Economic Impact Assessment of the Hunter Valley Operations continuation project

HV Operations Pty Ltd

07/05/2024

Building a better working world

Release Notice

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The results of Ernst & Young's work, including the assumptions and qualifications made in preparing the report, are set out in Ernst & Young's Draft report dated 07 May 2024 ("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.

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Executive Summary

Hunter Valley Operations (HVO) is a multi-pit open cut mining complex (the "HVO Complex") situated approximately 24 kilometres (km) north-west of the town of Singleton in the Hunter Valley region of New South Wales (NSW). HVO is owned by subsidiary companies of Yancoal and Glencore as participants in the unincorporated HVO Joint Venture (JV). HV Operations Pty Ltd is the appointed manager of the JV. The HVO Complex consists of two mines, HVO North and HVO South.

HV Operations Pty Ltd is seeking approval for the HVO continuation project (the Project) which comprises the continuation of HVO North and HVO South operations to the end of 2050 and 2045 respectively. The Project will support the extraction of approximately 684.2 million tonnes (Mt) of Run of Mine (ROM) coal from the operation[1].

The existing HVO North operation operates under development consent DA 450-10-2003 (as modified) and comprises the approved mining areas of West Pit, Mitchell Pit, Carrington Pit and North Pit. HVO South operates under Project Approval (PA) 06_0261 (as modified) and comprises the approved mining areas of Riverview Pit and Cheshunt Pit, where mining activities currently take place, and the Riverview South-East Extension and South Lemington Pits 1 and 2.

The continuation of mining across the HVO Complex (which entails the continued operations of both the HVO North and HVO South), according to HVO, is expected to optimise resource recovery from existing operations, predominately by mining across previously mined areas within the extent of existing mining tenements and extracting coal from deeper seams at HVO North. HVO South would cease coal extraction from Riverview South-East extension, South Lemington Pit 1 and South Lemington Pit 2 mining areas and increase the capacity in Lake James.

HVO has provided EY with the information required to complete an economic impact assessment of the Project, including environmental studies, project financial data, project physicals and operation requirements such as employment. Information from HVO is combined with our own research based on publicly available information such as data from the Australian Bureau of Statistics (ABS) and KPMG *Coal Price and FX Market Forecasts*.

The information underpinning this analysis, therefore, is a combination of publicly available information and commissioned expert studies assessing the Project financials and environmental impacts. 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 inputs.

The analysis

This Report provides an Economic Impact Assessment (EIA) for the Project 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.

EY prepared an EIA (EY 2022) which accompanied the HVO Continuation Project Environmental Impact Statement (EIS) (EMM 2022). In March 2024, HVO received correspondence from the Department of Planning, Housing and Infrastructure requesting additional information to inform their assessment of the Project primarily in relation to consideration of the Commonwealth Safeguard Mechanism and the *Climate Change (Net Zero Future) Act 2023* (NZF Act). Relevant to this assessment, in their correspondence, DPHI requested *'any relevant updates to the economic assessment associated with the above'*. This report has been prepared to address this request, which represents a full update to the EIA dated for 15 December 2022 (EY 2022).

[1] EY does not provide any view or opinion on the Project, as to whether it should proceed or not. EY's role is limited to modelling the inputs and assumptions to prepare the EIA to present the outcome of the analysis undertaken, Therefore, analysis and outcome included in this report should not be construed as EY's view or opinion on whether the Project should proceed or not.

This report incorporates changes to the economic assessment landscape arising since the completion of the EIA (EY 2022) including:

- An 2.6% increase to the NSW government coal royalty rate for open cut mining from 8.2% to 10.8% from 1 July 2024.[2]
- Contemporary coal price and currency forecasts for Q1 2024 (KPMG Coal Price and FX Market Forecasts December 2023/January 2024).
- Consideration of direct environmental costs as an outcome of the HVO Continuation Project Submissions Report and HVO Continuation Project Amendment Report including:
  - revised forecast of mine greenhouse gas emissions and the inclusion of a pre-gas drainage trial.
  - the revised positioning of the proposed Lemington Road realignment and related update to transport, biodiversity and Aboriginal archaeology impacts, and
  - the inclusion of the Carrington West Wing low permeability groundwater barrier wall prior to mining within 100m of the remnant paleochannel in connection to the Hunter River.

To estimate the direct environmental, social and transport-related costs generated by the Project as required by the Guidelines, the EIA uses the methods outlined in the *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (the Technical Notes).[3] These costs are classified as mitigation costs which are outlined in the impact assessments conducted (see **Appendix A**) for Aboriginal heritage, noise, air quality, visual amenity, groundwater, biodiversity, greenhouse gas emissions, and traffic and transport.

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 proposed development to NSW. The LEA is based on analysis for the Lower Hunter region (as defined by the Australian Bureau of Statistics SA3 10601 region).

In addition, we have included the results of assessing the economy-wide potential impacts of the Project to both the local region of Lower Hunter and to NSW. The economic modelling is undertaken using EYs inhouse Computable General Equilibrium (CGE) Model.

Results of the CBA

HVO is seeking approval for a State Significant Development Application for the Project to an incremental 684.2 million tonnes (Mt) Run-of-Mine (ROM) coal over the period of 2025-2050. The Project would produce around 497.3 Mt of product coal[4], comprised of approximately 59 Mt of metallurgical coal and 438 Mt of thermal coal.[5] The calculated net benefits for the individual mines HVO North and HVO South are $5,458.2 million and $2,318.5 million in Net Present Value (NPV) terms respectively.[6]

However, as a complex, HVO is estimated to produce a potential net benefit of $7,836.2 million in NPV terms[7], and an increase of $60.5 in NPV terms in comparison to the combined net benefits (potential) of the operation of the individual mines. This is due to the higher operation and capital

[2] Coal royalties to deliver budget repair, fairer return for NSW | NSW Government (2024).

[3] Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals (2018)

[4] Product coal is mined coal that has been cleared of impurities and are marketable.

[5] Incremental coal production figures have been provided by HVO.

[6] All NPV figures reported are in real 2024 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated).

[7] The net benefits are estimated after the consideration of direct costs however, EY have not assessed the useful life of fixed assets (both moveable and immovable) and whether or not additional fixed assets will be deployed.

expenditure costs when HVO North and HVO South are run as individual operations in comparison to a combined, more efficient approach wherein both projects continue to remain operational.

Table 1: Net Benefits to NSW under central case assumptions for HVO North, HVO South and Combined Operations

	HVO Complex	HVO North	HVO South
Direct Benefits ($)	4,367.4	2,901.4	1,351.5
Indirect Benefits ($)	3,488.1	2,569.6	972.0
Incremental Indirect Costs ($)	19.3	12.7	5.1
Net Benefits	**7,836.2**	**5,458.2**	**2,318.5**

*Source: EY estimated based on information from various sources. *NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*[8] *Totals for all tables may not sum due to rounding*

The estimated potential gross benefit for the HVO Complex is comprised of $4,367.4 million and $3,488.1 million in potential direct and indirect benefits respectively. Incremental indirect costs are estimated at $19.3 million in NPV terms. Estimated incremental direct costs were considered individually as capital expenditure and operational expenditure to determine the net producer surplus for potential direct benefits (see Table 11).

These estimates are based on central case assumptions in relation to the proposed mine development and capital expenditure of $2,701.8 million in NPV terms and an average estimated realised coal price of $150.5 per tonne for metallurgical coal and $127.0 per tonne for thermal coal.[9]

The potential ***direct economic benefits*** of the Project are a function of the profitability of the proposed development which, in turn, depends on the prevailing coal price and the mines' cost structures. The estimated economic viability of the Project is underpinned by the combination of high output and value of thermal and metallurgical coal, compared to the estimated capital costs of the Project. The estimated capital expenditure cost per product coal is found to equate to $5.4 million in NPV per tonne for HVO Complex in comparison to $4.7 and $9.8 for HVO North and HVO South respectively.

For the **HVO Complex**, this is estimated to result in generating:

- An overall net producer surplus[10] of $5,851.6 million in NPV terms for Australia, of which 0 per cent, or $0 is attributed to NSW.[11]
- Total corporate taxes of $2,829.4 million in NPV terms for Australia, of which $905.4 million is attributed to NSW[12](A 30[13] per cent tax rate on operating profit was utilised in the estimation of this figure in reference to the Guidelines).
- Other government revenue for NSW of $3,462 million in NPV terms, the largest component of this being royalties of $3,262.8 million (based on a royalty rate of 10.8[14] per cent of revenue

[8] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015) page 4.

[9] Average realised prices estimated from https://assets.kpmg.com/content/dam/kpmg/au/pdf/2024/coal-price-fx-market-forecast-december-2023-january-2024.pdf in real terms.

[10] Consistent with the Guidelines, the net producer surplus of the proposed development represents the private benefit, or operating surplus, generated that is attributable to NSW.

[11] The 0 per cent share is based on the estimated 0 per cent NSW ownership of the Project. This can be considered an inherently conservative assumption, given that Yancoal – part owner of the Project - is listed on the Australian Stock Exchange. Therefore, it is quite likely that there would be some proportion of net producer surplus that could be attributed NSW, however given the uncertainties around ascertaining this level of ownership, it is conservatively assumed that 0 per cent of the net producer surplus is attributed to NSW.

[12] Amount contributed is the total corporate taxes multiplied by the percentage contribution to NSW (32 per cent). 32 per cent is referenced from the guidelines located in *Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au)* where 32 per cent is derived from NSW population divided by Australian population. This measurement of 32 per cent is meant to apportion the Australian corporate tax benefits to only those in NSW.

[13] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015) page 10.

[14] Coal royalties to deliver budget repair, fairer return for NSW | NSW Government (2024).

taking into account a discount of $3.5 per sales tonne applied for coal wash), plus payroll taxes of $159.5 million and council rates of $39.7 million.

The potential ***indirect economic benefits*** of the Project are related to the linkages that the proposed development has to the NSW economy through both the labour market and suppliers. The analysis shows that of the $3,488.1 million in NPV terms of indirect benefits:

- Worker benefits are $1,264.9 million in NPV terms attributable to an average direct employment of 1,118 FTE workers over the period of the Project and due to higher average wages paid to Project employees than average wages paid to similar occupations outside the mining sector in NSW (see **Appendix C**).

- Supplier benefits are $2,223.2 million in NPV terms, representing direct value add generated by NSW suppliers providing goods and services to the Project, based on NSW-based operational expenditure over the life of the Project of $11,016.6 million in NPV terms.

The estimated ***indirect costs*** of the Project are related to the costs borne on the NSW community through the generation of externalities[15] by the Project which have not been offset by investments by HVO. These costs include:

- Scope One and Two greenhouse gas emissions of $3.68 million in NPV terms.[16,17]

- Traffic and Transport costs of $1.62 million in NPV terms.

- Biodiversity offset costs of $34.4 million in NPV terms internalised as operational expenditure.

- Loss of surplus to other industries costs of $14 million in NPV terms (Impact to agricultural lands).

- Mitigation offset costs of $18.1 million in NPV terms, which are accounted for in operational expenditure consisting of blasting impacts, air quality, noise impacts, groundwater and surface water impacts, visual amenity impact, social impacts, pre-gas drainage testing and historical and aboriginal heritage impacts.

Individual HVO North and HVO South CBA Results

For HVO North operating on its own without the HVO South project being extended, this is estimated to result in generating:

- An overall net producer surplus of $3,452.8 million in NPV terms for Australia, of which 0 per cent, or $0 million is attributed to NSW.[18]

- Total corporate taxes of $1,696.3 million in NPV terms for Australia, of which $542.8 million is attributed to NSW (A 30 per cent tax rate[19] on operating profit was utilised in the estimation of this figure in reference to the Guidelines).

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[15] Cost estimates such as the biodiversity, mitigation offset costs and loss of surplus to other industry costs were provided by HVO. Total incremental amount of GHG emissions emitted and vehicles impacted by traffic and transport were provided, however, costs were estimated by EY.

[16] Additional sensitivity analysis on the cost and apportionment method of the greenhouse gas externality is presented in section 2.7.1.6.

[17] The EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.

[18] The 0 per cent share is based on the estimated 0 per cent NSW ownership of the Project. This can be considered an inherently conservative assumption, given that Yancoal – part owner of the Project - is listed on the Australian Stock Exchange. Therefore, it is quite likely that there would be some proportion of net producer surplus that could be attributed NSW, however given the uncertainties around ascertaining this level of ownership, it is conservatively assumed that 0 per cent of the net producer surplus is attributed to NSW.

[19] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015) page 10.

- Other government revenue for NSW of $2,358.6 million in NPV terms, the largest component of this being royalties of $2,220.7 million (based on a royalty rate of 10.8 per cent[20] of revenue taking into account a discount of $3.5 per sales tonne applied for coal wash), plus payroll taxes of $118 million and council rates of $19.9 million.

The potential ***indirect economic benefits*** of the HVO North Project are related to the linkages that the proposed development has to the NSW economy through both the labour market and suppliers. The analysis shows that of the $2,569.6 million in NPV terms of potential indirect benefits:

- Potential worker benefits are estimated at $939.0 million in NPV terms attributable to an average direct employment of 900 FTE workers over the period of the Project and due to higher average wages paid to Project employees than average wages paid to similar occupations outside the mining sector in NSW (see **Appendix C**).

- Potential supplier benefits are estimated at $1,630.5 million in NPV terms, representing direct value add generated by NSW suppliers providing goods and services to the Project, based on NSW-based operational expenditure over the life of the Project of $8,079.7 million.

The estimated ***indirect costs*** of the HVO North Project are related to the costs borne on the NSW community through the generation of externalities[21] by the Project which have not been offset by investments by HVO. These costs include:

- Scope One and Two greenhouse gas emissions of $2.4 million in NPV terms.[22,23]

- Traffic and Transport costs of $1.8 million in NPV terms.

- Biodiversity offset costs of $32.4 million in NPV terms internalised as operational expenditure.

- Loss of surplus to other industries costs of $8.7 million in NPV terms (Impact to agricultural lands).

- Mitigation offset costs of $10.6 million in NPV terms are accounted for in operational expenditure consisting of blasting impacts, air quality, noise impacts, groundwater and surface water impacts, visual amenity impact, social impacts, pre-gas drainage testing and historical and aboriginal heritage impacts.

For HVO South operating on its own without the HVO North project being extended, this is estimated to result in generating:

- An overall net producer surplus of $1,223.3 million in NPV terms for Australia, of which 0 per cent, or $0 million is attributed to NSW.

- Total corporate taxes of $734.7 million in NPV terms for Australia, of which $237.2 million is attributed to NSW (A 30 per cent tax rate[24] on operating profit was utilised in the estimation of this figure in reference to the Guidelines).

- Other government revenue for NSW of $1,116.4 million in NPV terms, the largest component of this being royalties of $1042.2 million (based on a royalty rate of 10.8[25] per cent of revenue

[20] Coal royalties to deliver budget repair, fairer return for NSW | NSW Government (2024).

[21] Cost estimates such as the biodiversity, mitigation offset costs and loss of surplus to other industry inputs were provided by HVO, in addition to total incremental GHG emissions emitted and traffic and transport impacts.

[22] The EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.

[23] Additional sensitivity analysis on the cost and apportionment method of the greenhouse gas externality is presented in section 2.7.1.6.

[24] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 10.

[25] Coal royalties to deliver budget repair, fairer return for NSW | NSW Government (2024).

taking into account a discount of $3.5 per sales tonne applied for coal wash), plus payroll taxes of $55.6 million and council rates of $18.6 million.

The potential ***indirect benefits*** of the HVO South Project are related to the linkages that the proposed development has to the NSW economy through both the labour market and suppliers. The analysis shows that of the $972 million in NPV terms of potential indirect benefits:

- Potential worker benefits are $448.5 million in NPV terms attributable to an average direct employment of 494 FTE workers over the period of the Project and due to higher average wages paid to Project employees than average wages paid to similar occupations outside the mining sector in NSW (see **Appendix C**).

- Potential supplier benefits are $523.5 million in NPV terms, representing direct value add generated by NSW suppliers providing goods and services to the Project, based on NSW-based operational expenditure over the life of the Project of $2,594.1 million.

The estimated ***indirect costs*** of the HVO South Project are related to the costs borne on the NSW community through the generation of externalities[26] by the Project which have not been offset by investments by HVO. These costs include:

- Scope one and two greenhouse gas emissions of $1.4 million in NPV terms.[27,28]

- Traffic and Transport costs of $0 million in NPV terms.

- Biodiversity offset costs of $2.0 million in NPV terms internalised as operational expenditure.

- Loss of surplus to other industries costs of $4 million in NPV terms (Impact to agricultural lands).

- Mitigation offset costs of $8.5 million in NPV terms which are accounted for in operational expenditure consisting of blasting impacts, air quality, noise impacts, groundwater and surface water impacts, visual amenity impact, social impacts, pre-gas drainage testing and historical and aboriginal heritage impacts.

Sensitivity analysis

Consistent with the Guidelines, a systematic sensitivity analysis of the estimated net benefits is undertaken in this Report (see **Appendix B**). This sensitivity analysis shows that the estimated net economic 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 proposed development is most sensitive to the coal price assumptions underpinning the analysis. For example, assuming coal prices are 25 per cent lower[29] than the central case assumptions, the net benefits to NSW are estimated to be $6,337.3 million in NPV terms (a 19.1 per cent reduction in net benefit), as shown in Figure 1.

The lower bound estimate of net economic benefits, which takes the most pessimistic assumptions[30] around coal prices, capital expenditure, operational expenditure, worker and supplier benefits as well

[26] Cost estimates such as the biodiversity, mitigation offset costs and loss of surplus to other industry inputs were provided by HVO, in addition to total incremental GHG emissions emitted and traffic and transport impacts.

[27] The EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.

[28] Additional sensitivity analysis on the cost and apportionment method of the greenhouse gas externality is presented in section 2.7.1.6.

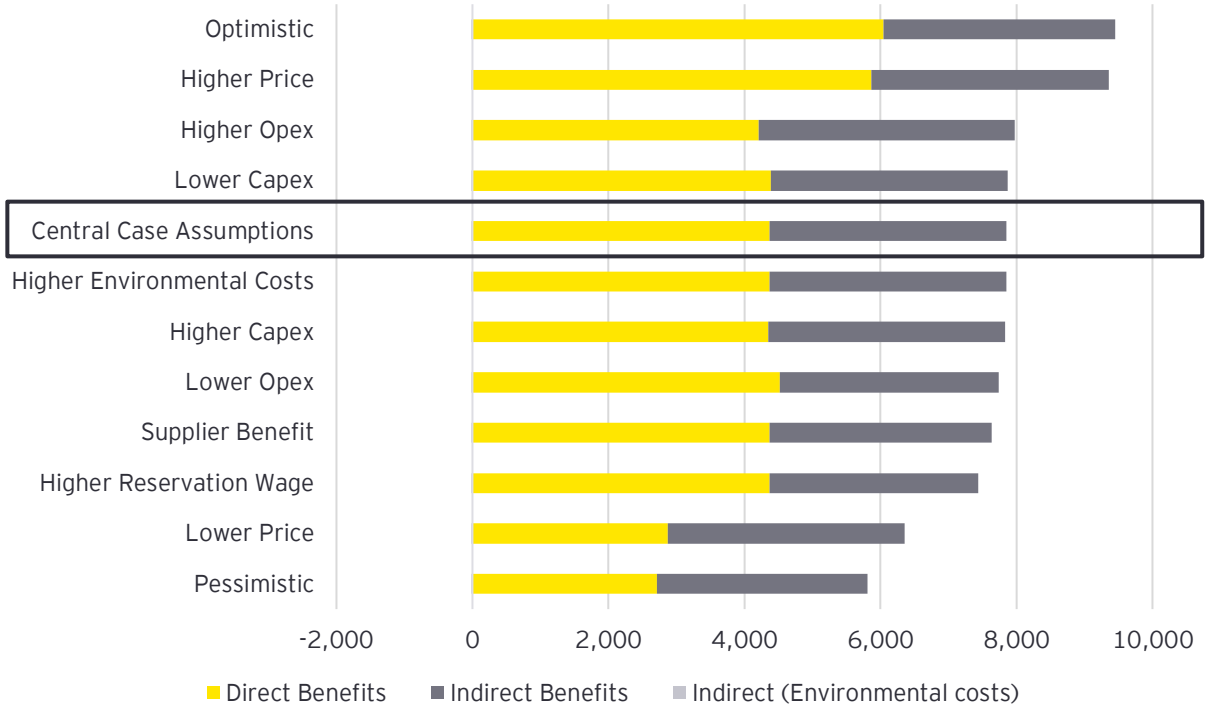
[29] The mechanical shifting of inputs upwards and downwards should not imply that broader climate scenario analysis has been undertaken. As such, it is likely that depending on longer term climate outcomes, the price of coal may vary to a greater extent than 25 per cent, and that the lower bound may not be reflective of a Net Zero scenario.

[30] Assumes a decrease in coal prices by 25%, increase in operational expenditures, capital expenditure, environmental costs by 10% respectively, decrease in supplier benefits by 10% and increase in reservation wage by 25%.

as indirect costs, yields an estimated net benefit to NSW of $5,784.0 million in NPV terms. The upper bound estimate, based on the most optimistic assumptions[31], is $9,433.3 million in NPV terms.

The results are equally sensitive to the choice of discount rate chosen due to the relatively long timeframe of the proposed development. The NPV of the estimated net benefits to NSW range between $6,097.7 million and $10,453.1 million under real discount rates of 10 and 4 per cent, respectively.

Figure 1: Systematic sensitivity analysis of the results of the CBA to key assumptions (NPV*, $ million)



Source: EY estimated based on information from various sources. NPV in real 2024 Australian dollars based on a 7 per cent real discount rate. Indirect costs of NPV $18.4 million have been included in the figure.*

In addition, the sensitivity analysis has been extended to test the impact of a full range of worker and supplier benefits, (see **Appendix C** for full results). In the case where worker benefits are reduced by 75%, the Project still yields a net benefit of $6,836.3 million in NPV terms, while reducing supplier benefits by 25% has the impact of reducing the net benefit of the Project to $7,229.1 million in NPV terms.[32]

Results of the LEA

The LEA considers the costs and benefits of the Project on residents of the Lower Hunter SA3 region of NSW. The analysis shows an estimated net benefit of $2,181.8 million to the Lower Hunter region in NPV terms (see Table 2 below).

Table 2: Net Benefits to the LEA under central case assumptions for HVO North, HVO South and the Combined Operations

	HVO Complex	HVO North	HVO South
Direct Benefits ($)	36.6	18.3	17.1
Indirect Benefits ($)	2,159.2	1,591.6	652.5
Indirect Costs ($)	14.0	9.4	4.0
Net Benefits	2,181.8	1,600.5	665.6

[31] Assumes an increase in coal prices by 25%, decrease in operational expenditures, capital expenditure, environmental costs by 10% respectively and increase in supplier benefits by 10%

[32] The EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.

*Source: EY estimated based on information from various sources. *NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

This is driven by (see Table 29):

- Potential benefits to local workers of $1,174.0 million in NPV terms for the HVO Complex, and $869.1 million $420.5million for HVO North and HVO South respectively. It is assumed that the proportion of workers sourced from the Lower Hunter region would remain consistent at the complex level, and between HVO North and HVO South. It is estimated that around 75 per cent of the workforce expected for the Project is sourced from the Lower Hunter region.[33]

- Potential benefits to local suppliers of $985.2 million in NPV terms for the HVO Complex, and $722.5 million and $232 million for HVO North and HVO South respectively. These estimates are based on the assumption that 37 per cent[34] of the inputs to production are from the region. It is also assumed that the proportion of inputs that are sourced from the local region would remain constant at the complex level and between HVO North and HVO South.

- Payment of local council rates of $36.6 million in NPV terms over the life of the Project, which is comprised of the estimated land tax and payments to the Singleton Council. For HVO North and HVO South, the total payments to council are estimated to be $18.3 million and $17.1 million in NPV terms.[35]

This assessment demonstrates that the estimated local effects are ***robust*** under the sensitivity analysis conducted (see **Appendix B**) with a lower bound estimate of net benefits to the Lower Hunter region of $1,927.5 million and upper bound estimate of $2,149.7 million in NPV terms for the HVO Complex.

Economy-wide modelling of the proposed development

To corroborate these findings, the economy-wide impacts[36] of the Project are assessed based on our inhouse CGE Model. EY General Equilibrium Model (EYGEM) is a large scale, dynamic, multi-region, multi-sector model of the global economy, with an explicit representation of the Lower Hunter region and the NSW economy.

CGE modelling is the preferred technique to assess the impacts of large investments, such as the Project, as it is based on a more detailed representation of the economy, including the complex interactions between different sectors of the economy.

EYGEM 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 changes in real gross regional product (real GRP) and real gross regional income (real GRI). The Model also projects state-wide and regional employment, taking into account employment in supplier industries and any crowding out effects.

The Project is forecast to provide significant positive economy-wide impacts to both the local region of Lower Hunter and to NSW. In the Lower Hunter region, the Project is forecast to increase GRP by $17,326 million in NPV terms, as outlined in Figure 2. For NSW, the forecast increase in GSP is $23,977 million in NPV terms.

GRI, or regional welfare, is forecast to increase by $21,005 million in NPV terms the forecast increase in GRI is significant to the relatively small region of Lower Hunter. GSI is forecast to increase by $38,151 million. This results in a 9.6 per cent increase in GRI relative to the base case.

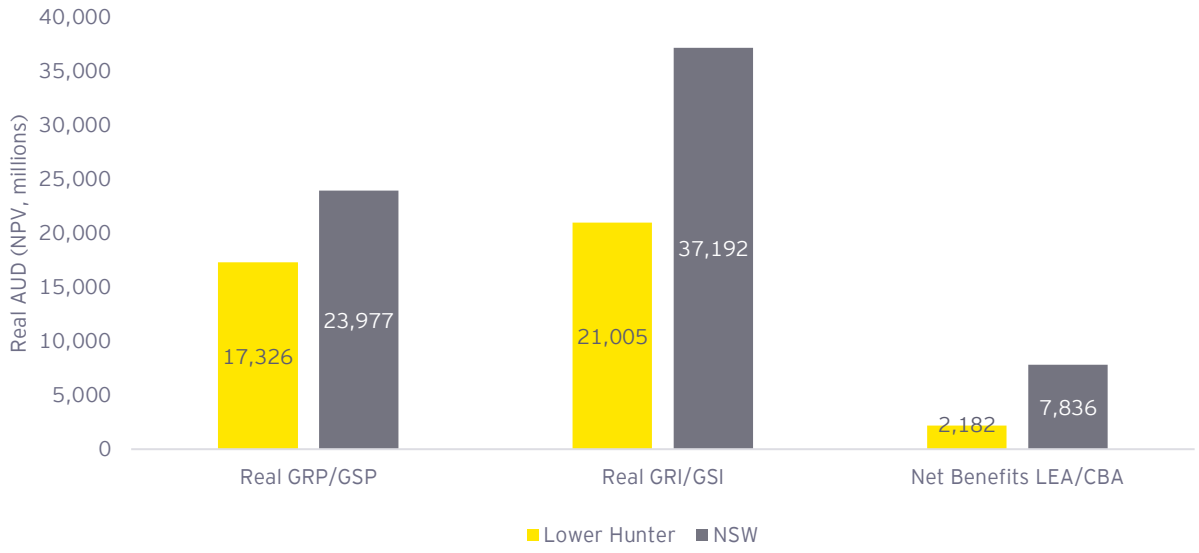
[33] Estimates derived from surveys conducted on current employees to determine the proportion of their SA2 geographical area.

[34] Estimates derived from a list of suppliers provided by HVO where companies are weighted based on size, using employee numbers.

[35] VPA and road closure costs are not included.

[36] This version of the CGE model does not account for the physical impacts of climate change in the results, including any incremental impacts associated with this Project.

Figure 2: Economy-wide impacts of the Project utilising CGE analysis, (base case) (NPV*, $ million) for HVO Complex



*Source: EY Computable General Equilibrium (CGE) modelling. * NPV in real 2024 Australian dollars based on a 7 per cent real discount rate.*

HVO North is forecast to provide significant positive economy-wide impacts to both the local region of Lower Hunter and to NSW. In the Lower Hunter region, HVON is forecast to increase GRP by $11,908 million in NPV terms, as outlined in Figure 3. For NSW, the forecast increase in GSP is $16,420 million in NPV terms.

GRI, or regional welfare, is forecast to increase by $15,117 million in NPV terms. The forecast increase in GRI is significant to the relatively small region of Lower Hunter and GSI is forecast to increase by $26,674 million. This results in a 7.8 per cent increase relative to the base case.

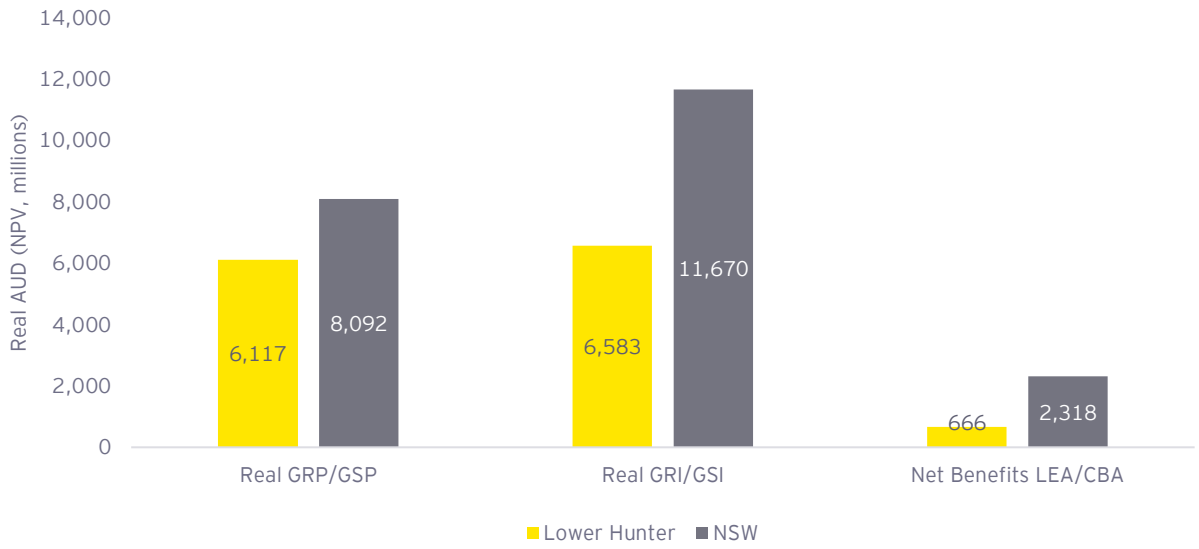
Figure 3: Economy-wide impacts of the Project utilising CGE analysis, (base case) (NPV*, $ million (left) and Dollars (right)) for HVO North

*Source: EY Computable General Equilibrium (CGE) modelling. * NPV in real 2024 Australian dollars based on a 7 per cent real discount rate.*

HVO South is forecast to provide significant positive economy-wide impacts to both the local region of Lower Hunter and to NSW. In the Lower Hunter region, the Project is forecast to increase GRP by $6,117 million in NPV terms, as outlined in Figure 4. For NSW, the forecast increase in GSP is $8,092 million in NPV terms.

GRI, or regional welfare, is forecast to increase by $6,583 million in NPV terms. The forecast increase in GRI is significant to the relatively small region of Lower Hunter and GSI is forecast to increase by $11,875 million. This results in a 4 per cent increase relative to the base case.

Figure 4: Economy-wide impacts of the Project utilising CGE analysis, (base case) (NPV*, $ million) for HVO South



*Source: EY Computable General Equilibrium (CGE) modelling. * NPV in real 2024 Australian dollars based on a 7 per cent real discount rate.*

The relative size of the local region and the NSW economy-wide impacts is reflective of how each region is impacted by the Project. As outlined in Section 4, the CGE modelling takes into account the capital expenditure, the coal output, the migration of workers into the region, the payment of royalties from Lower Hunter into NSW and the repatriation of profits and uses the same input assumptions as the CBA assessment outlined in this report. The CGE Model is based on a more detailed representation of the economy, in our view, is a useful complement to the narrower focus of the CBA. Expanding the lens of the economic assessment to consider economic welfare more broadly, we believe this kind of analysis is useful to corroborate and compare the results of the economic impact assessment undertaking using CBA. Such modelling provides an alternative outlook of the benefits that could potentially accrue to the region and NSW.

1. Introduction

EY was commissioned by Hunter Valley Operations (HVO) to undertake an Economic Impact Assessment (EIA) for the Hunter Valley Operations Continuation Project (the Project).

The following terms are used throughout this assessment to describe the HVO Continuation Project:

- HVO Complex – Which comprises both HVO North and HVO South operations.
- The Project – Which comprises of the Project in its entirety, representing the continuation of the life of the complex for both HVO North and HVO South, within their respective proposed development consent boundaries.

This EIA forms part of the EIS and provides an assessment of the potential impacts to NSW and the Lower Hunter region as a result of the Project; that is, of the whole complex. It also provides an assessment of the incremental impacts of the continuation of HVO North and HVO South given that separate development consents are being sought for each operation.

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.[37] The CBA requires an assessment of the net benefits that accrue to the proponent, government, workers, and suppliers of the Project.

This Report considers recent changes to state and federal policies including the Safeguard Mechanism, NSW Climate Policy and amendments to coal royalty rates levied in NSW. The Safeguard Mechanism is the Australian Government's policy to incentivise Australia's largest industrial facilities (emitters of over 100,000 tonnes of carbon dioxide equivalent (CO_2 e) per year, defined as designated large facilities) to reduce their Greenhouse Gas (GHG) emissions. Having commenced in July 2015, the mechanism sets baselines on the greenhouse gas emissions of these facilities. Reforms to the Safeguard Mechanism took effect from 1 July 2023. Under these reforms, new baseline emissions numbers ('baselines') for designated large facilities are set on a declining trajectory aligned with achieving Australia's emissions reduction targets in its Nationally Determined Contribution (NDC) under the Paris Agreement. Across the Safeguard Mechanism sector baselines will gradually decline to be consistent with the trajectory required for Australia to reach its emissions reductions target of 43% below 2005 levels by 2030, and net zero by 2050.

The modelling underpinning the Report has been updated to account for the Safeguard Mechanism and the estimated impacts of the Safeguard Mechanism on the overall Project cost and benefits. The modelling also includes the incremental estimated impact of HVO's offer to voluntarily implement higher net emission decline rates than what is required by the Safeguard Mechanism, in order to reflect consideration of the NSW State's Climate Change (Net Zero Future) Act 2023 (NZF Act).

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 relevant requirements of the *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*.[38] These costs are classified as mitigation costs which are outlined in the impact assessments conducted for Aboriginal heritage, noise, air quality, visual amenity, groundwater, biodiversity, agricultural land, greenhouse gas emissions[39] and traffic and transport in section **2.7**, where all the above listed were considered as operational costs exclusive of greenhouse gas emissions, and traffic and transport.

[37] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015).

[38] Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals (2018)

[39] Noting that the EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions in the CBA. The impacts on climate change from Scope 3 emissions are therefore, excluded from this economic analysis.

1.1 Description of existing operations

HVO is a multi-pit open cut mining complex approximately 24 kilometres (km) north-west of the town of Singleton in the Hunter Valley of New South Wales (NSW). HVO is owned by subsidiary companies of Yancoal and Glencore, as participants in the unincorporated HVO Joint Venture (JV). HV Operations Pty Ltd is the appointed manager of the JV.

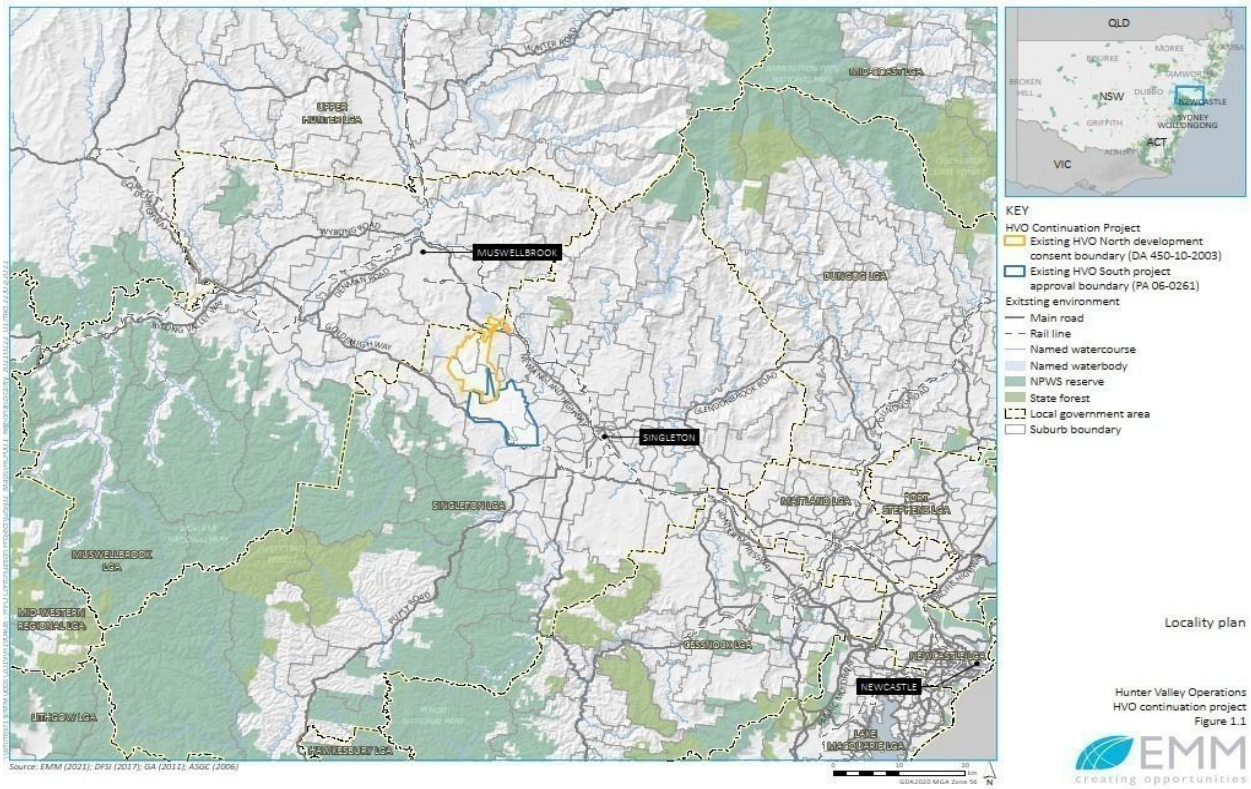
The existing HVO North operation operates under development consent DA 450-10-2003 which allows extraction of up to 22 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 12 June 2025. HVO North comprises the approved mining areas of West Pit, Mitchell Pit, Carrington Pit and North Pit, as well as the Hunter Valley (HV) and Howick Coal Preparation Plants (CPP) and the HVO North mine infrastructure area (MIA). The Newdell Load Point (LP) and Hunter Valley (HVLP) train loading facilities are also at HVO North.

HVO South operates under Project Approval (PA) 06_0261 and comprises the approved mining areas of Riverview Pit and Cheshunt Pit, where mining activities currently take place, and the Riverview South-East Extension and South Lemington Pits 1 and 2. PA 06_0261 allows the extraction of up to 20 Mtpa of ROM coal until 24 March 2030.

1.2 Description of the Project

The Project broadly comprises the continuation of the life of HVO North and HVO South, from the current approved mining completion dates of 2025 and 2030 respectively, to the end of 2050 at HVO North and 2045 at HVO South. The continuation of mining across the HVO Complex will optimise resource recovery from the existing operation, predominantly by mining through previously mined areas and to the extent of existing mining tenements and extracting coal from deeper seams at HVO North.

Figure 5: Regional Location of the Hunter Valley Operations Complex



Source: Figure provided by EMM consultingA full Project description is provided in the HVO Continuation Project Amendment Report (EMM 2023). The key changes as they relate to HVO North are listed below.

The amendments to the proposed HVO North Project are as follows:

- Refinement of a portion of the proposed Lemington Road alignment.
- As a result of the previous adjustments, the HVO North Project area has been adjusted.
- Amendment to the construction timing of the barrier wall within the Carrington West Wing area.

A summary of the key components of HVO North and HVO South from the previous EIA are listed below.

HVO North

- Continuation of the life of the mine from 2025 to the end of 2050.
- Extraction to the base of the Barrett seam across the HVO North mining area. Existing operations are approved to extract coal to the base of the shallower Bayswater seam in Carrington Pit.
- The extraction of an additional approximate 497.3 Mt of ROM coal from HVO North through the extraction of coal from deeper seams and optimising the mining extent.
- An increase in the capacity of Parnells Dam.
- Demolition of the existing Newdell train loading facility and product stockpile, and construction of a new product stockpile and replacement of train loading facilities.
- Coal haulage from the HVCPP to the Ravensworth ROM pad.
- Revision of the tailings strategy.
- Amendments to the approved final landform.
- Relocation of transmission and telecommunication lines.
- Realignment of Lemington Road, and
- Progressive rehabilitation throughout the mine life.

Key aspects of the currently approved development at HVO North that will remain the same under the Project include the following:

- No change proposed to the maximum allowable annual coal extraction and processing rate.
- No change to the receipt of ROM coal from HVO South via internal haul road for processing.
- No change in annual workforce numbers or associated operational traffic generation.
- The ridge between Jerrys Plains and HVO North will remain, continuing to provide an amenity barrier, and
- No increase to approved heights of overburden emplacement areas.

HVO South

- Changes to the approved mine sequencing and extension of the life of mine until the end of 2045.
- A reduction in the approved maximum extraction rate from 20 Mtpa to 18 Mtpa.

- Removal of mining areas of the Riverview South East Extension, and South Lemington Pit 1 and 2.
- Removal of the short rail loop option (shown in Figure 5).
- An increase in the capacity of Lake James, and
- Progressive rehabilitation throughout the mine life.

A summary of the key elements of the Project are presented in Table 3. The total mine capital expenditure for HVO Complex is $4,293.7 million in real undiscounted terms over the lifetime period to 2050. The Project is expected to produce approximately an additional 684.2 Mt of ROM output, yielding a total of 497.3 Mt of product coal. This product coal is comprised of approximately 59.0 Mt metallurgical coal and 438.2 Mt of thermal coal.

Table 3: Summary of operations under HVO Complex, HVO North and HVO South

	Description of operations		
	HVO Complex	HVO North	HVO South
ROM	684.2 Mt	497.7 Mt	186.5 Mt
Product Coal	497.3 Mt	355.2 Mt	142.0 Mt
Metallurgical Coal	59.0 Mt	36.9 Mt	22.2 Mt
Thermal Coal	438.2 Mt	318.4 Mt	119.9 Mt
Total mine capital expenditure (real)	$4,293.7 million	$2,558.0 million	$1,748.0 million
Mining Rate	Up to a maximum incremental product coal of 27.6 Mt in (2040)	Up to a maximum incremental product coal of 15.9 Mt in (2042)	Up to a maximum incremental product coal of 13.1 Mt in (2040)
Life of Project	To 2050	To 2050	To 2045
Operational Workforce^	Average incremental 1118 FTE^^ over the life of the Project, 1524 FTE (in 2040)	Average incremental 907 FTE^^ over the life of the Project, 1264 FTE (in 2043)	Average incremental 485 FTE^^ over the life of the Project, 855 FTE (in 2039)

*Source: EY estimates based on information provided by HVO. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*[40] *^ Excluding on-site contractors, ^^ full time equivalent (or FTE).*

HVO has provided EY with the information required to complete an economic impact assessment of the Project, including environmental studies, project financial data, project physicals and operation requirements such as employment (see **Appendix A**). Information from HVO is combined with our own research based on publicly available information such as data from the Australian Bureau of Statistics (ABS) and KPMG *Coal Price and FX Market Forecasts* (see **Appendix A**).

The information underpinning this assessment therefore is a combination of publicly available information and commissioned expert studies assessing the Project financials and environmental impacts. 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 inputs.

The CBA is presented in Section 2 and measures the net benefits of the Project. The LEA, which focusses on the benefits accruing to the Lower Hunter (SA3) region is presented in Section 3.

[40] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

In addition to the CBA and LEA, the report also contains an assessment of the economic impacts of the proposed development on the Lower Hunter region and the State of NSW based on computable general equilibrium (CGE) modelling. This modelling is presented in Section 4.

The list of Appendices is as follows:

- **Appendix A** details information underpinning this EIA, including a list of information provided by HVO and a list of publicly available information used by EY.
- **Appendix B** provides an account of the year-on-year production, output and prices for the Project scenario, and provides details on the sensitivity analysis to both the CBA and the LEA.
- **Appendix C** outlines the methodology for determining worker and supplier benefits of the Project.
- **Appendix D** References.

2. Cost-Benefit Analysis

The Guidelines released by the NSW Government in December 2015 set out the CBA framework to measure the net benefits of a proposed mining project to the NSW community. This approach has been adopted in the economic analysis outlined in this report. Table 4 provides a summary of how these net benefits are measured.

Table 4: 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 Project	The net benefits that are generated for parties that economically interact with the proposed Project	Social costs generated by the proposed Project, borne by the NSW community
Includes: ► Net producer surplus attributable to NSW ► Royalties payable ► Company tax attributable to NSW	Includes: ► Net economic benefits to landowners ► Net economics benefits to NSW employees ► Net economic benefits to NSW suppliers	Includes: ► Net environmental, social and transport-related costs ► Net public infrastructure costs ► Loss of surplus to other industries

Source: NSW Government (2015).

The direct benefits are those that accrue to the Project proponent and payments made to government. The indirect benefits are those that accrue to economic agents that engage with the Project proponent. These include employees, suppliers, and landowners. The indirect costs are the costs borne by the community of NSW, through environmental and social impacts or public infrastructure costs provided by HVO (see **Appendix A**).

A major emphasis of the Guidelines is on transparency of assumptions made. The remainder of this section describes in detail the assumptions underpinning the CBA.

The costs and benefits outlined in this report include the costs and benefits from the operation of the Project only. It does not include the costs and benefits of the use of coal output in NSW.

In addition, the analysis does not include any of the costs associated with coal use in NSW, including the scope 3 greenhouse gas emissions[41] that would be generated from coal combustion.

2.1 Baseline

The starting point for any CBA is the baseline, or counterfactual. This scenario considers all costs and benefits if the proposed development does not proceed. The HVO Complex currently has approved operations in HVO North and HVO South under separate developmental consents. HVO North consent expires in June 2025 while HVO South's consent expires in March 2030. However, HVO South is dependant on HVO north for coal processing and railings, therefore, baseline considers both mines cease operations at the end of HVO North consent. This currently gives approval to mine until June 2025. As such, the economic benefits and costs associated with extraction of coal within these areas have been included in the baseline, and therefore have been excluded for the purposes of assessing the incremental net benefits of the Project. The baseline includes closure costs associated with decommissioning the currently approved site infrastructure and undertaking rehabilitation. If the Project[42] is approved, these costs would be delayed into the future, representing a saving in NPV terms.

[41] Noting that the EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions in the CBA. The impacts on climate change from Scope 3 emissions are therefore, excluded from this economic analysis.

[42] EY does not provide any view or opinion on the Project, as to whether it should proceed or not. EY's role is limited to modelling the inputs and assumptions to prepare the EIA to present the outcome of the analysis undertaken, Therefore, analysis and outcome included in this report should not be construed as EY's view or opinion on whether the Project should proceed or not.

The modelling also includes the estimated impact of HVO's SGM obligations and with additional voluntary contribution towards the NSW emissions reduction targets including using carbon offsets to reduce the Project's net GHG emissions.

In order to estimate the potential impacts on the economic benefits of HVO, the analysis is predicated on the following assumptions:

- The HVOC will be required to reduce its net emissions intensity as a designated large facility, in accordance with the SGM and will make voluntary additional contributions towards the NSW emissions reduction targets including by using offsets to reduce the Project's net GHG emissions.

- The Project will have Scope 1 emissions as forecast (Submissions Report EMM 2023), which are based on continuation of existing practices to minimise diesel consumption and unabated open-cut fugitive emissions and hence are considered conservative/higher estimate as they do not reflect emerging technologies which may be able to be utilised in the future.

- The forecast Scope 1 emission intensity results in the facility exceeding its declining baseline in each year, therefore the full cost of the required reduction in emissions will be incurred by HVO (roughly 11.7 Mt CO_2-e over the Project lifetime for the SGM along with a further ~2.6Mt CO_2-e of emissions reduction through the voluntary surrender of additional Australian Carbon Credit Units (ACCUs) and/or SMCs towards the NZF Act targets).

- The price of the required carbon offsets will be costed, in real terms, at $75 per tonne, and will escalate a further 2% per annum in real terms,[43] noting that this measure is inherently conservative and was adopted to examine the Project's cost and benefits through pessimistic assumptions.

2.2 Cost-Benefit Analysis results

2.2.1 HVO Complex CBA Results

Consistent with the Guidelines, the CBA is based on comparing the net direct and indirect benefits and subtracting the indirect costs of the proposed development compared against the baseline scenario where the proposed development does not occur. The results are summarised in Table 5.

Based on the CBA methodology outlined in the Guidelines, and information provided by HVO, the proposed development is estimated to provide a net benefit to NSW. This net benefit is estimated to be $7,836.2 million in NPV[44] terms. This is comprised of $4367.4 million and $3488.1 million in potential direct and indirect benefits respectively and estimated incremental indirect costs of $18.37 million in NPV terms.

Table 5: Central case - estimated net benefits for the HVO Complex ($ million^)- HVO Complex

Benefits	NPV*	Costs	NPV*
Direct benefits		Direct costs	
Net producer surplus attributed to NSW		Safeguard Mechanism and Voluntary additional ACCU purchases[45]	$504.6
Royalties, payroll tax and Council rates	$3,462.0		

[43] The government has also flagged the establishment of a cost containment measure. The cost containment measure will provide for Australian Carbon Credit Units (ACCUs) delivered under ACCU contracts to the CER after 13 January 2023 to be sold to safeguard mechanism entities at a fixed price, initially at $75 per tonne of CO2-e in 2023–24, increasing with the CPI plus 2% each year. (https://cer.gov.au/markets/reports-and-data/quarterly-carbon-market-reports/quarterly-carbon-market-report-march-quarter-2023/australian-carbon-credit-units-accus)

[44] All NPV figures reported are in real 2024 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated).

[45] See Table 24 and Section 2.5 for detailed information regarding the spending between the Safeguard Mechanism, and Additional Voluntary ACCU surrenders, and how the costs have been internalised by HVO.

Benefits	NPV*	Costs	NPV*
Company income tax apportioned to NSW	$ 905.4		
Total direct benefits	$4,367.4	Total direct costs	$504.6
Indirect benefits		Indirect costs	
Net economic benefit to landholders		Air quality	-
Net economic benefit to NSW workers	$1,264.9	Greenhouse gas emissions^^	$ 3.7
Net economic benefit to NSW suppliers	$2,223.2	Noise impact^^	-
		Transport impact	$ 1.6
		Net public infrastructure cost	-
		Surface water impact^^	-
		Groundwater^^	-
		Biodiversity impact^^	$ 34.4
		Loss of surplus to other industries	$ 14.0
		Visual amenity	-
		Aboriginal cultural heritage^^	-
		Historical heritage^^	-
Total indirect benefits	$3,488.1	Other	-
Total economic benefit of Project	$7,855.5	Indirect Costs	$70.59
NPV of Project - ($m)	$7,836.2	Total incremental cost of project	$ 19.29

*Source: EY estimated based on information from various sources. ^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*[46] *^^ Management and mitigation costs are included in the operating and capital costs and types of impact are outlined in 2.7*

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

- An overall net producer surplus[47] of $5,851.6 million in NPV terms for Australia, of which 0 per cent, or $0 is attributed to NSW.

- Total corporate taxes of $2,829.4 million in NPV terms for Australia, of which $905.4 million is attributed to NSW[48] (a 30 per cent tax rate on operating profit was utilised in the estimation of this figure in reference to the Guidelines).

- Other government revenue for NSW of $3,462 million in NPV terms, the largest component of this being royalties of $3,262.8 million (based on a royalty rate of 10.8 per cent of revenue taking into account a discount of $3.5 per sales tonne applied for coal wash), plus payroll taxes of $159.5 million and council rates of $39.7 million.

The potential ***indirect benefits*** of the Project are related to the linkages that the proposed development has to the NSW economy through both the labour market and suppliers. The analysis shows that of the $3,488.1 million in NPV terms of potential indirect benefits:

[46] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

[47] Consistent with the Guidelines, the net producer surplus of the proposed development represents the private benefit, or operating surplus, generated that is attributable to NSW.

[48] Amount contributed is the total corporate taxes multiplied by the percentage contribution to NSW (32 per cent). 32 per cent is referenced from the guidelines located in *Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au)* where 32 per cent is derived from NSW population divided by Australian population. This measurement of 32 per cent is meant to apportion the Australian corporate tax benefits to only those in NSW.

- Potential worker benefits are $1,264.9 million in NPV terms attributable to an average direct employment of 1,118 FTE workers over the period of the Project and due to higher average wages paid to Project employees than average wages paid to similar occupations outside the mining sector in NSW (see **Appendix C**).

- Potential supplier benefits are $2,223.2 million in NPV terms, representing direct value add generated by NSW suppliers providing goods and services to the Project, based on NSW-based operational expenditure over the life of the Project of $11,016.6 million in NPV terms.

The ***indirect costs*** of the Project are related to the costs borne on the NSW community through the generation of externalities[49] by the Project which have not been offset by investments by HVO. These costs include:

- Greenhouse gas emissions costs of $3.68 million in NPV terms.[50,51]

- Traffic and Transport costs of $1.6 million in NPV terms.

- Biodiversity offset costs of $34.4 million in NPV terms internalised as operational expenditure.

- Loss of surplus to other industries costs of $14 million in NPV terms (Impact to agricultural lands).

- Mitigation offset costs of $18.1 million in NPV terms.

2.2.2 HVO North CBA Results

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

Table 6.

Based on the CBA methodology outlined in the Guidelines, and information provided by HVO, the proposed development is estimated to provide a net benefit to NSW. This net benefit is estimated to be $5,458.2 million in NPV[52] terms. This is comprised of $2,901.4 million and $2,569.6 million in potential direct and indirect benefits respectively and estimated incremental indirect costs of $13.8 million in NPV terms.

Table 6: Central case estimated net benefits of the proposed development ($ million^)-HVO North

Benefits	NPV*	Costs	NPV*
Direct benefits		Direct costs	
Net producer surplus attributed to NSW		Safeguard Mechanism and Voluntary additional ACCU purchases[53]	$376.5
Royalties, payroll tax and Council rates	$2,358.6		

[49] Cost estimates such as the biodiversity, mitigation offset costs and loss of surplus to other industry costs were provided by HVO. Total incremental amount of GHG emissions emitted and vehicles impacted by traffic and transport were provided, however, costs were estimated by EY.

[50] Additional sensitivity analysis on the cost and apportionment method of the greenhouse gas externality is presented in section 2.7.1.6.

[51] The EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.

[52] All NPV figures reported are in real 2024 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated).

[53] See Table 24 and Section 2.5 for detailed information regarding the spending between the Safeguard Mechanism, and Additional Voluntary ACCU surrenders, and how the costs have been internalised by HVO.

Benefits	NPV*	Costs	NPV*
Company income tax apportioned to NSW	$542.8		
Total direct benefits	$2,901.4	Total direct costs	$376.5
Indirect benefits		Indirect costs	
Net economic benefit to landholders	-	Air quality	-
Net economic benefit to NSW workers	$ 939.0	Greenhouse gas emissions^^	$ 2.4
Net economic benefit to NSW suppliers	$1,630.5	Noise impact^^	-
		Transport impact	$ 1.6
		Net public infrastructure cost	-
		Surface water impact^^	-
		Groundwater^^	-
		Biodiversity impact^^	$32.4
		Loss of surplus to other industries	$ 8.7
		Visual amenity	-
		Aboriginal cultural heritage^^	-
		Historical heritage^^	-
Total indirect benefits	$2,569.6	Indirect Costs	$54.7
Total Project economic benefit	$5,470.9	Total incremental cost of project	$12.9
NPV of project - ($m)	$5,458.0		

*Source: EY estimated based on information from various sources. ^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate. ^^ Management and mitigation costs are included in the operating and capital costs.*

The potential ***direct benefits*** of the Project are a function of the profitability of the proposed development which, in turn, depends on the prevailing coal price. This results in:

- An overall net producer surplus of $3,452.8 million in NPV terms for Australia, of which 0 per cent, or $0 million is attributed to NSW.[54]

- Total corporate taxes of $1,696.3 million in NPV terms for Australia, of which $542.8 million is attributed to NSW (A 30 per cent tax rate on operating profit was utilised in the estimation of this figure in reference to the Guidelines).

- Other government revenue for NSW of $2,358.6 million in NPV terms, the largest component of this being royalties of $2,220.7 million (based on a royalty rate of 10.8 per cent of revenue taking into account a discount of $3.5 per sales tonne applied for coal wash, plus payroll taxes of $118 million and council rates of $19.9 million).

The potential ***indirect benefits*** of the HVO North Project are related to the linkages that the proposed development has to the NSW economy through both the labour market and suppliers. The analysis shows that of the $2,569.6 million in NPV terms of indirect benefits:

- Potential worker benefits are $939 million in NPV terms attributable to an average direct employment of 900 FTE workers over the period of the Project and due to higher average wages

[54] The 0 per cent share is based on the estimated 0 per cent NSW ownership of the Project. This can be considered an inherently conservative assumption, given that Yancoal – part owner of the Project - is listed on the Australian Stock Exchange. Therefore, it is quite likely that there would be some proportion of net producer surplus that could be attributed NSW, however given the uncertainties around ascertaining this level of ownership, it is conservatively assumed that 0 per cent of the net producer surplus is attributed to NSW.

paid to Project employees than average wages paid to similar occupations outside the mining sector in NSW (see **Appendix C**).

- Potential supplier benefits are $1,630.5 million in NPV terms, representing direct value add generated by NSW suppliers providing goods and services to the Project, based on NSW-based operational expenditure over the life of the Project of $8,079.7 million.

The ***indirect costs*** of the HVO North Project are related to the costs borne on the NSW community through the generation of externalities[55] by the Project which have not been offset by investments by HVO. These costs include:

- Greenhouse gas emissions costs of $2.4 million in NPV terms.[56,57]
- Traffic and Transport costs of $1.6 million in NPV terms.
- Biodiversity offset costs of $32.4 million in NPV terms internalised as operational expenditure.
- Loss of surplus to other industries costs of $8.7 million in NPV terms (Impact to agricultural lands).
- Mitigation offset costs of $10.6 million in NPV terms are accounted for in operational expenditure consisting of blasting impacts, air quality, noise impacts, groundwater and surface water impacts, visual amenity impact, social impacts, pre-gas drainage testing and, historical and aboriginal heritage impacts.

2.2.3 HVO South CBA Results

The results for HVO South are summarised in Table 7. Based on the CBA methodology outlined in the Guidelines, and information provided by HVO, the proposed development is estimated to provide a net benefit to NSW. This net benefit is estimated to be $2,318.5 million in NPV[58] terms. This is comprised of $1,351.5 million and $972 million in direct and indirect benefits respectively and estimated incremental indirect costs of $5.1 million in NPV terms.

Table 7: Central case - estimated net benefits of the proposed development ($ million^)-HVO South

Benefits	NPV*	Costs	NPV*
Direct benefits		Direct costs	
Net producer surplus attributed to NSW		Safeguard Mechanism and Voluntary additional ACCU purchases[59]	128.2
Royalties, payroll tax and Council rates	$ 1,116.4		
Company income tax apportioned to NSW	$235.1		
Total direct benefits	$ 1,351.5	Total direct costs	-
Indirect benefits		Indirect costs	
Net economic benefit to landholders		Air quality	-

[55] Cost estimates such as the biodiversity, mitigation offset costs and loss of surplus to other industry inputs were provided by HVO, in addition to total incremental GHG emissions emitted and traffic and transport impacts.
[56] The EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.
[57] Additional sensitivity analysis on the cost and apportionment method of the greenhouse gas externality is presented in section 2.7.1.6.
[58] All NPV figures reported are in real 2024 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated).
[59] See Table 24 and Section 2.5 for detailed information regarding the spending between the Safeguard Mechanism, and Additional Voluntary ACCU surrenders, and how the costs have been internalised by HVO.

Benefits	NPV*	Costs	NPV*
Net economic benefit to NSW workers	$ 448.5	Greenhouse gas emissions^^	$1.4
Net economic benefit to NSW suppliers	$ 523.5	Noise impact^^	-
		Transport impact	-
		Net public infrastructure cost	-
		Surface water impact^^	-
		Groundwater^^	-
		Biodiversity impact^^	$2.0
		Loss of surplus to other industries	$4.0
		Visual amenity	-
		Aboriginal cultural heritage^^	-
		Historical heritage^^	-
		Other	-
Total indirect benefits	$ 972.0	Indirect Costs	$15.0
Total Project economic benefit	$ 2,323.6	Total incremental cost of project	$5.4
NPV of project - ($m)	$ 2,318.1		

*Source: EY estimated based on information from various sources. ^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate. ^^ Management and mitigation costs are included in the operating and capital costs.*

The potential ***direct benefits*** of the Project are a function of the profitability of the proposed development which, in turn, depends on the prevailing coal price. This results in:

- An overall net producer surplus of $1,223.3 million in NPV terms for Australia, of which 0 per cent, or $0 million is attributed to NSW.[60]

- Total corporate taxes of $734.7 million in NPV terms for Australia, of which $237.2 million is attributed to NSW (A 30 per cent tax rate on operating profit was utilised in the estimation of this figure in reference to the Guidelines).

- Other government revenue for NSW of $1,116.4 million in NPV terms, the largest component of this being royalties of $1042.2 million (based on a royalty rate of 10.8 per cent of revenue taking into account a discount of $3.5 per sales tonne applied for coal wash), plus payroll taxes of $55.6 million and council rates of $18.6 million.

The potential ***indirect benefits*** of the HVO South Project are related to the linkages that the proposed development has to the NSW economy through both the labour market and suppliers. The analysis shows that of the $972 million in NPV terms of indirect benefits:

- Potential worker benefits are $448.5 million in NPV terms attributable to an average direct employment of 494 FTE workers over the period of the Project and due to higher average wages paid to Project employees than average wages paid to similar occupations outside the mining sector in NSW (see **Appendix C**).

[60] The 0 per cent share is based on the estimated 0 per cent NSW ownership of the Project. This can be considered an inherently conservative assumption, given that Yancoal – part owner of the Project - is listed on the Australian Stock Exchange. Therefore, it is quite likely that there would be some proportion of net producer surplus that could be attributed NSW, however given the uncertainties around ascertaining this level of ownership, it is conservatively assumed that 0 per cent of the net producer surplus is attributed to NSW.

- Potential supplier benefits are $523.5 million in NPV terms, representing direct value add generated by NSW suppliers providing goods and services to the Project, based on NSW-based operational expenditure over the life of the Project of $2,594.1 million.

The ***indirect costs*** of the HVO South Project are related to the costs borne on the NSW community through the generation of externalities[61] by the Project which have not been offset by investments by HVO. These costs include:

- Greenhouse gas emissions costs of $1.4 million in NPV terms.[62,63]
- Traffic and Transport costs of $0 million in NPV terms.
- Biodiversity offset costs of $2.0 million in NPV terms internalised as operational expenditure.
- Loss of surplus to other industries costs of $4 million in NPV terms (Impact to agricultural lands).
- Mitigation offset costs of $8.5 million in NPV terms which are accounted for in operational expenditure consisting of blasting impacts, air quality, noise impacts, groundwater and surface water impacts, visual amenity impact, social impacts, pre-gas drainage testing and, historical and aboriginal heritage impacts.

2.3 Proposed development – 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 (which also includes labour input costs and intermediate inputs). These assumptions are used to estimate the direct and indirect benefits to NSW and form the basis of the LEA presented later in the report.

2.3.1 Capital costs

2.3.1.1 HVO Complex CBA Capital Costs

HVO has provided EY with the capital expenditure profile of the proposed development for the HVO Complex which is summarised in the figure shown below.

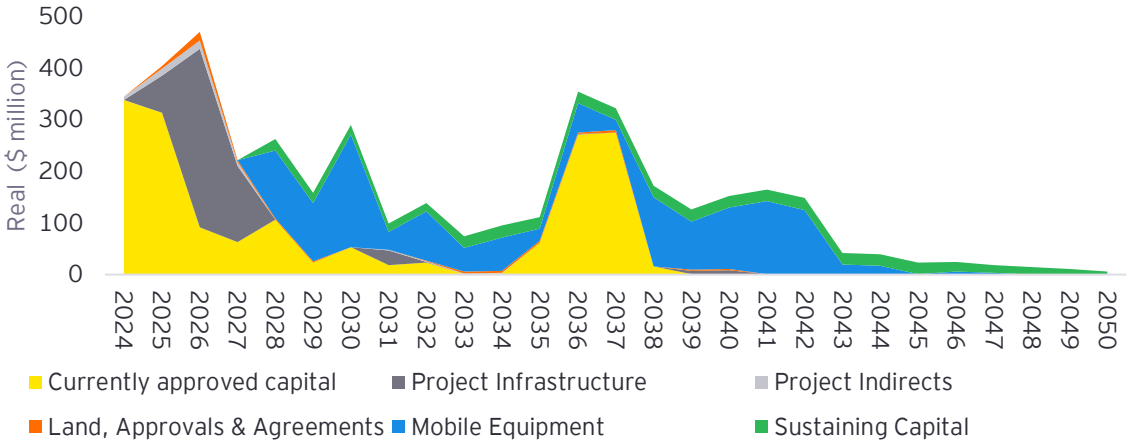
Figure 6 shows, the continuation of HVO Complex capital expenditure that is planned to take place from 2022 to 2050 and the replacement and sustaining capital from 2025 to 2050.

Figure 6: Profile of capital expenditure HVO Complex Project Plan (real $ million^)

[61] Cost estimates such as the biodiversity, mitigation offset costs and loss of surplus to other industry inputs were provided by HVO, in addition to total incremental GHG emissions emitted and traffic and transport impacts.

[62] The EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.

[63] Additional sensitivity analysis on the cost and apportionment method of the greenhouse gas externality is presented in section 2.7.1.6.



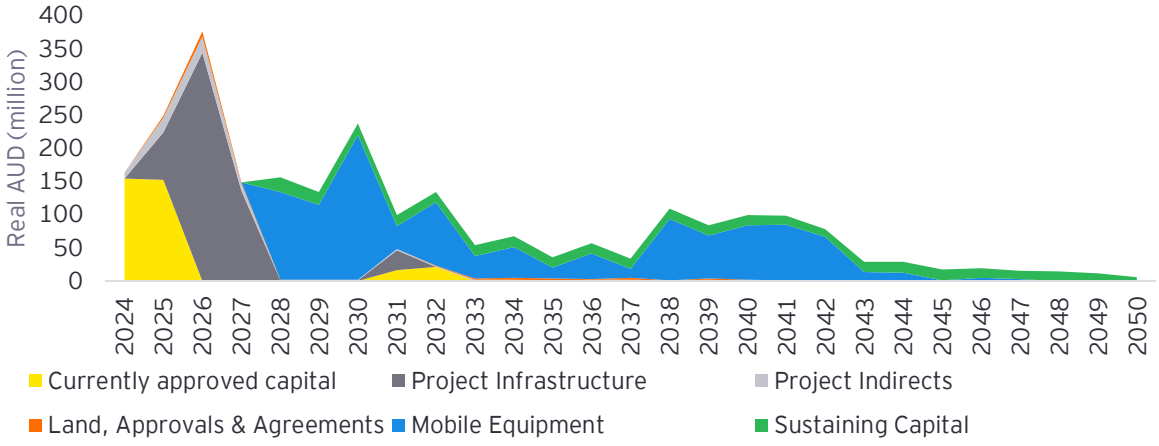
Source: HVO. ^ Real 2024 Australian dollars

In total, the Project requires $2,701.8 million in NPV terms of capital expenditure. This includes project infrastructure of $516.4 million in NPV terms, sustaining capital expenditure of $185.2 million in NPV terms and currently approved capital [64] of $1,192.5 million in NPV terms. Other components of capital expenditure include project indirects, land approvals & agreements and mobile equipment.

2.3.1.2 HVO North Capital Costs

Figure 7 shows the expected, capital expenditure that is planned to take place from 2024 to 2050 for HVO North.

Figure 7: Profile of capital expenditure under the Project (real $ million^)



Source: HVO. ^ Real 2024 Australian dollars

In total the Project requires $1,673.2 million in NPV terms of capital expenditure. This includes new project infrastructure of $498.4 million in NPV terms, sustaining capital expenditure of $148.2 million in NPV terms and currently approved capital[65] of $320.9 million in NPV terms. Other components of capital expenditure include project indirects, land approvals & agreements and mobile equipment.

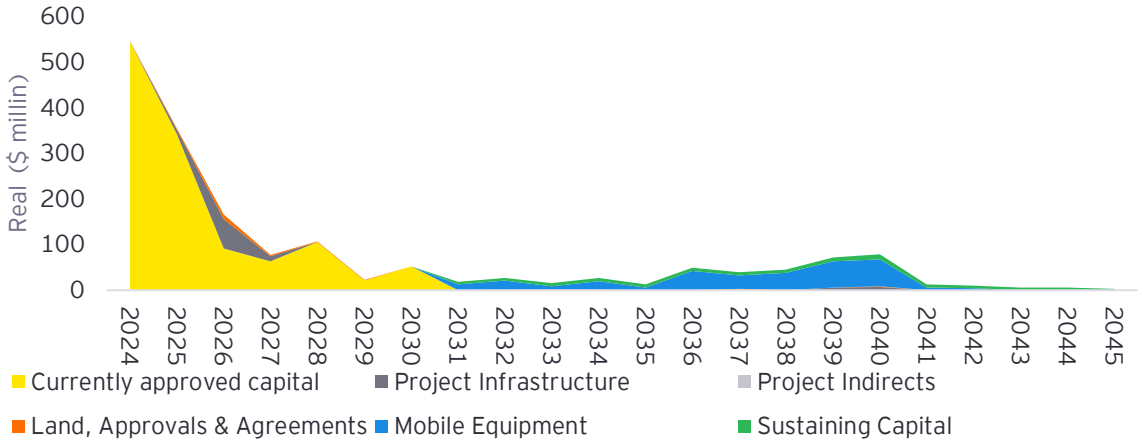
2.3.1.3 HVO South Capital Costs

Figure 8 shows the expected capital expenditure profile for HVO South.

Figure 8: Profile of capital expenditure under the Project (real $ million^)

[64] Capital that HVO does not need further approval to construct.

[65] Capital that HVO does not need further approval to construct.



Source: HVO. ^ Real 2024 Australian dollars

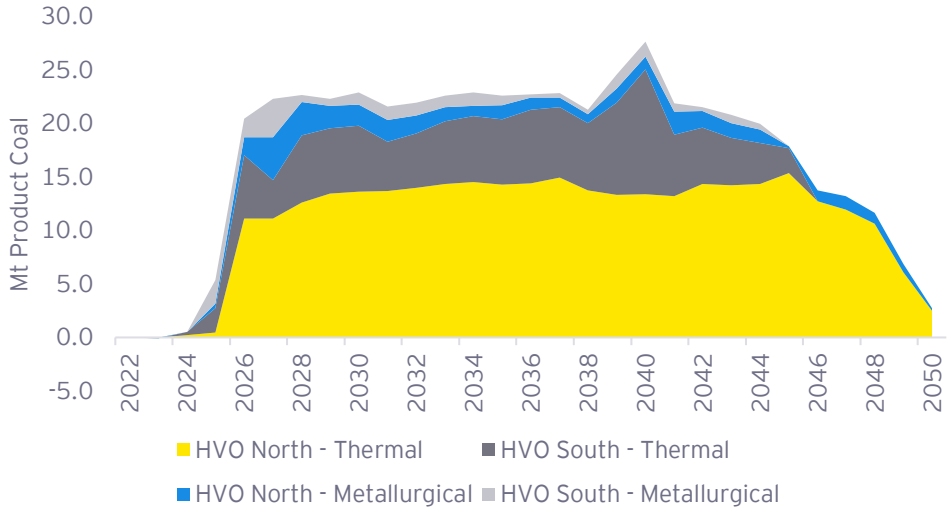
In total the Project requires $1,371.4 million in NPV terms of capital expenditure. This includes new project infrastructure of $82.3 million in NPV terms, sustaining capital expenditure of $35.6 million in NPV terms and current approved capital[66] of $1,126.6 million in NPV terms. Other components of capital expenditure include project indirects, land approvals & agreements and mobile equipment.

Production assumptions

HVO provided EY with the projected production figures for the Project which are summarised in the figure below. The Project is expected to extract an additional 497.3 Mt of product coal over the lifetime of the mine, from June 2025 to 2050. Of this incremental production, the Project is expected to mostly produce thermal coal, representing around 88 per cent of the incremental coal produced.

HVO North is expected to produce around 71 per cent of the incremental coal production, resulting in producing around 355.2 Mt over the lifetime of the mine (318.4 Mt of thermal coal, and 36.9 Mt of metallurgical coal), until the end of 2050. Conversely, HVO South is expected to cease mining operating by 2045, and is expected to produce 142 Mt over its expected production profile (resulting in 119.9 Mt of thermal coal, and 22.2 Mt of metallurgical coal),

Figure 9: Key production figures (Mt) for the HVO Complex



Source: HVO

[66]Capital that HVO does not need further approval to construct.

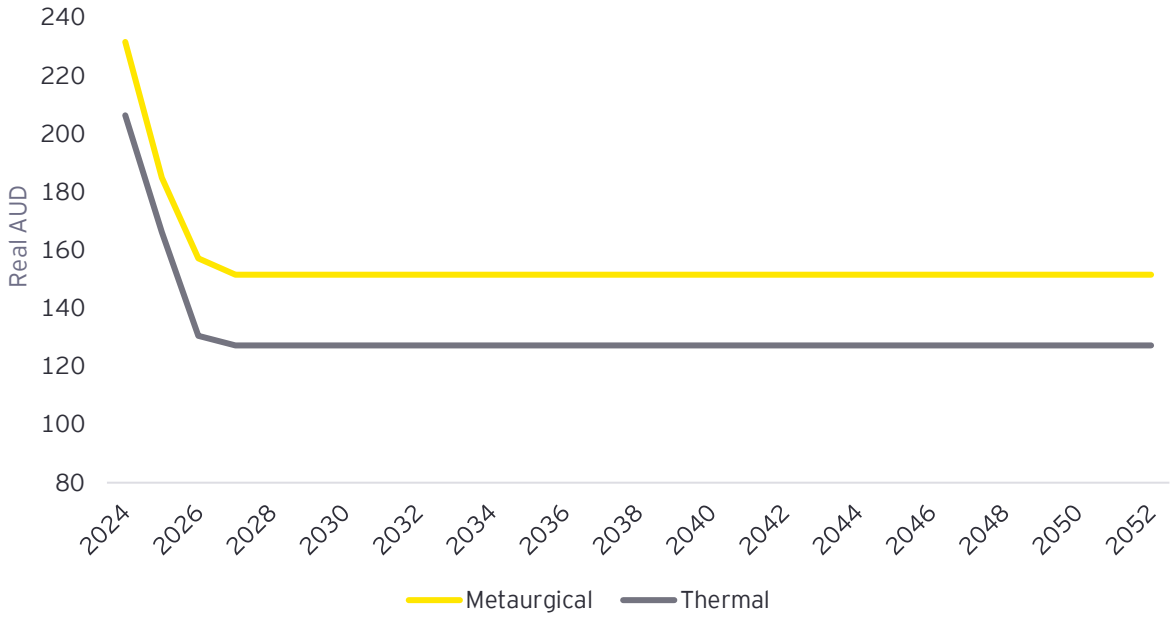
2.3.2 Price assumptions

The price assumptions used for this analysis come from KPMG, the Office of Chief Economist and other information sources as outlined below.

Coal price assumptions are estimated based on information from KPMG published *Coal Price and FX consensus forecasts December 2023/January 2024*. KPMG publishes metallurgical coal, thermal and PCI price forecasts in nominal US dollars out to 2028. The price forecasts are converted to nominal Australian dollars using the exchange rate forecasts from the KPMG report.[67] The exchange rate varies between $0.66 and $0.70 US dollars per AUD until 2025 and then is fixed long term at $0.70 US dollars per AUD. All nominal coal price forecasts are converted into real 2024 AUD using Office of the Chief Economist *Resources and Quarterly December 2023* inflation rate forecast.

The Project metallurgical coal price in real 2024 Australian dollars ranges from $231.7 per tonne in 2024 to $151.6 per tonne from 2028 onwards, as shown in Figure 10, below. For thermal coal, the analysis assumes in 2024 a price of $206.4 per tonne, which decreases to $127.2 per tonne over the long term.

Figure 10: Metallurgical and thermal coal price assumptions (real 2024 Australian dollars)



Source: EY estimates based on KPMG published Coal Price and FX consensus forecasts December 2023/January 2024

2.4 Projected revenue and project financials

The combined operations are expected to generate revenues of approximately $65.0 billion over 27 years in real undiscounted 2024 Australian dollars. This is based on the production assumptions outlined in Figure 9, and the real price assumptions outlined in Figure 10. This equates to approximately $31.0 billion revenue in NPV terms based on 7 per cent real discount rate as shown in Table 8 (this table shows selected years; full results are presented in Appendix B). When considering HVO North in isolation, the proposed extension is estimated to generate $46.2 billion revenue in real undiscounted terms, with a resulting $21.1 billion revenue in NPV terms. The balance of the revenue can be attributed to HVO South, which is estimated to generate $18.8 billion revenue in real undiscounted terms, and $9.9 billion revenue in NPV terms. In the context of this analysis, these are deemed to be central case assumptions, and subject to sensitivity analysis later in this report.

[67] Coal Price and FX Market forecasts - KPMG Australia (2024)

Table 8: Central case assumptions – coal production, real prices^, total revenue (real and NPV at a 7 per cent discount rate) in $ million for HVO Complex, HVO North and HVO South

		HVO Complex	HVO North	HVO South
Production (Mt)				
Metallurgical Coal (Mt)		59.0	36.9	22.2
Thermal coal (Mt)		438.2	318.4	119.9
Total (Mt)		497.3	355.2	142.0
Average Real Price^				
Semi-soft ($/t)	150.5			
Thermal coal ($/t)	127.0			
Total Sales Revenue		65,016.9	46,196.4	18,820.6
Total Sales Revenue – NPV*		31,033.5	21,126.5	9,907.0

Source: HVO and EY estimates ^ Real 2024 Australian dollars.

Based on information provided by HVO, the operating costs for the proposed development are summarised in Table 9.

Operating costs (including closure costs) are provided by HVO and are estimated to be $33,754 million over the lifetime of the Project (HVO Complex), while HVO North operation costs are estimated to be $25,827.4 million and HVO South $10,570.7 million. Mitigation and management costs are estimated to be $55.6 million for the HVO Complex which includes costs associated with reducing the environmental impacts of the Project operations, as discussed in the introduction.

In terms of other costs:

- Depreciation is calculated using the diminishing value method.
- Royalties are based on standard NSW Government royalty rates of 10.8 per cent *ad valorem* for open cut mines. A discount of $3.50 per sales tonne is applied for washing as is allowed by the NSW Government.

These are deemed to be ***central case assumptions***, and subject to sensitivity analysis later in this report.

Table 9: Central case assumptions – Project financials ($million*), for HVO Complex, HVO North and HVO South

	HVO Combined	HVO North	HVO South
Revenue			
Revenue from coal sales	65,016.9	46,196.4	18,820.6
Residual value of capital	-	-	-
Total Revenue	65,016.9	46,196.4	18,820.6
Costs			
Operating costs (incl. closure costs) ^	33,754.6	25,827.4	10,570.7
Safeguard Mechanism and Voluntary additional ACCU purchases[68]	1,554.5	1,248.3	306.1
Mitigation and management costs	55.6	44.6	11.9
Depreciation	4,044.6	2,413.6	1,626.5
Royalties	6,834.1	4,855.0	1,979.0
Council rates and land tax	89.7	45.0	37.3
Total Costs	46,334.0	34,433.9	14,531.5
Operating Profit	18,682.9	11,762.5	4,289.0

[68]See Table 24 for detailed information regarding the spending between the Safeguard Mechanism and Additional Voluntary ACCU surrenders.

Source: EY estimates based on information provided by HVO.
*^ Includes intermediate inputs, labour costs and payroll taxes paid *in real 2024 terms.*

2.5 Direct benefits

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

- The net producer surplus (profits) generated by the Project that is attributable to NSW.
- 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.

2.5.1 Summary of potential direct benefits to NSW

Based on the central case assumptions, the Project is estimated to generate $4,367.4 million in total estimated financial benefits to NSW in NPV terms, as outlined in Table 10.

Table 10: Central case - summary of direct benefits of the Project to NSW ($ million^)

Direct benefits to NSW	HVO Complex	HVO North	HVO South
Net producer surplus attributable to NSW	-	-	-
Company income tax attributable to NSW	905.4	542.8	235.1
Payments to the NSW and local Government	3,462.0	2,358.6	1,116.4
Total financial benefit attributable to NSW	4,367.4	2,901.4	1,351.5

*Source: EY estimates based on information provided by HVO. ^Real 2024 Australian dollars. *NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

The potential benefits produced by HVO Complex are comprised of HVO North and HVO South which creates $905.4 million in company tax attributable to NSW and $3,462 million in NPV terms paid to the NSW and local governments, in the way of coal royalties, payroll tax, council rates and land taxes. Attributable net producer surplus to NSW is $0 due to the assumption of 0 per cent share based on NSW ownership of the Project.

Net producer surplus attributable to NSW

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

The Project is estimated to generate an operating surplus of $8,681.8 million in NPV terms, see Table 11. The operating surplus is estimated using cash earnings and cash costs (cash costs are made up of both capital expenditure and operating costs, excluding depreciation), $2,829.4 million in NPV terms is payable in the form of corporate taxes, levied on accrued Project profits.

In total, the Project generates a net producer surplus of $5,851.6 million in NPV terms. Of this, 0 per cent, or $0 million is payable to NSW.

Table 11: Central case - estimate of net producer surplus attributable to NSW ($ million*)

Key Data	HVO Complex	HVO North	HVO South
Total Revenue	31,033.5	21,126.5	9,907.0
Cash Costs			
Operating costs (incl. closure costs)	15,831.9	11,645.5	9.5

Safeguard Mechanism and Voluntary additional ACCU purchases[69]	504.6	376.5	128.2
Mitigation and management costs	51.3	41.8	9.5
Capital	2,701.8	1,673.2	1,393.0
Royalties	3,262.8	2,220.7	1,042.2
Council rates and land tax	39.7	19.9	18.6
Total Costs	22,392.3	15,977.5	7,960.6
Net Producer Surplus before Tax	8,681.8	5,149.1	1,958.0
Company Tax^^	2,829.4	1,696.3	734.7
Net Producer Surplus	5,851.6	3,452.8	1,223.3
NSW share of Project ownership	0.0%	0.0%	0.0%
Value of net producer surplus attributable to NSW	-	-	-

Source: EY estimates based on information provided by HVO. ^ Real 2024 Australian dollars.
*^^ Based on a 30 per cent company tax rate. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

2.5.2 Company tax attributable to NSW

Consistent with the Guidelines, the company tax payments made to the Australian Government are levied on the profits generated under the proposed development. A company tax rate of 30 per cent is used to estimate the tax payments made to the Australian Government under the assumption that all the profit generated by the Project is subject to company tax in Australia (for example, ignoring financing costs). Consistent with the Guidelines, company tax is attributable to NSW based on the State's share of population which is 32 per cent.

As summarised in Table 12, it is estimated the HVO Complex will generate $9,252.3 million in taxable operating profit in NPV terms (this is an estimate of the accounting profit from which company taxes are calculated). At a company tax rate of 30 per cent, the company tax estimate is $2,829.4 million in NPV terms, of which $905.4 million is attributable to NSW.

Company taxes are estimated based on operating profits, which is on an accrued basis and recognises yearly depreciation costs rather than the full capital costs upfront. Operating profit is generally higher than operating surplus (the basis for estimating net producer surplus), which is on a cash basis and thus recognises the full capital costs upfront.

Table 12: Central case - company income tax attributable to NSW ($ million^)

Company tax attributable to NSW	HVO Complex	HVO North	HVO South
Total Revenue[70]	31,033.5	21,126.5	9,907.0
Total Costs	21,781.3	15,604.5	7,596.7
Operating Profit	9,252.3	5,522.1	2,310.3
Company Tax^^	2,829.4	1,696.3	734.7
NSW share^^^	905.4	542.8	235.1

Source: EY estimates based on information provided by HVO. ^ Real 2024 Australian dollars.
*^^ Based on a 30 per cent company tax rate. ^^^ Based on a 32 per cent population share. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

[69] See Table 24 for detailed information regarding the spending between the Safeguard Mechanism and Additional Voluntary ACCU surrenders.
[70] Total Revenue includes the sale of product coal and any residual value of capital remaining at the end of life of the Project.

2.5.3 Payments to the State and the local Council

Under the proposed development, various payments will be made to NSW Government and the LGAs 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, council rates and NSW land tax. Over the life of the proposed developments, a total of $3,462 in payments are made in NPV terms (Table 13) for the HVO Complex operations – this is made up of $3,262.8 million in royalty payments, $159.5 million in payroll taxes and $39.7 million in council rates and land taxes. There is $2,358.6 million in payments when considering only HVO North, and $1,116.4 million in payments are made when considering HVO South, with royalties to the state representing the majority of the State Government payments.

Table 13: Central case - total payments to State Government and local Council ($ million^)

Project payments to NSW	HVO Complex	HVO North	HVO South
Coal sales revenue	31,033.5	21,126.5	9,907.0
Total Royalties paid	3,262.8	2,220.7	1,042.2
Payroll taxes	159.5	118.0	55.6
Council rates and land tax	39.7	19.9	18.6
Total Payments	3,462.0	2,358.6	1,116.4

*Source: EY estimates based on information provided by HVO. ^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

2.6 Potential Indirect Benefits to NSW

Based on the Guidelines, the potential indirect benefits to NSW of the proposed development are derived from three sources (see **Appendix C** for detailed methodology):

- The net economic benefit to workers in NSW.
- The net economic benefit to suppliers in NSW.
- Any landowner premiums attributable to the Project.

2.6.1 Summary of potential indirect benefits to NSW

Consistent with the Guidelines, the potential indirect benefits of the proposed development that accrue to workers and suppliers are summarised in

Table 14. When assessing HVO North in isolation, the total potential indirect benefits are estimated at $2,569.6 million, comprising of $939 million in economic benefits to workers and $1,630.5 million of benefits to suppliers. For HVO South, the net economic benefits to workers are estimated at $448.5 million, and $523.5 million in benefits to suppliers.

The total potential indirect benefits are estimated to be $3,488.1 million in NPV terms for the entire Project. The main source of these benefits is $1264.9 million to workers and $2,223.2 million to suppliers in NPV terms. It is conservatively assumed that there are no anticipated benefits to landowners as a result of the Project.

Table 14: Central case - summary of potential indirect benefits of the Project to NSW ($ million^)

Indirect benefits to NSW	HVO Complex	HVO North	HVO South
Net economic benefit to workers	1,264.9	939.0	448.5
Net economic benefit to suppliers	2,223.2	1,630.5	523.5
Total indirect benefit	3,488.1	2,569.6	972.0

*Source: EY estimates based on information provided by HVO. ^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

2.6.2 Benefit to workers

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

- Wages earned in the HVO Complex.
- 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.

HVO has provided EY with incremental FTE employment under the Project cases, as well as average wages paid per employee.

Over the period of 2024 to 2050 HVO advises that under the combined operations case, the Project would employ an average incremental 1,118 FTE workers. During this period, employment increases up to 1,524 FTEs in 2040, as outlined in Table 3.

HVO has advised EY of an average pre-tax wage (including leave entitlements and superannuation) for an FTE employee at the HVO Complex upon commencement of the Projects (and is assumed to remain fixed over the period). This was used to calculate estimated Total wages paid for the Project cases.

Total wages paid to employees is estimated at $2,942.1 million in NPV terms for the Combined Project case, $2,165.1 million for HVO North and $1,035.5 million for HVO South. To measure the opportunity cost compared to working in the non-mining sector, the average wage earned by workers at the HVO Complex is compared to the likely wages that would be earned by employees in other sections if the Project does not proceed.

The reservation wage is constructed as a weighted average of the wages paid to occupations not in the mining sector in NSW. The weights are given by the occupational distribution of those found working in the coal mining sector. Additionally, the reservation wage is adjusted upwards to account for the differential in hours worked between those in the coal mining sector and those employed in the wider economy. This implies that, should the proposed development not go ahead, those who would have been employed at the HVO Complex would instead find alternative work at the average wage afforded to their occupation in NSW. The weighted average reservation wage is estimated to be $106,668 per annum in real 2024 Australian dollars (Table 15).

Table 15: Central case – estimated NSW potential worker benefits for HVO Complex, HVO North and HVO South

Potential Indirect benefits - workers	HVO Complex	HVO North	HVO South
Reservation wage	1,677.3	1,226.1	587.0
Mining wages at the HVO Complex	2,942.1	2,165.1	1,035.5
Estimated worker benefit ($ million^)	1,264.9	939.0	448.5

Source: HVO, ABS (Table W17) Census (2016) Occupational Total Personal Income (Weekly) by Hours Worked and EY estimates.
*^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

As shown, there is a significant premium incorporated in mining wages compared with the average wage paid in NSW. 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).

A further consideration is whether workers would experience more or less disutility being employed at the HVO Complex compared with any alternate employment. In this context, as the assumption is made that any worker employed at the HVO Complex 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. However, 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) manner.

One reasonable approximation for the mining specific levels of disutility are the hardship allowances paid to employees. For example, the Black Coal Mining Industry Award 2010[71] provides for the payment of an underground allowance at 0.23 per cent per day above the standard rate/reimbursement to an adult employee who works underground in any shift. These rates appear to be non-material in comparison to the differences in wages paid to workers not in the mining industry. Furthermore, in assessing the safety of the mining sector relative to comparable industries, we find that according to statistics gathered by Safe Work Australia[72], the mining sector has recently outperformed on a claims per million hour basis relative to comparable industries such as construction, agriculture and manufacturing. Thus, it is unclear whether there is any significant disutility incurred from working in the mining sector relative to other industries.

Given these minor allowances for working in a coal mine and the measurement difficulties associated with measuring these disutilities, generally, EY have assumed that the disutility for workers at the HVO Complex is zero. This implies, effectively, that those workers employed at the HVO Complex experience no additional disutility from working in the HVO Complex compared with any alternative employment they would have secured in the absence of the Project.

Based on these assumptions, estimated ***worker benefit*** is $1,264.9 million in the Combined Project case, $939 million for HVO North and $448.5 million for HVO South.

2.6.3 Potential Benefit to suppliers

Consistent with the Guidelines, the potential economic benefit to suppliers is estimated as a producer surplus generated for NSW firms that provide goods and services to the proposed development. As summarised in

Table 16, based on the input cost data provided by HVO, the Project is estimated to use $13,125.2 million in intermediate inputs supplied from NSW over its life-cycle in NPV terms. Currently, 84 per cent of the HVO Complex inputs used are supplied from NSW-based businesses and it is assumed this would also be the case with the Project.

The estimated economic benefit to suppliers (producer surplus) is based on the EY Regional Input-Output Model. This Model was customised to generate an NSW-specific Input-Output table and 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 total supplier benefits are estimated to be $2,223.2 million in NPV terms for the Project case. When considering HVO North and HVO South in isolation, the total supplier benefits are estimated at $1,630.5 million and $523.5 million for HVO North and HVO South respectively.

Table 16: Central case – estimated supplier benefits

Potential Indirect benefits - suppliers	HVO Combined	HVO North	HVO South
Total intermediate inputs ($ million^)	13,125.2	9,626.3	3,090.7
Share from NSW (Per cent)	84%	84%	84%
Total intermediate inputs supplied from NSW ($ million^)	11,016.6	8,079.7	2,594.1
Gross operating surplus ratio	20%	20%	20%
Total benefits to suppliers (NPV*)	2,223.2	1,630.5	523.5

[71] https://library.fairwork.gov.au/award/?krn=MA000001 (2010)

[72] https://www.safeworkaustralia.gov.au/data-and-research/industry-benchmarking (2024)

*Source: EY estimates based on information provided by HVO. ^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*

2.7 Indirect costs to NSW

Consistent with the Guidelines, the Project's indirect costs cover a range of net environmental, social and transport-related costs as well as the net public infrastructure costs as well as the estimated loss of surplus to other industries (listed in Table 17).

Consideration of these costs are based on a range of assessments undertaken by specialised consultants for the Project such as an Air Quality and Greenhouse Gas Assessment and Groundwater Assessment (see **Appendix A**).

This section outlines the calculation of both the total mitigation and management costs (a part of indirect costs), as well as the incremental indirect costs of the Project. It is the calculation of incremental indirect costs that are accounted for in the CBA.

The incremental indirect costs are those attributable by the Project that are not already included in the Project financials (and therefore already accounted for in the CBA). These costs include:

- Greenhouse Gas Emissions (GHG).
- Traffic and transport impacts.
- Loss of surplus to other industries (agricultural land).

In addition, there are several environmental costs that are internalised by HVO, these costs include:

- Noise mitigation.
- Historical and aboriginal cultural heritage mitigation.
- Social mitigation.
- Implementing a biodiversity offset strategy.
- Visual Amenity mitigation measures.
- Air quality mitigation.
- Groundwater mitigation.
- Other environmental management and mitigation costs such as blasting and social impacts.

These costs are classified as indirect costs of the Project, however, to avoid double counting, are excluded from the incremental costs as they are already included in the operational costs of the Project. HVO provided EY with the approximate cost estimates for each of the environmental mitigation and management measures.

Table 17: Summary of indirect costs impacts ($ million^)

Scope of environmental costs	Assessment type	HVO Complex	HVO North	HVO South
Incremental indirect costs				
Greenhouse gas emissions	Quantitative	3.68	2.38	1.44
Traffic and Transport	Quantitative	1.62	1.61	0.00
Loss of surplus to other industries (agricultural land)	Quantitative	14.00	8.71	4.00
Mitigation and management cost^				
Air quality impacts^^	Quantitative	0.00	0.00	0.00

Visual amenity^^	Quantitative	0.00	0.00	0.00
Aboriginal cultural heritage and historical heritage^^	Quantitative	0.00	0.00	0.00
Ambient noise impacts^^	Quantitative	0.00	0.00	0.00
Biodiversity impacts	Quantitative	34.37	32.37	2.01
Subsidence impacts^^	Quantitative	0.00	0.00	0.00
Water impact (mitigation) - including surface and ground water^^	Quantitative	0.00	0.00	0.00
Other (Blasting and Social) ^^	Quantitative	0.00	0.00	0.00
Total mitigation and management costs (NPV, includes costs as part of operational expenditure)		70.59	54.67	14.97
Total incremental Indirect costs		19.29	12.91	5.43

*Source: EY estimates based on information provided from HVO and relevant environmental assessments for the Project. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate. ^Some values are not shown as they may be subject to commercial negotiations, and have therefore been excluded from the table, however these costs have been accounted for in the cost benefit analysis. ^^Included in the total internalised costs.*

2.7.1 Project Indirect Costs

The following sections provide more detail on how the indirect environmental costs have been assessed based on the relevant environmental assessments provided for the Project. These include the inputs utilised for HVO North, HVO South and the HVO Complex.

2.7.1.1 Air Quality

The *Air Quality Assessment* report[73] concludes that voluntary acquisition rights will be triggered at two properties (labelled as receptors 121 and 308 in the EIS). This is because the air quality model predicts that the Project may contribute to an exceedance of the Particulate Matter (PM) $_{2.5}$ and PM_{10} annual average criteria specified in the NSW Government's *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) on more than 25% of privately owned land at these properties. While acquisition rights is voluntary on behalf of the private landowner it as been assumed these properties are acquired at Project commencement.

The air quality model also predicts that the operational dust for 24-hour $PM_{2.5}$ and 24-hour PM_{10} concentrations may continue to exceed the NSW Environmental Protection Authority's (EPA) 24-hour average air quality criteria of 25 µg/m^3 and 50 µg/m^3 respectively, from time-to-time; however, these events would be within the range of historically measured days above the criteria, excluding extraordinary events such as bushfires. Operational dust produced by the Project is expected to be in compliance with the EPA criterion, and therefore it is expected that there would be no additional externalities arising due to the operation of the Project in relation to air quality impacts. The incremental deposited dust produced by the Project is 2 g/m^2/month which is also within compliance with the EPA's assessment criteria and the Project is not anticipated to cause adverse impacts in terms of deposited dust levels and therefore, associated with no economic impacts.

It is advised by the air quality model that the 1-hour average concentrations of NO_2 produced by post-blast fume under worst-case meteorological conditions, with a rate 3 fume every day between 9 am to 5 pm and maximum background NO_2 concentrations are still within compliance of EPA's assessment criterion of 164 µg/m^3. Also, the consideration of potential odour impacts for NO_2 from the Project are estimated to be less than 20 µg/m^3 and when compared with the World Health Organisation (WHO) range of 100 µg/m^3 to 410 µg/m^3 , suggests that the odour impacts can be managed with appropriate blasting procedures as a result, it is assumed that there would be no further economic externalities arising, over and above the expected mitigation and management costs.

To mitigate potential impacts on privately owned residences from dust, HVO will establish a water tank inspection and cleaning program for all private residences within 4 km of the proposed mining

[73] Air Quality Assessment Report (2022).

area. HVO will also continue to monitor air quality in the area around the operation via the existing air quality monitoring network. For all assessed environmental impacts, assessments that were found to have to no economic impacts were assumed to have no economic value as per the Technical Notes. However, the mitigation costs required, have been provided by HVO and are classified as indirect costs which are included in the operational expenditure of the Project but are excluded from incremental costs to avoid double counting. These costs related to the acquisition of properties, have been apportioned equally between HVO North and HVO South. As is stated in the Technical Notes, the cost of mitigating the impacts of air quality, such as water tank cleaning and inspections, and for the acquisition of the impacted properties, have been included as part of the direct operational costs.

While the nearby receptors are not expected to exceed the 24-hour average $PM_{2.5}$ EPA criterion, an economic assessment was conducted to estimate the potential unit costs associated with emissions in three scenarios; Low Unit Cost, Central Unit Cost and High Unit Cost for $PM_{2.5}$ produced for the Singleton LGA and Lower Hunter SA2.[74] These scenarios have a $236.3, $389.2 and $528.2 cost per population density for Singleton and Lower Hunter SA2. The economic assessment uses the methodology as prescribed in Methodology for Valuing the Health Impacts of Change in Particle Emissions[75], published by the NSW EPA to estimate the cost per tonne of PM emissions escalated to 2024 with the CPI of January 2024.[76] The EPA report uses a damage cost approach for each of the Significant Urban Areas (SUA) in NSW.

In the estimation it was assumed that the costs of $PM_{2.5}$ was in relation to:

- The population destiny of the region (population/area (km^2)), assumed to be roughly 6 and 12 people per km^2 for Singleton and Hunter Regions.
- Average assumed $PM_{2.5}$ emissions per ROM tonne, as described in the *Air Quality and Greenhouse Gas Assessment* (Jacobs 2022).[77]
- Interpolated estimates of $PM_{2.5}$ emissions from 2023-2050 for HVO North and 2023-2045 for HVO South as described in the *Air Quality and Greenhouse Gas Assessment*.
- **Low Unit Cost:** Average Unit Damage Cost for regions Singleton and Hunter Valley are approximately $1,390.8 and $2,806.8 per tonne of $PM_{2.5}$ respectively.
- **Central Unit Cost:** Average Unit Damage Cost for regions Singleton and Hunter Valley are approximately $2,290.7 and $4,623.0 per tonne of $PM_{2.5}$ respectively.
- **High Unit Cost:** Average Unit Damage Cost for regions Singleton and Hunter Valley are approximately $3,108.8 and $6,274.0 per tonne of $PM_{2.5}$ respectively.

Table 18 outlines the costs associated to the incremental production of $PM_{2.5}$ for each region for HVO Complex, HVO North and HVO South in terms of three alternative unit costs.

Table 18: Economic cost of incremental PM2.5 emissions for three price Trajectories in Singleton and Hunter Valley for HVO Complex, HVO North and HVO South. ($ million NPV @ 7 per cent real interest rate)[78]

	Singleton Region			Lower Hunter Region		
Unit Cost ($ million NPV)	HVO Complex	HVO North	HVO South	HVO Complex	HVO North	HVO South
Low Unit Cost	12.5	8.6	4.2	25.0	17.5	8.5

[74] The LGA of Singleton was chosen to model the potential costs solely in the region surrounding the mine. Lower Hunter was chosen to ensure alignment with local region as required by the Guidelines.

[75] Methodology for Valuing the Health Impacts of Changes in Particle Emissions -- Final Report (nsw.gov.au) (2013).

[76] Consumer Price Index, Australia, March Quarter 2024 | Australian Bureau of Statistics (abs.gov.au) (2024).

[77] Report estimated at an emission of 33.2 tonnes of PM2.5 per tonne ROM coal produced for HVO Complex, 32.1 of tonnes of PM2.5 per tonne ROM coal produced for HVO North and 36.5 of tonnes of PM2.5 per ROM coal produced for HVO South.

[78] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

Central Unit Cost	21.2	14.2	6.8	42.5	28.8	13.8
High Unit Cost	28.6	19.4	9.3	57.8	39.0	18.7

Source: EY estimates based on the EPA methodology and Jacob's air quality assessment

These externality values are low relative to the total benefits of the Project. These costs can also be considered potentially aggressive, as the Air Quality Assessment report states that nearby receptors are not expected to exceed the EPA's maximum 24-hour average $PM_{2.5}$ concentration limit, with the modelling indicating overall compliance with the EPA's assessment criteria.

2.7.1.2 Blasting Impact

The *Blasting Impact Assessment (BIA) report*[79] concludes that blast and vibration impacts will need to be managed for the lifetime of the project, as is currently the case, so that vibration and overpressure levels remain within the relevant criteria for surrounding infrastructure.

The BIA determined that exposure to vibration and air blast overpressure can be effectively managed via the application of reduced charge masses for surrounding infrastructure (public roads and bridges, high voltage powerlines and electrical substations), nearby private residences, heritage items (Great Lodge, Carrington Homestead and Wandewoi Homestead), and livestock. To ensure all criteria is met, additional costs may be required. This includes the addition of extra blast monitoring stations additional controls to manage overpressure and vibration levels.

The mitigation costs required have been provided by HVO and are classified as indirect costs which are included in the operational expenditure of the Project but are excluded from incremental costs to avoid double counting. The blasting and vibration mitigation costs of additional receptors, the monitoring of vibration and overpressure levels have been apportioned equally between HVO North and HVO South.

As described in the Technical Notes, blasting activities may impact the surrounding heritage and environment in a variety of ways. However, the Technical Notes are not prescriptive in detailing the methodology for account for this potential externality. As a result, the additional mitigation costs incurred to manage these procedures are utilised as a proxy for the potential value of the externality arising due to the use of blasting procedures throughout the Project.

2.7.1.3 Aboriginal Cultural Heritage

As per the Technical Notes, the EIS (including the *Aboriginal Cultural Heritage Assessment*[80] included as Appendix N to the EIS) has described and documented the potential impacts on Aboriginal and cultural heritage values, as well as the measures to mitigate and manage these impacts. An Addendum to the ACHAR was also prepared by EMM in 2023 (included as Appendix C to the Submissions Report) to address feedback on the Project received from Heritage NSW, and to consider the amendment to a portion of the Lemington Road realignment following the submission of the EIS. The following description outlines the impacts and mitigation measures employed to manage some of the impacts arising on Aboriginal heritage as a result of the Project. As is required by the Technical Notes, these have been recognised, and included as part of the Projects operating costs.

The *Aboriginal Culture Heritage Assessment* report[81] as revised by the subsequent *Aboriginal Culture Heritage Assessment (Addendum)* [82] concludes there are several cultural heritage sites within the disturbance area associated with the Project, that will therefore be impacted. Following the implementation of avoidance measures, the Project will impact on:

[79] EMM consulting (2022), Hunter Valley Operations Continuation Project – *Blasting Impact Assessment*.

[80] Aboriginal Cultural Heritage Assessment (nsw.gov.au) (2022).

[81] Aboriginal Cultural Heritage Assessment (nsw.gov.au) (2022).

[82] HVO North Continuation Project (nsw.gov.au) (2023).

- 2 sites assessed as having high significance.
- 10 sites assessed as having moderate significance (3 of which are within areas previously approved for disturbance by existing development consents).
- 193 sites assessed as having low/low-moderate significance.

Mitigation measures will be implemented for all Aboriginal sites within the Project disturbance area. These include cultural collection of surface stone artefacts and/or the passive/active avoidance of sites not proposed to be adversely affected by the Project, and archaeological investigative and salvage excavations focussed on identified sites with high artefact densities and/or containing stratified cultural deposits, where proposed for impact.

HVO has also identified social mitigation measures that will be implemented as part of the Project, in consultation with Aboriginal community, which include job readiness programs, assistance relating to tendering for work at HVO by Aboriginal suppliers, and a commitment of $1,000,000 over the first 10 years of the Project for funding programs that align with Closing the Gap initiatives or community mental health. The Social Impact Management Plan to be developed for the Project will further develop these initiatives and outline the proposed implementation plan. Historical heritage mitigation measures of the management of the Great Lodge and archival recordings costs are considered together with Aboriginal culture heritage mitigation costs.

The mitigation costs required have been provided by HVO and are classified as indirect costs which are included in the operational expenditure of the Project but are excluded from incremental costs to avoid double counting.

The mitigation costs are apportioned to HVO North and HVO South as outlined in Table 19 below:

Table 19: Apportionment of costs of Aboriginal Cultural Heritage in isolation for HVO North and HVO South

Mitigation and Management Measures	HVO North	HVO South
Salvage	80%	20%
Fencing etc. of sites	50%	50%
Social	50%	50%
Historical Heritage	50%	50%

Source: Aboriginal Cultural and Heritage Assessment Report (Addendum) (EMM 2023)

2.7.1.4 Noise Mitigation

The *Hunter Valley Operations Continuation Project Noise Impact Assessment* (NIA) report[83] concludes that to mitigate operational noise, 19 receptors will be entitled to voluntary mitigation rights based on residual noise impact significance levels. Also, HVO proposes to maintain existing noise mitigation rights held by a further seven receptors despite not being required to do so in accordance with the noise predictions for the Project. This was concluded from five operational scenarios that were modelled representing stages in progression of the mining operation over the lifetime of the project.

Potential additional incurred costs include those associated with delays in operations due to periods of meteorological enchantments which may restrict the operation of exposed drills, operations of rehabilitation and dozers to limit noise impacts. The assessment of private lands in accordance with the VLAMP to determine acceptable amenity noise levels plus 5 dB would exceed 25 per cent of any property area, saw that in all cases it was less than 25 per cent, therefore, it is assumed that there are no further economic impacts arising from the noise externalities over and above the estimated mitigation costs. Cumulative noise predictions were equal to or below the recommended amenity

[83] Hunter Valley Operations Continuation Project Noise Report (nsw.gov.au) (2022).

noise levels while also the potential sleep disturbance impacts were less than the linear sounds power (LAmax) level for all receptors.

The mitigation costs required have been provided by HVO and are classified as indirect costs which are included in the operational expenditure of the Project but are excluded from incremental costs to avoid double counting. The noise mitigation costs for six properties have been identified in the NIA and costs have been apportioned equally between HVO North and HVO South due to the receptors in Jerry Plains detecting higher levels of noise created by the modelled noise operations in the NIA.

As is required by the Technical Notes, the mitigation measures employed by the Project have been examined and included as part of the direct costs associated with the Project. However, given that the NIA suggests that noise impacts are likely to be minor, there was no additional economic valuation of residual noise impacts undertaken.

2.7.1.5 Visual Amenity

The *Visual Amenity Assessment* report[84] and additional analysis contained in the *Submissions Report* concludes that visual impacts would occur during construction and operational stages of the project. For HVO North, the realignment of Lemington Road and relocation of transmission infrastructure will change the visual aesthetics of motorists and receptors.

For HVO South, visibility of the eastern face of the Cheshunt Put overburden emplacement area will continue, with possibilities of Lemington CPP (LCPP) and rail loop becoming visible to residents when this infrastructure is constructed later in the project life (around year 13-15). The economic costs associated with minimising visual impacts will continue through raising awareness of employees about the usage of light equipment and operations on sensitive locations, usage of colours complimenting the environment and the continuation of progressive rehabilitations to reshape and revegetate disturbed areas.

HVO will also investigate the feasibility of strategically planting vegetation adjacent to the realigned Lemington Road to provide an effective visual screen and reduce views of this infrastructure from residences and local roads. The mitigation costs required have been provided by HVO and are classified as indirect costs which are included in the operational expenditure of the Project but are excluded from incremental costs to avoid double counting. The visual amenity mitigation costs have been apportioned solely to HVO South for tree screening along the realigned Lemington road due to the visibility of the eastern face of Cheshunt Put overburden emplacement area, with possibilities of LCPP and rail loop being visible to residents. No mitigations costs are required for HVO North as it is expected to have limited visual amenity impacts on nearby receptors and motorists due to the temporary nature of the construction activities (approximately 18 months) as recommended in the VIA.

As is consistent with the Technical Notes, the costs of mitigation measures undertaken for the management of surrounding visual amenity have been included as part of the operating costs of the Project. Given that the Visual Amenity report concludes that significant visual impacts are not predicted as a result of the Project, therefore it is assumed that any residual visual impacts may be immaterial to the overall cost benefits of the Project.

2.7.1.6 Greenhouse Gas Emissions

As detailed in Table 20, GHG emissions cost are estimated at $3.68 million in NPV terms for the Project, $2.38 million and $1.44 million for HVO North and HVO South, respectively (based on a ratio of NSW population and global population (on average 0.33%) multiplied by the GHG global emission cost). These costs were estimated based on the incremental expected Scope 1 and 2 emissions detailed in the Air Quality and Greenhouse Gas Assessment conducted by Jacobs as revised with the Submissions Report.

[84] HVO Continuation Project Visual Report (nsw.gov.au) (2022).

Greenhouse Gases associated with the burning of coal from this facility are excluded from this assessment. This is because the EIA Guidelines and Technical notes do not require consideration of Scope 3 emissions. The impacts on climate change from Scope 3 emissions are therefore excluded from this analysis.

Table 20: Greenhouse gas emissions attributable to the Project

	HVO Complex	HVO North	HVO South
ROM Coal Output Mt	684.15	497.66	186.49
Tonnes of GHG (Mt)			
Scope 1	29.31	21.35	7.97
Scope 2	0.28	0.17	0.11
Total	29.59	21.51	8.08
Global Impact (NPV*, $ million^)	3,392.84	2,044.48	1,242.70
NSW (NPV*, $ million^)	3.68	2.38	1.44

Source: EY estimates Submissions Report (EMM 2023)^ Real 2024 Australian dollars.
* NPV in 2024 Australian dollars based on a 7 per cent real discount rate.

The Technical Notes include specific commentary around the use of market prices as a proxy for the costs of climate change impacts associated with greenhouse gas emissions. The Technical Notes initiate the discussion on this issue as follows:

"While at present there is no identified carbon price in Australia, it is suggested for NSW project appraisal purposes that proponents refer to the NSW Government Guide to Cost-Benefit Analysis (TPP17-03) which states that: Market prices should be used as a basis for valuing the costs of carbon emissions, where reliable evidence can demonstrate that those market prices are not significantly biased as a direct consequence of scheme design."

The Technical Notes indicate a preference for the European Union credit price as a proxy for carbon costs – however, recent significant price jumps in the EU credit prices indicate that the current EU market price falls afoul of the last point identified in the extract above, namely that its price may be biased as a direct consequence of the scheme design. Indeed, it is likely that most carbon trading processes will be significantly influenced by the particular characteristics of each respective scheme and the relevant emissions targets set by countries, which would limit their appropriateness as a proxy for externalities.

The use of the US EPA Social Cost of Carbon (whilst not without criticism)[85], however, provides a robust assessment of the costs of GHG emissions on a per-unit basis, allowing for agencies to understand the potential social benefits (costs) of reducing (increasing) emissions, whilst not being influenced by domestic policy settings. As shown below, these estimates are highly sensitive to the discount factors used and are currently under review by the Interagency Working Group that established them.

The following paragraphs present some further analysis surrounding the estimation of greenhouse gas externalities for the Project, in addition to a justification for using the US EPA Social Cost of Carbon prices for the analysis of the externalities of the Project. The sensitivity analysis both increases the proportion of costs which are attributed to NSW and the Project, in addition to increasing the cost per tonne of carbon emissions. In this section, the total cost of greenhouse gas externalities is apportioned based on the ratio between the population of NSW and Australia,

[85] See for example:

- National Academies of Sciences, Engineering, and Medicine (NASEM) https://doi.org/10.17226/24651 (2017) and
- Rennert et al https://www.brookings.edu/wp-content/uploads/2021/09/Social-Cost-of-Carbon_Conf-Draft.pdf (2021)

resulting in around 32 per cent of the total indirect costs attributed to the externality arising by greenhouse gas emissions being borne by NSW.

In addition to altering the method of apportionment, three additional price trajectories were assessed in our scenario analysis. The details on the price trajectory per tonne of carbon emissions are detailed below. The price assumptions are derived from recent estimates on the social cost of carbon by the United States Government, based on the social cost of one tonne of carbon at 5 per cent, 3 per cent and 2.5 per cent discount rates:[86]

- **Low-Price Trajectory.** The Low-Price Trajectory adopts a starting price of $217/t $CO_{2\text{-}e}$ was adopted in 2024, which grows at an average rate of 1.7 per cent pa to $334/t $CO_{2\text{-}e}$ by 2050.

- **Mid-Price Trajectory.** The Mid Price Trajectory scenario adopts a starting price of $344/t $CO_{2\text{-}e}$ was adopted in 2024, which grows at an average rate of 1.6 per cent pa to $518/t $CO_{2\text{-}e}$ by 2050.

- **High Price Trajectory.** The High Price Trajectory adopts a starting price of $595/t $CO_{2\text{-}e}$ was adopted in 2024, which grows at an average rate of 1.2% to $803/t $CO_{2\text{-}e}$ by 2050.

Table 21 details the total Net Benefits of the Project under the adjusted apportionment method and additional price sensitivities.

Table 21: Net Benefits of the Project with adjusted method of apportionment and various price trajectories^($ million NPV @ 7 per cent real interest rate)[87]

HVO Complex	Low Price Trajectory	Mid Price Trajectory	High Price Trajectory
Direct Benefits^	$4,367.4	$4,367.4	$4,367.4
Indirect Benefits^	$3,488.1	$3,488.1	$3,488.1
Total Greenhouse Gas Costs (Costs to Australia)^	$2,098.2	$3,392.8	$5,677.8
Apportionment to NSW (%)	32.70%	32.70%	32.70%
Indirect (Environmental Costs)			
Greenhouse Gas Emissions^	$686.11	$1,109.46	$1,856.63
Other Indirect Incremental Costs*	$15.61	$15.61	$15.61
Net Benefit^	**$7,153.78**	**$6,730.43**	**$5,983.26**

*Source: HVO. *Other Indirect Incremental Costs include costs that are not operationalised or capitalised such as: Transport Impacts and Loss of Surplus to other industries*

Table 22 details the total Net Benefits for HVO North under the adjusted apportionment method and additional price sensitivities.

[86] United States Government, 2023, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide.

[87] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

Table 22: Net Benefits of HVO North with adjusted method of apportionment and various price trajectories^($ million NPV @ 7 per cent real interest rate)[88]

HVO North	Low Price Trajectory	Mid Price Trajectory	High Price Trajectory
Direct Benefits^	$2,901.4	$2,901.4	$2,901.4
Indirect Benefits^	$2,569.6	$2,569.6	$2,569.6
Total Greenhouse Gas Costs (Costs to Australia)^	$1,264.5	$2,044.5	$3,390.0
Apportionment to NSW (%)	32.70%	32.70%	32.70%
Indirect (Environmental Costs)			
Greenhouse Gas Emissions^	$413.49	$668.54	$1,108.53
Other Indirect Incremental Costs*	$10.52	$10.52	$10.52
Net Benefit^	**$5,046.93**	**$4,791.88**	**$4,351.90**

*Source: HVO. *Other Indirect Incremental Costs include costs that are not operationalised or capitalised such as: Transport Impacts and Loss of Surplus to other industries*

Table 23 details the total Net Benefits for HVO South under the adjusted apportionment method and additional price sensitivities.

Table 23: Potential Net Benefits of HVO South with adjusted method of apportionment and various price trajectories^($ million NPV @ 7 per cent real interest rate)[89]

HVO North	Low Price Trajectory	Mid Price Trajectory	High Price Trajectory
Potential Direct Benefits^	$1,351.5	$1,351.5	$1,351.5
Potential Indirect Benefits^	$972.0	$972.0	$972.0
Total Greenhouse Gas Costs (Costs to Australia)^	$770.0	$1,242.7	$2,090.0
Apportionment to NSW (%)	32.70%	32.70%	32.70%
Indirect (Environmental Costs)			
Greenhouse Gas Emissions^	$251.80	$406.36	$683.42
Other Indirect Incremental Costs*	$4.00	$4.00	$4.00
Net Benefit^	**$2,067.76**	**$1,913.20**	**$1,636.14**

*Source: HVO. *Other Indirect Incremental Costs include costs that are not operationalised or capitalised such as: Transport Impacts and Loss of Surplus to other industries*

Noting that treating the total global costs as total costs to Australia, and comparing the direct benefits of the Project will not result in a like-for-like comparison, as the direct benefits can only be

[88] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

[89] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

attributed to NSW, which means many of the global and Australia-wide benefits of the Project are not included. As such, care should be taken when comparing these two figures broadly.

Safeguard Mechanism Analysis

The Safeguard Mechanism is the Australian Government's policy to incentivise Australia's largest industrial facilities (emitters of over 100,000 tonnes of carbon dioxide equivalent (CO_2e) per year, defined as designated large facilities) to reduce their Greenhouse Gas (GHG) emissions. Having commenced in July 2015,[90] the mechanism sets baselines on the greenhouse gas emissions of these facilities. Reforms to the Safeguard Mechanism took effect from 1 July 2023.[91] Under these reforms, new baseline emissions numbers ('baselines') for designated large facilities are set on a declining trajectory aligned with achieving Australia's emissions reduction targets in its Nationally Determined Contribution (NDC) under the Paris Agreement. Across the Safeguard sector baselines will gradually decline to be consistent with the trajectory required for Australia to reach its emissions reductions target of 43% below 2005 levels by 2030, and net zero by 2050.

The Safeguard Mechanism is expected to gradually reduce the emissions intensity limits of these facilities, requiring that the net covered emissions of GHG from the operation of a designated large facility do not exceed the baseline applicable to the facility. Facilities that produce below the baseline are issued Safeguard Mechanism Credits (SMCs) that are purchasable.[92] The Hunter Valley Operations Complex is a designated large facility, meaning the Safeguard Mechanism will apply to HVO, and HVO will be subject to the emissions reduction requirements contained within it in the future. The modelling underpinning the Report has been updated to account for the Safeguard Mechanism and the estimated impacts of the Safeguard Mechanism on the overall Project cost and thus net benefits. Given the potential for increased operational costs, the Safeguard Mechanism may potentially reduce the direct benefits related to corporate taxes, as the profitability of the Project may be impacted. The modelling also includes the incremental estimated impact of HVO's offer to voluntarily implement higher net emissions decline rates than required by the Safeguard Mechanism in order to reflect consideration of the NSW State's Climate Change (Net Zero Future) Act 2023 (NZF Act). As such, HVO has offered to voluntarily surrender additional ACCUs than required by Safeguard, in order to reflect consideration of the NSW State's Climate Change (Net Zero Future) Act 2023 (NZF Act).

The HVOC will be required to reduce its net emissions intensity as a designated large facility, in accordance with the SGM and will make voluntary additional contributions towards the NSW emissions reduction targets including by using offsets to reduce the Project's net GHG emissions. The Project will have Scope 1 emissions as forecast (Submissions Report EMM 2023), which are based on continuation of existing practices to minimise diesel consumption and unabated open-cut fugitive emissions and hence are considered conservative/higher estimate as they do not reflect emerging technologies which may be able to be utilised in the future.

- The forecast Scope 1 emission intensity results in the facility exceeding its declining baseline in each year, therefore the full cost of the required reduction in emissions will be incurred by HVOC (roughly 11.7 Mt C02-e over the Project lifetime for the SGM along with a further ~2.6Mt CO2-e of emissions reduction through the voluntary surrender of additional ACCUs to reflect consideration of the NZF Act).

[90] Federal Register of Legislation - National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (2015).

[91] Safeguard Mechanism | Clean Energy Regulator (cer.gov.au) (2024).

[92] Safeguard Mechanism | Clean Energy Regulator (cer.gov.au) (2024).

- The price of the required carbon offsets will be costed, in real terms, at $75 per tonne, and will escalate a further 2% per annum in real terms[93] noting that this measure is inherently conservative and was adopted to examine the Project's cost and benefits through conservative (high cost) assumptions.

It is reasonable to expect that the actual emissions by HVO may be lower if it is able to adopt reasonable and feasible emissions reduction technologies over the Project life to 2050, and/or the cost of purchasing offsets will be lower than the cap of $75 per tonne over the operating life of the facility.

For example, the development of the Project incorporates commitments by HVO to review, monitor and assess opportunities to mitigate and reduce the GHG emissions produced by HVO. These measures are proposed to be undertaken every 3 years and include:

- Undertaking regular reviews of technologies and abatement measures to reduce GHG emissions from the Project, including whether these measures are reasonable and feasible to implement at HVO.

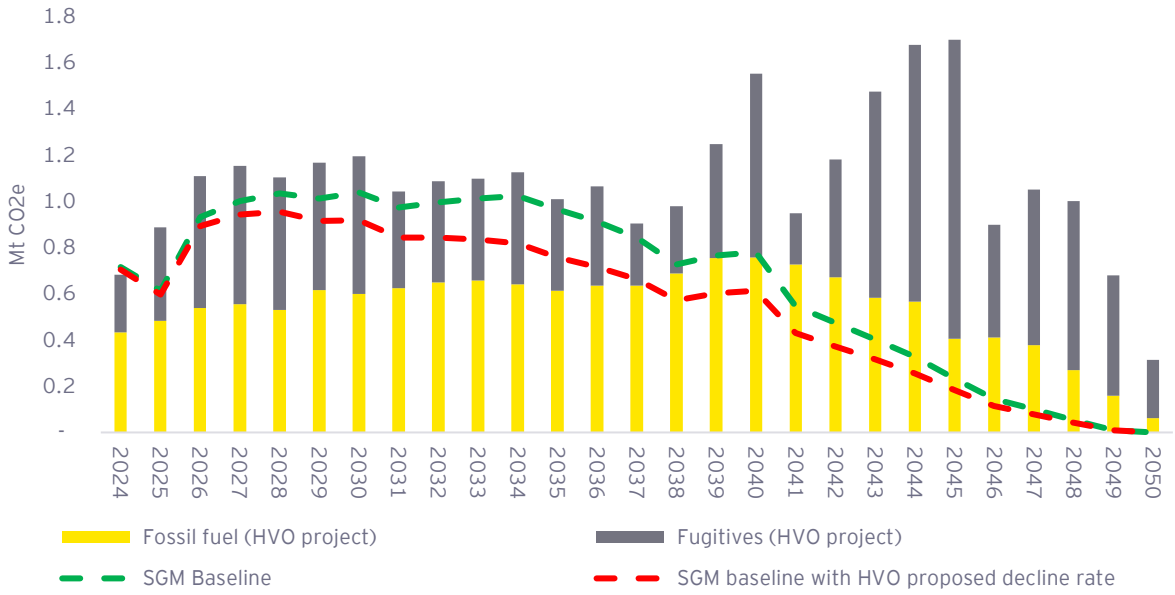
- These reviews include consideration of the use of alternate fuels including biofuels and hydrogen, and the transition to an electric powered fleet, as these technologies advance and more information becomes available.

- Further, as described in the HVO Continuation Project Submissions Report (EMM 2023), HVO will conduct a trial of gas pre-drainage in an area identified where pre-drainage has higher potential for effectiveness.

HVO has provided an updated emissions profile, and the extent of which the expected emissions will be costed over the Project lifetime, as highlighted in the Figure 11 below.

[93] The government has also flagged the establishment of a cost containment measure. The cost containment measure will provide for Australian Carbon Credit Units (ACCUs) delivered under ACCU contracts to the CER after 13 January 2023 to be sold to safeguard mechanism entities at a fixed price, initially at $75 per tonne of CO2-e in 2023–24, increasing with the CPI plus 2% each year. (https://cer.gov.au/markets/reports-and-data/quarterly-carbon-market-reports/quarterly-carbon-market-report-march-quarter-2023/australian-carbon-credit-units-accus).

Figure 11: HVO Project Scope 1 Emissions Profile vs Indicative Baselines



Source: HVO

The following table outlines the total spending that may be incurred by the Project, with respect to the implementation of the SGM baseline, in addition to the additional surrender of voluntary ACCUs, to reflect consideration of the NSW Climate Change (Net Zero Future) Act 2023. These emissions are apportioned between HVO North and HVO South by their respective ROM production per year. Note that this method of apportionment based on ROM tonnes is an approximation and does not reflect a first principles apportionment of emissions specific to each of HVON and HVOS.

Table 24: Key Figures from the implementation of the Safeguard Mechanism on the Project

	Unit	HVOC	HVON	HVOS
Safeguard Baseline Exceedances	Mt C02-e	11.68	9.43	2.25
Additional Voluntary Surrender	Mt C02-e	2.65	1.86	0.79
Total Costed Emissions	Mt C02-e	14.33	11.29	3.04
Net Scope 1 Emissions After SGM and voluntary surrender	Mt C02-e	14.98	10.06	4.92
Gross Scope 1 Emissions	Mt C02-e	29.31	21.35	7.97
Total Scope 2 Emissions	Mt C02-e	0.28	0.17	0.11
Total Emissions	**Mt C02-e**	**29.59**	**21.51**	**8.08**
Total Safeguard Mechanism Costs	$ millions, Real	1,297.11	1,067.17	229.93
Additional Voluntary ACCU Surrenders	$ millions, Real	257.38	181.17	76.21
Total	**$ millions, Real**	**1,554.5**	**1,248.3**	**306.1**
Total Safeguard Mechanism Costs	$ millions, NPV	386.12	294.05	92.07
Additional Voluntary ACCU Surrenders	$ millions, NPV	118.51	82.42	36.09
Total	**$ millions, NPV**	**504.6**	**376.5**	**128.2**

Source: HVO, EY Analysis

The modelling underpinning this report has been updated to account for the Safeguard Mechanism reforms and the additional proposed voluntary contribution by HVO to reflect consideration of the

NSW NZF Act and estimates the impacts of these policies on the projects overall costs and benefits. As a result of the implementation of the Safeguard Mechanism, a portion of the Projects broader greenhouse gas emission costs have been internalised by HVO, at $471 million in NPV terms for the HVO Complex.

2.7.1.7 Biodiversity Offsets

The *Biodiversity Development Assessment*[94] report concludes that, through native vegetation clearing, the Project would have an adverse impact on biodiversity (both flora and fauna) within the Study Area. The impacts of flora and fauna would require offsets to be either purchased or generated to manage the impacts of the Project. The biodiversity credit requirements are summarised in Table 25, which shows a breakdown of the number of credits required to offset the impacts of the Project. HVO have provided the estimated offset cost for each biodiversity credit.

Table 25: Biodiversity credit requirements

HVO North	Stage One HVON (Credits)	Stage Two (Credits)
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions EEC	39	0
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion VEC	192	0
Warkworth Sands Woodland in the Sydney Basin Bioregion EEC	0	0
Central Hunter Grey Box–Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC	2,531	40
PCT42 - River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	1	0
PCT485 - River Oak riparian grassy tall woodland of the western Hunter Valley (Brigalow Belt South Bioregion and Sydney Basin Bioregion)	15	0
PCT 1691 - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	1266	2
PCT 1692 - Bull Oak grassy woodland of the central Hunter Valley	662	0
PCT 1731 - Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley	40	12
Eucalyptus camaldulensis – endangered population in the Hunter catchment	5	0
Hunter Valley delma	1,401	3
Southern myotis	1,036	20
Brush-tailed phascogale	3,420	51

[94] Biodiversity Development Assessment Report (nsw.gov.au) (2022)

HVO South	Stage One HVOS (Credits)	Stage Three (Credits
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions EEC	1	0
Warkworth Sands Woodland in the Sydney Basin Bioregion EEC	0	5
Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC	73	49
PCT42 - River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	13	0
PCT 1691 - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	6	0
Eucalyptus camaldulensis	4	0
Hunter Valley delma	61	45
Southern myotis	74	43
Brush-tailed phascogale	75	48

Source: Biodiversity Assessment Report (Umwelt (2023))

To generate these biodiversity credits, HVO would implement a biodiversity offset strategy. As outlined previously in this assessment, these costs are estimated as a lump sum to be payable in different stages of the Project. The mitigation costs required have been provided by HVO and are classified as indirect costs which are included in the operational expenditure of the Project but are excluded from incremental costs to avoid double counting. In isolation, the annual management of offset costs are equally divided between HVO North and HVO South, however the cost of the biodiversity credits themselves are allocated based on the table above.

As is consistent with the Technical Notes, the management and biodiversity credits have been valued as part of the operational costs of the Project. However, as the Biodiversity Development Assessment Report states with regards to the economic appraisal of indirect costs, it is expected that the cumulative impacts of HVO North and South are captured with the combined credit assessments. As a result, further estimates of the externality of uncompensated costs are assumed to be immaterial to the cost benefit analysis of the Project.

2.7.1.8 Water Mitigation

The *Groundwater impact assessment (GIA)* report[95] concludes the recommendation of further groundwater monitoring. Costs incurred will include those associated with additional monitoring recommended by the groundwater report associated with the installation of additional bores in multiple positions. A key groundwater mitigation measure also includes the installation of a low permeability barrier wall which is included in the Project design. The barrier wall will be installed prior to mining within 100 m of the remnant western arm of the paleochannel in connection to the Hunter River, as per the existing HVO North development consent requirement.

The *Surface Water impact* assessment report[96] concludes there are no further mitigation measures required.

In relation to water licences, HVO holds sufficient entitlement for the Project predicted surface water take, and holds more than sufficient entitlement to account for the predicted groundwater take over the Project life and beyond in most water sources. Some small long-term indirect take due to watertable equilibration is predicted in the *Hunter Regulated River Alluvial Water Source – Glennies Creek management zone* and the Jerrys Water Source, and HVO will purchase the required entitlement via the open market to account for this prior to the take occurring.

[95] HVO Continuation Project_Water Assessment (nsw.gov.au) (2022).

[96] HVO Continuation Project_Water Assessment (nsw.gov.au) (2022).

The mitigation costs required have been provided by HVO and classified as indirect costs which are included in the operational expenditure of the Project but are excluded from incremental costs to avoid double counting. In isolation, all mitigation costs for groundwater are apportioned to HVO North due to the installation of additional bores recommended by the groundwater assessment's GIAs prediction of short-term incremental drawdown in Hunter River alluvium.

The Technical Notes state that direct costs that are utilised in the management and mitigation of the Project should be considered as part of the operating and capital costs within the cost benefit analysis of the Project.

2.7.1.9 Traffic and Transport

The *Traffic and transport impact assessment* report[97] concludes that mitigation measures to the impacts that are likely to be caused during the construction of the Project. These impacts include traffic management during construction, intersection performance affected by increased demand by construction traffic, temporary lane closures, public transport services, access to properties during construction, emergency access, oversized vehicle movements and coordination with other works in the area. In response to these impacts, mitigation measures to implement are appropriate traffic management and signposting for access and detours, development of Traffic guidance Scheme (TGS) to manage traffic, minimise outbound construction truck movements during AM peak periods (6:00 am – 7:00 am), obtain Road Occupancy License (ROL) from relevant road authority, liaise with relevant school and bus service providers to ensure continuation, obtaining permits for Over Size and Over Mass (OSOM) vehicles access, and ensuring and maintaining emergency vehicles have access at all times.

A realised cost per $45 per hour and $64 per hour[98] was utilised to estimate the vehicle cost per hour, for light and heavy vehicles respectively, for any delays arising from the construction of the Project and the subsequent realignment of Lemington Road. Based on the estimated number of vehicles travelling along Lemington Road, and the estimated directional impact, a total hours per day of impacts to travel time were estimated.[99]

These were annualised to represent an annual cost or benefit for the construction and operation of the Project. It is estimated that during the operation of the Project, that there will be a net decrease in estimated travel time, for road users transiting westward from Golden Hwy to New England Hwy, representing a positive externality – however those travelling eastward from Golden Hwy, will experience an increase in travel time, as detailed below. Table 26 details the total estimated annual impacts under the construction and operation of the Project, in addition to highlighting the subsection of travellers (those traversing from Jerry's Plains to Singleton) that could potentially be impacted by the increased travel times resulting from the Lemington Road realignment. These mitigation costs are classified as incremental costs and in isolation, HVO North incurs all costs while HVO South has no cost, as if HVO South operates in isolation, the re-alignment of Lemington Road is not expected to occur.

Table 26: Quantified transport and traffic impacts of the Project, under the Construction and Operational phase

Traffic Impacts	Total Time Impact (Hrs/day)	Cost ($/hr)	Annualised Cost Per Year ($)
Construction Impact (2024)			
Light Vehicles	56.0	$45	$919,354
Heavy Vehicles	6.9	$64	$162,117
Total	62.9		$ 1,081,471

[97] Hunter Valley Operations Continuation Project Traffic Assessment (nsw.gov.au) (2022)

[98] Transport for NSW Economic Parameter Values (2023) adjusted to real 2024 terms.

[99] The entirety of the traffic and transport impacts have been attributed to HVO North, as the Lemington Road alignment is not expected to be re-aligned if HVO South operates in isolation.

Net Operational Impacts (2025-2050)			
Light Vehicles	-1.9	$45	-$31,791
Heavy Vehicles	0.0	$64	-$937
Total	-2.0		-$32,728
Operational Impacts (Jerrys Plains to Singleton Transit)			
Light Vehicles	2.6	$45	$ 43,100
Heavy Vehicles	0.2	$64	$ 5,229
Sub-Total	2.8		$ 48,329

Source: Hunter Valley Operations Amendment Report (2023), Transport for NSW Economic Parameter Values

As is consistent with the Technical Notes, the method described in this section estimates the additional incremental time taken for those traveling to various destinations during the construction and operation of the Project. These factors are also subject to further sensitivity analysis, and all key assumptions have been described. The quantitative results are shown in Table 17.

2.7.1.10 Agricultural Impacts

As per the Agricultural impact assessment report,[100] the total potential lost surplus to the agricultural industry is detailed in Table 27 below:[101]

Table 27: Estimated agricultural productivity of the study area.

Assessment Stage	Agricultural Area (ha)	Study Area Gross Margin ($)
Pre-Project	4123	804,008-1,906,009
Post-Project	4216	804,008-1,906,009

Source: Hunter Valley Operations Continuation Project – Agricultural Impact Statement

The Projects total agricultural area disturbance for the study case sees approximately two-thirds of impacted agricultural land being attributable to HVO North and the remaining one-third apportioned to HVO South, which is detailed in Table 28 below:[102]

Table 28: Estimated distribution of agricultural productivity in terms of area (ha) for HVO Complex, HVO North and HVO South.

Study Area	Approved Final Land Use Domain / Current land use	Land Used for Agriculture (ha)		
		HVO North	HVO South	HVO Complex
Re-disturbance areas	Agricultural - Grazing	2274	1,252	3526
	Other (including Native Ecosystem, Final Void, Water Storage)	0	0	0
Additional disturbance areas	Land subject to grazing activity	458	125	583
	Land subject to cropping activity	14	0	14

[100] Hunter Valley Operations Continuation Project Agricultural Impact Statement (2022).
[101] Hunter Valley Operations Continuation Project Agricultural Impact Statement (2022).
[102] Hunter Valley Operations Continuation Project Agricultural Impact Statement (2022).

	Other land use (including land vacancy)	0	0	0
Total		2746	1,377	4123

Source: Hunter Valley Operations Continuation Project – Agricultural Impact Statement

As a result, it is expected that over the lifetime of the operations of the Project, there may be impacts of gross margin at between $0.8 to $1.9 million per annum. However, post mining operations, it is expected that there would be an additional 93 hectares that will be utilised for agricultural business, resulting in incremental net benefits from 2051 onward (in the case of HVO North) and 2046 onwards (in the case of HVO South, in isolation). These costs were treated as an incremental indirect cost. The quantitative results are shown in Table 17.

The potential loss of surplus to the agricultural industry, as a result of the operation of the Project, was estimated to provide an estimate of the total surplus that the agricultural industry may not achieve in the absence of the Project. These outcomes in essence represent an opportunity cost for the Agricultural Industry, in the sense that 4123 Ha of agricultural land will be used for mining activities in favour of agricultural activities, resulting in a potential loss of surplus for the Agricultural Industry. As per the Guidelines, the Agricultural Impact Statement was used to estimate these impacts.

2.8 Potential Net benefits – sensitivity analysis

Consistent with the Guidelines, this section outlines a summary of the systematic sensitivity analysis undertaken for the proposed development. 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 potential 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/lower price assumptions, where coal prices are increased/decreased by 25 per cent based on the central case assumptions over the life of the Project.
- Cost-base sensitivity.
    - Higher/lower operational expenditure (increase/decrease by 10 per cent based on the central case).
    - Higher/lower capital expenditure (increase/decrease by 10 per cent based on 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.
- Higher environmental costs (increased by 10 per cent).
- Discount rate sensitivity, using a 4 per cent and a 10 per cent real discount rate (see **Appendix B**).

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

- ***'Pessimistic case' scenario***, the coal price is reduced by 25 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.

- ***'Optimistic case' scenario***, the coal price is increased by 25 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.

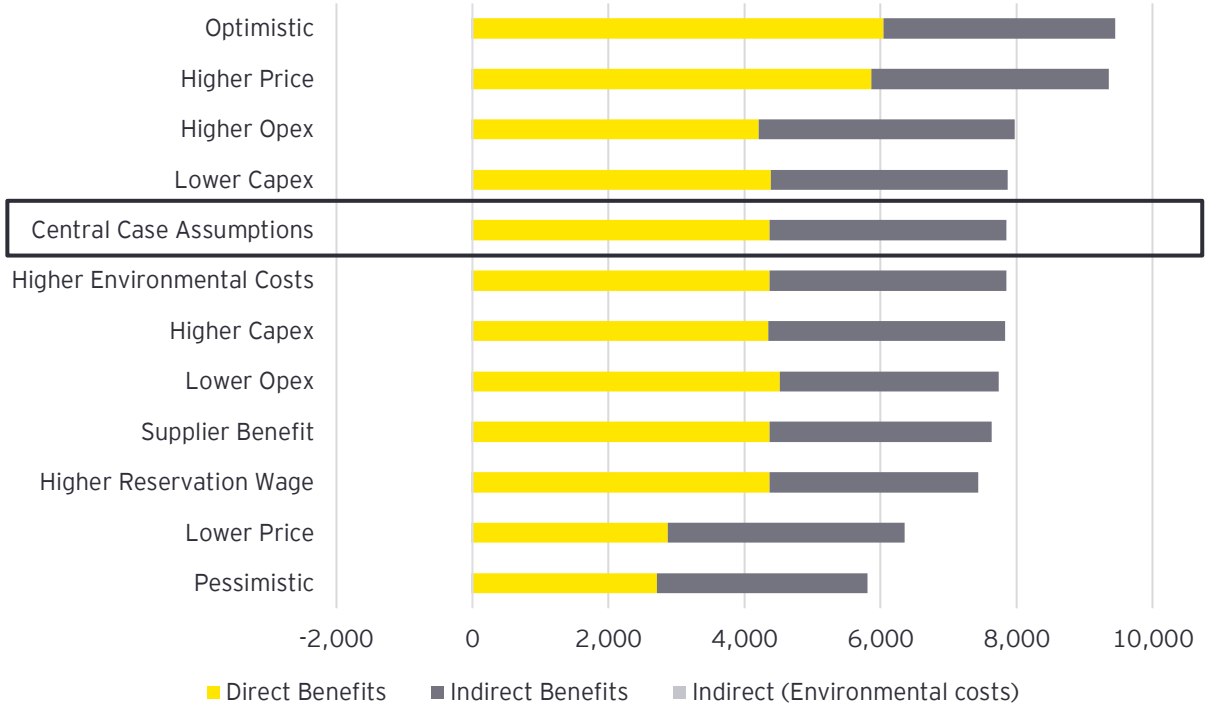
2.8.1 Results of sensitivity analysis

2.8.1.1 HVO Complex sensitivity analysis

The results of the systematic sensitivity analysis are summarised in Figure 1112. 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 proposed development is most sensitive to the coal price assumptions underpinning the analysis, but even assuming coal prices are 25 per cent lower than under the central case assumptions the net benefits are estimated to be $6,337.3 million in NPV terms, a reduction of 19.1 per cent from the central case assumptions. The lower bound, or pessimistic case, estimate of net benefits, which takes the combined assumptions around coal prices, capital expenditure, operational expenditure as well as worker, environmental impacts and supplier benefits, yields an estimated net benefit of $5,784.0 million in NPV terms. The upper bound, or optimistic case, estimate, based on the combined optimistic assumptions, is $9,433.3 million in NPV terms.

Figure 1112: Systematic sensitivity analysis of the CBA to key assumptions (NPV*, $ million)



Source: EY estimated based on information from various sources. NPV in real 2024Australian dollars based on a 7 per cent real discount rate. Indirect costs have been included in the figure.*

It can also be inferred from the sensitivity analysis how large the non-quantified negative externalities would need to be before the proposed development would no longer represent a net benefit to the NSW community. Using the most conservative estimate, the pessimistic case assumptions, these externalities would need to be $5,784 million in NPV terms before the proposed development would represent a net negative return to NSW.

Given the timeframe of the Project mining (2023 to 2050) the net benefits are sensitive to the discount rate used for the analysis. Under central case assumptions, the proposed development is expected to generate $7,836.2 million of net benefit using a 7 per cent discount rate. Using a 4 per cent discount rate increases the net benefit to $10,453.1 million; conversely a 10 per cent discount decreases the net benefit to $6,097.0 million. Sensitivities based on a discount rate of 4 per cent and 10 per cent are required by the Guidelines.

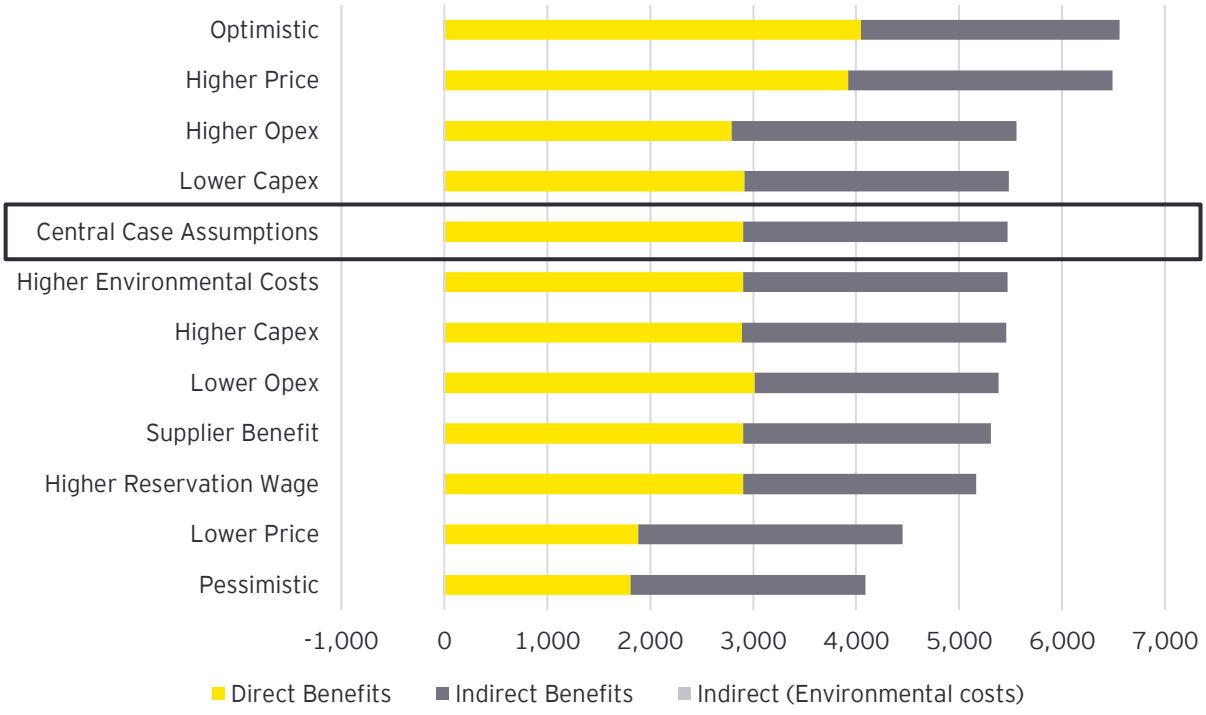
2.8.1.2 HVO North sensitivity analysis

The results of the systematic sensitivity analysis are summarised in Figure 1213 for HVO North.

In isolation, the estimated net benefit of HVO North is most sensitive to the coal price assumptions underpinning the analysis, but even assuming coal prices are 25 per cent lower than under the central case assumptions the net benefits are estimated to be $5,458.2 million in NPV terms, a reduction of 18.7 per cent from the central case assumptions.

The lower bound, or pessimistic case, estimate of net benefits, which takes the combined assumptions around coal prices, capital expenditure, operational expenditure as well as worker, environmental impacts and supplier benefits, yields an estimated net benefit of 4,077.3 million in NPV terms. The upper bound, or optimistic case, estimate, based on the combined optimistic assumptions, is $6,548.7 million in NPV terms.

Figure 1213: Systematic sensitivity analysis of the CBA for HVO North to key assumptions (NPV*, $ million)



Source: EY estimated based on information from various sources. NPV in real 20244 Australian dollars based on a 7 per cent real discount rate. Indirect costs have been included in the figure.*

It can also be inferred from the sensitivity analysis how large the non-quantified negative externalities would need to be before the proposed development would no longer represent a net benefit to the NSW community. Using the most conservative estimate, the pessimistic case assumptions, these externalities would need to be $4,077.3 million in NPV terms before the proposed development would represent a net negative return to NSW.

Given the timeframe of the Project mining (2024 to 2050) the net benefits are sensitive to the discount rate used for the analysis. Under central case assumptions, the proposed development is

expected to generate $5,458.2 million of net benefit using a 7 per cent discount rate. Using a 4 per cent discount rate increases the net benefit to $7,429.9 million; conversely a 10 per cent discount decreases the net benefit to $4,171.4 million. Sensitivities based on a discount rate of 4 per cent and 10 per cent are required by the Guidelines.

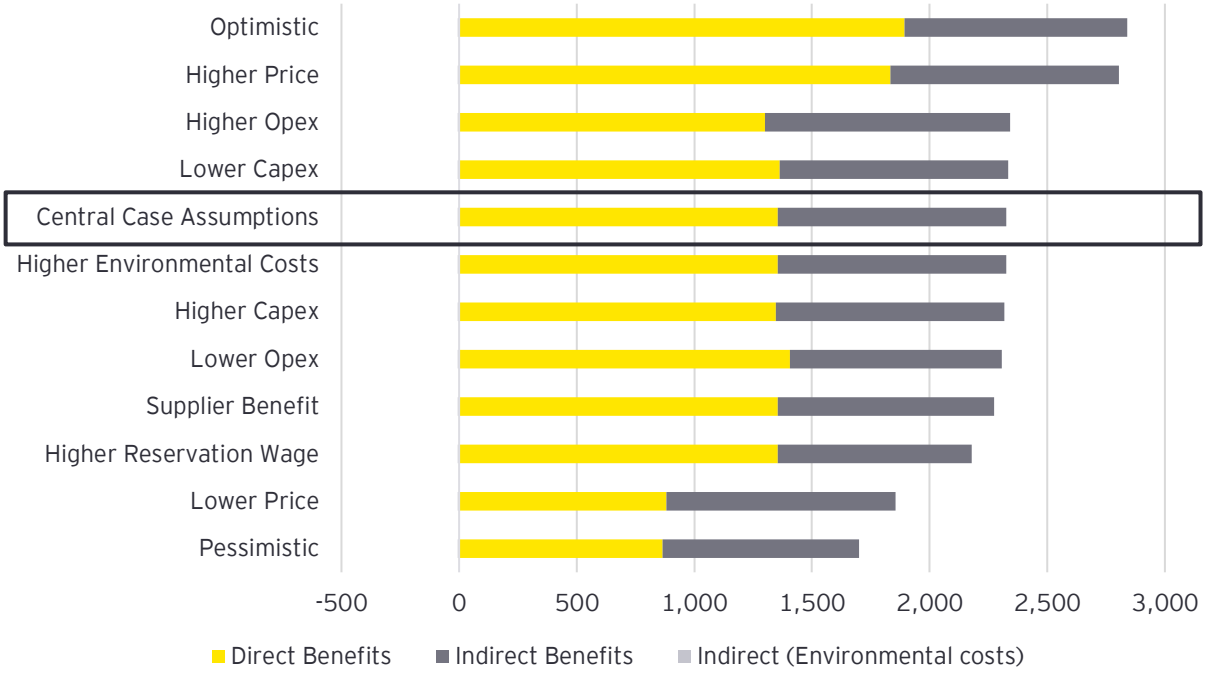
2.8.1.3 HVO South sensitivity analysis

The results of the systematic sensitivity analysis are summarised in Figure 1314 for HVO South.

In isolation, the estimated net benefit of the proposed development is most sensitive to the coal price assumptions underpinning the analysis, but even assuming coal prices are 25 per cent lower than under the central case assumptions the net benefits are estimated to be $1,847.4 million in NPV terms, a reduction of 20.3 per cent from the central case assumptions.

The lower bound, or pessimistic case, estimate of net benefits, which takes the combined assumptions around coal prices, capital expenditure, operational expenditure as well as worker, environmental impacts and supplier benefits, yields an estimated net benefit of $1,695.6 million in NPV terms. The upper bound, or optimistic case, estimate, based on the combined optimistic assumptions, is $2,833.2 million in NPV terms.

Figure 1314: Systematic sensitivity analysis of the CBA to key assumptions for HVO South (NPV*, $ million)



Source: EY estimated based on information from various sources. NPV in real 2024 2024 Australian dollars based on a 7 per cent real discount rate. Indirect costs have been included in the figure.*

It can also be inferred from the sensitivity analysis how large the non-quantified negative externalities would need to be before the proposed development would no longer represent a net benefit to the NSW community. Using the most conservative estimate, the pessimistic case assumptions, these externalities would need to be $1,695.6 million in NPV terms before the proposed development would represent a net negative return to NSW.

Given the timeframe of the Project mining (2024 to 2050) the net benefits are sensitive to the discount rate used for the analysis. Under central case assumptions, the proposed development is expected to generate $2,318.1 million of net benefit using a 7 per cent discount rate. Using a 4 per cent discount rate increases the net benefit to $2,891.1 million; conversely a 10 per cent discount decreases the net benefit to $1,905.7 million. Sensitivities based on a discount rate of 4 per cent and 10 per cent are required by the Guidelines.

In addition, the sensitivity analysis has been extended to test the impact of a full range of worker and supplier benefits, (see **Appendix C** for full results). In the case where we reduce worker benefits to 25% of the full estimate, the proposed Project for the HVO Complex still yields a net benefit of $6,836.3 million in NPV terms, while reducing supplier benefits by 25% has the impact of reducing the benefit of the Project to $7,229.1 million in NPV terms.

Appendix B provides a detailed account of the direct and indirect benefits and the indirect costs for each of the sensitivities conducted. The analysis shows that the net benefits of the Project remain ***robust*** under various assumptions. In addition, if conservatively the indirect benefits were all set to zero, that is suppliers were assumed to gain no benefit and workers reservation wages are equal to those earned in the HVO Complex, the net benefits to NSW would remain positive.

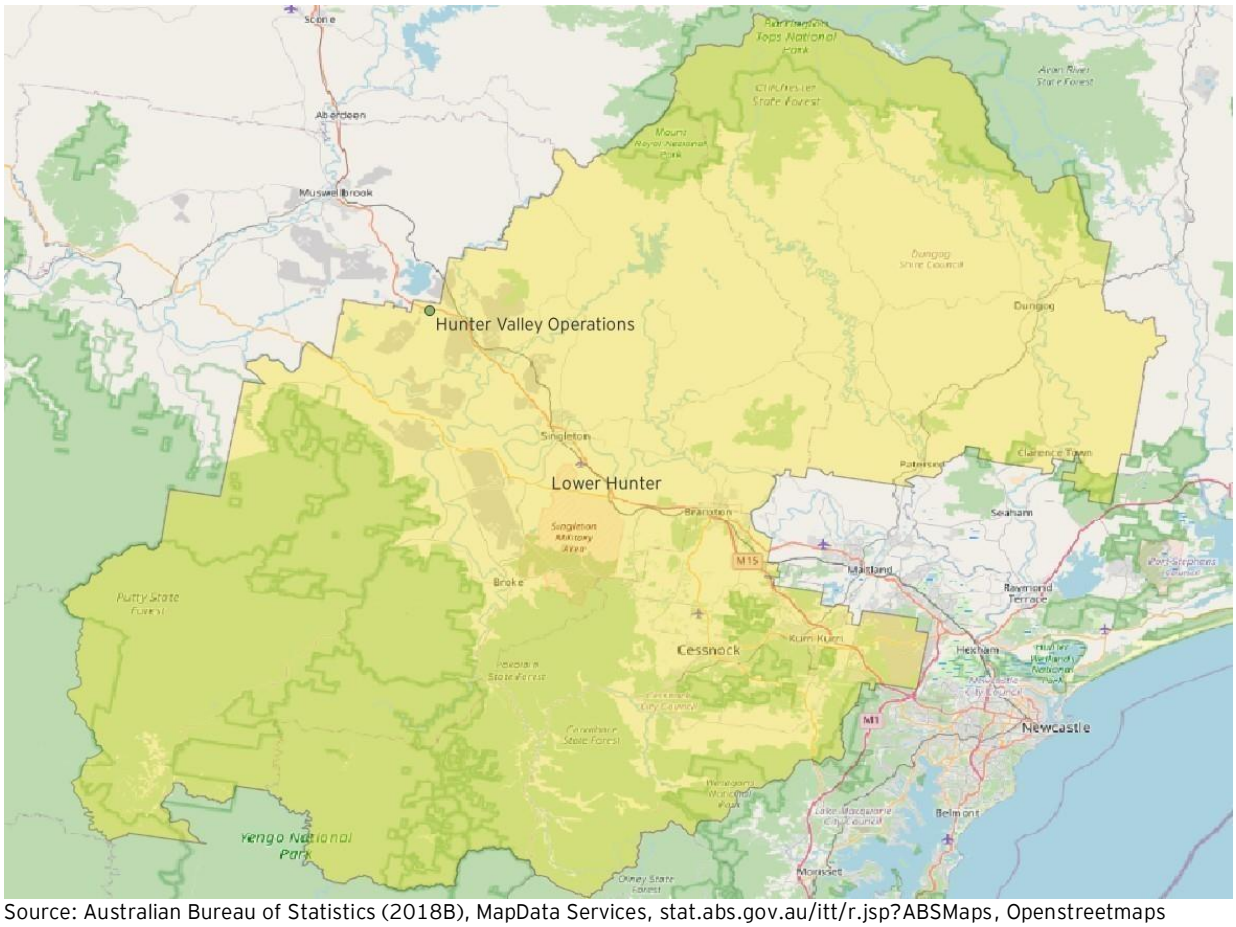
3. Local Effects Analysis

Consistent with the Guidelines, the 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 SA3 as defined by the Australia Bureau of Statistics. In the case of this Project the Lower Hunter SA3 area is used for the LEA.

3.1 The Lower Hunter region

As shown in Figure 1415, the Lower Hunter region is located to the north-west of Newcastle. In 2020 the Lower Hunter SA3 had a population of approximately 96,772 (ABS, 2021). The region is home to many coal mines.

Figure 1415: Lower Hunter SA3 and Hunter Valley Operations Location



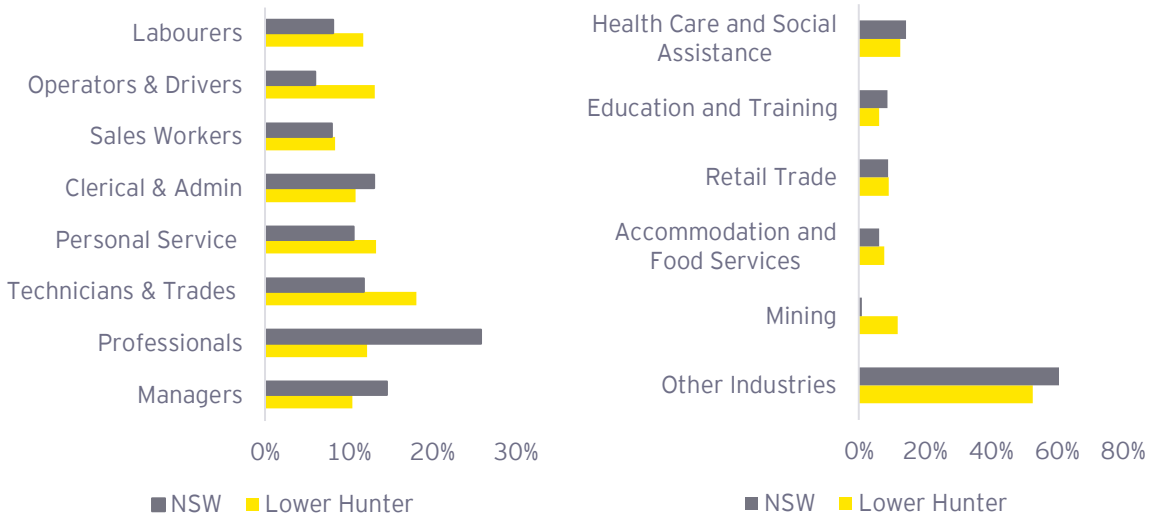
Source: Australian Bureau of Statistics (2018B), MapData Services, stat.abs.gov.au/itt/r.jsp?ABSMaps, Openstreetmaps

The majority of the Project is located in northwest Lower Hunter, on the border between the Lower Hunter and Upper Hunter SA3. HVO South is situated completely in Lower Hunter, whereas a small portion of HVO North is situated in Upper Hunter. As a result, it is conservatively assumed that the majority of local effects of the Project are attributed to the Lower Hunter SA3 region. However, given the Project's central location between Muswellbrook and Singleton, it is not unreasonable to assume that many of the benefits that accrue to the Lower Hunter region, could also accrue to the neighbouring Upper Hunter region nearby. In consideration of the workforce, majority are employed from Singleton compared to Muswellbrook although the Project's central location.

3.1.1 Regional characteristics

Figure 1516 and Figure 1617 describe the employment and education characteristics of persons who reside within the Lower Hunter SA3 region.

Figure 1516: Employment shares by occupation (left) and by industry (right, top 5 and mining), per cent of total employed



Source: 2021 Census General Community Profile, Lower Hunter SA3, New South Wales and Australia, Australian Bureau of Statistics cat. no. 2001.0

The region is a major producer of coal, with approximately 11.7 per cent of workers in the region employed in the mining sector. This is relative to the mining share of employment in NSW, which has a representation of around 1 per cent in the mining sector.

Technicians and trade workers account for 18 per cent of the workforce in the region, compared to 11.9 per cent for NSW. Similarly, machinery operators and drivers account for 13 per cent, more than double the state-wide average of 6 per cent.

Figure 1617: Education attainment in each region, per cent

Source: 2021 Census General Community Profile, Lower Hunter SA3, New South Wales and Australia, Australian Bureau of Statistics cat. no. 2001.0

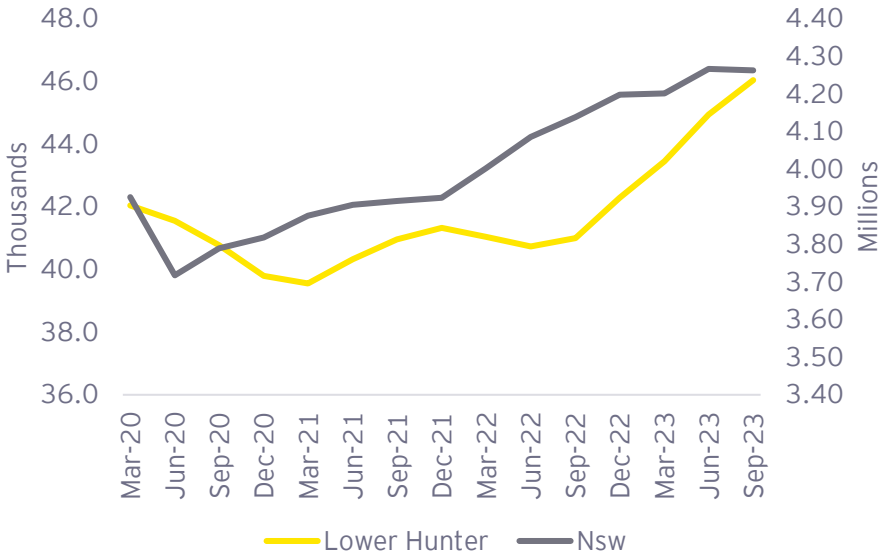
The region's workforce also has a relatively high proportion of workers with Certificate attainment. Workers with Certificate's account for 44 per cent of the region's workers, compared to 29 per cent for NSW.

Both the educational attainment and occupational structure is a result of the high dependence on the mining industry within the region.

3.1.2 Employment outcomes

Figure 1718 shows total employment in the Lower Hunter SA3 region and the NSW economy, from December 2020 to September 2023. Employment in the region has been growing since 2021, remaining relatively strong despite the labour market impacts of COVID-19. Employment in the region currently stands at just below 46,000 workers.

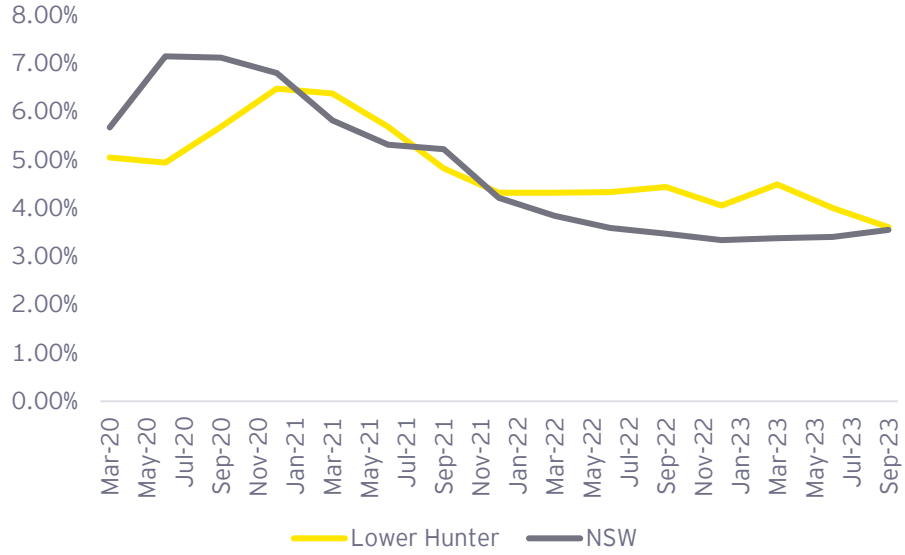
Figure 1718: Employment, Lower Hunter SA3 and New South Wales



Source: Department of Jobs and Small Business, *SA2 Data tables – Small Area Labour Markets – December quarter 2024*

As shown in Figure 1819, unemployment in the region has been consistently higher than NSW. Between 2020 and 2024, the region experienced an unemployment rate at between 4 per cent and 6 per cent. However, recently, unemployment in the region remains very similar to the unemployment rate seen in the broader NSW region.

Figure 1819: Unemployment rate, Lower Hunter SA3 and New South Wales



Source: Department of Jobs and Small Business, SA2 Data tables – Small Area Labour Markets – December quarter 2024

3.2 Local Effects Analysis results

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, such as Newcastle, which are located nearby,

Given the nature of coal and mining operations located in the Lower Hunter region, many of the inputs may be supplied from the NSW region. In addition, analysis from HVO indicates over the life of the proposed development, only a proportion of the inputs will be supplied from Lower Hunter region and some employees are sourced from the wider region. As a result, this Project would generate economic benefits to these regions; for example, those supplies that are sourced from the wider Upper Hunter region, Newcastle and some of the surrounding regional communities situated near the Project.

Underpinning the LEA are the assumptions that:

- Local rates, of $36.6 million in NPV terms are paid to the City of Singleton Local Government Area under the Project case.
- No net producer surplus accrues to the region (conservative assumptions).
- No company income tax accrues to the Lower Hunter SA3 region (conservative assumptions).
- Based on information provided by HVO, 75 per cent of the workforce requirement of the proposed development come from the SA3 region.

As a result of these assumptions, it is expected the proposed development for the HVO Complex will generate indirect benefits to local suppliers and employees of $985.2 million and $1,174.0 million respectively in NPV terms over the no Project case (i.e., baseline case) as outlined in Table 29. The incremental indirect costs associated with the Project are allocated to the SA3 region. The proposed development is estimated to confer a net benefit on the Lower Hunter SA3 region of $2,181.8 million in NPV terms.

Table 29: Estimated Local Effects Analysis of the proposed development ($ million^)

Benefits	HVO Complex	HVO North	HVO South
Direct benefits			
Net producer surplus attributed to Low Hunter	-	-	-
Royalties, payroll tax and Council rates	36.6	18.3	17.1
Company income tax apportioned to NSW	-	-	-
Total direct benefits	36.6	18.3	17.1
Indirect benefits			
Net economic benefit to landholders	-	-	-
Net economic benefit to NSW workers	1,174.0	869.1	420.5
Net economic benefit to NSW suppliers	985.2	722.5	232.0
Total indirect benefits	2,159.2	1,591.6	652.5
Total Project economic benefit	2,195.7	1,609.9	669.6
Indirect Costs	14.0	9.4	4.0
NPV of Project - ($m)	2,181.8	1,600.5	665.6

*Source: EY estimated based on information from various sources.^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate.*[103] *^^ Incorporated in operational costs.*

3.3 Sensitivity analysis

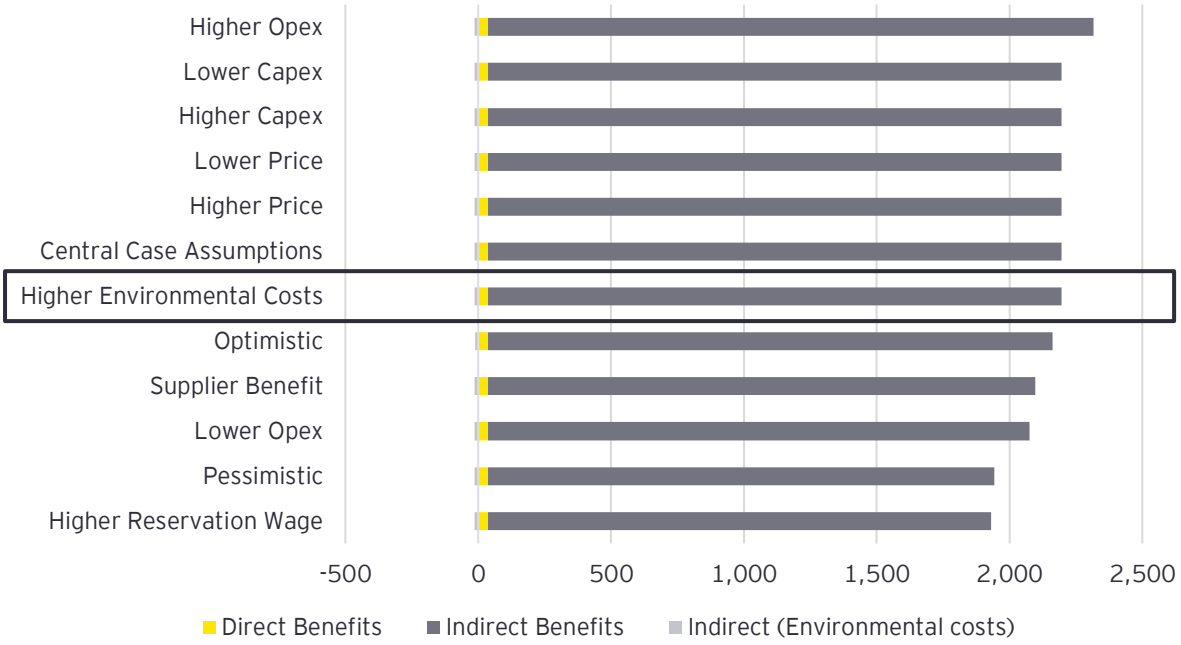
As outlined above the LEA relies on a number of modelling assumptions. Consistent with the Guidelines, this assessment provides a summary of the systematic sensitivity analysis undertaken for the proposed development. The sensitivity analysis tests the same assumptions outlined in the CBA.

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 1920. 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 details of the sensitivity analysis are presented in **Appendix B**. The lower bound, or pessimistic 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 net benefit of $1,926.7 million in NPV terms. The upper bound, or optimistic case, estimate, based on the most optimistic assumptions, is $2,149.0 million in NPV terms.

Figure 1920: Systematic sensitivity analysis of the LEA to key assumptions (NPV*, $ million^)

[103] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.



*Source: EY estimated based on information from various sources.^ Real 2024 Australian dollars. * NPV in 2024 Australian dollars based on a 7 per cent real discount rate. Indirect costs have been included in the figure.*

4. CGE Modelling Framework

The economy-wide[104] impacts of the proposed development have been undertaken using a CGE Model of the regional and NSW economy.

The aim of an EIA study based on applied CGE Modelling is to estimate the 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 can be used to assess the impacts, and second round flow on effects 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.[105] 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 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, IMC).

4.1 About the EY CGE model

Economy-wide impacts of the Project are assessed based on the EY 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.

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).

[104] This version of the CGE model does not account for the physical impacts of climate change in the results, including any incremental impacts associated with this Project.

[105] See for example the Policy & Guidelines Paper produced by the NSW Treasury (2009).

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.

Box 1: An overview of EYGEM

The EY General Equilibrium Model (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.

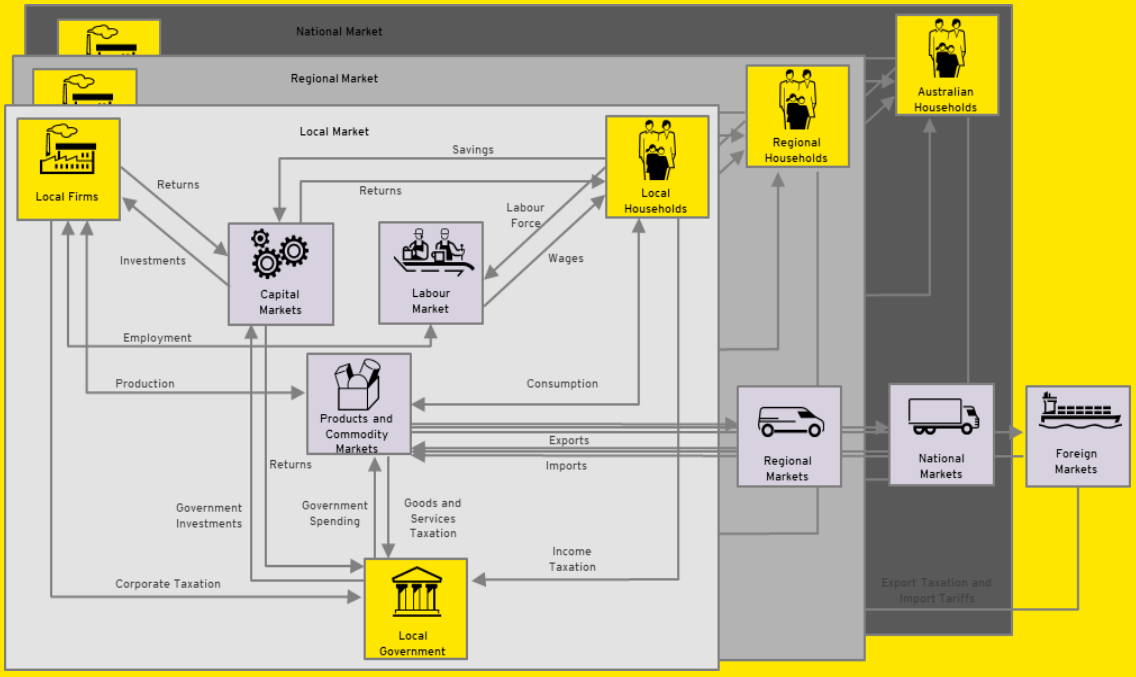
Capital in each region of the model accumulates by investment less depreciation in each period. Capital is mobile internationally in EYGEM where global investment equals global savings. Global savings are made available to invest across regions. Rates of return can differ to reflect region specific differences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

The below diagram is a visual representation of the EYGEM model.



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 year-on-year over a specified timeframe. 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

All scenarios outlined in the modelling below use the central case assumptions for the HVO Complex, HVO North and HVO South:

HVO Complex:

- Capital expenditure of $2,701.8 million in NPV terms.
- Coal revenue of 31,033.5 million in NPV terms.

HVO North:

- Capital expenditure of $1,673.2 million in NPV terms.
- Coal revenue of $21,126.5 million in NPV terms.

HVO South:

- Capital expenditure of $1,371.4 million in NPV terms.
- Coal revenue of $9,907 million in NPV terms.

EY have also factored into our scenarios the benefits that flow from the proposed development 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 corporation tax to the Australian Government. EY have conservatively assumed these royalty payments accrue to the rest of NSW.

In addition, EY have factored into our scenarios the level of migration of workers from the rest of NSW into the Lower Hunter SA3. As outlined above, 75 per cent[106] of the workers at the HVO Complex reside in Lower Hunter, where the remainder are sourced from the rest of NSW. This represents a migration into the region, increasing the labour supply in Lower Hunter and reducing the labour supply in the Rest of NSW.

4.3 Economy-wide modelling of the proposed development

Total employment in the region is projected to increase by 1,023 FTE workers on average. As outlined above the Project would employ 1,118 FTE workers on average across NSW of which 876 are regional employment, as a result 147 additional workers will be employed in other sectors of the economy in the Lower Hunter region, taking into account employment in supplier industries and any crowding out effects. Across NSW, employment is projected to increase by 903 FTE comprising of direct FTE 876 and 27 flow-on FTE.

[106] Estimates derived from surveys conducted on current employees to determine the proportion of their geographical representation in terms of SA2

Table 30 provides an account of the economy-wide impacts of each operation HVO Complex, HVO North and HVO South. The accounts summarise the welfare in the region, as measured by real GRI, gross regional product, employment projections and per cent change in wages.

Table 30: Economy-wide impacts of the HVO Complex, HVO North and HVO South to the Lower Hunter region

Variable	Description	HVOC Complex	HVO North	HVO South
Real GRP	$million^ [% change]	17326.1 [8.71]	11908.3 [6.32]	8091.7 [3.73]
Real GRI	$million^ [% change]	21005.2 [8.92]	15117.2 [7.86]	11874.5 [4.03]
Employment	FTE [% change]	1023 [2.15]	777 [1.63]	372 [0.73]
Real wages	% change	10.0	7.3	3.1

Source: EY estimates based on information provided by HVO. ^ Real 2024 Australian dollars, undiscounted.

Table 31 outlines the economy-wide impacts to NSW for each operation of the Project.

Table 31: Project economy-wide impacts of HVO Complex, HVO North and HVO South to NSW

Variable	Description	HVOC Complex	HVO North	HVO South
Real GRP	$million^ [% change]	23976.8 [0.57]	16419.9 [0.56]	8091.7 [0.58]
Real GRI	$million^ [% change]	37191.9 [0.21]	26107.7 [0.16]	11669.8 [0.08]
Employment	FTE [% change]	902.6 [0.02]	690.2 [0.01]	372.4 [0.01]
Real wages	% change	0.1	0.1	0.0

Source: EY estimates based on information provided by HVO. ^ Real 2024 Australian dollars, undiscounted.

The Hunter is Australia's largest regional economy, with strong foundations in mining, agriculture, defence and broad-based services. There are a significant number of mines that are due to close over the next 20 years – these closures will likely involve major economic challenges for the region, with a potential 17 mines closing over the next 20 years, and which would free up an estimated 130,000 hectares of land for repurposing. In EYs report, completed for the Lock the Gate Alliance, *Diversification and Growth – Transforming mining land in the Hunter Valley*,[107] a high-level assessment indicated the potential for concerted industry development of between an additional $95 million to $3.7 billion in additional regional economic activity on top of the current trajectory of the Hunter. These scenarios are based on the extent of which current mine owners rehabilitate their own land, and to the extent that existing mining infrastructure and utility connections are repurposed for new renewable energy precincts.

This assessment does not suggest or recommend that coal mines are closed or examine the value which could be derived from existing or expanded mining functions compared with alternative uses for the land. Rather, the report scope was limited to examining the potential economic gains of repurposing land only after coal mines are closed. As shown in various EY analysis of Hunter Valley mining operations, the mining sector plays an integral role in the NSW economy and the Hunter Valley region, creating jobs, providing export earnings, and strongly contributing to regional output and growth. As demonstrated in this Economic Impact Analysis for the Project, the benefits of current and future mining operations are substantial. In fact, the net benefits of the Project in its own right are assessed to be greater than the upper end of the range of economic activity that EY assessed for the post-mining alternatives examined in the *Transforming Mining Land in the Hunter Valley* report.

[107] The economic impacts of transforming mine land in the Hunter Valley (nationbuilder.com) (2022).

Appendix A Information Received

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

- The Environmental Impact Statement.
- Various social and environmental consultant reports.
- *Coal Price and FX Markets Forecasts – December 2023/January 2024*.
- Various data from the Australian Bureau of Statistics (ABS) including the most recent Census data.

In addition, EY was provided the financial model prepared by HVO, which includes Project capital expenditure, operational costs, output and employment for an optimised mine plan scenario for each year of the Project. All values in the financial model were in real 2024 Australian dollars.

The optimised mine plan scenario includes mining in HVO North and HVO South. EY was provided both the capital costs and the operational costs for each of these mining areas based on the optimised mine plan. The new mine development capital and the replacement and sustaining capital costs and operational costs for both HVO North and HVO South are included in the net benefit calculations for the Project. In addition, employment estimates for each of the areas was provided by HVO and the operational employment associated with both HVO North and HVO South are included in the net benefit estimations.

In addition to the operational costs, HVO has provided EY with several costings to meet required environmental mitigation and management costs of the Project. Some of these costs are subject to commercial negotiation and are not therefore available to publish on an individual basis. The economic analysis therefore combines all the environmental costs into one item called "mitigation and management" to ensure commercial confidentiality and are included in the cost of the Project. The costs included in mitigation and management are:

- Noise mitigation.
- Historical and aboriginal cultural heritage mitigation.
- Social mitigation.
- Implementing a biodiversity offset strategy.
- Visual Amenity mitigation measures.
- Air quality mitigation.
- Groundwater mitigation
- Other environmental management and mitigation costs such as blasting and social impacts.[108]

Consistent with the Guidelines, the Project's indirect costs cover a range of net environmental, social and transport-related costs as well as the net public infrastructure costs as well as the estimated loss of surplus to other industries (listed in Table 17).

Consideration of these costs are based on a range of assessments undertaken by specialised consultants for the Project. The list of social and environmental consultant reports includes:

[108] EY has not reviewed or provided view on appropriateness of these cost estimates or assessments and by including these costs into our analysis it should not be implied that we consider them to be appropriate. We have included these costs as provided to us.

- Air Quality and Greenhouse Gas Assessment undertaken by Jacobs Group (Australia) Pty Limited presented the report, *Air Quality and Greenhouse Gas Assessment*.

- Blasting Impact Assessment undertaken by Enviro Strata Consulting Pty Ltd (EMM) presented in the report *Blasting Impact Assessment*.

- Air Quality Assessment undertaken by EMM consulting presented in the report *Air Quality*.

- Aboriginal Cultural Heritage Assessment undertaken by EMM consulting presented in the report *Aboriginal Cultural Heritage*.

- Groundwater Assessment undertaken by Australasian Groundwater & Environmental Consultants presented in the report *HVO Continuation Project – Groundwater impact assessment*

- Surface Water Assessment undertaken by Engeny Water management presented in the report, *HVO Continuation Project Surface Water Impact Assessment*.

- Noise Assessment undertaken by EMM consulting presented in the report, *Hunter Valley Operations Continuation Project Noise Impact Assessment*.

- Visual Amenity Assessment by EMM consulting presented in the report, *HVO Continuation Project Visual Amenity Assessment*.

- Submissions Report by EMM consulting presented in the *HVO Continuation Project Submissions Report*

Appendix B Full Results and Sensitivity Analysis

Full-year inputs

Table 32 provides a detailed schedule of selected year-on-year coal production and coal prices (after quality adjustment) as key inputs into total coal sales revenue generated by the Project between 2024 and 2050. The Project focuses on thermal coal, accounting for 438 Mt (or 88 per cent) of total product coal.

Extraction rates increase substantially from 2030, peaking at 38.26 Mt of ROM coal in 2040, resulting in a similar revenue schedule. In total, the Project is estimated to general 497.3 Mt of ROM coal and revenue of $19.7 billion in NPV terms.

Table 32: Central case assumptions – revenue projection (selected years)

	ROM Output			Met. Coal Output			Thermal Coal Output			Coal Prices^		
Year	HVO Complex	HVO North	HVO South	HVO Complex	HVO North	HVO South	HVO Complex	HVO North	HVO South	Met. Coal Price	Thermal Coal Price	Rev. ($bn)
2025	6.63	0.91	5.71	2.66	0.45	2.21	2.72	0.48	2.25	184.93	166.20	0.94
2030	31.50	22.00	9.50	3.15	1.98	1.18	19.75	13.59	6.16	151.57	127.24	2.99
2035	31.01	22.00	9.01	2.19	1.29	0.90	20.39	14.28	6.11	151.57	127.24	2.93
2040	38.26	20.30	17.96	2.59	1.19	1.40	25.04	13.38	11.66	151.57	127.24	3.58
2045	24.32	21.36	2.96	0.17	0.17	-	17.71	15.34	2.37	151.57	127.24	2.28
2050	3.79	3.79	-	0.23	0.23	-	2.48	2.48	-	151.57	127.24	0.35
Total	684.15	497.66	186.49	59.03	36.87	22.16	438.24	318.37	119.87	684.15	684.15	65.0
NPV*												31.0

*Source: EY estimates ^ Real 2024 Australian dollars. * NPV to 2024 based on a 7 per cent real discount rate.*[109]

[109] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

Sensitivity Analysis – CBA and LEA

HVO Complex sensitivity analysis

Table 33: CBA – sensitivity analysis of the net benefits of the HVO Complex (NPV*, $ million)

HVOC Sensitivity	Central Case Assumptions	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Supplier Benefit	Higher Environmental Costs	Pessimistic case	Optimistic case	Central Case Assumptions (4%)	Central Case Assumptions (10%)
Direct Benefits	**$4,367.4**	**$5,867.5**	**$2,868.5**	**$4,213.7**	**$4,521.4**	**$4,349.1**	**$4,385.8**	**$4,367.4**	**$4,367.4**	**$4,367.3**	**$2,713.5**	**$6,040.0**	**$5,808.5**	**$3,408.9**
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	$3,462.0	$4,299.9	$2,624.1	$3,462.0	$3,462.0	$3,462.0	$3,462.0	$3,462.0	$3,462.0	$3,462.0	$2,624.1	$4,299.9	$4,619.1	$2,693.8
3. Company income tax apportioned	$905.4	$1,567.6	$244.4	$751.7	$1,059.3	$887.0	$923.8	$905.4	$905.4	$905.2	$89.4	$1,740.0	$1,189.3	$715.1
Indirect Benefits	**$3,488.1**	**$3,488.1**	**$3,488.1**	**$3,760.2**	**$3,215.9**	**$3,488.1**	**$3,488.1**	**$3,068.8**	**$3,265.7**	**$3,488.1**	**$3,091.4**	**$3,411.0**	**$4,670.8**	**$2,703.0**
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	$1,264.9	$1,264.9	$1,264.9	$1,264.9	$1,264.9	$1,264.9	$1,264.9	$845.5	$1,264.9	$1,264.9	$845.5	$1,264.9	$1,696.7	$981.1
3. Net economic benefit to Local suppliers	$2,223.2	$2,223.2	$2,223.2	$2,495.4	$1,951.1	$2,223.2	$2,223.2	$2,223.2	$2,000.9	$2,223.2	$2,245.8	$2,146.2	$2,974.0	$1,721.9
Indirect (Environmental costs)	$19.3	$19.3	$19.3	$19.3	$19.3	$19.3	$19.3	$19.3	$18.4	$20.8	$20.8	$17.7	$26.2	$14.9
Net Benefits	**$7,836.2**	**$9,336.3**	**$6,337.3**	**$7,954.6**	**$7,718.8**	**$7,817.8**	**$7,854.6**	**$7,416.9**	**$7,614.8**	**$7,834.9**	**$5,784.0**	**$9,433.3**	**$10,453.1**	**$6,097.0**

*Source: EY estimates based on information from various sources. Estimated as the benefits of the Project case less the Baseline case. *NPV in real 2024Australian dollars based on a 7 per cent real discount rate, except for "Central Case (4%)" which is based on a 4 per cent real discount rate and "Central Case (10%)" which is based on a 10 per cent real discount rate. See Section 2.8 for descriptions of each assumption tested.*

Table 34: LEA – sensitivity analysis of the net regional benefits of the HVO Complex (NPV*, $ million)

LEA Sensitivity	Central Case Assumptions	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Supplier Benefit	Higher Environmental Costs	Pessimistic case	Optimistic case	Central Case Assumptions (4%)	Central Case Assumptions (10%)
Direct Benefits	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$36.6**	**$50.6**	**$27.9**
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	$36.6	$36.6	$36.6	$36.6	$36.6	$36.6	$36.6	$36.6	$36.6	$36.6	$36.6	$36.6	$50.6	$27.9
3. Company income tax apportioned	$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
Indirect Benefits	**$2,159.2**	**$2,159.2**	**$2,159.2**	**$2,279.8**	**$2,038.6**	**$2,159.2**	**$2,159.2**	**$1,895.4**	**2,060.6**	**$2,159.2**	**$1,905.5**	**$2,125.0**	**$2,892.7**	**$1,673.7**
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	$1,174.0	$1,174.0	$1,174.0	$1,174.0	$1,174.0	$1,174.0	$1,174.0	$910.3	$1,174.0	$1,174.0	$910.3	$1,174.0	$1,574.8	$910.6
3. Net economic benefit to Local suppliers	$985.2	$985.2	$985.2	$1,105.8	$864.6	$985.2	$985.2	$985.2	$886.7	$985.2	$995.2	$951.0	$1,317.9	$763.0
Indirect (Environmental costs)	$14.0	$14.0	$14.0	$14.0	$14.0	$14.0	$14.0	$14.0	$14.0	$15.3	$15.3	$12.6	$19.3	$10.6
Net Benefits	**$2,181.8**	**$2,181.8**	**$2,181.8**	**$2,302.4**	**$2,061.2**	**$2,061.2**	**$2,181.8**	**$1,918.0**	**$2,083.2**	**$2,180.4**	**$1,926.7**	**$2,149.0**	**$2,924.0**	**$1,690.9**

*Source: EY estimated based on information from various sources. Estimated as the benefits of the Project case less the Baseline case. *NPV in real 2024 Australian dollars based on a 7 per cent real discount rate, except for "Central Case (4%)" which is based on a 4 per cent real discount rate and "Central Case (10%)" which is based on a 10 per cent real discount rate. See Section 2.8 for descriptions of each assumption tested.*

HVO North sensitivity analysis

Table 35: CBA – sensitivity analysis of the net benefits of HVO North (NPV*, $ million)

HVON Sensitivity	Central Case Assumptions	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Supplier Benefit	Higher Environmental Costs	Pessimistic case	Optimistic case	Central Case Assumptions (4%)	Central Case Assumptions (10%)
Direct Benefits	**$2,901.4**	**$3,923.0**	**$1,882.6**	**$2,788.4**	**$3,014.4**	**$2,890.0**	**$2,912.8**	**$2,901.4**	**$2,901.4**	**$2,901.3**	**$1,811.4**	**$4,047.5**	**$3,929.9**	**$2,229.0**
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	$2,358.6	$2,929.0	$1,788.2	$2,358.6	$2,358.6	$2,358.6	$2,358.6	$2,358.6	$2,358.6	$2,358.6	$1,788.2	$2,929.0	$3,203.1	$1,807.1
3. Company income tax apportioned	$542.8	$994.0	$94.4	$429.8	$655.8	$531.4	$554.2	$542.8	$542.8	$542.7	$23.2	$1,118.5	$726.8	$421.9
Indirect Benefits	**$2,569.6**	**$2,569.6**	**$2,569.6**	**$2,769.3**	**$2,369.8**	**$2,569.6**	**$2,569.6**	**$2,263.0**	**$2,406.5**	**$2,569.6**	**$2,279.7**	**$2,512.9**	**$3,517.6**	**$1,952.2**
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	$939.0	$939.0	$939.0	$939.0	$939.0	$939.0	$939.0	$632.5	$939.0	$939.0	$632.5	$939.0	$1,315.2	$699.3
3. Net economic benefit to Local suppliers	$1,630.5	$1,630.5	$1,630.5	$1,830.3	$1,430.8	$1,630.5	$1,630.5	$1,630.5	$1,467.5	$1,630.5	$1,647.2	$1,573.9	$2,202.4	$1,252.9
Indirect (Environmental costs)	$12.7	$12.7	$12.7	$12.7	$12.7	$12.7	$12.7	$12.7	$12.7	$13.8	$13.8	$11.7	$17.6	$9.7
Net Benefits	**$5,458.2**	**$6,479.8**	**$4,439.4**	**$5,544.9**	**5,371.5**	**$5,446.8**	**$5,469.6**	**$5,151.7**	**$5,295.1**	**$5,457.1**	**4,077.3**	**$6,548.7**	**$7,429.9**	**$4,171.4**

*Source: EY estimates based on information from various sources. Estimated as the benefits of the Project case less the Baseline case. *NPV in real 2024 Australian dollars based on a 7 per cent real discount rate, except for "Central Case (4%)" which is based on a 4 per cent real discount rate and "Central Case (10%)" which is based on a 10 per cent real discount rate. See Section 2.8 for descriptions of each assumption tested.*

Table 36: LEA – sensitivity analysis of the net regional benefits of HVO North (NPV*, $ million)

LEA Sensitivity	Central Case Assumptions	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Supplier Benefit	Higher Environmental Costs	Pessimistic case	Optimistic case	Central Case Assumptions (4%)	Central Case Assumptions (10%)
Direct Benefits	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$18.3**	**$25.3**	**$13.9**
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	$18.3	$18.3	$18.3	$18.3	$18.3	$18.3	$18.3	$18.3	$18.3	$18.3	$18.3	$18.3	$25.3	$13.9
3. Company income tax apportioned	$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
Indirect Benefits	**$1,591.6**	**$1,591.6**	**$1,591.6**	**$1,680.1**	**$1,503.1**	**$1,591.6**	**$1,591.6**	**$1,398.8**	**$1,519.4**	**$1,591.6**	**$1,406.2**	**$1,566.5**	**$2,193.2**	**$1,202.4**
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	$869.1	$869.1	$869.1	$869.1	$869.1	$869.1	$869.1	$676.3	$869.1	$869.1	$676.3	$869.1	$1,217.2	$647.2
3. Net economic benefit to Local suppliers	$722.5	$722.5	$722.5	$811.0	$634.0	$722.5	$722.5	$722.5	$650.3	$722.5	$729.9	$697.4	$976.0	$555.2
Indirect (Environmental costs)	$9.4	$9.4	$9.4	$9.4	$9.4	$9.4	$9.4	$9.4	$9.4	$10.3	$10.3	$8.5	$13.0	$7.2
Net Benefits	**$1,600.5**	**$1,600.5**	**$1,600.5**	**1,689.0**	**$1,512.0**	**$1,600.5**	**$1,600.5**	**$1,407.7**	**$1,528.3**	**$1,599.6**	**$1,414.2**	**$1,576.3**	**2,205.5**	**$1,209.2**

*Source: EY estimated based on information from various sources. Estimated as the benefits of the Project case less the Baseline case. *NPV in real 2024 Australian dollars based on a 7 per cent real discount rate, except for "Central Case (4%)" which is based on a 4 per cent real discount rate and "Central Case (10%)" which is based on a 10 per cent real discount rate. See Section 2.8 for descriptions of each assumption tested*

HVO South sensitivity analysis

Table 37: CBA – sensitivity analysis of the net benefits of HVO South (NPV*, $ million)

HVOS Sensitivity	Central Case Assumptions	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Supplier Benefit	Higher Environmental Costs	Pessimistic case	Optimistic case	Central Case Assumptions (4%)	Central Case Assumptions (10%)
Direct Benefits	**$1,351.5**	**$1,830.0**	**$880.8**	**$1,299.3**	**$1,403.7**	**$1,343.1**	**$1,360.0**	**$1,351.5**	**$1,351.5**	**$1,351.4**	**$865.6**	**$1,890.7**	**$1,729.4**	**$1,089.1**
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	$1,116.4	$1,383.9	$849.0	$1,116.4	$1,116.4	$1,116.4	$1,116.4	$1,116.4	$1,116.4	$1,116.4	$849.0	$1,383.9	$1,431.3	$897.7
3. Company income tax apportioned	$235.1	$446.1	$31.8	$182.9	$287.3	$226.7	$243.5	$235.1	$235.1	$235.0	$16.7	$506.8	$298.1	$191.4
Indirect Benefits	**$972.0**	**$972.0**	**$972.0**	**$1,041.9**	**$902.1**	**$972.0**	**$972.0**	**$825.3**	**$919.7**	**$972.0**	**$835.8**	**$947.5**	**$1,169.1**	**$820.7**
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	$448.5	$448.5	$448.5	$448.5	$448.5	$448.5	$448.5	$301.8	$448.5	$448.5	$301.8	$448.5	$536.5	$380.8
3. Net economic benefit to Local suppliers	$523.5	$523.5	$523.5	$593.4	$453.6	$523.5	$523.5	$523.5	$471.2	$523.5	$534.1	$499.0	$632.6	$439.9
Indirect (Environmental costs)	$5.4	$5.4	$5.4	$5.4	$5.4	$5.4	$5.4	$5.4	$5.4	$5.8	$5.8	$5.0	$7.4	$4.1
Net Benefits	**$2,318.1**	**$2,796.6**	**$1,847.4**	**$2,335.8**	**$2,300.4**	**$2,309.7**	**$2,326.6**	**$2,171.4**	**$2,265.8**	**$2,317.6**	**$1,695.6**	**$2,833.2**	**$2,891.1**	**$1,905.7**

Source: EY estimates based on information from various sources. Estimated as the benefits of the Project case less the Baseline case. *NPV in real 2024 Australian dollars based on a 7 per cent real discount rate, except for "Central Case (4%)" which is based on a 4 per cent real discount rate and "Central Case (10%)" which is based on a 10 per cent real discount rate. See Section 2.8 for descriptions of each assumption tested.

Table 38: LEA – sensitivity analysis of the net regional benefits of HVO South (NPV*, $ million)

LEA Sensitivity	Central Case Assumptions	Higher Price	Lower Price	Higher Opex	Lower Opex	Higher Capex	Lower Capex	Higher Reservation Wage	Supplier Benefit	Higher Environmental Costs	Pessimistic case	Optimistic case	Central Case Assumptions (4%)	Central Case Assumptions (10%)
Direct Benefits	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$17.1**	**$22.7**	**$13.4**
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	$17.1	$17.1	$17.1	$17.1	$17.1	$17.1	$17.1	$17.1	$17.1	$17.1	$17.1	$17.1	$22.7	$13.4
3. Company income tax apportioned	$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
Indirect Benefits	**$652.5**	**$652.5**	**$652.5**	**$683.5**	**$621.5**	**$652.5**	**$652.5**	**$561.5**	**$629.3**	**$652.5**	**$566.2**	**$641.6**	**$782.3**	**$552.7**
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	$420.5	$420.5	$420.5	$420.5	$420.5	$420.5	$420.5	$329.5	$420.5	$420.5	$329.5	$420.5	$502.0	$357.8
3. Net economic benefit to Local suppliers	$232.0	$232.0	$232.0	$263.0	$201.0	$232.0	$232.0	$232.0	$208.8	$232.0	$236.7	$221.1	$280.3	$194.9
Indirect (Environmental costs)	$4.0	$4.0	$4.0	$4.0	$4.0	$4.0	$4.0	$4.0	$4.0	$4.4	$4.4	$3.6	$5.6	$2.9
Net Benefits	**$665.6**	**$665.6**	**$665.6**	**$696.5**	**$634.6**	**$665.6**	**$665.6**	**$574.6**	**$642.4**	**$665.2**	**$578.8**	**$655.1**	**$799.4**	**$563.2**

*Source: EY estimated based on information from various sources. Estimated as the benefits of the Project case less the Baseline case. *NPV in real 2024 Australian dollars based on a 7 per cent real discount rate, except for "Central Case (4%)" which is based on a 4 per cent real discount rate and "Central Case (10%)" which is based on a 10 per cent real discount rate. See Section 2.8 for descriptions of each assumption tested.*

Appendix C Worker and Supplier Benefits

C.1 Introduction

In this Appendix, additional supporting evidence is presented to substantiate the addition of worker and supplier benefits as part of the economic CBA undertaken for the extension of the life of the HVO Complex. In this case, we have considered the relevant NSW planning guidelines, including:

1. NSW Government (2015) Guideline (the "Guidelines") for the economic assessment of mining and coal seam gas proposals.

2. NSW Government (2018) Technical Notes supporting the Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals.

Mining approvals in NSW require a CBA to be undertaken based on the above Guidelines published by the NSW Government.[110] At the outset, we believe that it is important to recognize the relatively unique role that the economic CBA plays in the approvals process. Whilst it is common for governments to undertake CBA when considering public expenditures such as large infrastructure developments or programs, it is much less common for governments to undertake CBA for private sector investments.

The Guidelines explicitly recognise that there are a range of potential impacts to internal and external stakeholders from a mining project, along with the direct and indirect costs. These internal and external stakeholders are appropriate to consider when assessing private investment and include the NSW government through tax and royalty collection, workers at a mine and suppliers to the mine. Furthermore, the Guidelines explicitly recognise that the "benefits to workers can be one of the major economic benefits from a project".

What we have observed in the approvals process broadly, is that much of the commentary around the merits of CBA analysis calls for the exclusion of key benefits, such as those that accrue to workers and suppliers at a new mine. The exclusion of these benefits is often based on highly theoretical arguments, with little supporting evidence provided, and are only justifiable under the most restrictive of circumstances. Further, the commentary overlooks the fact that the assessment considers net benefits, that is, the benefits of the Project proceeding versus there being no project (and therefore no additional demand for suppliers nor additional employment).

In this appendix we set out to address some of the common (often unsubstantiated) claims that are used to justify the exclusion key benefits, such as those related to worker and supplier benefits.

In addition, a further set of sensitivity analysis is presented with the impact on the overall benefits and costs of the Project on a range of benefits to workers and suppliers. This Appendix is additional to the analysis undertaken in the main report.

C.2 Benefits to workers

The Guidelines are explicit in their allowance of positive worker benefits and recognise that such benefits can represent a major proportion of the overall benefits of a project, provided there is sufficient evidence to support it. The basis for estimating the benefits that accrue to workers in a mine is based on the following principles, as highlighted in the Guidelines:

- Wages earned in the mine.

- Minus the opportunity costs of labour for working in the mining sector, compared to working in non-mining sectors (or being unemployed).

[110] Guidelines for the economic assessment of mining and coal seam gas proposals (nsw.gov.au) (2015), page 4.

- Minus the wage difference due to skills and the disutility of working in the mining industry.

To measure the opportunity cost compared to the non-mining sector, the wages earned by HVO Complex workers are compared to an estimated reservation wage, which is constructed as a weighted average of the wages paid to occupations not in the mining sector. The weights are given by the occupational distribution of those found working in the coal mining sector. Furthermore, the reservation wage is adjusted upwards to account for the differential in hours worked between those in the coal mining sector and those employed in the wider economy. This implies that should the Project not go ahead, those who would have been employed by HVO would find alternative work at the average wage paid for their occupation in NSW. The reservation wage across NSW is estimated at $106,668 per annum, based on 2016 Census data (updated to 2024 dollars using ABS cat. No. 6401.0 and ABS cat. No. 6345.0).

However, the inclusion of worker benefits is a key area of disagreement in the assessment process for many mine applications, as the Guidelines are not explicitly prescriptive in their treatment of these benefits. For example, in the Independent Planning Commission's (the "IPC") statements[111] regarding the Mangoola Coal Continued Operations Project, which was approved in April 2021,[112] it is noted that worker benefits were overstated and were not prepared in accordance with the Guidelines. It was in part, because that "should mining cease at the site, workers would likely gain employment elsewhere in the mining industry".

Further general criticisms on the inclusion of worker benefits for mining projects in NSW tend to follow three common approaches, that:

- Projects will generally not employ people locally, and rather source employees through drive-in-drive out and fly-in-fly-out arrangements from broader areas and interstate.

- Any calculation of worker benefits should include an adjustment for the disutility of working in the mines and the extra skills needed to work in the mining industry.

- By measuring the mining wage against the average wage in NSW implies that workers will find alternative work at an average wage paid in NSW, which implies that there are no significant differences in skills between miners and the average worker.

Each of these arguments are addressed in commentary below.

C.2.1 Worker locations and jobs

Mining Jobs

Standing in contrast to the assertion that coal miners will simply find employment in alternative mines, Figure 2021 details the forecasted coal mining employment in NSW.[113] These projections of employment also operate as a proxy for coal production. Under all scenarios, there is predicted to be a potential decline in projected employment within the coal sector in NSW over the expected life of the Project with only the high demand scenario showing a potential increase in employment over the short term. In contrast to the 2016 NSW Intergenerational Report (IGR), the 2021 IGR highlights a quick and significant shift in the outlook for the coal mining industry, with Australia's three of the top four metallurgical coal export countries (Japan, South Korea and China)[114] committing to achieving net zero emissions by the middle of the century.

In 2021 IGR, *The sensitivity of the NSW economic and fiscal outlook to global coal demand and the broader energy transition for the 2021 NSW Intergenerational Report*, the NSW treasury writes that

[111] Independent Planning Commission - Mangoola Coal Continued Operations Project (SSD 8642) (nsw.gov.au) (2021).

[112] Notice of State Significant Development Determination- Mangoola Coal Continued Operations Project

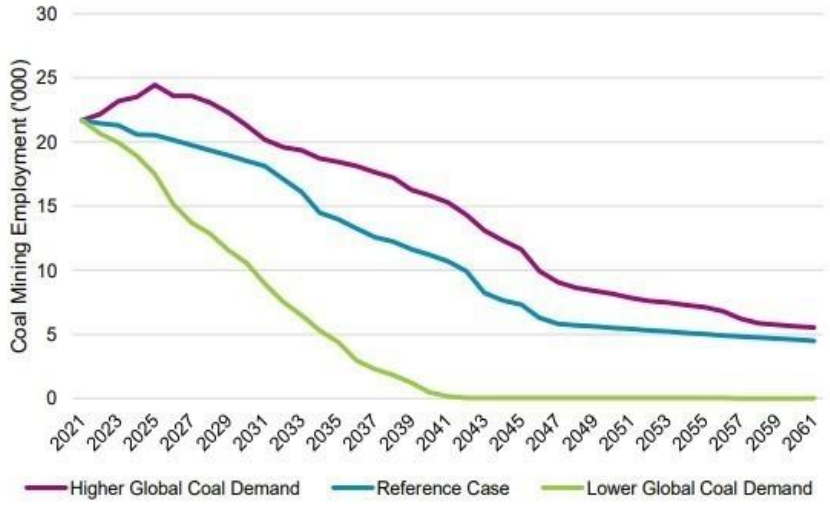
[113] 2021 IGR TTRP - The sensitivity of the NSW economic and fiscal outlook to global coal demand and the broader energy transition for the 2021 NSW Intergenerational Report (2021).

[114] https://publications.industry.gov.au/publications/resourcesandenergyquarterlymarch2021/documents/Resources-and-Energy-Quarterly-March-2021-Met-Coal.pdf (2021).

a "declining global demand for NSW coal will impact employment in coal mining. Under the reference case, employment in coal mining is projected to decline by an average of 600 per year for the next two decades".

As global demand for coal is forecast to plateau, NSW plans to slowly unwind investing in coal mining projects, as countries transition to a clean energy framework.[115] Those currently employed in the sector are going to face increasing challenges in finding alternative employment within the mining sector. Those that do will displace a person already in the workforce, who may either retire from the workforce or seek employment in some other profession. Therefore, the continued operations related to the Project would give the employees at the HVO Complex an opportunity to have access to stable employment in an environment where global factors mean that alternative opportunities in coal mining in NSW are becoming increasingly scarce.

Figure 2021: Forecasted Coal Mining Employment



Source: NSW Treasury and VURM

In the establishment of a base case to compare the Project against, one of the key assumptions in the Guidelines is that alternative project and land uses should continue on in a business-as-usual fashion, unless there is a significant and material impact that a new project would have.

In this respect, we also assume that alternative mines would be operating in a business-as-usual manner, irrespective of whether a project is approved. That is, they would also be attempting to maximise their production though the minimisation of vacancies, which would result in minimal lateral transitions between operations. Taking this assumption in conjunction with the estimates shown in Figure 2021, it becomes increasingly difficult to argue that, should the Project not proceed, that the existing workforce would find alternative employment in the coal mining industry in NSW. While these employees may find employment in other jurisdictions, this would result in a net loss of benefits to NSW relative to the Project Case (and assumed base case).

Worker locations

Relatedly, it is also commonly argued that many workers would not be sourced locally, and that workers would alternatively be resourced through Fly-In-Fly-Out programs. As such, many of the employment benefits would accrue to workers that may not be from the state. However, since this is an extension of a currently operating mine, it is expected that many of the workers currently employed will remain working at HVO. To the extent that increased workforce numbers associated with this project would dislodge workers from alternative mines, the subsequent filling of that vacancy would eventually result in workers being sourced either from other sectors or the unemployment queue. According to residential information provided by IMC, nearly all the

[115] STRATEGIC STATEMENT ON COAL EXPLORATION AND MINING IN NSW (2022).

workforce resides within NSW, therefore it is reasonable to expect that the vast majority of wage benefits that accrue to employees in the project case would be attributable to NSW.

C.2.2 The skills argument

The second major criticism usually put against worker benefit estimations is the fact that miners will possess specialised and unique skillsets, which would mean that, should approvals for a project not be granted, workers would simply end up employed elsewhere in the mining industry. Alternatively, that a project will generally source most of its employees from within the mining sector. Therefore, the reservation wage that should be utilised in the estimation of worker benefits is the average mining wage. However, as noted in the previous subsection, it is unlikely that any workers at HVO that are to lose a prospective employment opportunity by this project not proceeding can assume they would gain employment in the NSW mining industry. Accordingly, the assumption that the use of the average mining wage as a reservation wage cannot be justified unless there is evidence of additional demand for mining employment in NSW that would enable the displaced workers to be employed in the mining sector. In the following section we aim to show that using the average mining wage as a reservation wage is not appropriate, based on an examination of inter-industry movements and the average age and education level of occupations that are found in the mining industry, and of comparable industries.

C.2.3 Inter-industry movement

One of the major arguments levied on the estimation of worker benefits are that jobs in the mining sector require a very specialised and niche set of skills. Such an implication would mean that there would be a significantly lower level of transitions from other industries into the mining sector, whether individuals work in the same occupation (for example, technicians) or not.

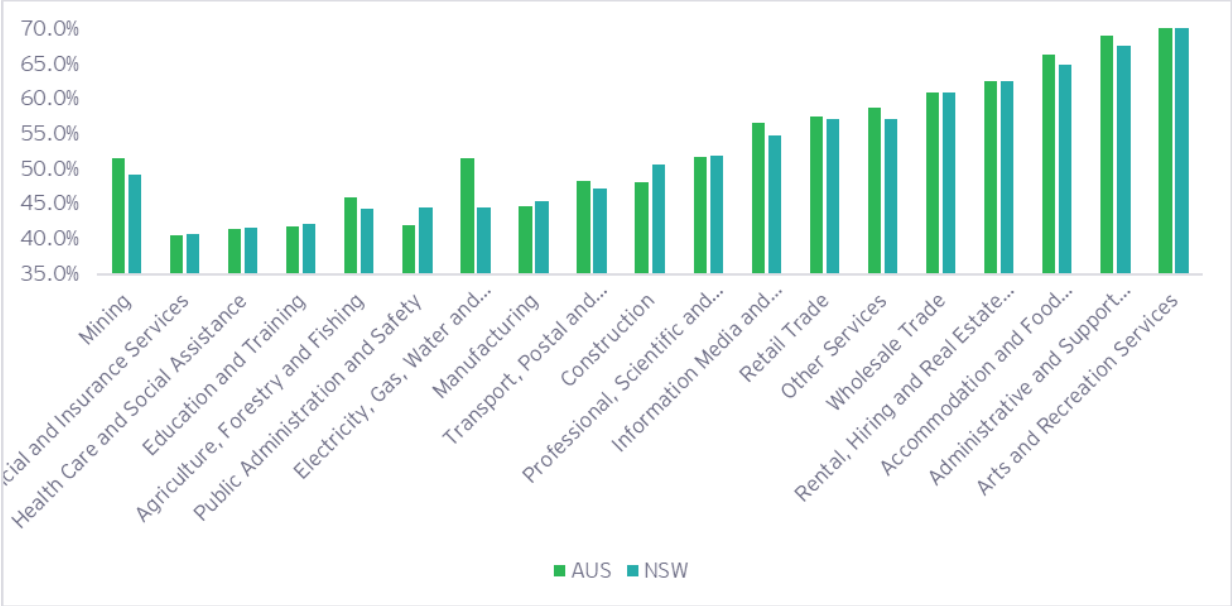
Figure 2122 outlines the proportion of workers that reported changing industries between 2011 and 2016 from Census data. Longitudinal census analysis can represent a reasonable proxy on estimating the level of difficulty, or levels of qualifications required, to enter certain industries, as these can be compared on a like-for-like basis across a range of sectors in the Australian economy. For example, the industries which showed the lowest proportions of lateral transfers (i.e. staying in the same occupation but switching sectors) were the financial services, health care, and education and training. These industries generally require significant qualifications and educational levels to enter, which explains the lower level of lateral transfers into these industries.

Alternatively, the industries which saw the highest lateral transfers were the accommodation and food services, administration and support services and arts and recreation services. These industries are characterised as having lower barriers to entry for jobs (in terms of educational or required qualifications), as well as generally providing short term employment.

From 2011 to 2016 (at the time of the census), roughly half of the employees in the mining sector had transferred from alternative industries, placing it roughly between the construction and professional, scientific and technical services sectors in terms of ease of entry. In this respect, there doesn't appear to be any significant differences in the level of accessibility for employees of this industry relative to the rest of Australia. Figure 2223 demonstrates that the construction, manufacturing and professional services sectors are the main sectors supplying skilled workers to mining between 2011 and 2016.

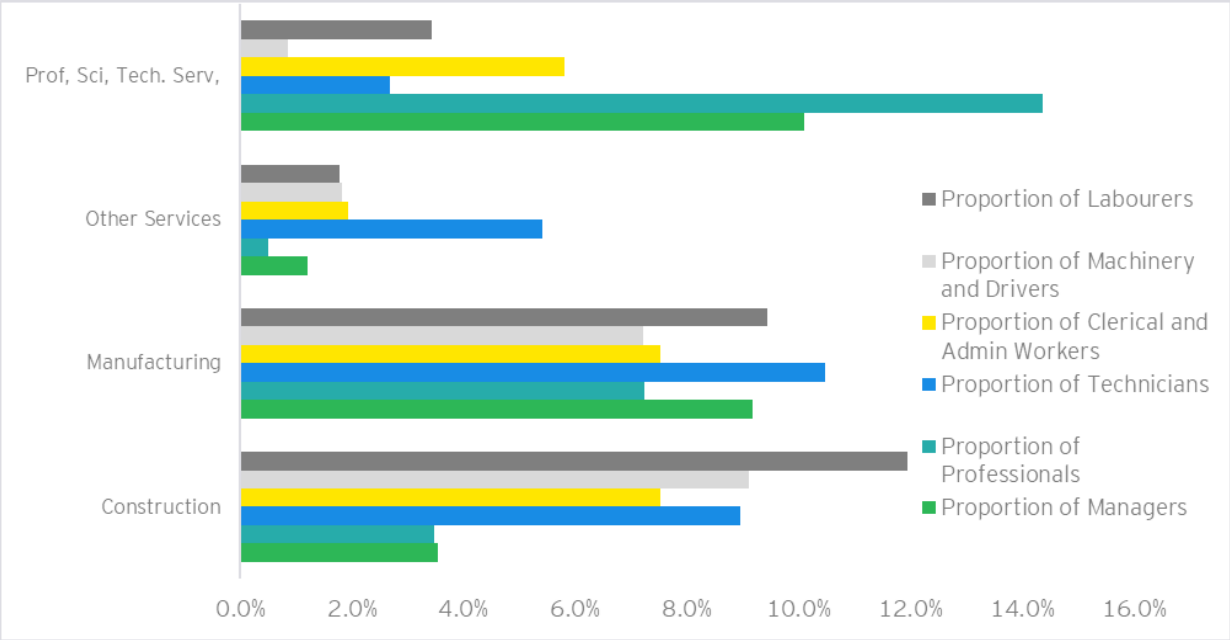
Moreover, this implies that there doesn't appear to be any significant differences in the level of qualification, or education needed to secure entry into the mining, with that of the general employment landscape in Australia, which we show in more detail below.

Figure 2122: Proportion of workers that transferred laterally into select industries from 2011 - 2016[116]



Source: Australian Bureau of Statistics (2016)

Figure 2223: Longitudinal movements into the mining sector from 2011 - 2016 at the occupational level



Source: Australian Bureau of Statistics (2016)

C.2.4 Average age of the workforce

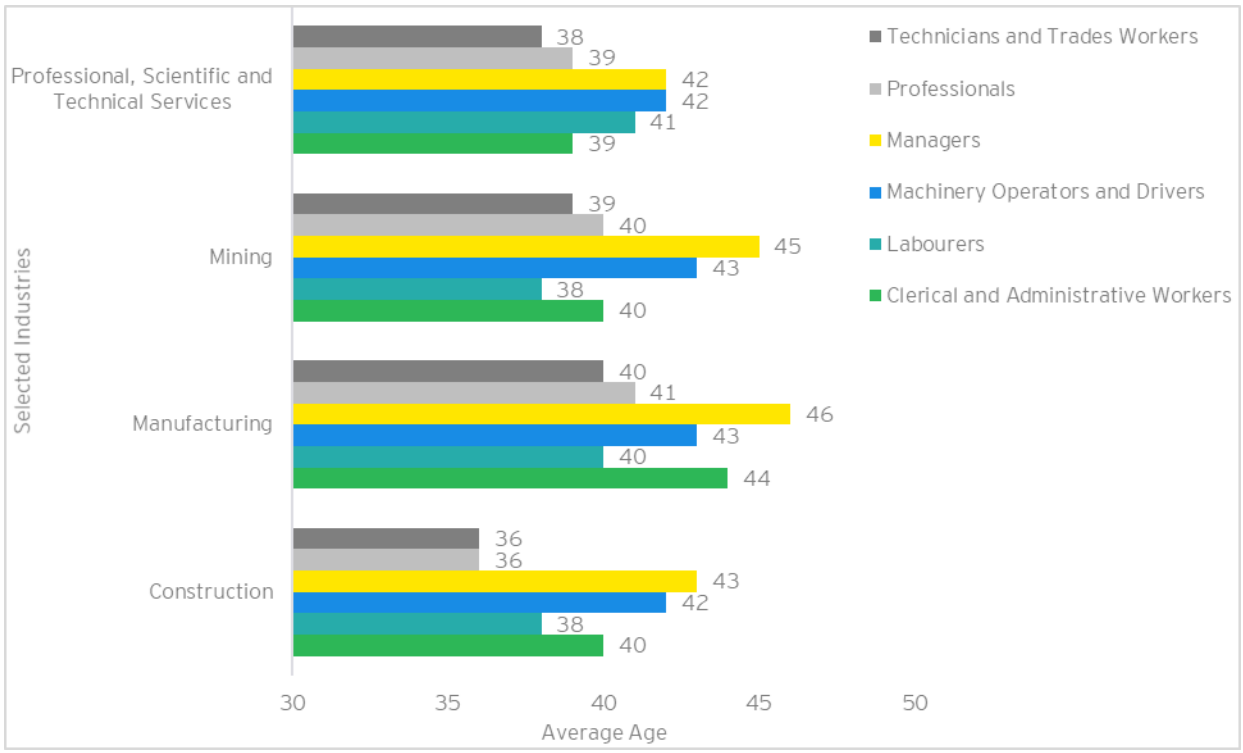
Measuring the unique skillsets of a workforce also presents challenges, however some reasonable proxies can be utilised to examine whether occupations in the mining sector are different relative to these comparable industries. These can be, for example, examining demographics such as the

[116] From 2011 and 2016 the ABS changed their method of collecting industry of employment data. The changes were aimed at reducing the amount of responses which provided an industry but failed to provide sufficient information to code the information at the Australia New Zealand Industry Classification (ANZIC) 2-Digit level or higher. As such, we've limited the longitudinal analysis to only consider ANZIC 1-Digit industry codes, as we believe this change would not have a material effect on these results.

average age of occupations as a proxy for experience, as well as the total years of reported schooling, to measure education and skill levels.

Figure 2324 details the average age of workers by occupation across the mining sector in comparison to the sectors that supplied the most workers to mining between 2011 and 2016. Broadly speaking it appears that there are no significant differences in the age of workers at the occupational level between mining and the three comparable industries. For example, the occupation which sees the largest representation in the mining workforce, machinery operators and drivers, has an average age of its workforce at around 43 years old, which is consistent with machinery operators and drivers in other sectors. This shows that there may be no significant differences in the level of experience between those employed in the mining sector, and those that are employed in comparable industries.

Figure 2324: Average age of employees at the occupation level



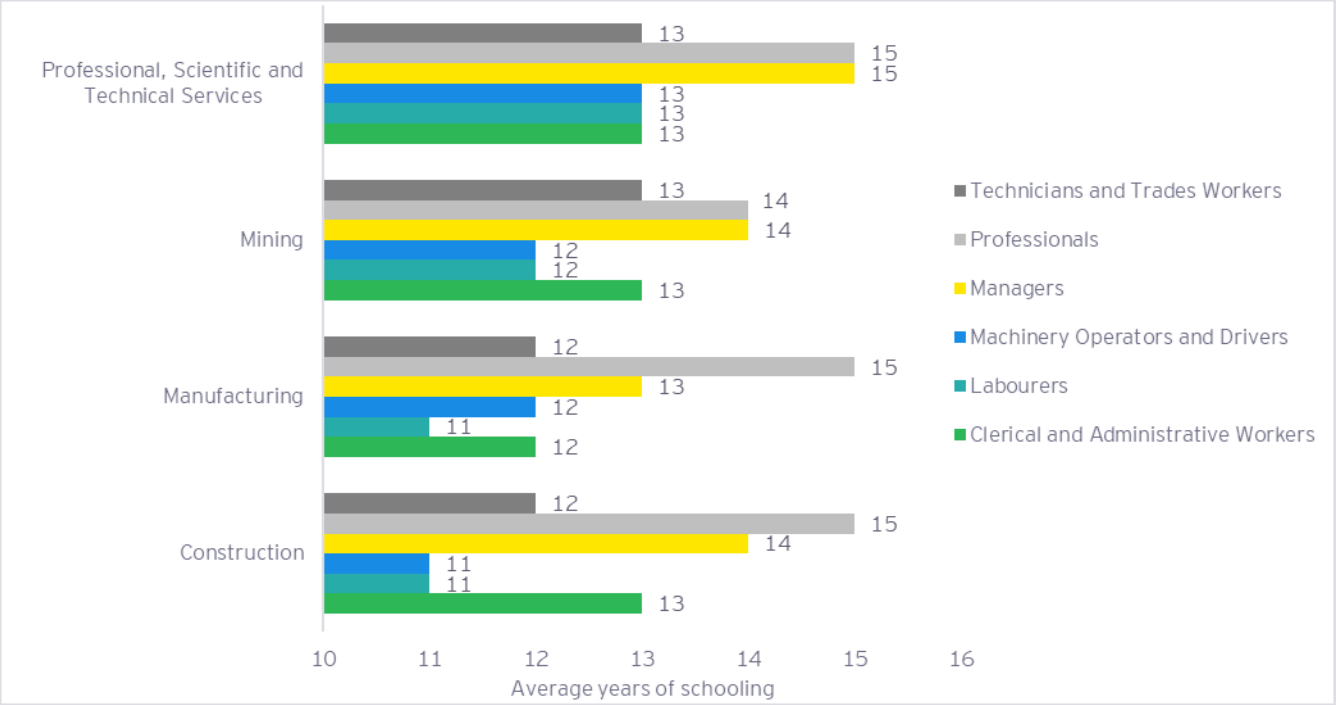
Source: Australian Bureau of Statistics (2016)

C.2.5 Skills and qualifications

A suitable proxy for examining the skill and qualification levels of employees in occupations is to look at the amount of time each employee has spent in schooling. Figure 2425 details the average number of years of schooling that employees have by each occupation and industry.

In mining, professionals and managers have the highest levels of schooling, at 14 years on average. This in contrast to the Professional Scientific and Technical Services industry, where, on average, managers and professionals undertake and extra year of schooling. Overall, education levels in each occupation is similar across mining and other sectors. This implies that there are no significant differences in the amount of schooling that employees undertake in the mining sector relative to some of the comparable industries.

Figure 2425: Estimated^ average number of years of schooling



Source: Australian Bureau of Statistics (2016) ^Based on reported highest levels of education achieved.

C.2.6 Disutility argument

General criticisms against worker benefits tend to argue that the high reservation wage is due to the disutility of working at the mine face, and therefore any wage premium should be adjusted due to the challenges of working in the mining sector. The application of any premium to account for these externalities will be specific to the mine site and type of commodity being mined.

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. As noted in the Report, regarding the mining specific measures of disutility, one source of information considered in this analysis was any documented 'hardship' allowances recognized 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 cent 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 per cent and a Dirty work allowance of 0.23 per cent, that may apply to underground workers. These are not significant uplift rates relative to allowances for other functions in coal mining (for example, the First Aid Officer Allowance is 0.76 per cent per day or shift above the standard rate).

On the other hand, one possible way to measure the relative disutility of working in mining, would be through published work health and safety statistics, which examine various fatality and injury statistics, nation-wide, for all industries.

The mining sector has focused on providing a safe working environment for all its workers.

outlines the incidence rates by sector per million hours worked from 2000 to 2019. During the period of analysis, the Australian mining sector has reduced their average number of claims per million hours worked by 57 per cent, which represented the largest decline in incidence rates, from 2000 to 2019, of any sector, except for financial services.

Comparable industries, such as agriculture, forestry and fishing, construction and manufacturing reduced their rates (defined as claims per million hours worked) from between 35 and 42 per cent over the same period.

Based on a 5-year moving average, on a claims per million hours worked basis, the mining industry also ranks well below these comparable industries and delivered incidence rates below the national average.

Work Health and safety statistics for Australia

Industry	Average claims per million hours worked (2013 – 2019)	Change from 2000 to 2019	Ranking
Agriculture, forestry, and fishing	9.2	-35%	19
Manufacturing	8.5	-39%	18
Transport, postal and warehousing	8.4	-44%	17
Construction	8.1	-33%	16
Retail trade	5.1	-42%	9
Mining	4.6	-57%	7
Information media and telecommunications	1.5	-51%	3
Financial and insurance services	0.9	-58%	1

Source: Safe work Australia (2020)[117]

Given the relative safety of the mining industry, the minor allowances for working in a coal mine and the measurement difficulties associated with measuring these disutility's generally, we have assumed the disutility for workers under the Project cases 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.

C.2.7 Concluding remarks

The evidence presented here supports the argument for the inclusion of worker benefits in the CBA. For example, by utilising census data, we have shown that, not only does the industry not appear to be any more difficult to transfer into related industries such as construction manufacturing, but that a significant proportion of those working in the mining sector, as of 2016, had previously been drawn from said industries - noting also that the total number of years of schooling remains consistent between these industries, as shown in Figure 2223. Moreover, the level of educational attainment and estimated level of experience (proxied by age) support the argument that the characteristics of workers in the mining industry are not significantly different to those in comparable industries.

Secondly, on the concept of disutility, evidence suggests that there are minor additional negative externalities incurred by workers,[118] especially given that a sizeable portion of the workforce would not be working at the mine face. Relative to comparable industries, the mining sector appears not only have implemented significant safety measures over the last two decades, which has resulted in a consistently lower claims rate. Lastly, given the Projects proximity to the city of Wollongong, the mine can be considered hardly remote, with the majority of the current HVO workforce residing in the local region, it is therefore unlikely that there would be any significant disutility arising due to the location of the mine.

In this respect, we believe that, not only would the majority of worker benefits accrue to NSW, but that employees in this Project would be paid a significant wage premium driven primarily by the highly capital-intensive nature of the mining sector which results in a higher average labour productivity for workers in the sector. The high capital requirements of the sector imply high operating leverage (i.e. a higher proportion of fixed to total costs). Such businesses have a strong

[117] National dataset for compensation-based statistics 3rd edition (Revision 1) | Safe Work Australia (2020).

[118] That is, would be subject to any negative externalities over and above those incurred from alternative employment.

incentive to maximise the utilisation of those assets, failing which, their margins fall disproportionately.

This means that such firms, included mining firms, would be willing to pay a large premium to ensure that vacancies are minimized, turnover is kept low, employees are trained sufficiently, and that the safety of employees are considered as top priority.

C.3 Benefits to suppliers

One of the key benefits of private sector investment is through the establishment of supply chain networks that act to disperse economic benefits to a myriad of businesses.

The Guidelines are clear in their allowance for the use of supplier benefits as part of the CBA. Consistent with the Guidelines, we have made an estimate of the producer surplus associated with the additional demand for inputs into production.

C.3.1 Current criticisms and responses

In its reasons for approving the Mangoola Coal Continued Operations project, the IPC noted: "[The IPC] is of the view that local suppliers will earn similar margins relative to what they receive under the base case, such that there are no additional benefits to suppliers in NSW".[119] However, the base case that would result in the Project's operations not being extended is a direct and significant reduction in demand for goods and services in the region, as outlined in the supplier demographics section above, which will not necessarily be replaced by other projects or alternative sectors. The supply curve for goods and services in this instance can be considered as "horizontal" meaning that there are strong levels of competition in the region for goods and services to be supplied to mines. An increase in demand from a mine is unlikely to result in a change in prices from suppliers, especially when we consider the long run nature of the operations of a mine.

In the long run, we can expect relatively low barriers to entry for firms to fill changes in demand, and equally, there is likely to be some form of spare capacity in the economy (as is evidenced with the low levels of inflation in the region and discussed below). Mining companies are likely to have access to a variety of firms to supply products, who are competing and reducing their overall margins.

However, this does mean that the change in demand that is directly a result of the Project case must result, at a minimum, in a linear increase in overall gross operating surplus (which again, is the profits that firms receive from supplying their goods into the mining sector). This can be considered as a relatively conservative estimate of the change in producer surplus, as we could see a more inelastic supply curve for some goods and services, and this would result in an increase in the gross operating surplus relative to the base case.

Put another way, the Project is unlikely to increase the margin that suppliers receive, however the extended life of the Projects and the associated required capital and operational expenditure of the mine is expected to increase the demand for services and supplies relative to the base case of the Project not proceeding. The effect of this is that the same margin is applied to increased turnover which can be considered as a supplier benefit associated with the Project that should be considered as part of the benefits indirectly accruing to NSW.

Lastly, in contrast to the IPCs view, in their review of the Tahmoor South Coal Mine[120] BIS Oxford Economics (2020) writes that such an approach appears to be broadly consistent with the specifications in the Guidelines. Whilst the use of gross operating surplus is not quite equivalent to a strict definition of Producer Surplus, the approach is said to be reasonable, given data limitations.

[119] Independent Planning Commission - Mangoola Coal Continued Operations Project (SSD 8642) (nsw.gov.au) (2021).

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

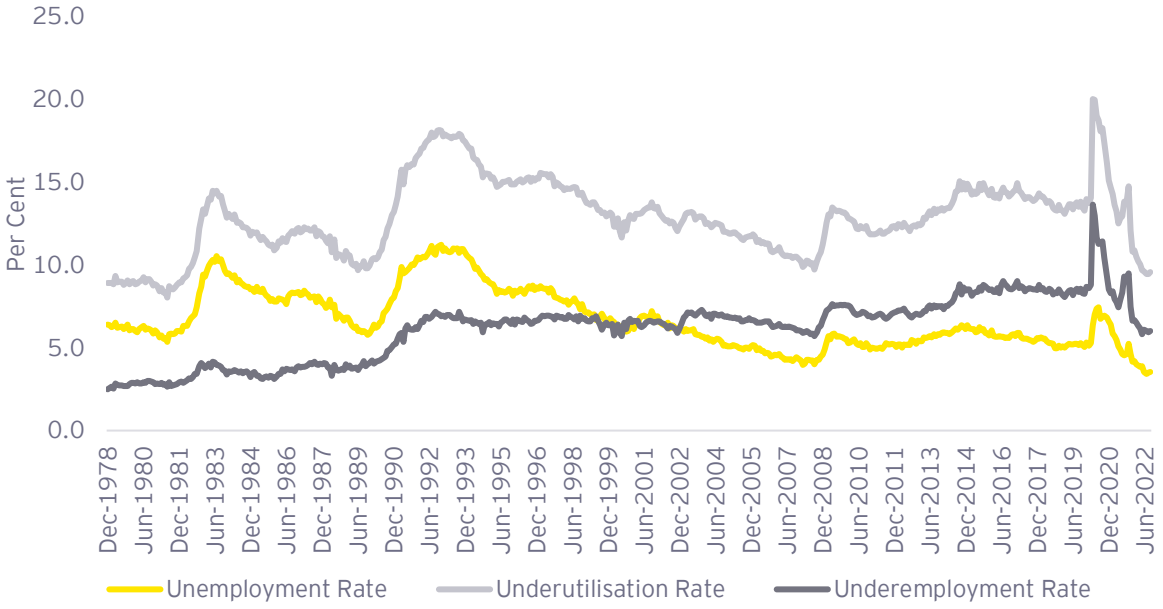
C.3.2 The relationship between spare capacity, inflation and, unemployment

An important consideration that the Reserve Bank of Australia (RBA) considers in their monetary policy actions is the level of spare capacity in the economy. Spare capacity relates to the balance of demand for goods and services, relative to the economy's potential to produce them.

At an aggregate level, inflationary pressure is likely to be greater in an economy operating at a higher level of capacity utilisation than if it is operating at a lower level[121]. For example, firms that have a greater degree of pricing power should be able to expand their mark-ups in an economy experiencing strong growth in demand relative to available supply.

A second indicator of spare capacity in the economy is the unemployment rate and underemployment rate. A high unemployment rate implies that there is a large pool of workers willing to work, but are not engaged in production, which suggests that the economy is operating below its potential. Whilst the unemployment rate has been relatively consistent, if trending slightly downwards, as shown in the figures below, over the past four decades the underemployment rate has trended upwards, and has been higher than the unemployment rate since the early 2000s.

Figure 2526: Unemployment, Underemployment and Underutilisations rates



Source: ABS Cat. No. 6202.0.

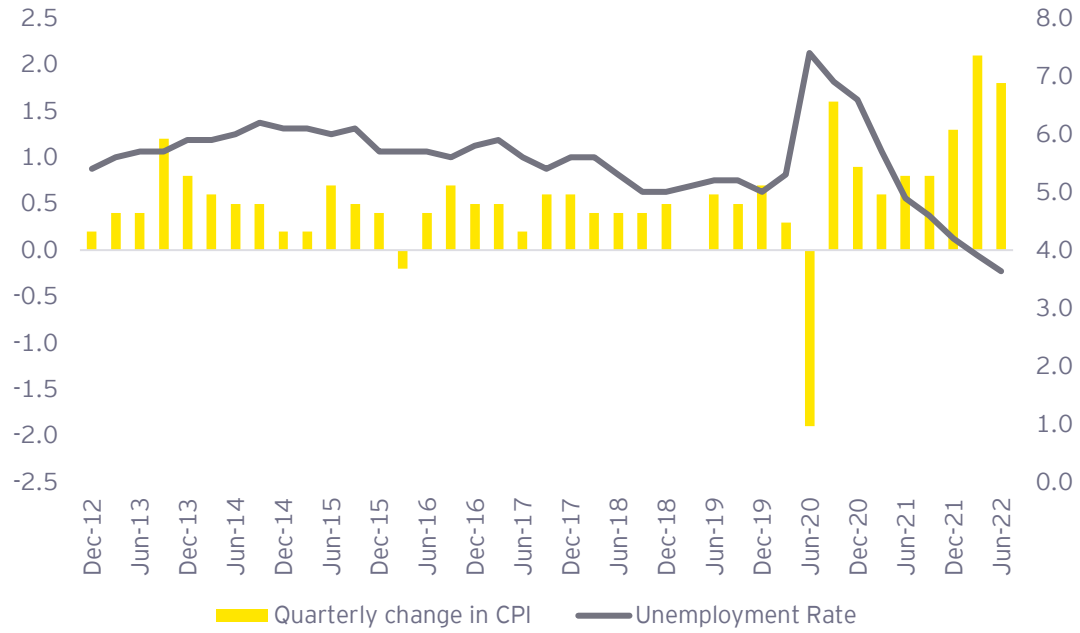
What we've observed more broadly, in Figure 2627, is that inflation has been benign and dropped into negative territory in July-2020, due to the large spike in unemployment related to the COVID-19 pandemic. However as of recently, there has been a significant uptick in inflation, which has coincided with a decrease in unemployment and underemployment throughout Australia, suggesting that currently the Australian economy may be operating with less spare capacity than previously observed.

The subsequent recovery from COVID-19, lack of employment immigration related to labour shortages in specific sectors such as agriculture, in addition to supply shocks as a result of geopolitical tensions translating to higher energy prices, have both contributed to a tighter labour market and has resulted in upwards pressure in inflation. It is arguable that these recent developments are potentially transient in nature and will likely subside once supply-side pressures

[121] Firm-level Capacity Utilisation and the Implications for Investment, Labour and Prices | Bulletin – December 2015 | RBA (2015).

ease up, and the national labour market is able to again import labour. It could be argued that the economy, over a longer time horizon, could return to operating with some level of slack in its capacity, especially considering that the commencement of the Project is estimated to start in 2025.

Figure 2627: Quarterly Change in CPI (LHS) and the Unemployment Rate (RHS)



Source: ABS Cat. No. 6462.0, ABS Cat. No. 6202.0

C.4 Sensitivity Analysis

In addition to the arguments put forward in this Appendix, we extend the sensitivity analysis presented in the Report to include a full range in both worker and supplier benefits. These results are presented in Table 39,Table 40, and Table 41 and below.

Table 39: Worker and supplier benefits scenario analysis for HVO Complex ($million**)

HVO Complex	Worker Benefits			Supplier Benefits		
Scenario	25% Worker Benefits	50% Worker Benefits	75% Worker Benefits	25% Supplier Benefits	50% Supplier Benefits	75% Supplier Benefits
Direct Benefits	$4,367.4	$4,367.4	$4,367.4	$4,367.4	$4,367.4	$4,367.4
1. Net producer surplus	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
2. Royalties, payroll tax and Council rates	$3,462.0	$3,462.0	$3,462.0	$3,462.0	$3,462.0	$3,462.0
3. Company income tax apportioned	$905.4	$905.4	$905.4	$905.4	$905.4	$905.4
Indirect Benefits	$2,468.8	$2,785.0	$3,101.3	$1,750.1	$2,305.9	$2,861.7
1. Net economic benefit to existing landholders	$0	$0	$0	$0	$0	$0
2. Net economic benefit to Local workers	$316.2	$632.4	$948.6	$1,264.9	$1,264.9	$1,264.9
3. Net economic benefit to Local suppliers	$2,223.2	$2,223.2	$2,223.2	$555.8	$1,111.6	$1,667.4
Indirect (Environmental costs)	$70.6	$70.6	$70.6	$70.6	$70.6	$70.6

Potential Net Benefits	$6,836.3	$7,152.5	$7,468.7	$6,117.5	$6,673.3	$7,229.1

*Source: EY estimates based on information from various sources. * Estimated as the benefits of the Planned Project case less the Baseline case. ** NPV in 2024 dollars based on a 7 percent real discount rate.*

Table 40: Worker and supplier benefits scenario analysis for HVO North ($million**)

HVO North	Worker Benefits			Supplier Benefits		
Scenario	25% Worker Benefits	50% Worker Benefits	75% Worker Benefits	25% Supplier Benefits	50% Supplier Benefits	75% Supplier Benefits
Direct Benefits	$2901.4	$2901.4	$2901.4	$2901.4	$2901.4	$2901.4
1. Net producer surplus	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
2. Royalties, payroll tax and Council rates	$2358.6	$2358.6	$2358.6	$2358.6	$2358.6	$2358.6
3. Company income tax apportioned	$542.8	$542.8	$542.8	$542.8	$542.8	$542.8
Indirect Benefits	$1809.8	$2044.5	$2279.3	$1291.1	$1698.7	$2106.4
1. Net economic benefit to existing landholders	$0	$0	$0	$0	$0	$0
2. Net economic benefit to Local workers	$234.8	$469.5	$704.3	$939.0	$939.0	$939.0
3. Net economic benefit to Local suppliers	$1630.5	$1630.5	$1630.5	$407.6	$815.3	$1222.9
Indirect (Environmental costs)	$55.5	$55.5	$55.5	$55.5	$55.5	$55.5
Potential Net Benefits	$4711.1	$4945.9	$5180.7	$4192.5	$4600.1	$5007.8

*Source: EY estimates based on information from various sources. * Estimated as the benefits of the Planned Project case less the Baseline case. ** NPV in 2024 dollars based on a 7 percent real discount rate.*

Table 41: Worker and supplier benefits scenario analysis for HVO South ($million**)

HVO South	Worker Benefits			Supplier Benefits		
Scenario	25% Worker Benefits	50% Worker Benefits	75% Worker Benefits	25% Supplier Benefits	50% Supplier Benefits	75% Supplier Benefits
Direct Benefits	$1351.5	$1351.5	$1351.5	$1351.5	$1351.5	$1351.5
1. Net producer surplus	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
2. Royalties, payroll tax and Council rates	$1116.4	$1116.4	$1116.4	$1116.4	$1116.4	$1116.4
3. Company income tax apportioned	$235.1	$235.1	$235.1	$235.1	$235.1	$235.1
Indirect Benefits	$621.0	$733.2	$845.3	$564.8	$695.7	$826.6
1. Net economic benefit to existing landholders	$0	$0	$0	$0	$0	$0
2. Net economic benefit to Local workers	$112.1	$224.3	$336.4	$448.5	$448.5	$448.5
3. Net economic benefit to Local suppliers	$523.5	$523.5	$523.5	$130.9	$261.8	$392.6
Indirect (Environmental costs)	$14.6	$14.6	$14.6	$14.6	$14.6	$14.6
Potential Net Benefits	$1972.6	$2084.7	$2196.8	$1916.3	$2047.2	$2178.1

*Source: EY estimates based on information from various sources. * Estimated as the benefits of the Planned Project case less the Baseline case. ** NPV in 2024 dollars based on a 7 percent real discount rate.*

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