceptual final landform are minor and not expected to have a measurable impact on the flow regime of Bowmans Creek.

No discharge of mine affected water is proposed by the Project. Excess water will continue to be managed through the Greater Ravensworth Area Water and Tailings Scheme (GRAWTS), which allows for the pumping, storage and discharge of excess mine water at the neighbouring Ravensworth and Liddell Operations, which reduces the need for licenced water discharges under the Hunter River Salinity Trading Scheme. The Project is not expected to have any adverse impacts on downstream water quality.

The Project includes management measures to minimise the interception of clean water, including building a network of clean water drains and the realignment of Yorks Creek to direct clean water away from areas disturbed by the mine. The realignment of Yorks Creek has been designed to mitigate the potential impact of erosion on Bowmans Creek downstream of the proposed confluence and modelling indicates that no significant flooding impacts are expected due to the diversion. These surface water management measures are included in the operating and capital costs for the Project.

## Groundwater impact

A comprehensive assessment of potential groundwater impacts has been completed for the Project using a numerical groundwater model. The findings of the assessment is outlined in the Groundwater Impact Assessment (GWIA) complete by AGE. The model has been developed based on historical datasets and responses of the groundwater systems to the progression of mining in the area. A range of potential groundwater issues were investigated as part of the assessment. Monitoring data from an established groundwater monitoring network has been used to assess baseline conditions.

The only potentially highly productive aquifer in the Project Area is the Bowmans Creek alluvium, which is relatively thin but contains a permeable sand and gravel base that readily transmits fresh to slightly brackish groundwater. Bowmans Creek meanders through the flood plain adjacent to the Glendell Pit Extension and includes some ponding.

The long history of underground and open cut mining in close proximity of the Project has resulted in the groundwater levels within the coal measures being extensively depressurised indicating evidence of cumulative impacts within this hydrogeological environment. As outlined in the GWIA, the cumulative effects from historical and approved operations will continue to impact on groundwater systems with impacts on the Bowmans Creek alluvium predicted to peak in approximately 2046, shortly after the planned cessation of mining associated with the Project.

Modelling indicates that the Project will further depressurise the coal seams proposed to be mined however the Project's incremental impact to the peak cumulative impacts on the alluvial aquifers are small (approximately 7ML/year additional take). All predicted take associated with the Project can be licensed through readily available licence allocations or existing licences held by Glencore and are included in the operational costs.

Localised areas of additional drawdown (i.e. relative to existing approved operations) are predicted to occur within the Bowmans Creek alluvium in close proximity to the areas where the Glendell Pit Extension will intersect with the Yorks Creek and Swamp Creek alluvium. There are no operating private water supply bores in the area where the numerical modelling indicated the potential for drawdown.

Given the limited impacts detected in monitoring to date and by numerical modelling for future activities, no additional groundwater impact mitigation measures are required for the Project. Groundwater levels and quality will continue to be monitored in accordance with the approved Water Management Plan. The costs of monitoring and the licensing of take are included in the operating costs of the Project. Umwelt advises that the Project will result in minor residual groundwater impacts. As a result, the Project's impacts on groundwater are considered qualitatively.

## Transport/traffic impacts

A detailed Traffic and Transport Impact Assessment TTIA was undertaken by Puliypang, the analysis outlines the potential impacts the Project will have on road safety and travel times in the region.

Construction and operation of the Project will have a negligible impact on road safety conditions on the New England Highway and Hebden Road due to the minor increase in traffic volumes associated with the Project. Recently completed road safety projects have improved conditions in the area and the proposed Hebden Road realignment will provide a new, higher standard alignment that is more compatible with regulatory posted speed limits.

The operation of the Project will have impacts that result from the realignment of Hebden Road and from delaying traffic flow as a result of blasting.

Due to the realignment of Hebden Road, TTIA modelling suggests per day 364 light and heavy vehicles not associated with the mining operations at the Mount Owen Complex will travel an additional 1.2 kilometres or 54 seconds (or 0.015 hours). At a travel time cost of \$46.40 per hour, based on a cost of \$34.70 per hour for light vehicles and \$50.8 per hour heavy vehicles,<sup>10</sup> the annual travel time cost as a result of the realignment of Hebden Road is \$0.09 million per annum, see Table 16.

Blasting will primarily be undertaken during 9am and 5pm Monday to Friday with up to 8 blasts per week. As outlined in the TTIA up to 15 (non-Mount Owen Complex) vehicles could be delayed for up to 15 minutes (as advised by Umwelt) during each blast. Based on the length of delay, the number blasts and the number of cars, blast delays will total 1,560 hour per year. At a travel time cost of \$46.40 per hour, the total annual cost of blast delays is \$0.07 million. This is conservative estimate in that blasts located more than 500 metres from Hebden Road will not require a road closure and the 15 vehicles assumed to be delayed represents the maximum number of (non-mine) vehicle movements in any 15 minute period during the road survey period.

As a result of the realignment and the blast wait time cost the annual travel time costs are \$0.16 million. Over the life of the Project, the total estimated travel time cost is \$1.6 million in NPV terms.

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<sup>10</sup> Based on travel time costs in Transport for NSW (2016), updated to 2019 AUD

Table 16 Increased travel time from the realignment of Hebden Road

Additional travel time	Total
Non-Mine vehicle movements per day	
Light (No.)	101.0
Heavy (No.)	263.0
Total (No.)	364.0
Additional travel time	
Per vehicle (Hours)	0.015
Daily (Hours)	5.5
Annual (Hours)	1,992.9
Hourly Cost by vehicle type	
Light (\$)	34.7
Heavy (\$)	50.8
Hourly Cost (\$)	46.4
Annual travel time cost (\$ million^)	0.09
<b>Blast delay</b>	
Vehicle Movements per day (No.)	15
Delay (Hours)	0.25
Time lost per blast (Hours)	3.75
Blasts per year (No.)	416
Annual blasts (Hours)	1,560
Hourly Cost (\$)	46.4
Travel time cost (\$ million^)	0.07
Annual travel time cost (\$ million^)	0.16
Total NPV Cost (\$ million^, 2021 - 2044)	1.6

Source: EY estimates based on Puliypang (2019) and Transport for NSW (2016). ^ Real 2019 Australian dollars. \* NPV in 2019 Australian dollars based on a 7 per cent real discount rate.

## Biodiversity and ecological impacts

A Biodiversity Development Assessment (BDA) report has been carried out by Umwelt. The BDA notes that the Project maximises the use of previously disturbed and mined areas and the approved disturbance area of the Approved operations, thereby minimising the additional disturbance area.

To minimise the potential impacts of the Project, the report includes the Glendell implementation of a comprehensive biodiversity mitigation strategy to minimise unavoidable impacts. A number of management measures will also continue to be implemented including, landform rehabilitation, salvage of biodiversity features, weed management and feral animal control and environmental works to control erosion and sediment.

The BDA concludes the Project will result in biodiversity impacts that are unavoidable and will require credits to mitigate against the cost of loss of ecology values. Table 17 provides a summary of the ecosystem off-set credits required to compensate the ecological loss as calculated in accordance with the NSW Biodiversity Assessment Methodology established under the *Biodiversity Conservation Act 2017*. In total the development of the Project will require 9,281 credits, which is largely made up of, the 4898 credits required to offset the Project's assessed impacts to the Narrow-leaved Ironbark, Bull Oak and Grey Box Shrub Plant Community Types (PCTs) communities.

Table 17 Ecosystem credit prices set by the Biodiversity Conservation Trust (BCT) as no trades have been recorded.

Species/ Plant Community Types	Credits Required
Plant Community Type	
485 - River Oak Riparian Grassy Tall Woodland of the Western Hunter Valley	34
1604 - Spotted Gum - Narrow-Leaved Ironbark Shrub - Grass Open Forest of the Central and Lower Hunter	11
1603 - Narrow-leaved Ironbark - Bull Oak - Grey Box Shrub - Grass Open Forest of the Central and Lower Hunter - Moderate to Good Condition	4,898
1692 - Bull Oak Grassy Woodland of the Central Hunter Valley	322
1731 - Swamp Oak - Weeping Grass Grassy Riparian Forest of the Hunter Valley	707
Ecosystem Credits	5,972
Species	
Cymbidium canaliculatum population in the Hunter Catchment	1
Southern myotis (Myotis macropus)	732
Brush-tailed phascogale (Phascogale tapoatafa)	2,559
Eastern cave bat (Vespadelus troughtoni)	17
Species Credits	3,309
Total Credits	9,281

Source: Biodiversity Development Assessment Umwelt (2019)

The costs of the biodiversity mitigation strategy and the cost to generate the biodiversity credits are included in the operating costs of the Project. Umwelt advises that the biodiversity offset credits have been calculated based on the cost to pay into the Biodiversity Conservation Fund for the entirety of the estimated impact credits as outlined in the Table 17 (as at 16 September 2019). It has been assumed that all biodiversity credit costs would be incurred in Year 2 of the Project. Umwelt has identified the total offset costs (included in the operating and capital cost) are \$20.4 million or \$16.6 million in NPV terms.

## Aboriginal cultural heritage

Australian Cultural Heritage Management completed an Aboriginal Cultural Heritage Assessment (ACHA) report and OzArk prepared the Aboriginal Archaeological Impact Assessment (AAIA) for the Project. The ACHA was completed in consultation with the registered Aboriginal parties, knowledge holders and the local Aboriginal land council to seek advice and knowledge regarding the social, historic, aesthetic and scientific values which exist within the Project Area.

The AAIA identified 91 sites (55 artefact scatters and 36 isolated finds) which will be impacted by the Project, if approved. In response, Glencore has collaboratively developed management and mitigations measures with the registered Aboriginal parties involved in the ACHA.

As stated in the Technical Notes, there are substantive challenges in quantifying the intrinsic cultural value of Aboriginal culture and heritage in monetary terms. The Technical Notes also outline that existing valuation methods provide an unsatisfactory approach to accurately quantify potential impacts. The Technical Notes, do provide guidance on how to measure the costs of potential impact, including identify the management steps of the Project.

The management measures will also be undertaken in consultation and participation of the Knowledge Holders and community stakeholders. In addition, all sites required to be impacted will be recovered by the collection and recording of all visible surface artefacts. The costs of these management measures are included in the capital costs of the Project.

## Historical heritage

Lucas Stapleton Johnson & Partners completed the Statement of Heritage Impact (SoHI) for the Project, the SoHI outlines the potential impacts to historical heritage as a result of the Project, in particular, the impacts to Ravensworth Homestead.

The Ravensworth Homestead is a collection of buildings constructed in the early 19th century and is considered to have significant heritage values as a remnant of an early pastoral station. It is also associated with a number of historical persons. The estate retains evidence of the colonial development such as the property boundaries, historical archaeological sites and the homestead complex. The oldest structure dates to circa 1832 and is listed as an item of local heritage significance under the Singleton Local Environmental Plan 2013. The homestead and surrounding land is owned and maintained by Glencore.

As a mitigation measure, Glencore is proposing to relocate the homestead to an appropriate site for re-use. Glencore has undertaken extensive heritage studies that have enabled a greater understanding of the historic Ravensworth property and, with consideration of heritage and community values, appropriate options for relocation. In addition, over the last 18 months, further investigations have been completed by specialist heritage contractors to determine the viable options to relocate the Homestead and associated buildings. This process was undertaken with a Glencore-established community-based committee.

Two relocation options are proposed for the Ravensworth Homestead and associated buildings:

1. An in-tact move to a newly created 'Ravensworth Farm' site, located adjacent to the realigned Hebden Road. This site is on Glencore land and within the Project Area. During the life of the Project, the buildings would be used for administration purposes, with alternative uses post-mining including continuing its previous use as a rural homestead. The relocation methodology involves moving the buildings intact on a purpose-built road using highly specialised equipment.
2. Relocating to the Broke township where the buildings would have multi-purpose usage and form the village square. This method of relocation involves dismantling the buildings 'stone-by-stone' and then rebuilding in the new location.

The costs of relocating the Ravensworth Homestead complex are included in the capital costs of the Project. To avoid any double-count of potential historical impacts, as noted in the Technical Notes, any residual historical heritage losses are assessed qualitatively.

## Visual amenity

Umwelt advises that the Project will result in minor changes to visual amenity to the surrounding region. The vicinity of Glendell is generally comprised of active and non-active mining operations, coal related infrastructure, power generation infrastructure including the Liddell and Baywater Power Stations, other built infrastructure with a backdrop of rural and wooded areas.

The Mount Owen Complex, of which the Glendell mine is a part of, is located within a rural environment in close proximity to several other mining operations. The character of the immediate visual environment of the Project area is strongly influenced by the existing mining operations, with mining a key component of the landform in the local area for over 50 years. The proposed Glendell Pit Extension, in-pit emplacement areas and Heavy Vehicle Access Road will be immediately adjacent to sections of the realigned section of Hebden Road and will likely be visible along some sections of Hebden Road. The increased height of overburden emplacement areas associated with the Project is likely to result in increased visibility at some locations, all of which currently have visual impacts associated with existing operations at Glendell Mine and the operations within the Mount Owen Complex or other nearby mining operations.

Key mitigation measures will be similar to those currently implemented as part of the Mount Owen Complex operations and include roadside vegetation planting that acts as a screen, progressive rehabilitation and development of an appropriate landform that incorporates natural landform design principles.

The mitigation costs are included in the operating and capital costs of the Project.

## Loss of surplus to other industries

A detailed Agricultural Impact Assessment (AIS) for the Project was completed by Umwelt. The Project is expected to impact the agriculture sector by displacing vealer and weaner cattle. These losses are generated directly, from the movement of the pit-top disturbance area, and indirectly from an adjacent parcel.

Umwelt advises that, during operations from 2021 to 2048 (the life of the Project, plus an additional 4 years), both the disturbance area and the adjacent parcel could be lost to agricultural production. Umwelt advises that, based on recommended stocking rates<sup>11</sup> annually 279 production units will be lost to agriculture output during this period, as summarised in Table 18.

After operations are complete, the land adjacent will be returned to agriculture, Umwelt advises that, the losses to agriculture output will reduce to 57 breeding units.

Table 18 Total Breeding Unit Loss, by Project period, During mining operations and Post-mining

Scenario		Production units*		
		Additional Disturbance Area	Indirect Impact Area	Total
During Operations (2021-2048)	Vealer production on improved pastures (Units)	35	150	185
	Weaner production on unimproved pastures (Unit)	81	13	94
	Total units	116	163	279
Post-mining landscape (2049 onwards)	Vealer production on improved pastures (Units)	18	0	18
	Weaner production on unimproved pastures (Unit)	39	0	39
	Total units	57	0	57

Source: Agricultural Impact Statement (Umwelt)

Umwelt advises that, based on average weights in DPI (2006), the average live weight (LW) of a vealer, is 305kg, with female vealers LW of 285 kg, and male vealers LW of 325 kg. Weaners have an average LW of 180kg, with female weaners weighing 170kg and males 190kg.

MLA sales data for Singleton,<sup>12</sup> indicates that the sales price of vealers is \$2.73 per kg and of weaners is \$3.00 per kg.

As shown in Table 19, based on the number of units lost, the average LW and the sales price, it is estimated that vealer sales will reduce by \$0.15 million per annum and weaner production by \$0.05 million. Annually, over the period 2021 to 20248, the annual lost sales are \$0.2 million, which equates to loss of gross operating surplus of \$0.06 million to the NSW economy.

Table 19 Annual Loss of agricultural output during mining operations (2021 to 2048)

Units	Units lost	Average Live Weight	Total LW - Kg	Sales price	Revenue lost \$m	Lost GOS <sup>13</sup> \$m
Vealer	185	305	56,425	2.7	0.15	0.05
Weaner	94	180	16,920	3.0	0.05	0.02
Total	279		73,345		0.2	0.06

Source: EY analysis, based on Agricultural Impact Statement (Umwelt), MLA (2019)

<sup>11</sup> As outlined in DPI (2006)

<sup>12</sup> Meat and Livestock Australia *Market Reports & Prices*, for Singleton, accessed 18/09/2019

<sup>13</sup> The lost GOS of the Sheep, Grains, Beef, Dairy and Cattle is 0.31 per dollar of output, based on the EY Regional Input-Output Model (CERIO).



In the post mining phase, from 2049, the land indirectly impacted by mining operations are returned to agriculture use. The number of annual units lost of agriculture output reduced from 279 (during the mining operations) to 57 in the post mining period.

As shown in Table 20, based on the number of units lost, the average LW and the sales price, it is estimated that vealer sales will reduce the annual lost sales are \$0.036 million, which equates to loss of gross operating surplus of \$0.011 million to the NSW economy.

Table 20 Annual loss of agricultural output post mining period

Units	Units lost	Average Live Weight	Total LW - Kg	Sales price	Revenue lost \$m	Lost GOS \$m
Vealer	18	305	5,490	2.7	0.015	0.05
Weaner	39	180	7,020	3.0	0.021	0.07
Total	57		12,510		0.036	0.011

Source: EY analysis, based on Agricultural Impact Statement (Umwelt), MLA (2019)

Over the life of the Project and the post mining period, the loss of agricultural gross operating surplus amounts to \$0.7 million in NPV terms. This accounts for an annual loss of \$0.06 million during operations from 2021 to 2048 and an annual loss of \$0.011 million from post operations.<sup>14</sup>

## Net public infrastructure costs

Glendell advises that the Project is not expected to generate public infrastructure costs beyond the infrastructure relocation costs included in the capital costs of the project. The Project will include the continued use of existing infrastructure at the Mount Owen Complex and the construction of new water management facilities to support the proposed Glendell Pit Extension. The Project capital costs include the realignment of Hebden Road and the realignment of powerlines and telecommunications facilities.

As a result, the Project is expected to generate nil externalities in relation to net public infrastructure costs as the relocation costs are all internalised.

The increased travel-time costs of this realignment are included in traffic impacts section above.

<sup>14</sup> We have assumed that the post mining agriculture losses will be generated from 2049 to 2088.

## Appendix B      Sensitivity analysis – CBA and LEA

Table 21 Sensitivity analysis of the potential net benefits of the Project (NPV\*, \$ million\*\*)

	Central Case	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Lower Supplier Benefit	Higher Environ. Costs	Worst-case	Best-case	Central Case (4%)	Central Case (10%)
Direct Benefits	\$398.0	\$493.4	\$302.6	\$373.5	\$422.4	\$395.6	\$400.3	\$398.0	\$398.0	\$398.2	\$300.4	\$495.5	\$567.0	\$288.7
1. Net producer surplus	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2. Royalties, payroll tax and Council rates	\$333.3	\$379.3	\$287.3	\$333.3	\$333.3	\$333.3	\$333.3	\$333.3	\$333.3	\$333.3	\$287.3	\$379.3	\$472.1	\$243.2
3. Company income tax apportioned	\$64.7	\$114.1	\$15.3	\$40.2	\$89.1	\$62.3	\$67.0	\$64.7	\$64.7	\$64.9	\$13.1	\$116.2	\$94.9	\$45.5
Indirect Benefits	\$754.3	\$754.3	\$754.3	\$795.9	\$712.7	\$754.3	\$754.3	\$682.3	\$725.7	\$754.3	\$653.6	\$783.0	\$1,056.3	\$557.1
1. Net economic benefit to existing landholders	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2. Net economic benefit to Local workers	\$468.0	\$468.0	\$468.0	\$468.0	\$468.0	\$468.0	\$468.0	\$396.0	\$468.0	\$468.0	\$396.0	\$468.0	\$651.8	\$347.5
3. Net economic benefit to Local suppliers	\$286.3	\$286.3	\$286.3	\$327.9	\$244.7	\$286.3	\$286.3	\$286.3	\$257.7	\$286.3	\$257.7	\$315.0	\$404.5	\$209.6
Indirect (Environmental costs)	\$2.4	\$2.4	\$2.4	\$2.4	\$2.4	\$2.4	\$2.4	\$2.4	\$2.4	\$2.65	\$2.7	\$2.2	\$3.4	\$1.8
Potential Net Benefits	\$1,149.9	1,245.3	\$1,054.4	\$1,167.1	\$1,132.7	\$1,147.5	\$1,152.3	\$1,077.8	\$1,121.3	\$1,149.9	\$951.4	\$1,276.3	\$1,619.8	\$844.0

Source: EY estimates based on information from various sources. \* Estimated as the benefits of the Project case less the Baseline case. \*\* NPV in 2019 dollars based on a 7 percent real discount rate.

Table 22 Sensitivity analysis of the potential net regional benefits of the Project (NPV\*, \$ million\*\*)

	Central Case	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Lower Supplier Benefit	Higher Environ. Costs	Worst-case	Best-case	Central Case (4%)	Central Case (10%)
Direct Benefits														
1. Net producer surplus														
2. Royalties, payroll tax and Council rates														
3. Company income tax apportioned														
Indirect Benefits	\$449.0	\$449.0	\$449.0	\$468.6	\$429.5	\$449.0	\$449.0	\$400.7	\$435.6	\$449.0	\$387.3	\$462.5	\$628.1	\$332.0
1. Net economic benefit to existing landholders	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2. Net economic benefit to Local workers	\$314.7	\$314.7	\$314.7	\$314.7	\$314.7	\$314.7	\$314.7	\$266.4	\$314.7	\$314.7	\$266.4	\$314.7	\$438.3	\$233.7
3. Net economic benefit to Local suppliers	\$134.3	\$134.3	\$134.3	\$153.8	\$114.8	\$134.3	\$134.3	\$134.3	\$120.9	\$134.3	\$120.9	\$147.8	\$189.8	\$98.3
Indirect (Environmental costs)	\$2.3	\$2.3	\$2.3	\$2.3	\$2.3	\$2.3	\$2.3	\$2.3	\$2.3	\$2.58	\$2.6	\$2.1	\$3.3	\$1.7
<b>Potential Net Benefits</b>	<b>\$446.7</b>	<b>\$446.7</b>	<b>\$446.7</b>	<b>\$466.2</b>	<b>\$427.2</b>	<b>\$446.7</b>	<b>\$446.7</b>	<b>\$398.4</b>	<b>\$433.3</b>	<b>\$446.5</b>	<b>\$384.7</b>	<b>\$460.4</b>	<b>\$624.7</b>	<b>\$330.3</b>

Source: EY estimates based on information from various sources. \* Estimated as the benefits of the Project case less the Baseline case. \*\* NPV in 2019 dollars based on a 7 percent real discount rate.

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