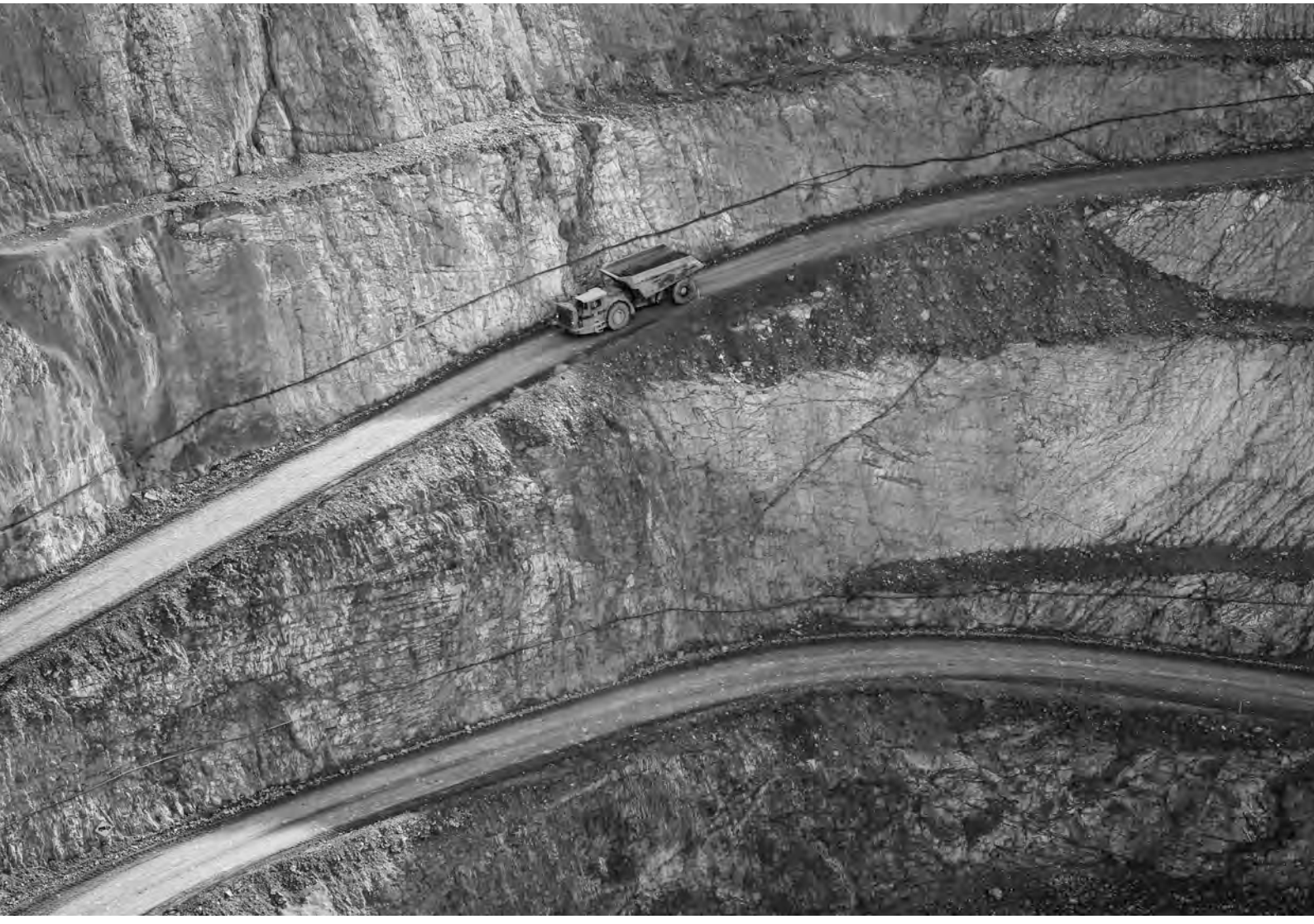
Appendix R

Economic impact assessment



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NEW COBAR COMPLEX PROJECT EIS – ECONOMIC ASSESSMENT

PEAK GOLD MINES
DECEMBER 2020

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EXECUTIVE SUMMARY

BACKGROUND

Peak Gold Mines Pty Ltd (PGM), a wholly owned subsidiary of Aurelia Metals Limited (Aurelia), owns and operates the Peak Gold Mines operation south-east of Cobar in western New South Wales (NSW), comprising the New Cobar Complex and Peak Complex located adjacent to the Kidman Way which connects Cobar to Hillston and Griffith to the south.

In the process of investigating options for extending the life of the New Cobar Complex, PGM has identified two deposits (the Gladstone and Great Cobar deposits) as targets and are now seeking approval for development and mining of these deposits (the New Cobar Complex Project, hereafter referred to as the Project). Underground mining production from the Great Cobar and Gladstone deposits (in aggregate) is estimated to peak at around 655,400 tonnes per annum (tpa) of run of mine (ROM) ore, with a total of approximately 4.8 million tonnes (Mt) of ROM ore anticipated to be extracted over an approximate 10 year mine life to the financial year 2033-34.

An Environmental Impact Statement (EIS) is required for the proposed development of the Project to comply with the requirements in Clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. As part of the EIS, analysis of the anticipated economic impacts of the Project is required.

The most relevant economy against which to examine the regional impacts associated with the Project is the regional economy comprised of the local government areas (LGAs) of Cobar, Bogan, Warren, Gilgandra, Narromine, Dubbo, Cabonne, Orange, Parkes and Lachlan. This area is hereafter referred to as the Catchment. This Catchment was chosen as it encompasses the Project location as well as anticipated key service centres for the Project of Dubbo and Orange.

EXISTING ECONOMIC ENVIRONMENT

The Catchment recorded an estimated resident population of around 151,400 people in 2019. Population growth in the Catchment has been positive (0.4% per annum on average) but well below that of the State of NSW since 2001. The majority of population growth has been within the Catchment's key centres (e.g. Dubbo and Orange); Cobar LGA's population has declined since 2001 from 5,100 residents to 4,660 residents in 2019. The Catchment's population is projected to continue to grow modestly to 2041 (0.3% per annum on average), however, Cobar LGA is projected to continue to decline at a rate of 0.5% per annum on average over this period.

The Catchment recorded Gross Regional Product (GRP) of approximately $11.2 billion in 2018-19, with the industries of mining and agriculture the two largest contributors to GRP (16.8% and 8.7% of total sector gross value added (GVA) activity). Growth in GRP in the Catchment has been volatile since 2006-07, largely reflecting fluctuations in these two industries over this period. The industries of health care and social assistance (16.5% of total jobs), agriculture, forestry and fishing (11.3%) and retail trade (9.7%) are the largest employers in the Catchment.

Cobar LGA's economy in particular is reliant on the mining industry, with mining contributing more than 75% of total sector GVA activity and more than 40% of jobs in 2018-19.

As of March 2020, the unemployment rate in the Catchment was 2.8% (lower than the 4.6% recorded for NSW). Cobar LGA recorded an even lower unemployment rate of 1.3%. Unemployment rates in the Catchment and Cobar LGA have generally been well below NSW since June 2006, which is consistent with many regional and rural areas across NSW and Australia, in particular mining areas such as Cobar LGA.

Within the Catchment, housing and rental market activity is primarily centred in Dubbo Regional and Orange LGAs, though sales activity has declined since June 2017. Approximately 20.4% of Cobar LGA's housing stock is comprised of unoccupied private dwellings, compared to 11.4% for the Catchment and 9.3% for the State, indicating the property market in Cobar LGA is highly subdued with significant available stock.

Indicative estimates of the impact from COVID-19, as of 22 September 2020, suggest the Catchment and Cobar LGA's economies and employment were not as heavily impacted by the COVID-19 pandemic as that for the State. The pandemic is indicatively estimated to have resulted in a decline of approximately $215 million in GVA in the Catchment, or 2.2%, compared to a decline of 3.1% for the State. Similarly, the pandemic resulted in a decline of approximately 2,200 workers in the Catchment, equating to a 3.3% decline, compared to the 3.9% decline recorded by the State. In contrast to the Catchment overall, Cobar LGA has recorded a small ($7 million) increase in total GVA (or 1.0%), indicating that mining activity has been sustained throughout the pandemic and supported the local economy, though despite the small increase in GVA the LGA has experienced a reduction of approximately 35 jobs.

LOCAL EFFECTS ANALYSIS

Potential Beneficial Impacts

Key beneficial impacts arising from the Project are outlined in Table ES.1. Beneficial impacts are examined in consideration of what would otherwise occur if the Project does not proceed.

In understanding the benefits delivered by the Project it is important to understand the Project will provide an extension of existing operations at the New Cobar and Peak complexes, with mining activity of the Great Cobar and Gladstone deposits ramping up as mining at other existing deposits winds down. The Project is not expected to result in any significant change in labour for mining, processing and maintenance at the Peak and New Cobar complexes (combined) from existing levels.

The Project thereby represents an important contributor to maintaining and extending activity and jobs supported by PGM's New Cobar and Peak complexes into the 2030s. Where the Project does not proceed, the economic contribution by PGM to the local and State economies would reduce considerably in the near future and the contribution to be delivered by the Project would not be realised. The Project will also deliver a boost to the economy through construction as well as decommissioning / rehabilitation activities.

Table ES.1. Assessment of Beneficial Impacts of the Project

Impact	Description
Economic Growth	The Project will contribute to economic growth through increased Gross Regional / State Product (GRP / GSP) during construction, operations and decommissioning / rehabilitation phases, compared to what would occur without the Project, flowing from both direct and flow-on impacts. The Project is estimated to support: • Over the four-year construction phase (2022-23 to 2025-26), approximately $32.8 million in GRP for the Catchment and an additional $19.7 million in GSP in the rest of NSW, including direct and flow-on activity. • During peak production (2026-27 to 2032-33), an average of $73.4 million in GRP in the Catchment per annum, and an additional $18.2 million in GSP per annum in the rest of NSW, including direct and flow-on activity. • For decommissioning / rehabilitation activities, approximately $3.3 million in GRP in the Catchment in aggregate between 2023-24 and 2034-35, and an additional $0.2 million in GSP in the rest of NSW, including direct and flow-on activity.

Employment and Incomes	The Project will support jobs and incomes during construction, operations and decommissioning / rehabilitation phases, compared to what would occur without the Project, flowing from both direct and flow-on impacts. Including both direct and flow-on (supply chain) impacts, the Project is estimated to support:
	• Over the four-year construction phase (2022-23 to 2025-26), in total including direct and flow-on activity:
	  ○ 159 full time equivalent (FTE)[1] jobs for local residents in the Catchment, paying a total $21.8 million in wages and salaries.
	  ○ An additional 108 FTE jobs in the rest of NSW, paying a total of $12.7 million in wages and salaries.

[1] Where one FTE is equivalent to one person working full time for a period of one year.

Impact	Description

	• During peak production (2026-27 to 2032-33), an average per year including direct and flow-on activity:
	  ○ 342 FTE jobs per annum in the Catchment, paying a total $59.5 million in wages and salaries.
	  ○ An additional 112 FTE jobs per annum in the rest of NSW, paying a total of $10.2 million in wages and salaries.
	• For decommissioning / rehabilitation activities, in total including direct and flow-on activity:
	  ○ 19 FTE jobs in the Catchment, paying a total $2.7 million in wages and salaries.
	  ○ One additional FTE job in the rest of NSW, paying $0.1 million in wages and salaries.

Support for Upstream Supply Chain Businesses	PGM has in place an extensive supply chain for their existing operations in the Peak and New Cobar complexes. The Project will extend the mining and processing activities at these complexes and thereby enable continued support and opportunities for suppliers in the Catchment and NSW that otherwise would be lost, providing additional security and longevity of business incomes (and employment). The Project will also create opportunities to secure new contracts and increase sales to supply and service the needs of the Project through flow-on impacts in the supply chain, during all phases of the Project. The construction phase is estimated to support: • Revenues for local businesses within the Catchment of approximately $58.8 million through direct and flow-on activity. • Revenues for businesses in the rest of NSW of $37.4 million through direct and flow-on activity. During operations, the Project is estimated to support approximately $18.4 million in business revenues per annum on average in the Catchment through flow-on activity during the peak period of production (2026-27 to 2032-33), with a further $39.5 million in revenues supported for businesses in the rest of NSW.
Support for Downstream Customers	The Project will enable PGM to continue to supply gold and silver (in doré and concentrates) as well as copper, zinc and lead concentrates to meet the demands of their customers over the next decade. Without the Project these customers would be required to source product from alternative suppliers (which may be expected to place upward pressure on input costs for these customers), or potentially reduce their own production where appropriate alternative supply is unable to be sourced. To this end the Project can be seen as important for the longer-term security of supply of precious metals for domestic production, while also supporting domestic transport and logistics business for the transport of doré and concentrates to customers.
Government Revenue	The Project will provide a lift in State and Australian government taxation revenues through a variety of taxes and duties. Overall, the Project is estimated to deliver a total of: • $182.8 million in additional revenue to the Australian Government, through personal income tax, fringe benefits tax, company tax and GST, compared to what would occur without the Project. • $59.7 million in additional revenue to the NSW Government compared to what would occur without the Project, primarily through royalty payments. These additional revenues can be used by government to provide additional infrastructure and services to support business and households throughout Australia.

Source: AEC.

Potential Adverse Impacts

The Project will extend PGM's activities to provide an important retention of economic activity within the Catchment and NSW economy over the next decade that would otherwise be lost without the Project. Economic impacts of the Project are anticipated to be overwhelmingly positive, with minimal adverse economic impacts identified.

MITIGATION STRATEGIES

While the potential adverse economic impacts from the Project are minimal, there are some potential areas that should be monitored and strategies employed to ensure benefits of the Project to the Catchment and NSW are maximised and any potential adverse impacts minimised:

- To maximise local benefits derived from the Project, and consistent with existing PGM policies, the proponent and contractors engaged by the proponent will be encouraged to source labour locally where possible and practical and provide training opportunities where practical. PGM actively encourages workers to reside locally and more than half of the existing workforce at the Peak and New Cobar complexes reside within Cobar. PGM aims to continue to source the majority of its workforce locally, including contractor labour.

- PGM has long standing relationships with local business and an established supply chain for its existing activities in the region. To maximise local benefits derived from the Project, PGM (and contractors engaged by the proponent) will continue to support local business by utilising these established supply networks and providing sufficient opportunities and information for local business to secure new supply contracts.
- While the Project is anticipated to have minimal impacts in terms of additional demand for accommodation / housing in the local area, and review of existing market conditions indicates there is significant housing stock currently unoccupied in Cobar LGA, PGM will monitor the local accommodation / housing market and demands placed on it by its workforce. If supply constraints are identified, PGM will work with Council to identify options for increasing supply as needed.

It should be recognised that these strategies form part of PGM's Project planning, and modelling of impacts in this report has been based on these strategies being implemented.

COST BENEFIT ANALYSIS

The Net Present Value (NPV) of the Project has been estimated as the difference between the present value (PV) of future benefits and PV of future costs. A cost benefit analysis (CBA) for the Project shows that, assuming a discount rate of 7%, the NPV of the Project to the NSW economy is estimated at $281.4 million (Table ES.2). Even at a discount rate of 10%, the Project is estimated to result in a net benefit to NSW of $214.9 million. The benefit cost ratio (BCR) is estimated at 1.59 at a discount rate of 7%, highlighting that the Project is estimated to return $1.59 for every dollar cost.

Table ES.2. Summary CBA Results of Project Impacts to NSW

Real Discount Rate	PV Costs ($M)	PV Benefits ($M)	NPV ($M)	BCR
4%	$593.1	$964.3	$371.3	1.63
7%	**$475.1**	**$756.6**	**$281.4**	**1.59**
10%	$385.3	$600.3	$214.9	1.56

Source: AEC.

The CBA identifies that the Project is economically desirable for NSW with the benefits outweighing the costs across all discount rates examined (4%, 7% and 10%) (Table ES.2).

Sensitivity analysis shows that, at a discount rate of 7%, there is a 90% probability the Project will provide an NPV between $143.5 million and $417.1 million. Sensitivity testing returned a positive NPV across 99.96% of the 5,000 iterations run in Monte Carlo analysis, with the analysis most sensitive to the value of production.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

Peak Gold Mines Pty Ltd (PGM), a wholly owned subsidiary of Aurelia Metals Limited (Aurelia), owns and operates the Peak Gold Mines operation south-east of Cobar in western New South Wales (NSW). The PGM operation comprises the New Cobar Complex located three kilometres (km) to the south-east of Cobar town centre and the Peak Complex located 10 km south-east of the town centre; both complexes are located adjacent to the Kidman Way which connects Cobar to Hillston and Griffith to the south.

In the process of investigating options for extending the life of the New Cobar Complex, PGM identified the Gladstone and Great Cobar deposits as targets and are now seeking approval for development and mining of these deposits (the New Cobar Complex Project, hereafter referred to as the Project).

An Environmental Impact Statement (EIS) is required for the proposed development of the Project to comply with the requirements in Clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. As part of the EIS, analysis of the anticipated economic impacts of the Project is required.

1.2 PURPOSE OF THIS REPORT

This report has been developed as a technical document for use in preparing the EIS. The report quantifies the expected beneficial and adverse economic impacts of the Project on the regional and state economies. The report also recommends mitigation strategies to ensure regional economic values are enhanced or, as a minimum, maintained if the Project proceeds.

2. ASSESSMENT APPROACH

2.1 ASSESSMENT REQUIREMENTS

The Secretary's Environmental Assessment Requirements (SEARs) outline that the economic analysis is required to provide "an assessment of the likely economic impacts of the development, paying particular attention to the:

- Costs and benefits of the development for the State; identifying whether the development as a whole would result in a net benefit to NSW, including consideration of fluctuation in commodity markets and exchange rates.
- Demand for the provision of local infrastructure and services."

In addition to the SEARs, the *Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals (December 2015)* have been used as a basis for the scope of assessment required for the economic assessment. These guidelines indicate the following works as being required:

- A cost benefit analysis (CBA) to assess the public interest by estimating the net present value of the project to the New South Wales (NSW) community.
- A local effects analysis (LEA) to assess the likely impacts of the development in the locality / region in which the project is located.

In addition to the above, the following components are provided as part of this economic assessment:

- A profile of the existing economic environment of the local area to provide a basis for understanding the relative magnitude of local / regional impacts in the LEA.
- Development of appropriate mitigation strategies for identified economic impacts.

The following table (Table 2.1) outlines where the above outlined items are addressed.

Table 2.1. Assessment Requirements and Sections Where These Are Addressed

Assessment Item	Section(s) Addressed
Costs and benefits of the development for the State; identifying whether the development as a whole would result in a net benefit to NSW.	6
Consideration of fluctuation in commodity markets and exchange rates.	5.7
Demand for the provision of local infrastructure and services.	5.5
A cost benefit analysis (CBA) to assess the public interest by estimating the net present value of the project to the New South Wales (NSW) community.	6
A local effects analysis (LEA) to assess the likely impacts of the development in the locality / region in which the project is located.	5
A profile of the existing economic environment of the local area to provide a basis for understanding the relative magnitude of local / regional impacts in the LEA.	4
Development of appropriate mitigation strategies for identified economic impacts.	5.8

2.2 METHOD OF ASSESSMENT

2.2.1 Existing Economic Environment

The existing economic environment section provides an overview of the existing economic profile of the Project study area (see section 2.3 for a definition of the Catchment used for the Project study area) and provides a current baseline for assessment of the significance of potential impacts of the proposed development. Regional economic data collected during this stage is used to develop economic models and informs the 'base case' (or baseline scenario) against which the Project's impacts are assessed.

A summary of the existing economic environment is presented in section 4, with supporting data and analysis in Appendix A.

The existing economic environment includes an assessment and overview of the prevailing conditions of the economy based on available data sets at the time of writing. However, the timing of release of many data sets can

lag by three to six months (and in the case of Census data this is only available every five years), which can mean recent developments and macro-economic conditions (including ramifications of COVID-19) may not be fully reflected in the statistics and data presented. Additional context and analysis regarding recent impacts on the existing environment in consideration of the ramifications of COVID-19 for the Catchment, Cobar local government area (LGA) and NSW economies has been provided where possible.

2.2.2 Local Effects Analysis (LEA)

The LEA section uses economic impact modelling results as well as information from the existing environment and desktop research to analyse, assess and discuss the economic impacts of the Project.

The LEA includes input and information from:

- Economic modelling using Input-Output (IO) modelling techniques (a description of IO modelling is provided in Appendix B).
- Interpretation of modelling output in the context of the regional and state economies, and analysis of other non-quantified changes to the economic environment.
- Evaluation of the significance of impacts in relation to economic resources.

The assessment identifies the economic impacts specific to the Project compared to what would be anticipated if the Project does not proceed. The LEA is presented in section 5.

2.2.3 Development of Mitigation and Enhancement Strategies

The mitigation strategies section identifies strategies to avoid, reduce or mitigate the negative economic impacts and enhance and facilitate the capture of the positive impacts identified in the economic impact assessment. Mitigation and enhancement strategies are presented in section 5.8.

2.2.4 Cost Benefit Analysis (CBA)

The CBA has been conducted in line with NSW and Australian Government guidelines, examining the stream of relevant economic, social and environmental costs and benefits anticipated from the Project to assess the net present value of the Project to the NSW community. Additional details regarding the CBA assessment method used is provided in Appendix C. The results of the CBA are presented in section 6 of this report.

2.3 STUDY AREA

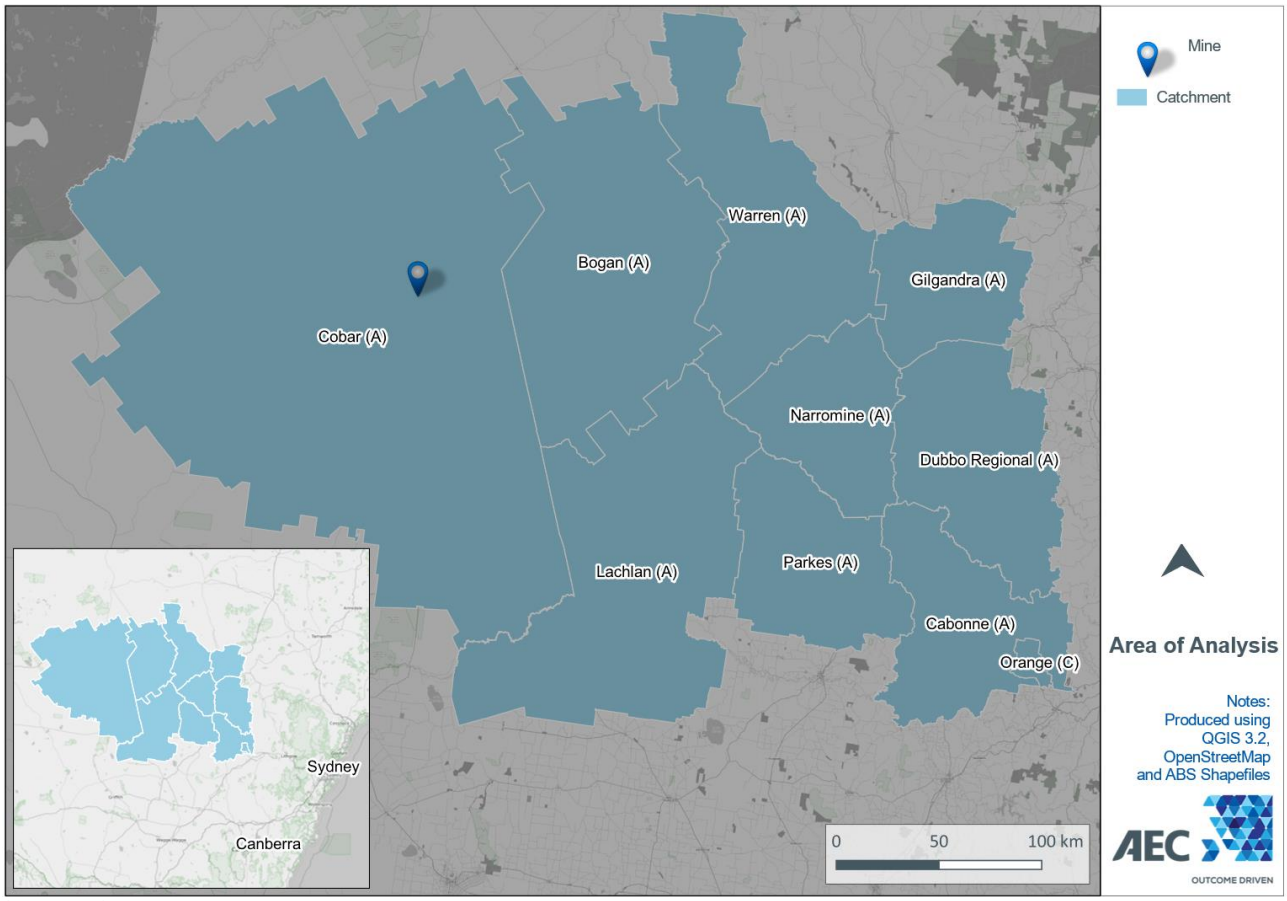
The study area used in the LEA is defined as the aggregation of the following LGAs:

- Cobar (in which the Project is located)
- Bogan
- Warren
- Gilgandra
- Narromine
- Dubbo Regional
- Cabonne
- Orange
- Parkes
- Lachlan.

The above study area is hereafter referred to as the “Catchment”. A map of the Catchment is presented in Figure 2.1. This catchment was chosen as it encompasses the Project location as well as anticipated key service centres for the Project of Dubbo and Orange. Where relevant, description of the local Cobar LGA economy and relevant economic impacts of the Project to Cobar LGA are also provided.

This report uses 2019 LGA boundaries as, at the time of writing, data for the 2020 LGA boundaries was not released. In September 2019, Murrin Bridge joined Lachlan Shire, representing a shift of approximately 1.9% of Cobar LGA’s population into Lachlan LGA (Lachlan Shire Council, 2020; ABS 2020d). While this results in no change to the Catchment overall, it should be noted the existing economic data for Cobar LGA presented in section 4 and Appendix A includes Murrin Bridge.

Figure 2.1. Map of Catchment



Source: AEC.

3. PROJECT OVERVIEW AND ASSUMPTIONS

3.1 PROJECT DESCRIPTION

PGM owns and operates the Peak Gold Mines operation south-east of Cobar in western NSW, comprising the New Cobar Complex and the Peak Complex. Geologically, the Cobar region is dominated by gold, silver, copper, lead, and zinc ore bodies. Within the New Cobar Complex, ore deposits with Cobar Shire Council (CSC) approval for mining include the New Cobar deposit (for which economic resources have been depleted), as well as the Chesney and Jubilee deposits which PGM are currently mining. PGM also currently undertakes mining at the Peak, Perseverance, Chronos and S4000 deposits within the Peak Complex.

A minerals processing facility and tailings storage facility (TSF) are located within the Peak Complex, and handle ore extracted from both the Peak and New Cobar complexes. The current CSC approvals at Peak and New Cobar allow for the operations to continue indefinitely and process up to 800,000 tonnes per annum (tpa) of ore at the Peak processing facility.

Approved deposits with economic resources within the Peak and New Cobar complexes are nearing depletion. PGM is in the process of investigating options for extending the life of the New Cobar Complex, and has identified the Gladstone and Great Cobar deposits as targets. PGM has obtained conditional approval for development of an exploration decline to target deeper resources (700–800 metres below ground level) within the Great Cobar deposit for ore evaluation. PGM are now seeking approval for development and mining of the Great Cobar and Gladstone deposits – i.e. the Project – for which this EIS is being undertaken.

The Project seeks approval for the development and underground mining at the Great Cobar and Gladstone deposits, as well as consolidation with all existing CSC approved development consents applicable to the New Cobar Complex into a single consent issued by the Department of Planning, Industry and Environment (DPIE).

Specifically, the Project will enable the following activity:

- Underground mining of the Great Cobar and Gladstone deposits. PGM proposes to use the decline, infrastructure and intake and exhaust ventilation elements developed for the approved Great Cobar exploration drive to facilitate this development.
- Transportation of extracted ore and waste rock to the existing surface run of mine (ROM) pad.
- Crushing and screening of ore within the existing surface ROM pad (if required).
- Transportation of ore to the Peak Complex for processing via Kidman Way using road registered heavy vehicles.
- Ongoing use of the existing waste rock emplacement (WRE) with the majority of waste rock from Gladstone and Great Cobar to remaining underground for backfilling of stopes.
- Deposition of potentially acid forming waste rock brought to the surface into the WRE where at end of mine life it would be capped, or progressively returned underground for disposal.
- Harvesting of waste rock at the WRE and transportation of that material back underground for use in stope backfilling operations and / or use on-site for construction / rehabilitation tasks and / or transportation to Peak Complex for backfilling, TSF lifts or capping.
- Continuation of all existing CSC approved activities within the New Cobar Complex.

The Project will utilise existing surface infrastructure at the New Cobar and Peak complexes, with only minimal additional surface infrastructure required as follows:

- Service decline and ventilation.
- Boxcut and portal.
- Internal roads linking the deposits to existing infrastructure.
- Laydown yard.

- Electrical supply (11kV switch room and line).

All other existing surface infrastructure at the New Cobar and Peak complexes is sufficient to meet the needs of the Project.

The Project will provide an extension of existing operations at the New Cobar and Peak complexes, with mining activity of the Great Cobar and Gladstone deposits ramping up as mining at other existing deposits winds down. Underground mining production from the Great Cobar and Gladstone deposits (in aggregate) is estimated to peak at around 655,400 tpa of ROM ore, with a total of approximately 4.8 million tonnes (Mt) of ROM ore anticipated to be extracted over an approximate 10 year mine life to the financial year 2033-34.

3.2 PROJECT SCENARIO

Modelling of economic impacts undertaken for this Project has examined the economic activity associated with and supported by the development, mining and closure / rehabilitation of the Great Cobar and Gladstone deposits only. While the approval will also encompass the consolidation of these activities with existing approved operations at the New Cobar Complex (e.g. activity supported by the Chesney and Jubilee deposits), it has been assumed in this analysis that future activity associated with the existing approved operations would occur regardless of the Project.

Modelling has, however, included consideration of the additional activity supported at existing operations as a result of the Great Cobar and Gladstone deposits, for example, the additional processing activity that otherwise would not occur.

Modelling conducted for the economic impact assessment is based on a scenario in which construction activity commences in the 2022-23 financial year. Construction activity is anticipated to be effectively completed by the end of 2025-26.

The Project is estimated to peak at around 655,400 tpa of ROM ore from the Great Cobar and Gladstone deposits (in aggregate), with a total of approximately 4.8 Mt of ROM ore anticipated to be extracted over the life of these two deposits. The scenario modelled in this assessment is for mine production to be undertaken over a period of approximately 10 years, from financial year 2023-24 to financial year 2033-34.

Ore extracted from these deposits will be processed at the existing processing facility at the Peak Complex. Modelling has assumed that ore is processed the same year in which it is extracted. Modelling is based on a scenario of approximately 101,300 ounces of gold, 91,100 tonnes of copper, 35,100 tonnes of zinc, 24,800 tonnes of lead, and 1.1 million ounces of silver being produced over the Project's life (including both doré and concentrate production). Gold and silver doré is expected to then be sold to domestic customers for further processing and refinement, with the majority of these customers anticipated to be outside NSW[2], while concentrates are expected to predominantly be sold to offshore customers.

Modelling of economic impacts has been undertaken in financial years.

Note: All dollar values presented in this section are in Australian dollar terms unless otherwise specified.

3.2.1 Construction

3.2.1.1 Construction Costs and Timing

The capital cost for developing the Project is estimated to be $66.4 million. Modelling is based on construction commencing in 2022-23, with all works completed by the end of 2025-26. A breakdown of construction costs by financial years used for modelling is presented in Table 3.1.

[2] For example, around 68% of total Aurelia revenues in the 2019-20 financial year were through sales of gold doré to a refinery in Western Australia (Aurelia Metals, 2020).

Table 3.1. Capital Cost Estimate for Project, $M

Component	2022-23	2023-24	2024-25	2025-26	Total
Capital Mine Development	$12.2	$25.5	$16.2	$7.3	$61.2
Service Decline and Ventilation	-	$3.4	-	-	$3.4
Other Surface Infrastructure	-	$1.7	-	-	$1.7
Total	**$12.2**	**$25.5**	**$16.2**	**$7.3**	**$66.4**

Source: PGM (unpublished).

For modelling purposes, the capital cost for developing the Project has been allocated to industries represented in the IO model (based on the Australian and New Zealand Industrial Classification (ANZZSIC) categories).

- **Professional, Scientific and Technical Services:** 5.0% of the total capital cost. This includes all professional services engaged for design, engineering, etc.
- **Heavy and Civil Engineering Construction:** 75.0% of the total capital cost. This includes the service decline, boxcut, and other surface infrastructure.
- **Construction Services:** 10.0% of the total capital cost. This includes the provision of roads, laydown yard, and electrical supply.
- **Specialised and Other Machinery and Equipment Manufacturing:** 10% of the total capital cost. This includes the manufacturing of equipment used in the construction process.

3.2.1.2 Construction Labour

Construction activity between 2022-23 and 2025-26 is estimated to require a total of approximately 141 FTE workers, with a peak workforce of 51 FTE workers in 2023-24. Timing for construction labour used for modelling is outlined in Table 3.2, including estimated labour costs (noting these labour costs are included within the construction costs outlined above).

Table 3.2. Construction Labour for Project

Component	2022-23	2023-24	2024-25	2025-26
Employment (FTEs)				
Capital Mine Development	40	40	30	20
Service Decline and Ventilation	-	10	-	-
Other Surface Infrastructure	-	1	-	-
Total	**40**	**51**	**30**	**20**
Labour Costs ($M)				
Total	**$7.0**	**$9.2**	**$5.3**	**$3.5**

Source: PGM (unpublished).

In addition to the above on-site construction labour, off-site (non-construction) jobs will also be directly supported for design and engineering activities, as well as for the manufacture / provision of equipment (fixed and mobile) to be purchased and installed on-site. These jobs have been estimated based on estimates of expenditure on the professional, scientific and technical services industry and the specialised and other machinery and equipment manufacturing industry outlined in section 3.2.1.1, applied to IO multipliers for these industries.

3.2.1.3 Source of Goods / Services

Construction will use labour from the Catchment where feasible, with the rest of the construction workforce supplemented by workers outside the Catchment. The economic analysis assumes:

- For underground mine development, the majority of labour will be sourced from the Catchment, with the exception of professional services and manufacturing services which will require more specialised skillsets not available within the Catchment.
- For surface infrastructure:
    - The service decline and ventilation related labour will require specialised skills that are unlikely to be available within the Catchment. It is therefore assumed this labour will be sourced from outside the Catchment.
    - All other surface infrastructure is anticipated to require approximately four workers over three months (i.e. one FTE job), with this labour expected to be able to be sourced from within the Catchment, with the exception of professional, scientific and technical services (where the majority will be sourced from outside the Catchment).

Assumptions regarding the source of labour from within the Catchment during construction were based on anticipated skills required and capacity within the Catchment's labour market. An overview of the existing labour market is provided in section 4 and Appendix A.

For the purposes of the economic impact assessment, assumptions regarding where goods and services and labour will be sourced from were developed in consideration of the IO sectors used. A summary of the assumptions used is presented in Table 3.3.

Table 3.3. Assumed Sources of Goods and Services & Labour During Construction

Component	Catchment	Rest of NSW	Rest of Australia/ Overseas
Capital Mine Development			
Professional, Scientific and Technical Services	25%	50%	25%
Heavy and Civil Engineering Construction	70%	20%	10%
Construction Services	70%	30%	0%
Specialised and other Machinery and Equipment Manufacturing	30%	50%	20%
Service Decline and Ventilation			
Professional, Scientific and Technical Services	25%	50%	25%
Heavy and Civil Engineering Construction	0%	50%	50%
Construction Services	0%	100%	0%
Specialised and other Machinery and Equipment Manufacturing	0%	50%	50%
Other Surface Infrastructure			
Professional, Scientific and Technical Services	25%	50%	25%
Heavy and Civil Engineering Construction	100%	0%	0%
Construction Services	100%	0%	0%
Specialised and other Machinery and Equipment Manufacturing	100%	0%	0%

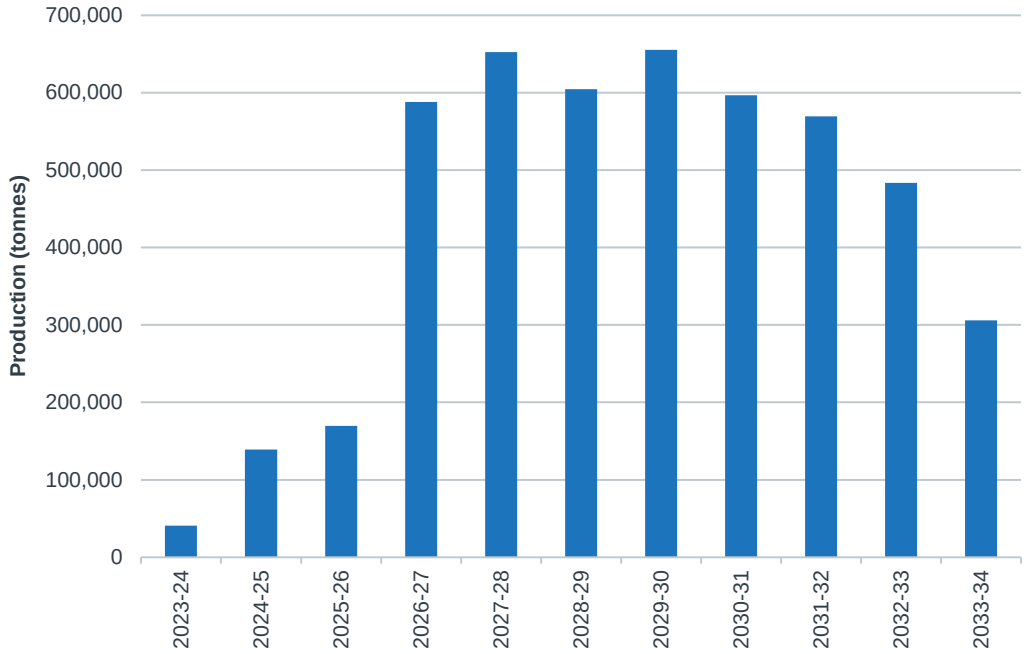
Source: PGM (unpublished).

3.2.2 Operations

3.2.2.1 Production and Timing

Figure 3.1 outlines the annual production of mined ore (ROM) from the Great Cobar and Gladstone deposits (in aggregate) on a financial year basis, between 2023-24 and 2033-34, as per the scenario used in modelling economic impacts.

Figure 3.1. Annual Production of ROM Ore (tonnes) – Great Cobar and Gladstone Deposits

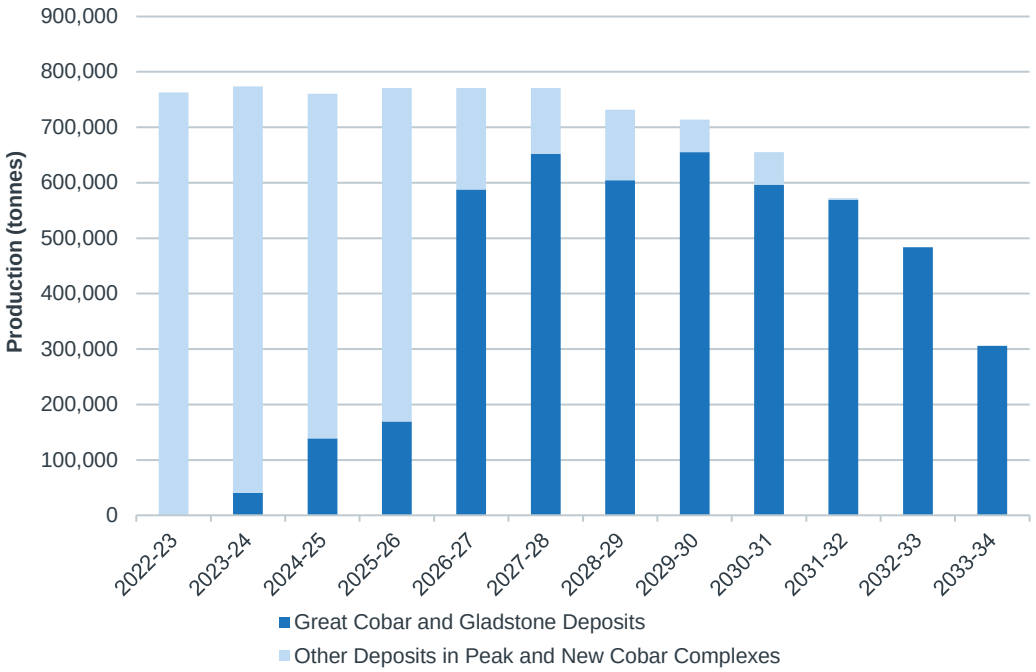


Source: PGM (unpublished).

In addition to the ore extracted at the Great Cobar and Gladstone deposits (which represent the net new activity that will be delivered by the Project), mining at existing deposits will continue over the life of the Project until these other existing deposits are depleted. Figure 3.2 outlines the overall level of mined ore to be extracted each year to 2033-34 at the combined Peak and New Cobar complexes, including the proportion delivered by the Great Cobar and Gladstone deposits.

As can be seen, the production from the Great Cobar and Gladstone deposits will take over as the primary deposits for PGM from 2026-27 through to 2033-34. Note that for economic modelling, only the production from the Great Cobar and Gladstone deposits has been included on the basis that ore extracted from other deposits would occur without the Project under existing approvals.

Figure 3.2. Annual Production of ROM Ore (tonnes) – Peak and New Cobar Complexes



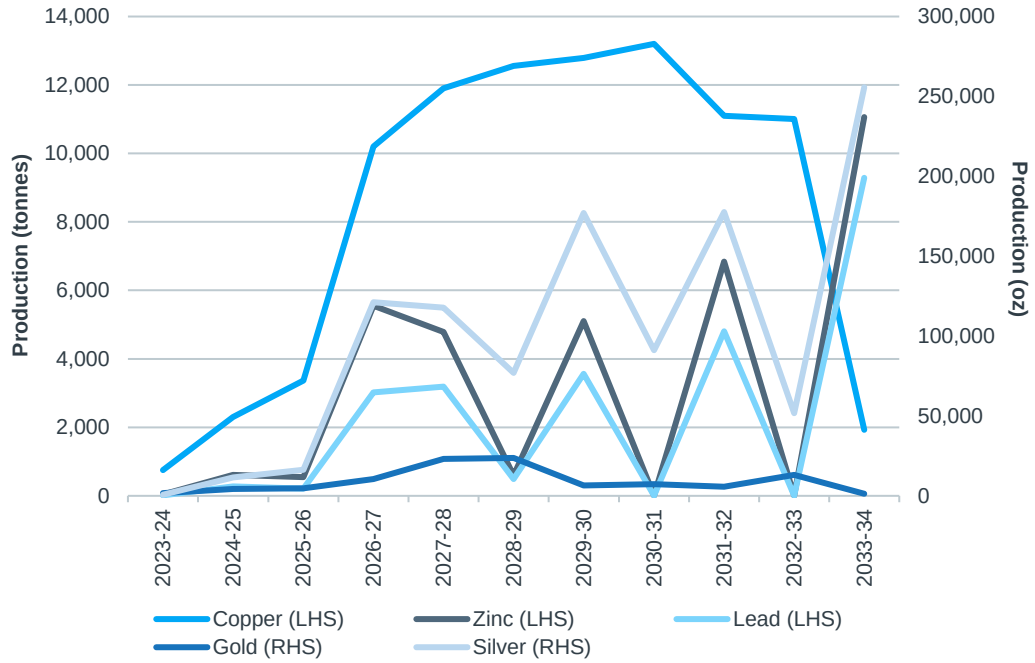
Source: PGM (unpublished).

ROM ore extracted from the Great Cobar and Gladstone deposits has been assumed to be processed in the year it is extracted for modelling. On average, over the life of the mine, the average rate of production per tonne of ROM ore processed is estimated to be:

- 0.021 ounces of gold (96.3% gold doré and 3.7% gold in concentrate).
- 0.228 ounces of silver (11.1% silver doré and 88.9% silver in concentrate).
- 0.019 tonnes of copper (all in concentrate).
- 0.007 tonnes of zinc (all in concentrate).
- 0.005 tonnes of lead (all in concentrate).

These rates will vary year to year and include both doré and concrete production. Estimates of the annual production of gold (doré and concentrate combined), silver (doré and concentrate combined), copper, zinc, and lead are outlined in Figure 3.3.

Figure 3.3. Annual Production of Gold, Silver, Copper, Zinc and Lead (oz) [(a)]



Note: (a) Gold and silver production includes both doré and concentrate production.
Source: PGM (unpublished).

3.2.2.2 Prices

Estimates of annual prices received for gold, silver, copper, zinc and lead product were provided by the proponent based on anticipated grade and price movements for these commodities. While prices are expected to fluctuate year to year, over the life of the Project prices are assumed to average approximately:

- $2,000 per ounce for gold (reflecting a pre-COVID longer-term average).
- $26 per ounce for silver.
- $9,200 per tonne for copper.
- $3,200 per tonne for zinc.
- $2,650 per tonne for lead.

3.2.2.3 PGM Operating Expenditure

Estimates of operating costs and timing over the life of the mine were provided by the proponent. A summary of the average non-labour and labour operating expenditure unitary rates over the life of operations are outlined in Table 3.4. While non-labour mining costs are presented as a rate per tonne of mined material over the life of the Project, the actual timing of operating costs varied year to year based on anticipated timing of key activities (e.g. anticipated timing of development of mining shafts) rather than tonnes of mined material.

Table 3.4. Operating Expenditure

Component	Units	Unit Value ($)
Mining		
Non-Labour Mining Costs	$ per t of mined material	$29
Labour Mining Costs	$ per employee	$180,000
Processing Costs		
Non-Labour Processing Costs	$ per t of processed ore	$29
Labour Processing Costs	$ per employee	$232,000

Source: PGM (unpublished).

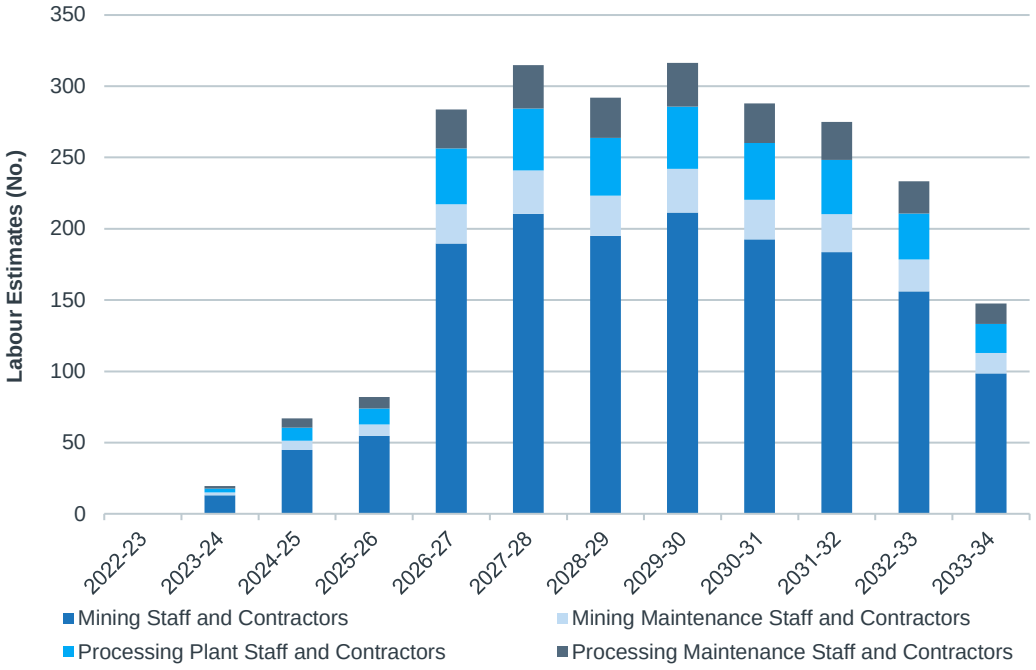
3.2.2.4 Operations Labour

Indicative estimates of employment during operations were developed based on data provided by the proponent regarding existing staffing levels and rates of production per employee (PGM, unpublished), applied to estimated future annual production levels for the Great Cobar and Gladstone deposits. Timing for operations labour (including staff and contractor labour) used for modelling is outlined in Figure 3.4.

The operations labour force includes staff at the existing processing facility at the Peak Complex for processing of gold, silver, copper, zinc and lead product. It should be recognised that the estimates of processing labour reflect a continuation of existing processing staff at the processing facility; the Project will not result in an increase or additional labour at the facility from existing levels. These estimates thereby are an indication of the existing processing jobs supported by ore produced by the Project.

Estimates of mining and processing plant labour in the graph below, including maintenance staff and contractors.

Figure 3.4. Labour Estimates per Annum, Operations – Great Cobar and Gladstone Deposits

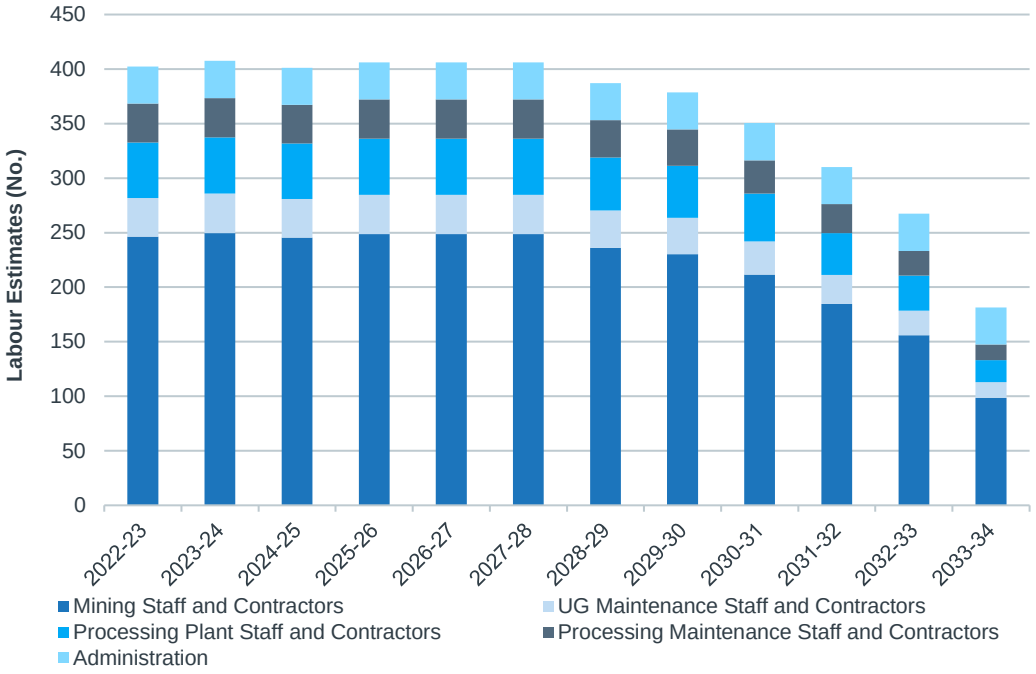


Source: PGM (unpublished), AEC.

In terms of overall levels of employment at PGM's Peak and New Cobar complexes, including administration staff there were approximately 405 FTE staff employed as of June 2020. The following figure outlines indicative estimates of mining, processing, maintenance and administration staff at PGM's Peak and New Cobar complexes through to 2033-34. As can be seen, the estimated number of operations employees at PGM's Peak and New Cobar complexes is expected to remain relatively stable at between 400 and 410 FTE staff through to 2027-28, then slowly ease to around 270 FTE staff by 2032-33 and 180 FTE staff in the last year of mining operations in 2033-34. While only the labour supported by the Great Cobar and Gladstone deposits outlined in Figure 3.4 are included in the assessment of economic impacts, Figure 3.5 below highlights that total operations employment

within the Peak and New Cobar complexes is not anticipated to materially change from existing levels until production begins to wind down in the latter part of the projection period.

Figure 3.5. Labour Estimates per Annum, Operations – Peak and New Cobar Complexes



Source: PGM (unpublished), AEC.

The mining and processing labour supported by the Project will include a mix of PGM own staff as well as contractor labour, in line with existing operations. Including mining, processing and other staff, PGM currently employs approximately one third of the workforce at the Peak and New Cobar complexes combined, with two-thirds being contractor labour (with Pybar Mining Services the primary labour contractor engaged currently). By component, contractor labour represents approximately:

- 90% of total mining labour.
- 20% of total processing labour.
- 30% of total maintenance labour (mining and processing).

For the purposes of this study, the same share between PGM and contractor labour has been assumed for the Project.

3.2.2.5 Source of Goods / Services

In developing assumptions regarding the source of workforce, it is important to understand the Project will deliver a continuation of existing mining and processing activity at the New Cobar / Peak complexes. Production from the Great Cobar and Gladstone deposits will make up for the future decline in production from existing deposits and the overall level of production at the combined complexes is not anticipated to exceed existing approved levels. This means that employment at the Great Cobar and Gladstone deposits will ramp up as employment at existing deposits winds down, and it is anticipated the existing workforce will transition to the Project.

Similarly, the processing of ore from Great Cobar and Gladstone will support ongoing employment for existing workers at the processing facility – no additional processing workers are anticipated to be required beyond what is already employed for processing.

In consideration of the above, the source of the operations workforce for the Project has been assumed to be similar to the existing workforce at PGM's operations. Data was provided by the proponent regarding where the existing workforce is sourced from.

The economic modelling thereby assumes:

- For underground mining and maintenance workers:
  - Approximately half (50%) will be residents of Cobar LGA (i.e. live and work in Cobar LGA).
  - Approximately 20% will reside elsewhere within the Catchment. These workers are assumed to operate on a drive-in drive-out (DIDO) basis, staying temporarily in Cobar LGA during their shifts.
  - The remaining 30% will be sourced from outside the Catchment (either from elsewhere in NSW or interstate). These workers are assumed to operate on a fly-in fly-out (FIFO) basis, staying temporarily in Cobar LGA during their shifts.
- For processing facility workers:
  - The majority (approximately 85%) will be residents of Cobar LGA (i.e. live and work in Cobar LGA).
  - Approximately 7.5% will reside elsewhere within the Catchment. These workers are assumed to operate on a DIDO basis, staying temporarily in Cobar LGA during their shifts.
  - The remaining 7.5% will be sourced from outside the Catchment (either from elsewhere in NSW or interstate). These workers are assumed to operate on a FIFO basis, staying temporarily in Cobar LGA during their shifts.

PGM has existing supply chains in place for underground mining and processing activities at the New Cobar and Peak complexes, and the Project will support the continuation of demand for these supply chains. For the purposes of the economic impact assessment, assumptions regarding where goods and services will be sourced from were derived from standard industry structures for the mining and processing industries aligning with activity of the Project and in consideration of the local capacity in the supply chain to meet demands.

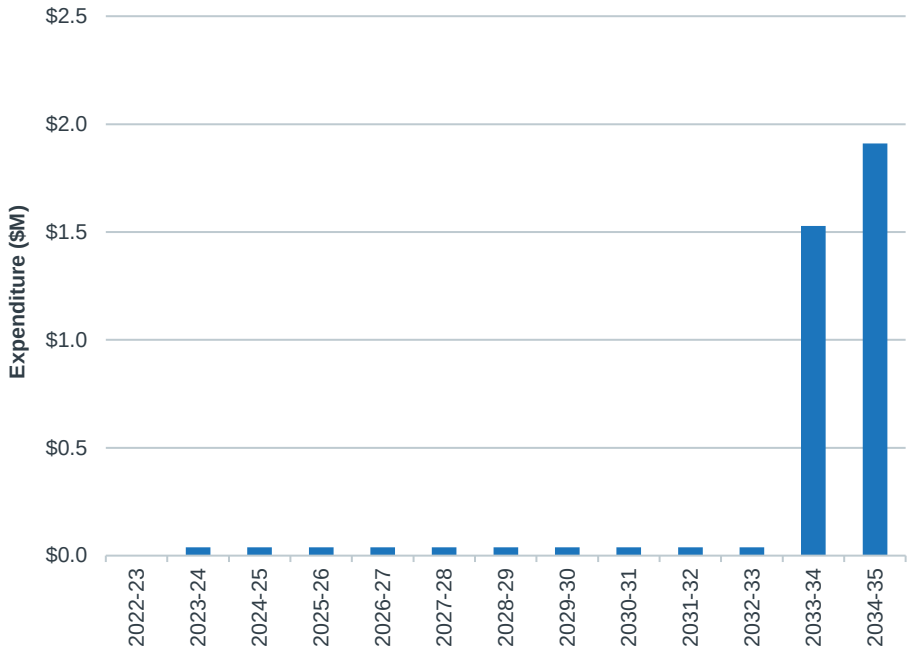
3.2.3 Post-Mining Decommissioning and Rehabilitation

Progressive rehabilitation activities will be undertaken on an ongoing basis throughout the Project life, with waste rock harvested and deployed for use in stope backfilling operations and / or surface construction / rehabilitation tasks (e.g. tailings dam lifts). This activity has been incorporated in the operating costs outlined in section 3.2.2.3.

The majority of other decommissioning / rehabilitation activity (i.e. not including backfilling) will occur following cessation of mining activities at the Great Cobar and Gladstone deposits. Information regarding the anticipated costs for decommissioning and rehabilitation works associated with the Project was provided by the Proponent, indicating total costs for decommissioning and rehabilitation of approximately $3.8 million. For modelling purposes, it has been assumed approximately 10% of this expenditure is undertaken between 2023-24 to 2032-33 (i.e. 1% per annum), 40% in 2033-34 following cessation of mining activity and the remaining 50% in 2034-35.

Decommissioning / rehabilitation labour is assumed to be entirely sourced from within the Catchment, with 80% sourced from Cobar LGA and the remainder sourced from the rest of Catchment. Figure 3.6 below demonstrates the assumed expenditure on decommissioning and rehabilitation works from 2022-23 to 2034-35.

Figure 3.6. Post-Mining Decommissioning and Rehabilitation Works Expenditure



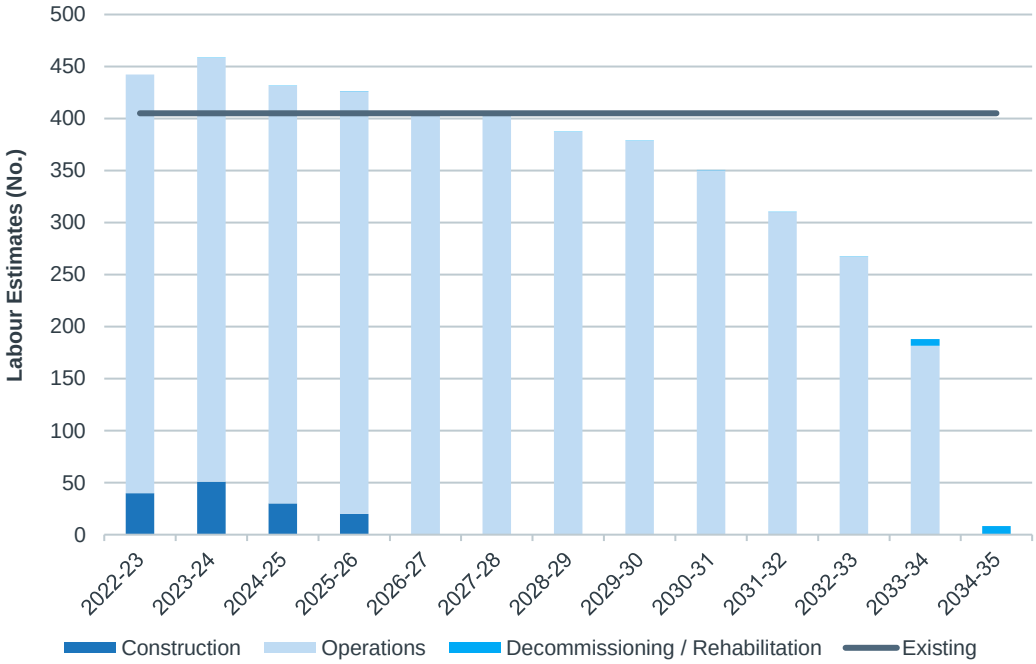
Source: PGM (unpublished), AEC.

3.3 WORKFORCE ACCOMMODATION

Mining and processing activity at the Great Cobar and Gladstone deposits is anticipated to ramp up as activity at the existing deposits wind down, with a similar overall level of activity relative to existing levels maintained. Therefore, the Project involves a transition of operating activity from existing deposits to new deposits rather than a tangible increase in overall operating activity. As a result, the Project will not result in any significant change in labour for mining, processing and maintenance at the Peak and New Cobar complexes (combined) from existing levels, as outlined in Figure 3.5 in section 3.2.2.4 above. The operational workforce at the Peak and New Cobar complexes combined is estimated to be approximately in line with existing levels for the combined complexes through to 2027-28.

The temporary construction workforce, however, will result in a small increase in labour compared to existing levels over the first four years (2022-23 to 2025-26). Figure 3.7 below outlines the estimated annual labour on-site at the Peak and New Cobar complexes combined between 2022-23 and 2034-35, including construction, operations and decommissioning / rehabilitation labour, with a comparison to existing levels of employment. Employment will peak at approximately 54 FTE workers above existing levels in 2023-24, the peak year of construction.

Figure 3.7. Indicative Estimates of Annual Labour – Peak and New Cobar Complexes



Source: PGM (unpublished), AEC.

The majority of the construction labour force is anticipated to be sourced from within the Catchment (see section 3.2.1.3), and is therefore not anticipated to require accommodation. Construction labour sourced from outside the Catchment is estimated to peak at 22 FTE workers in 2023-24, with these workers requiring temporary accommodation.

There is currently, high dwelling vacancy levels in Cobar (with unoccupied dwellings representing 20.4% of total housing stock, see section 4). Pybar, who currently supply the bulk of mining contractors to PGM, also own and operate a worker accommodation village in Cobar, with a maximum capacity for 119 occupants (Premise Pty Ltd, 2019). Given the significant capacity in the local area and relatively modest number of workers requiring accommodation it is anticipated the non-local construction workforce will be sufficiently accommodated within existing stock. As the Project will effectively represent a continuation of operations jobs at similar levels to existing workforce numbers, the operations workforce is anticipated to continue to be accommodated in line with existing accommodation arrangements with no material impact on supply.

3.4 CONSEQUENCES OF NOT PROCEEDING WITH PROJECT

In understanding the implications of the Project not proceeding it is important to note the Project will deliver a continuation of mining and processing activities within the New Cobar and Peak complexes. Remaining economic resources at approved deposits in the New Cobar and Peak complexes are nearing depletion, and without the Project it is anticipated that PGM's operating activity would wind down in the near future. With the Project, mining and processing activity and supply contracts will continue to be delivered in the region, with a retention of activity in the region as production at existing approved operations winds down.

The Project thereby represents an important contributor to maintaining and extending activity and jobs supported by PGM's New Cobar and Peak complexes into the early 2030s. Where the Project does not proceed, the economic contribution by PGM to the local and State economies would reduce considerably in the near future and the contribution to be delivered by the Project would not be realised. All economic modelling undertaken in this study (i.e. IO modelling and CBA) presents a comparison of Project impacts against a base case where the Project does not proceed. These analyses present the net change that would occur due to the Project, compared to this base case.

4. EXISTING ECONOMIC ENVIRONMENT

This section provides a summary of the economic environment of the Catchment and Cobar LGA based on the most recent data available at the time of writing. An indication of the impacts of COVID-19 has been provided where possible. The analysis and findings presented in this section are supported in more detail in Appendix A.

The following are key attributes of the Catchment and Cobar LGA's existing environment:

- **The Catchment has recorded consistently lower population growth than the State:** The Catchment recorded an estimated resident population of approximately 151,400 people in 2019, equating to 1.9% of the New South Wales population. Whilst annual population growth fluctuated between the years, the Catchment recorded average annual population growth of 0.4% between 2001 and 2019 (0.8 percentage points lower than the State). Whilst many small, rural areas in regional New South Wales has experienced negative net migration in recent years, the Catchment recorded positive net migration in 2018, where 36.3% of the population change can be attributed to migration.
- **Population growth is anticipated to remain low in the Catchment to 2041:** While the Catchment's resident population is expected to continue to increase, the annual growth rate is projected to remain lower than the State, averaging 0.3% per annum to reach approximately 162,700 people in 2041.
- **Cobar LGA's population has recorded an annual decline for over a decade, with this decline expected to continue to 2041:** Bar a small uptick in 2006, Cobar LGA's population steadily declined between 2001 and 2019, from around 5,100 residents in 2006 to around 4,660 in 2019, averaging a decline of 0.5% per annum on average. The declining population in Cobar LGA is consistent with the experience of many small, rural areas across NSW and Australia over the past few decades. Cobar LGA's population is projected to continue to decline by approximately 0.5% per annum through to 2041.
- **The Catchment's economy is heavily influenced by fluctuations in mining and agricultural activity:** In 2018-19, the Catchment recorded Gross Regional Product (GRP) of approximately $11.2 billion in chain volume terms. Annual growth between 2006-07 and 2018-19 has been volatile, primarily influenced by fluctuations in the Catchment's two largest contributing industries to GRP, mining and agriculture, which contributed to 16.8% and 8.7% of total sector Gross Value Added (GVA) activity, respectively, in 2018-19.
- **Cobar LGA's economy is heavily reliant on mining industry activity:** In 2018-19, Cobar LGA accounted for 7.4% of the Catchment's GRP. Cobar LGA's economy recorded significant fluctuations between 2006-07 to 2018-19 due to its high reliance on mining industry activity (75.8% of total sector GVA in Cobar LGA).
- **Employment in the Catchment contracted between 2009-10 and 2014-15, but has since recovered:** The number of workers in the Catchment (by place of work) displayed growth between 2006-07 and 2009-10 to a peak of nearly 43,100 jobs, but then contracted considerably over the next five years to around 40,100 jobs in 2014-15. Employment growth has since recovered to reach approximately 42,660 workers in 2019. The largest employing industry in the Catchment is healthcare and social assistance, representing 16.5% of jobs in 2018-19, followed by agriculture, forestry, and fishing (11.3%) and retail trade (9.1%).
- **Mining directly employs more than 40% of jobs in Cobar LGA:** Cobar LGA represented 5.7% of the Catchment's total employment in 2018-19. The mining industry is the largest employer in Cobar LGA, directly employing 42.4% of jobs in the LGA in 2018-19. Mining jobs in Cobar LGA have increased from just over 900 jobs in 2006-07 to more than 1,000 jobs in 2018-19; however, over this same period employment in all other industries (in aggregate) has declined from 1,580 jobs to 1,390.
- **The unemployment rate in the Catchment and Cobar LGA has trended well below that of the State:** As of March 2020, the unemployment rate in the Catchment equated to 2.8% (lower than the 4.6% recorded for NSW). Cobar LGA recorded an even smaller unemployment rate for this quarter, at 1.3%. Unemployment rates in the Catchment and Cobar LGA have generally been well below NSW since June 2006, which is consistent with many regional and rural areas across NSW and Australia, in particular mining areas such as Cobar LGA.

This is partly due to the importance of job prospects in attracting and retaining population in these regions, with many people leaving the region when jobs are unavailable.

- **The Catchment and Cobar LGA's economies and employment were not as heavily impacted by the COVID-19 pandemic as that for the State:** Indicative estimates suggest, as of 22 September 2020, the pandemic resulted in a decline of approximately $215 million in GVA in the Catchment, or 2.2%, compared to a decline of 3.1% for the State. Similarly, the pandemic resulted in a decline of approximately 2,200 workers in the Catchment, equating to a 3.3% decline, compared to the 3.9% decline recorded by the State. In contrast to the Catchment overall, Cobar LGA has recorded a small ($7 million) increase in total GVA (or 1.0%), indicating that mining activity has been sustained throughout the pandemic and supported the local economy, though despite the small increase in GVA the LGA has experienced a reduction of approximately 35 jobs.
- **Businesses are increasingly applying for JobKeeper in the Catchment and Cobar:** In the Catchment, approximately 5,000 businesses applied for JobKeeper in April, followed by approximately 5,400 businesses in May, and 5,500 in June (Treasury, 2020). In Cobar, approximately 220 businesses applied for JobKeeper in April, 230 in May, and 240 in June. There is potential that some of the small-medium businesses covered by the JobKeeper payment may struggle to recover once the payment has ended.
- **The Catchment is both highly self-sufficient and self-contained:** The Catchment is 94.7% self-sufficient, indicating that the majority of jobs in the local area are held by residents and there is an appropriate match between skillsets held by residents and the jobs that are available. This is largely due to the high number of healthcare and social assistance workers who live and work in the Catchment, representing the service centre nature of the Orange and Dubbo Regional within the Catchment. The Catchment has a higher self-containment rate (96.6%), reflecting that the vast majority of residents of the Catchment found suitable work in their region of residence, or relocated to the region for work purposes.
- **Cobar LGA is largely serviced by local labour:** Within the Catchment, approximately 2,344 people worked in Cobar. Of this, 2,056 people lived and worked in the area, whilst 288 people were classified as imported labour. Imported labour was particularly evident in the mining and agriculture, forestry, and fishing industries.
- **Residential approval activity has subdued in recent years:** Residential approval volumes in the Catchment have experienced a decline in recent years, by 3.1% on average per annum since 2012-13 (compared to growth of 1.5% for NSW). This contraction is indicative of reduced dwelling development in the region, which is reflective of low levels of population growth and demand for housing stock. Despite the reduced demand for residential dwellings, residential approval values have increased by 0.6% over the same period, though this still lags the growth recorded by the State (4.7%). Cobar LGA recorded a more significant decline in demand for residential dwellings over the 2012-13 to 2019-20 period, with residential approval volumes declining by 15.8% since 2012-13, whilst values declined by 13.9% (these percent changes are off small volumes and hence are not indicative of significant residential development activity). This is consistent with the steady population decline Cobar LGA has experienced in recent years.
- **Within the Catchment, housing and rental market activity is primarily centred in Dubbo Regional and Orange LGAs:** Since June 2017, the majority of house sales activity occurred in the key service centres of Dubbo Regional and Orange LGAs, which averaged between 200 and 210 sales per quarter each. Cobar recorded fewer than 30 sales in each quarter over the same period. In the Catchment, the number of sales per quarter has declined over the quarters since June 2017, however, sales prices have generally increased (with the exception of Cobar LGA and Dubbo Regional LGA). Property market activity prospects remain subdued; CoreLogic (2020) revealed that whilst regional areas have recorded higher growth in dwelling values than cities, there has still been a slowdown in property market activity as a result of the pandemic.
- **Vacancy rates are significantly higher in Cobar LGA than New South Wales on average:** Approximately 20.4% of Cobar LGA's housing stock is comprised of unoccupied private dwellings, compared to 11.4% for the Catchment and 9.3% for the State.

5. LOCAL EFFECTS ANALYSIS

The following section examines the economic impacts of the Project within the Catchment (i.e. analysis of local effects), as well as impacts to the State of NSW for context. Impacts to Australia are also examined where relevant and appropriate, noting the vast majority of impacts will occur within NSW.

This analysis uses economic modelling as well as findings from the literature review and existing environment to inform the assessment of economic impacts as appropriate. **All modelling outcomes are presented in 2020 Australian dollar values** unless otherwise specified. IO modelling has been used in modelling impacts to the Catchment and State (modelling of impacts to the rest of Australia have not been reported as the vast majority of impacts will occur within NSW). The modelling outcomes identified throughout this impact assessment depict the impact value of a range of economic indicators anticipated as a result of the Project. A description of the IO modelling framework used is provided in **Appendix B**.

Modelling results used in this section present both direct (i.e. the **initial stimulus** from the Project) and flow-on (i.e. **production-induced**) impacts of the Project. Only the production-induced flow-on impacts are included (i.e. type I flow-on), which reflects the first round supply chain impacts as well as the second and subsequent round effects of increased purchases by suppliers in response to increased sales resulting from demand for goods and services from the mine and associated infrastructure manufacturing and development activity. Household consumption induced flow-on impacts (i.e. type II flow-on impacts) are excluded from this analysis to provide a more conservative estimate of impacts.

IO modelling has been conducted for construction, operations and decommissioning / rehabilitation phase activities separately. The direct activity associated with each phase (construction, operations and decommissioning/ rehabilitation) is outlined in section 3.2. In reporting impacts:

- Construction phase impacts have been assessed and reported in aggregate over the four year construction phase, between 2022-23 and 2025-26.
- Operations phase activities have been assessed and reported as an average annual impact between 2026-27 and 2032-33, reflecting the period in which the bulk of production activity will occur (with over 86% of mined ore extracted during this period).
- Decommissioning and rehabilitation phase impacts have been assessed and reported in aggregate over the entire decommissioning and rehabilitation phase, to 2034-35.

Annual estimates of total Project impacts have also been presented, reflecting the annual direct and flow-on impacts on key measures from all phases in combination.

In interpreting results of the modelling, it is important to note that the Project is intended to extend the life of mining activity within the New Cobar Complex as well as processing activity within the Peak Complex, rather than tangibly change the level of activity from existing levels. As such, the operations activity presented in this section reflect the level of ongoing economic activity that will continue to be supported in the Catchment that otherwise would be lost, rather than a lift in activity compared to existing levels. The modelling has also not included any downstream uses of the precious metals produced by the Project on the basis that much of this activity will occur outside NSW, and may continue without the Project where alternative supply is sourced.

5.1 CONTRIBUTION TO THE ECONOMY

The Project will generate economic activity directly through the construction of the mine and supporting infrastructure, extraction, processing and transport of mined product during operations, and through onsite rehabilitation / decommissioning activities during and post-mining activity. Economic activity will also be supported through the supply of goods and services to support the Project across all these phases (flow-on activity). Impacts of the Project on gross product across construction, operation and decommissioning / rehabilitation phases are examined in this section. The analysis disaggregates impacts between:

- GRP for impacts accruing in the Catchment.
- Gross State Product (GSP) for impacts accruing in the rest of NSW (or when referring to the total NSW impact, this includes the Catchment and rest of NSW impact in aggregate).

Gross product (e.g. GRP / GSP) refers to the value of goods and services produced after deducting the costs of intermediate purchases of goods and services used as inputs in the production process. That is, gross product defines the true net economic contribution of a project (or value added).

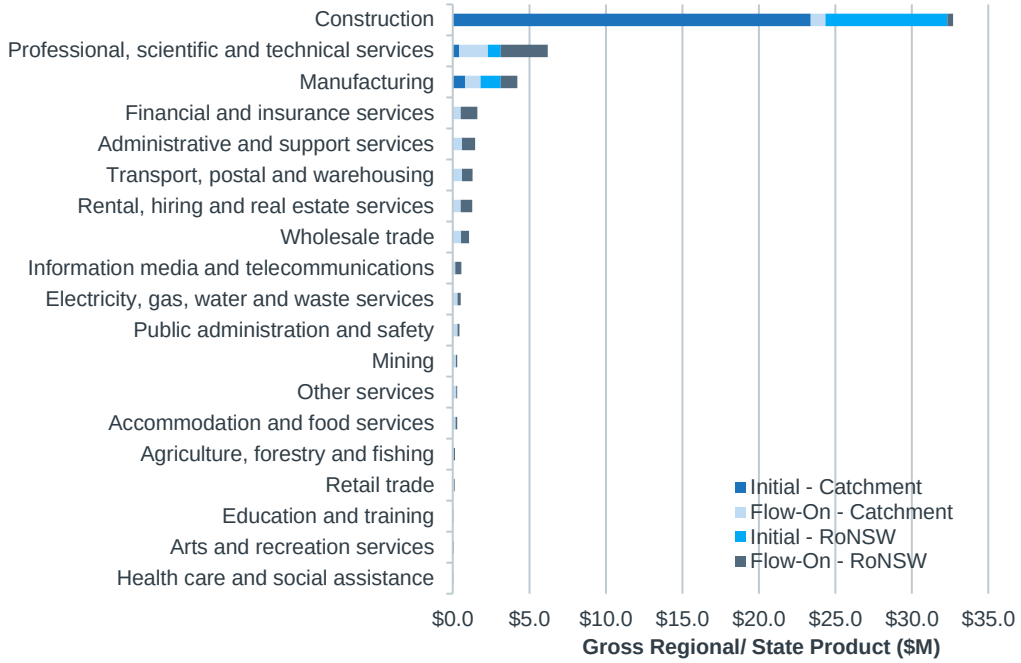
5.1.1 Construction Phase Impacts

The construction phase of the Project is expected to commence in the 2022-23 financial year and end in 2025-26. The Project is estimated to generate a total of $32.8 million in GRP in the Catchment economy during the four year construction phase, including $24.6 million through direct activity and $8.1 million through production-induced flow-on impacts.

An additional $19.7 million in GSP is estimated to be generated in the rest of NSW, $10.1 million of which will be supported by direct activity and $9.6 million through flow-on activity.

The following figure (Figure 5.1) outlines the quantum of GRP / GSP supported in aggregate during the construction phase, by industry. The construction industry is estimated to receive over 60% of total GSP impacts from construction, with professional, scientific and technical services (12%) and manufacturing (8%) the other main industries estimated to receive a boost in activity.

Figure 5.1. GRP / GSP ($M) Supported During Construction Phase, Aggregate Impacts (2022-23 to 2025-26)



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

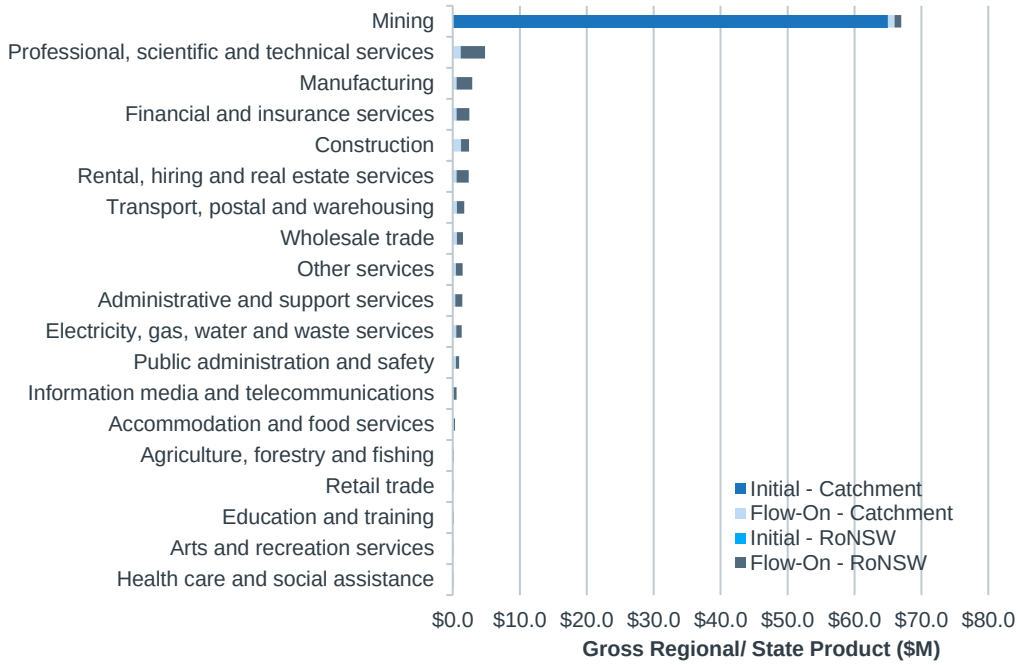
5.1.2 Operations Phase Impacts

The Project is anticipated to commence operations in 2023-24 with mining and processing activities expected to continue through to 2033-34. As outlined in section 3.2.2, the bulk of mining activity will occur between 2026-27 and 2032-33, with approximately 4.15 million tonnes of ore extracted from the Great Cobar and Gladstone deposits during this period (86% of total).

During this peak period of production (2026-27 to 2032-33) the Project is estimated to support an average of $73.4 million in GRP in the Catchment per annum, including $65.0 million supported directly through mining and processing activity and $8.4 million supported through flow-on activity. An additional $18.2 million in GSP per annum is estimated to be supported in the rest of NSW through flow-on activity.

Figure 5.2 outlines the quantum of GRP and GSP supported on average each year during the peak period of production (2026-27 to 2032-33), broken down by industry. The mining industry is estimated to record approximately 73% of total GSP impacts during operation, the majority a result of direct Project operating activity. The professional, scientific and technical services industry is estimated to produce almost $5 million per annum on average in GSP as a result of flow-on activity, while a number of industries are estimated to produce more than $2 million per annum on average.

Figure 5.2. GRP / GSP ($M) Supported During Operations Phase, Average Annual Impacts During Peak Operations (2026-27 to 2032-33)



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

Over the entire operational period between 2023-24 and 2033-34 the Project is estimated to support a total of $595.3 million in GRP within the Catchment (including $525.6 million directly and $69.7 million through flow-on activity), with a further $150.2 million supported through flow-on activity in the rest of NSW.

5.1.3 Decommissioning and Rehabilitation Phase Impacts

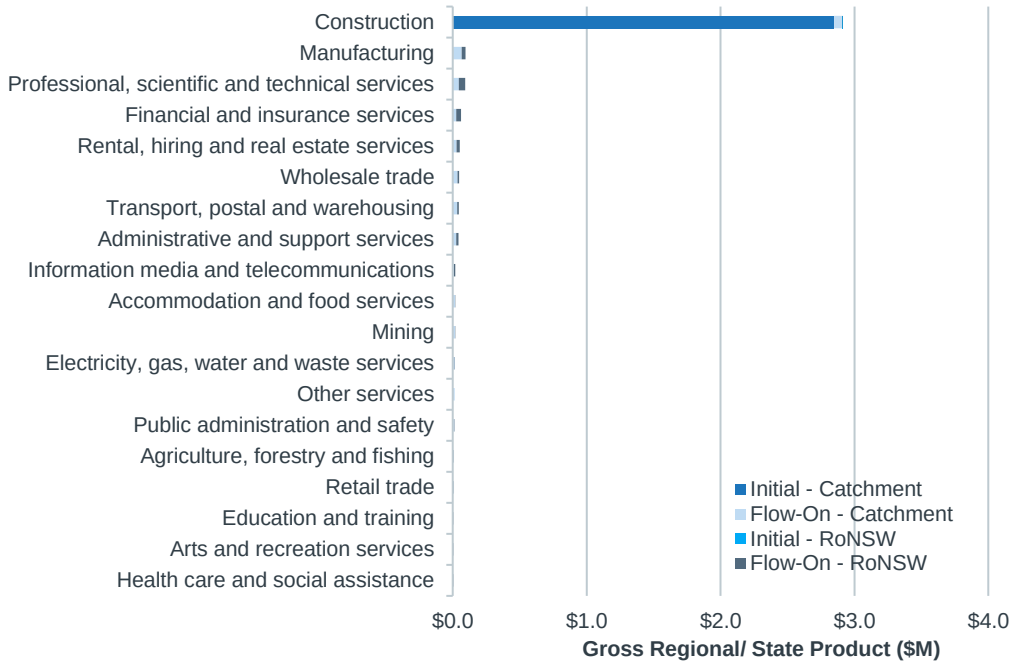
The use of waste rock for stope backfilling and surface construction / rehabilitation activities has been incorporated in the operating phase impacts outlined in section 5.1.2. The majority of other decommissioning / rehabilitation activity (i.e. not including backfilling) will occur following cessation of mining activities at the Great Cobar and Gladstone deposits, with some minor works progressively undertaken during operations phase activity. Information regarding the timing of activities is outlined in section 3.2.3.

The expenditure and activity for the decommissioning / rehabilitation phase (excluding stope backfilling) is estimated to support $3.3 million in GRP in the Catchment in aggregate between 2023-24 and 2034-35, with the

majority of this occurring in the 2033-34 and 2034-35 financial years. This includes $2.8 million directly through decommissioning / rehabilitation phase activities, with $0.4 million supported through flow-on activity. An additional $0.2 million in GSP is estimated to be supported in the rest of NSW through flow-on activity.

Figure 5.3 outlines the quantum of GRP and GSP supported in aggregate through decommissioning and rehabilitation phase activities between 2023-24 and 2034-35), broken down by industry. The construction industry is estimated to account for around 85% of total contribution to GSP from decommissioning and rehabilitation phase activities.

Figure 5.3. GRP / GSP ($M) Supported During Decommissioning / Rehabilitation Phase, Aggregate Impacts (2023-24 to 2034-35)



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

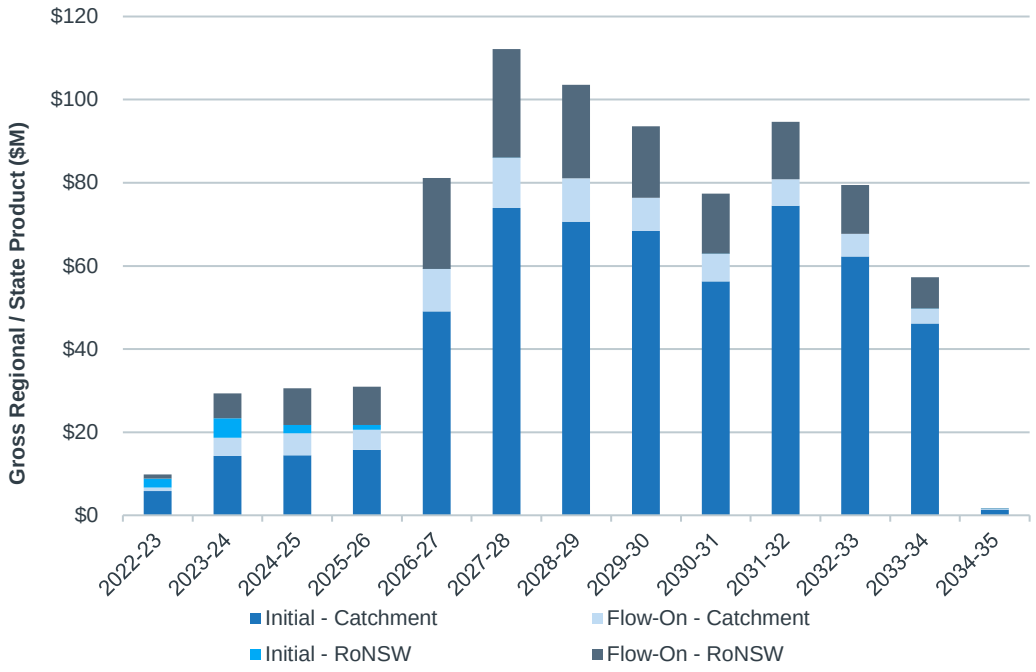
5.1.4 Annual Impacts on GRP / GSP

Modelling outcomes of the annual impacts of the Project on the Catchment's GRP and NSW GSP between the commencement of construction through to the completion of operations and decommissioning / rehabilitation are presented in Figure 5.4, based on the timing of these phases outlined in the Project overview and assumptions (section 3.2). Both direct and flow-on impacts of the Project are presented.

The contribution to GSP will increase from around $10 million in 2022-23 (first year of construction) to around $30 million each year between 2023-24 and 2025-26, as construction activity and initial operational phase activities overlap. The contribution to GSP is then estimated to spike to $81 million in 2026-27, as production at the Gladstone and Great Cobar deposits ramps up, peaking in 2027-28 at $112 million. The contribution to GSP is estimated to be between $77 million and $103 million per annum between 2028-29 and 2032-33, then fall to around $57 million in 2033-34 as production winds down and ceases during this year. A contribution of approximately $2 million in estimated in 2034-35 as a result of decommissioning and rehabilitation activities.

In total, the Catchment is estimated to capture approximately 79% of the total contribution to GSP, with the rest of NSW accounting for approximately 21%.

Figure 5.4. Annual Impact on GRP / GSP in the Catchment and Rest of NSW



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

5.2 CONTRIBUTION TO EMPLOYMENT AND WAGES

This section examines the modelled impacts of the Project on employment across the construction, operations and decommissioning / rehabilitation phases of the Project, including direct and production induced flow-on impacts. It also outlines modelled estimates of incomes (i.e. wages and salaries) paid to employees. In interpreting the results in this section, it should be noted that:

- The Project will, effectively, extend the life of mining operations in the Catchment with minimal change in overall employment when comparing to existing mining and processing activity at the Peak and New Cobar complexes combined. The operations phase of the Project can largely be considered as retaining jobs (both directly and through supply chain impacts) in the Catchment that otherwise may be lost (though construction activity will represent an increase over existing activity).
- COVID-19 is having a significant short-term impact on the NSW and Catchment economy and labour market, and these impacts are anticipated to continue to be felt in the longer-term (as outlined in section 4). This Project will provide an important boost to both the Catchment and NSW, supporting jobs and economic growth at a time where such stimulus is required to stabilise the State economy.

5.2.1 Construction Phase Impacts

Estimates of the direct workforce required for construction phase activity of the Project are based on data from PGM (unpublished), as outlined in section 3.2.1.2. Flow-on estimates of employment during construction were developed using assumptions of construction activity outlined in section 3.2.1 and IO multipliers.

Overall, the construction phase is estimated to directly support:

- 141 full time equivalent (FTE)[3] on-site construction workers over the four year construction period between 2022-23 and 2025-26, 92 FTEs of which are estimated to be sourced from the Catchment, 31 sourced from elsewhere in NSW, and 18 sourced from rest of Australia.

[3] Where one FTE is equivalent to one person working full time for a period of one year.

- 10 FTE jobs supported in the professional, scientific and technical services in NSW between 2022-23 and 2023-24, three of which are assumed to reside in the Catchment.
- 20 FTE jobs supported in the specialised and other machinery and equipment manufacturing industry in NSW between 2022-23 and 2025-26, eight of which are assumed to reside in the Catchment.

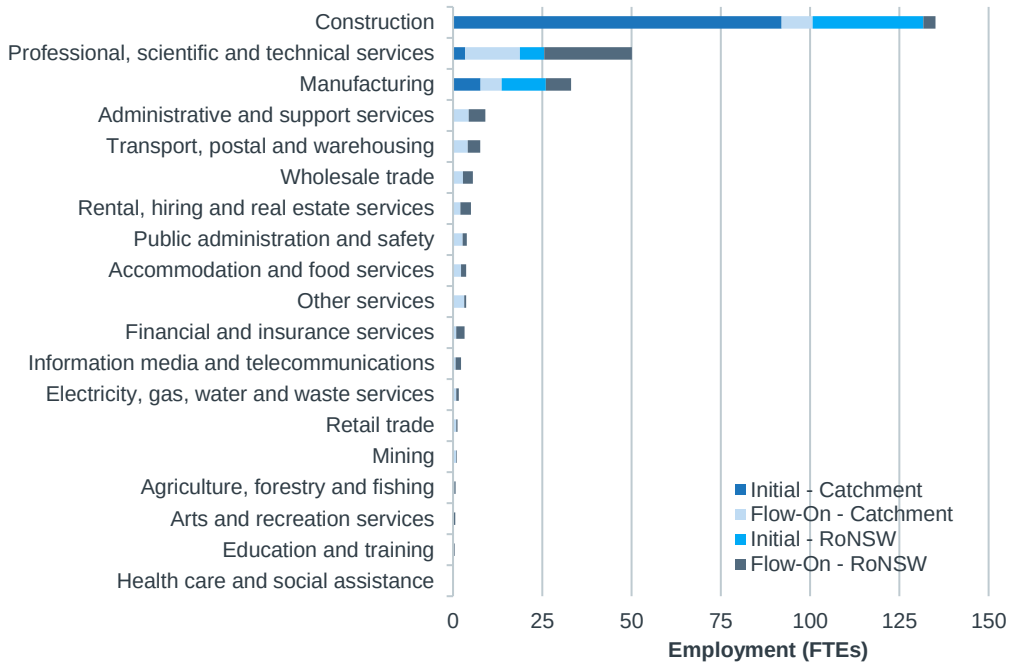
For construction phase impacts, on-site construction workers sourced from outside the Catchment have not been included in the Catchment impacts on the basis that construction jobs are highly mobile and short-term in nature, and these workers are likely to primarily operate out of their usual place of residence / business location. The same approach has been used in estimating NSW employment impacts for workers sourced from outside NSW.

The construction phase of the Project is estimated to support 159 FTE jobs for local residents in the Catchment in total over the course of the four year construction phase (2022-23 to 2025-26), 103 of which will be supported directly by the Project with a further 56 FTE jobs supported through flow-on activity. This is estimated to support a total of $21.8 million in wages and salaries in the Catchment (including direct and flow-on activity).

An additional 108 FTE jobs are estimated to be supported by construction phase activity in the rest of NSW, including 50 FTE jobs directly and 58 FTE jobs through flow-on impacts. These jobs will pay an additional $12.7 million in wages and salaries. It is anticipated 31 of these jobs will reflect construction workers directly employed by the Project and working on-site but sourced from outside the Catchment.

A breakdown of construction phase impacts on employment across industries in the Catchment and rest of NSW is presented in Figure 5.5. The majority of jobs during construction in the Catchment and rest of NSW are expected to be employed in the construction industry.

Figure 5.5. Employment (FTEs) Supported During Construction Phase, Aggregate Impacts (2022-23 to 2025-26)



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

5.2.2 Operations Phase Impacts

Estimates of the direct operations workforce are based on information provided by PGM (unpublished), as outlined in section 3.2.2.4. Flow-on estimates of employment during operations were developed using assumptions of operational activity outlined in section 3.2.2 and IO multipliers.

Unlike construction phase employment impacts, workers sourced from outside the Catchment for mining and processing activities are included within the Catchment's employment impacts. These workers are included given

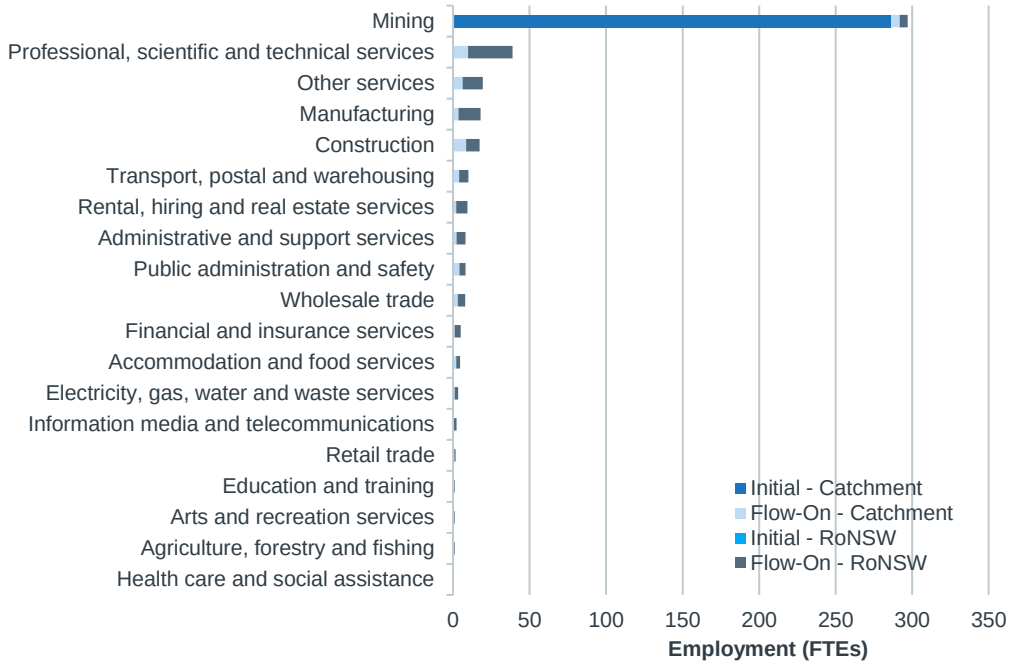
the jobs provided represent longer-term jobs located in the Catchment and these workers will thereby secure employment and incomes from the Catchment in the longer-term, despite needing to travel for work during shifts.

During the period of peak production between 2026-27 and 2032-33 the Project is estimated to support an average of 342 FTE jobs annually in the Catchment, 286 of which will be supported directly by mining and processing activities and 56 through flow-on activity. This is estimated to support a total of $59.5 million in wages and salaries in the Catchment (including direct and flow-on activity).

An additional 112 FTE jobs per annum are estimated to be supported in the rest of NSW during peak operational activity between 2026-27 and 2032-33, through flow-on impacts. These jobs are estimated to support an average of $10.2 million in employee incomes each year over this period.

The mining industry will account for around 65% of jobs supported in NSW during peak operations, with around 9% in the professional, scientific and technical services industry (Figure 5.6).

Figure 5.6. Employment (FTEs) Supported During Operations Phase, Average Annual Impacts During Peak Operations (2026-27 to 2032-33)



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

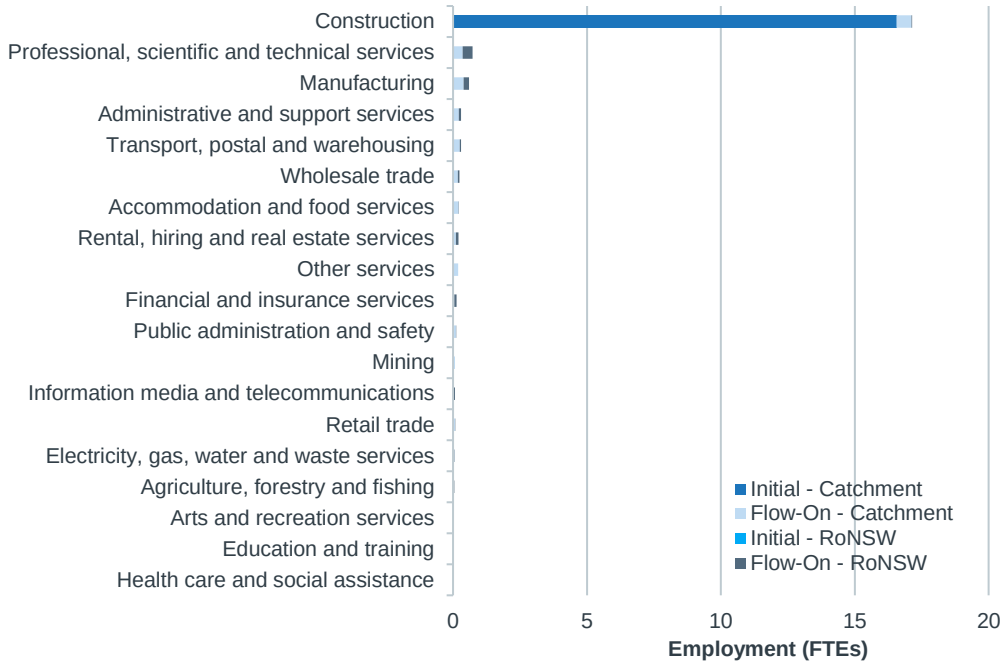
Of the 286 average annual FTEs directly employed for mining and processing activities in the Catchment between 2026-27 and 2032-33, 216 are estimated to be sourced from local residents of the Catchment, 48 sourced from elsewhere in NSW, and 22 from elsewhere in Australia.

5.2.3 Decommissioning and Rehabilitation Phase Impacts

Jobs supported by stope backfilling have been incorporated in the operating phase impacts outlined in section 5.2.2. Other decommissioning / rehabilitation activity is estimated to support 19 FTE jobs in the Catchment in aggregate between 2023-24 and 2034-35 (17 FTEs directly and the remainder through flow-on activity), with the majority of these jobs supported in 2033-34 and 2034-35. These jobs will support a total of $2.7 million in wages and salaries during the decommissioning / rehabilitation phase in aggregate. One additional FTE jobs will also be supported in the rest of NSW, paying $0.1 million in wages and salaries.

Around 85% of total FTE jobs supported in NSW by decommissioning / rehabilitation phase activities will be within the construction industry (Figure 5.7).

Figure 5.7. Employment (FTEs) Supported During Decommissioning / Rehabilitation Phase, Aggregate Impacts (2023-24 to 2034-35)



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

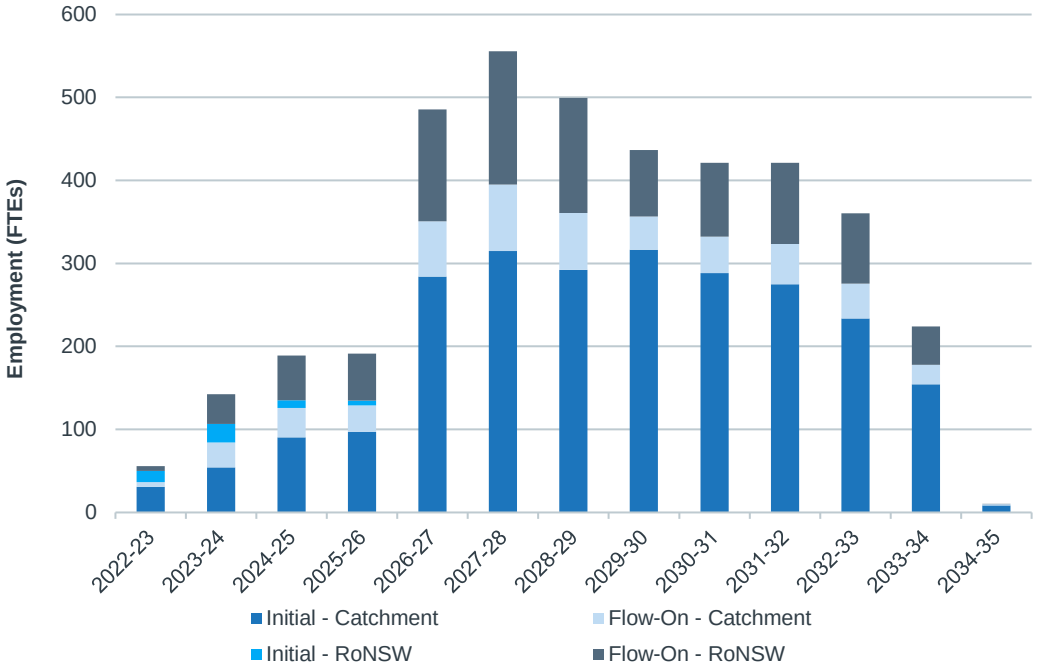
5.2.4 Annual Impacts on Employment

Annual employment impacts are presented in Figure 5.8 and follow a similar path as annual impacts on GRP / GSP outlined in section 5.1.4, with the number of jobs supported spiking between 2026-27 and 2028-29 during peak production and operations. Including direct and flow-on activity:

- Over 50 FTE jobs are estimated to be supported in NSW in the first year of construction (2022-23), increasing to between 140 FTE jobs and 190 FTE jobs between 2023-24 and 2025-26 as construction activities are completed and overlaps with initial operational activity over this period.
- FTE jobs supported in NSW are then estimated to spike to between 485 and 560 FTE jobs during peak operations between 2026-27 and 2028-29, then ease to between 420 and 435 FTE jobs per annum over the period from 2029-30 to 2031-32.
- Employment is then estimated to fall to around 360 FTE jobs in 2032-33 and then 225 FTE jobs in 2031-32 as production winds up and ceases, with around 10 FTEs supported in 2034-35 for decommissioning and rehabilitation activities.

Over 80% of jobs supported in NSW will be within the Catchment, with the remainder in the rest of NSW.

Figure 5.8. Annual Impact on Employment (FTEs) in the Catchment and Rest of NSW

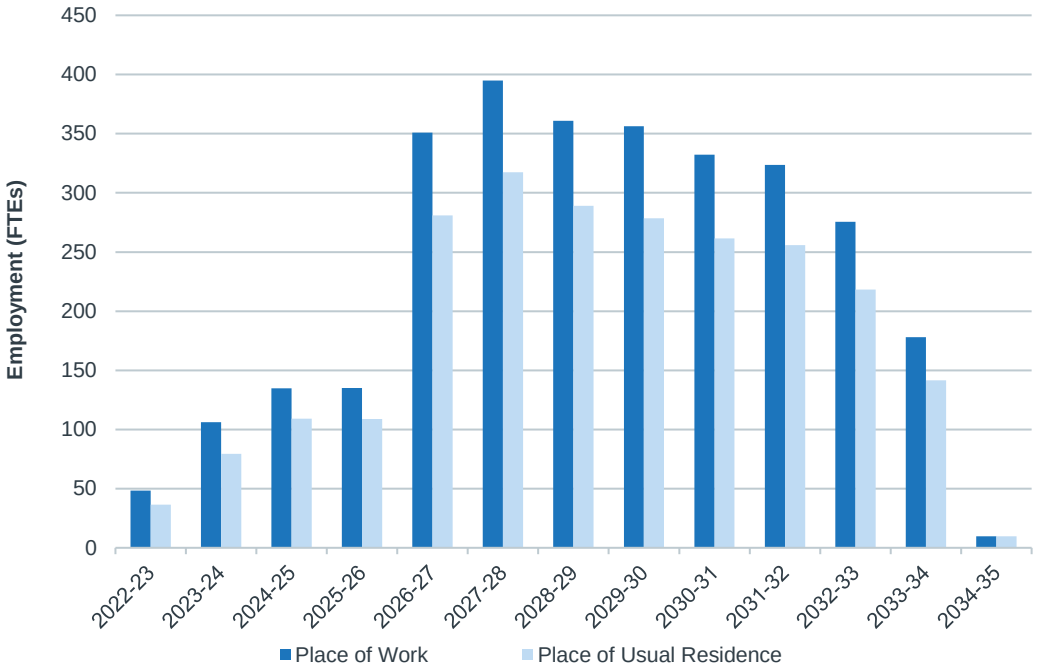


Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

5.2.5 Place of Work vs Place of Usual Residence Jobs

Figure 5.9 shows the annual impact on employment in the Catchment by place of work compared to place of usual residence, including direct and flow-on impacts, based on information provided by PGM (unpublished) and modelled outcomes. Including direct and flow-on impacts, around 75% to 80% of total jobs supported in the Catchment during construction, operations and decommissioning / rehabilitation phases are estimated to be filled by locals.

Figure 5.9. Annual Employment (FTEs) Impacts, Catchment, Place of Work vs Place of Usual Residence



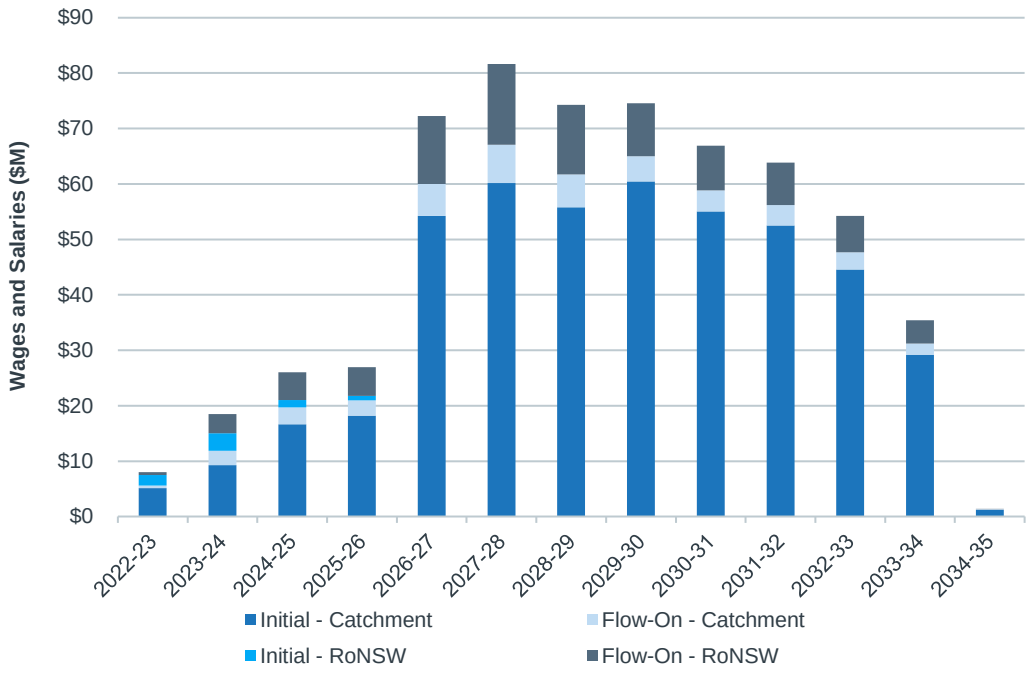
Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

5.2.6 Impacts on Incomes

A total of $604 million in wages and salaries is estimated to be paid to workers in NSW either directly engaged by the Project or engaged through flow-on activity between 2022-23 and 2034-35, across the combined construction, operations and decommissioning / rehabilitation phases. Of this, approximately 84% ($507 million) of total wages and salaries paid in NSW as a result of the Project will be for jobs in the Catchment, and 16% ($97 million) in the rest of NSW.

Annual estimates of wages and salaries paid to employees is presented in Figure 5.10, highlighting incomes paid will peak at $82 million in 2027-28, in line with the peak year of employment.

Figure 5.10. Annual Impact on Incomes in the Catchment and NSW



Note: RoNSW = Rest of NSW.
Sources: ABS (2012; 2017; 2020e; 2020f; 2020g), DoESE (2020), PGM (unpublished), AEC.

The income estimates above include all incomes paid to mining and processing workers directly engaged by the Project, however, some of these incomes of non-locally sourced workers will be repatriated to their place of residence. Of the $507 million of total wages and salaries paid for jobs in the Catchment, approximately $443 million reflects incomes for mining and processing workers of which:

- $339 million will be paid to local workers.
- $72 million to workers sourced from the rest of NSW.
- $32 million will be paid to workers from outside NSW.

5.3 IMPACTS TO BUSINESSES

5.3.1 Benefical Impacts

5.3.1.1 Benefits to Business Upstream in the Supply Chain

PGM has in place an extensive supply chain for their existing operations in the Peak and New Cobar complexes. The Project will extend the mining and processing activities at these complexes and thereby enable continued support and opportunities for suppliers in the Catchment and NSW that otherwise would be lost, providing additional security and longevity of business incomes (and employment). The Project will also create opportunities to secure new contracts and increase sales to supply and service the needs of the Project through flow-on impacts in the supply chain, during all phases of the Project.

The construction phase is estimated to support business revenues for local businesses within the Catchment of approximately $40.7 million through direct construction activity. Flow-on supply chain impacts during construction are estimated to support an additional $18.1 million in business revenue in the Catchment. An additional $37.4 million in business revenues are estimated to be supported in the rest of NSW through direct and flow-on activity.

During operations, the Project is estimated to support approximately $18.4 million in business revenues per annum on average in the Catchment through flow-on activity during the peak period of production (2026-27 to 2032-33), with a further $39.5 million in revenues supported for businesses in the rest of NSW.

These business revenues in the Catchment and rest of NSW would not be supported without the Project.

5.3.1.2 Benefits to Business Downstream in the Supply Chain

PGM is an important supplier of gold and silver doré as well as gold, silver, lead, zinc and copper concentrates, primarily for domestic refining and production (with refined product then sold / used domestically or for export). The Project will enable PGM to continue to supply product to meet the demands of their customers over the next decade. Without the Project these customers would be required to source product from alternative suppliers (which may be expected to place upward pressure on input costs for these customers), or potentially reduce their own production where appropriate alternative supply is unable to be sourced. To this end the Project can be seen as important for the longer-term security of supply of precious metals for domestic production, while also supporting domestic transport and logistics business for the transport of doré and concentrates to customers.

5.3.2 Adverse Impacts

5.3.2.1 Impacts on Business from Competition for Resources

While the Project will provide opportunities for businesses within the mining supply and value chain, some businesses and industries may be adversely impacted by the Project. For instance, mining Projects typically compete with industries such as manufacturing and construction for labour as these industries have similar skill sets, which can drive up costs for labour in these industries. The Project can also lead to increases in other costs of business as competition for goods and services drives input prices up.

The flow-on impacts of the Project presented in the economic modelling do not account for potential adverse impacts on business and industry due to the above factors. However, given the Project will primarily result in an extension of existing mining and supply chain activity, the impacts of the Project in terms of demand for resources are expected to overwhelmingly be positive in nature (through the ongoing support for jobs and suppliers, see section 5.3.1) and it is anticipated any adverse impacts of the Project on other businesses will be unlikely to be noticeable in the context of existing market conditions.

5.4 CONTRIBUTION TO GOVERNMENT REVENUES

5.4.1 Approach

Estimates of taxation revenue to the NSW and Australian Government have been developed based on benchmarks of taxation revenue received compared to relevant NSW and Australian measures and applied to results from IO modelling for NSW[4]. The following benchmarks were applied by taxation item:

- Personal income tax (Australian Government): total income tax received (ABS, 2020f) compared to total wages and salaries paid to Australian employees (ABS, 2020g; ABS, 2020h) between the financial years of 2009-10 and 2018-19. This was applied to estimates of incomes paid in NSW from the IO modelling.

[4] Modelling results for NSW were used for Australian Government revenue impacts as modelling for Australia was not undertaken. As the Project is anticipated to primarily source goods, services and labour from NSW the vast majority of impacts are anticipated to occur within the NSW economy and as such the NSW results are considered a reasonable approximation for the national impact.

- Fringe benefits tax (Australian Government): total fringe benefits tax received (ABS, 2020f) compared to total wages and salaries paid to Australian employees (ABS, 2020g; ABS, 2020h) between the financial years of 2009-10 and 2018-19. This was applied to estimates of incomes paid in NSW from the IO modelling.
- Company income tax (Australian Government): total company tax received (ABS, 2020f) compared to total gross profit of businesses in Australia (i.e. total GDP less total wages and salaries paid to employees) (ABS, 2019a; ABS, 2020g; ABS, 2020h) between the financial years of 2009-10 and 2018-19. This was applied to estimates of GDP less incomes paid in NSW from the IO modelling.
- Goods and Services Tax (GST) (Australian Government): total GST received (ABS, 2020f) compared to total Australian GDP (ABS, 2019a) between the financial years of 2009-10 and 2018-19. This was applied to estimates of GSP for NSW from the IO modelling.
- Payroll tax (NSW Government): total payroll tax received (ABS, 2020f) compared to total wages and salaries paid to NSW employees (ABS, 2020g; ABS, 2020h) between the financial years of 2009-10 and 2018-19. This was applied to estimates of incomes paid in NSW from the IO modelling.

Both direct and flow-on impacts are included in the estimation of the above taxation revenues.

In addition to the above, PGM will also pay the NSW Government royalties for the extraction of minerals. Royalty payments were estimated using royalty rates outlined by the NSW Government (NSW Government, 2020). The royalty rate is an ad valorem royalty with a base rate of 4% of 'ex-mine' value[5]. In estimating the royalty rate, all processing costs have been deducted on the assumption these represent allowable deductions.

5.4.2 Tax Revenues

Details of anticipated taxation revenue from both direct and flow-on activity associated with the Project are summarised in Table 5.1. The NSW Government is expected to receive around $59.7 million in additional revenue, primarily through royalty payments, over the life of the Project. The Australian Government is estimated to receive more than $182.8 million in various taxes. It should be noted that a portion of Australian Government revenues are likely to provide benefits to NSW, with the State allocated a portion of GST revenue as well as through the subsequent expenditure and redistribution of Australian Government revenues to provide services and infrastructure throughout Australia (including NSW).

Table 5.1. Aggregate Government Revenues from the Project

Taxes	Estimated Impact ($M)
NSW Government Revenues	
Payroll Tax	$20.4
Royalties	$39.3
Total	**$59.7**
Australian Government Revenues	
Personal Income Tax	$137.1
Fringe Benefits Tax	$3.4
Company Tax	$15.2
GST	$27.1
Total	**$182.8**

Note: Totals may not sum due to rounding.
Source: ABS (2019a), ABS (2020f), ABS (2020g), ABS (2020h), NSW Government (2020), AEC.

[5] The ex-mine value refers to the value of the mineral once it is mined and brought to the surface. In some cases the costs associated with the processing or treatment may be allowable deductions. However, the costs associated with exploration, development and mining of the ore body and the rehabilitation of the site are not allowable deductions (NSW Government, 2020).

5.5 DEMAND FOR LOCAL INFRASTRUCTURE AND SERVICES

Aside from the infrastructure developed by the proponent as part of the Project, the Project is not anticipated to require additional local infrastructure and services to be provided to support the Project and its workforce. The Project will, effectively, deliver a continuation of operational activity and workforce at the Peak and New Cobar complexes in line with existing levels. This will result in a continuation of demand for local infrastructure and services rather than a material change in demand. During construction a small lift in the number of workers on-site will be realised, peaking at approximately 54 more workers on-site than existing levels. However, this will be a temporary impact and is not anticipated to require additional local infrastructure and services to be provided.

5.6 IMPACT ON LOCAL PROPERTY MARKET

As outlined in section 3.3, the Project will not result in a material change in the operations workforce at the Peak and New Cobar complexes from existing levels, and existing accommodation arrangements for the operations workforce are anticipated to continue with no tangible impact on the local property market.

The construction workforce, however, will result in a small increase in demand for temporary accommodation compared to existing levels. Whilst the Project will primarily be supported by a workforce from within the Catchment, non-local workers will be utilised where more specialised skillsets are required that the local workforce does not provide (i.e. for service decline and ventilation construction works). The sources of labour have been outlined as per section 3.2, with a peak of 22 construction workers sourced from outside the Catchment in 2023-24. Due to the high vacancy levels apparent in Cobar (with unoccupied dwellings representing 20.4% of total housing stock) it is anticipated there will be sufficient accommodation available for these additional temporary workers.

Overall, the Project is not anticipated to have a significant impact on the local property market. In consideration of the existing high vacancy levels, the short-term increase in demand during construction may be considered to provide a small positive impact on demand and prices.

5.7 IMPACTS ON TRADE BALANCE AND EXCHANGE RATES

The Project will primarily impact on NSW trade balance through the production of gold, silver, copper, zinc, and lead product. Gold and silver doré is anticipated to be exported from NSW to other States and Territories in Australia for further refinement / processing, while concentrates are predominantly expected to be sold to offshore clients. In total, the value of product extracted is estimated to be valued at approximately $1.25 billion, with a peak annual value of $182.4 million. Australia's trade balance may then in turn be impacted by the export of refined / processed precious metals overseas, with the majority of Australia's precious metal production exported.

Partially offsetting the anticipated lift in exports for NSW and Australia will be an increase in imports to supply the Project (relative to what would otherwise occur without the Project). In total, approximately $205 million in goods and services are estimated to be imported to NSW between 2022-23 and 2034-35 to directly support the Project. Of this, $113 million is estimated to represent domestic imports from other States and Territories and $92 million imports from overseas. A modest amount of additional goods and services will also be imported through supply chain impacts.

On average, the Project is estimated to support less than $10 million in additional imports to Australia per annum. The average annual value of production between 2026-27 and 2032-33 (peak production) will be approximately $150 million, with the impact on domestic exports dependent on final markets for refined products from downstream refineries / processors. While the Project is anticipated to result in a small increase in net exports for Australia, the value of imports and exports generated by the Project are relatively small in consideration of existing annual imports and exports for Australia ($421.4 billion in in imports and $470.2 billion in exports 2018-19) (DFAT, 2020). While the Project will support economic growth and the value of the Australian dollar, in the context of Australia's overall economy and trade balance the impact of the Project on factors such as exchange rates and the value of the Australian dollar is anticipated to be negligible.

5.8 MITIGATION AND ENHANCEMENT STRATEGIES

Assessment of the economic impacts of the Project above identified the Project will extend PGM's activities to provide an important retention of economic activity within the Catchment and NSW economy over the next decade that would otherwise be lost without the Project. Economic impacts of the Project are anticipated to be overwhelmingly positive, with minimal adverse economic impacts.

While the potential adverse economic impacts from the Project are minimal, there are some potential areas that should be monitored and strategies employed to ensure benefits of the Project to the Catchment and NSW are maximised and any potential adverse impacts minimised:

- To maximise local benefits derived from the Project, and consistent with existing PGM policies, the proponent and contractors engaged by the proponent will be encouraged to source labour locally where possible and practical and provide training opportunities where practical. PGM actively encourages workers to reside locally and more than half of the existing workforce at the Peak and New Cobar complexes reside within Cobar. PGM aims to continue to source the majority of its workforce locally, including contractor labour.
- PGM has long standing relationships with local business and an established supply chain for its existing activities in the region. To maximise local benefits derived from the Project, PGM (and contractors engaged by the proponent) will continue to support local business by utilising these established supply networks and providing sufficient opportunities and information for local business to secure new supply contracts.
- While the Project is anticipated to have minimal impacts in terms of additional demand for accommodation / housing in the local area, PGM will monitor the local accommodation / housing market and demands placed on it by its workforce. If supply constraints are identified, PGM will work with Council to identify options for increasing supply as needed.

It should be recognised that these strategies form part of PGM's Project planning, and modelling of impacts in this report has been based on these strategies being implemented.

6. COST BENEFIT ANALYSIS

6.1 METHOD AND APPROACH

The following CBA to assess the net impact of the Project has been conducted at the state (NSW) level. The analysis examines the impacts resulting from the Project compared to the base case (or 'without project' scenario) to present a net stream of benefits and costs, to understand the public benefit of the Project to the NSW community.

The methodology used in conducting the CBA is outlined in Appendix C. Other key considerations for the CBA include:

- Modelling for the majority of impacts has been undertaken starting from the financial year ending June 2023, with impacts examined to the financial year ending June 2122. While the vast majority of project impacts will occur between the financial year ending June 2023 and the financial year ending June 2035, aligning with the anticipated construction, operations and decommissioning / rehabilitation periods for the Project, potential costs associated with mitigating groundwater impacts will extend beyond the life of the Project and thereby the CBA has been examined over 100 years.
- A base discount rate of 7% has been used for demonstration purposes (in line with many State and national standards for real discount rates used in economic appraisal of projects), with additional discount rates also examined (4% and 10%). As all values used in the CBA are in real terms, the discount rate does not incorporate inflation (i.e. it is a real discount rate, as opposed to a nominal discount rate).
- All values are expressed in 2020 Australian dollars.

Decision Criteria:

The Net Present Value (NPV) and Benefit Cost Ratio (BCR) will be the primary decision criteria for the economic appraisal. The NPV of a project expresses the difference between the present value (PV) of future benefits and PV of future costs, i.e.: NPV = PV Benefits – PV Costs. The BCR provides the ratio between the PV of benefits and PV of costs, i.e. BCR = PV Benefits / PV Costs.

Where the economic appraisal results in a:

- Positive NPV and BCR above 1: the project will be deemed as being desirable.
- NPV equal to zero and BCR of 1: the project will be deemed neutral (i.e. neither desirable nor undesirable).
- Negative NPV and BCR below 1: the project will be deemed undesirable.

The Internal Rate of Return (IRR), which indicates the discount rate which would return an NPV of $0 and a BCR of 1, is also reported.

6.2 DEFINITION OF WITH PROJECT AND BASE CASE SCENARIOS

CBA examines the net or incremental impacts (benefits and costs) of a project compared to a 'base case' scenario of what would be expected to occur without the project.

With Project Scenario

The 'with Project' scenario is as per the Project description in section 3.2.

Base Case Scenario

The 'base case' scenario assumes the Project is not developed. Under this scenario it is assumed that the approvals and decision whether to proceed with the Project will have no bearing on decisions for other alternative gold producing mines elsewhere in NSW (i.e. the operations and development of any other gold mining projects being considered in NSW will not be impacted by this Project). By not proceeding with the Project, the NSW economy would thereby not receive the activity outlined in section 3.2.

It is noted that current operations at the Peak and New Cobar complexes are expected to wind down in the next three to five years and the Project will supplement and extend overall production of the complexes; that is, without the Project the existing mining and processing operations would likely be expected to cease earlier than in the 'with project' scenario. While this may impact on the timing of mine closure, decommissioning and site rehabilitation activity, for the purposes of this CBA it has been assumed the Project will not impact on the overall timing of operations and closure of the Peak and New Cobar complexes.

6.3 COSTS AND BENEFITS EXAMINED

6.3.1 Costs

6.3.1.1 Construction Costs of the Project

Construction expenditure for developing the Project is estimated to cost of total of $66.4 million. A summary of construction expenditure by year is provided in section 3.2.1.1.

6.3.1.2 Operating and Closure Costs of the Project

Details of annual operating costs are outlined in section 3.2.2.3, while costs for decommissioning / rehabilitation are outlined in section 3.2.3. These costs include operating expenses related to extraction of the resource, processing, transport as well as backfilling mine shafts. Royalty and tax payments have been excluded from the operating costs as these represent a transfer payment.

Decommissioning and site rehabilitation costs of the broader Peak and New Cobar complexes have been excluded as this activity would occur regardless of the Project and forms part of the broader plan for these complexes.

6.3.1.3 Value of Foregone Economic Activity

The Project will develop an underground mining operation within the existing mining tenements at the New Cobar Complex. No existing activities on the site or neighbouring properties will be impeded or impacted by the Project. As such, the impact in terms of any foregone economic activity is expected to be negligible and has not been valued for inclusion in this assessment.

6.3.1.4 Air Quality Impacts

Atmospheric dispersion modelling predictions of air pollution emissions undertaken as part of the Air Quality and Greenhouse Gas Assessment (EMM, 2020a) indicates that the emissions from the Project are expected to result in minimal change from existing emissions levels at the Peak and New Cobar complexes and the emissions are not anticipated to adversely impact on air quality in the populated areas of Cobar. Costs from air quality impacts of the Project are thereby anticipated to be negligible and have not been valued for inclusion in this assessment.

6.3.1.5 Greenhouse Gas Emissions

Estimates of total greenhouse gas (GHG) emissions generated by the Project are outlined in the Air Quality and Greenhouse Gas Assessment (EMM, 2020a). A summary of existing and anticipated additional scope 1 emissions (direct associated with fuel combustion (diesel) by onsite plant and equipment) and scope 2 emissions (indirect associated with consumption of purchased electricity) is presented in Table 6.1 below.

Table 6.1. Estimated Annual GHG Emissions

Emission Sources	Scope 1 (t CO_2-e/year)	Scope 2 (t CO_2-e/year)
Existing	8,550.4	60,616.0
Additional	194.0	0.0
Total	**8,744.4**	**60,616.0**

Source: EMM (2020a).

Existing estimates of GHG emissions are based on diesel and electricity consumption in 2019 for the Peak and New Cobar complexes. The additional emissions represent the anticipated increase in consumption of diesel (and

thereby generated emissions) arising from additional haulage of ore from the New Cobar Complex to the Peak Complex for processing due to the Project.

To estimate the annual GHG emissions generated specifically by activity related to the Project (i.e. the Great Cobar and Gladstone deposits), the above existing annual GHG emissions were converted to a per tonne basis based on approximately 750,000 tonnes of ore being extracted / processed. This was then applied to annual production estimates for the Project outlined in section 3.2.2.1. The additional 194 t CO_2-e / year outlined in the table has been assumed to occur during peak production between 2026-27 and 2032-33; for other years this volume of emissions has been scaled based on production in the year relative to the average annual production during this peak period. This was then added to the annual production of emissions from the Project based on existing emissions.

In valuing the cost of emissions, the spot price for Australian Carbon Credit Units (ACCUs) has been used, from the Emissions Reduction Fund (ERF). A study from January 2020 indicates the average spot price at the end of 2019 was approximately $17.50 per t CO_2-e (RepuTex Energy, 2020). A price of $17.50 per tonne CO_2-e has been used in this study.

6.3.1.6 Noise and Vibration Impacts

The Project will be developed within the existing mining tenements of the New Cobar Complex with approved levels of activity and noise levels. The Noise and Vibration Impact Assessment (EMM, 2020b) outlines that all impacts from the Project will satisfy and be within relevant guidelines during construction and operation, with no significant noise and vibration impact relative to existing levels anticipated.

As noise and vibration impacts are assessed to be negligible this impact has not been valued for inclusion in the CBA.

6.3.1.7 Visual Amenity Impacts

The Landscape and Visual Impact Assessment (EMM, 2020c) outlines that, overall, visual impacts associated with the Project are not anticipated to be significant. The proposed new surface elements are assessed to have a negligible visual impact, while the visual and lighting impact from the waste rock emplacement and existing surface infrastructure area, which have been in place since 2000, will not be significantly different from present conditions. Any visual impacts during construction will be temporary.

As visual impacts are assessed to be insignificant this impact has not been valued for inclusion in the CBA.

6.3.1.8 Groundwater Impacts

The Groundwater Assessment (EMM, 2020d) identifies the impact on groundwater will be negligible, aside from a drawdown of greater than two metres at one registered bore located within 5 km of the New Cobar Complex. This bore is currently used by Cobar District Rugby Club for irrigation of its playing field. As outlined in the Groundwater Assessment, under the *NSW Aquifer Interference Policy* (AIP), make good arrangements will be put in place in consultation with the water supply work owner.

The rugby club has a Water Access Licence (WAL) to pump 1 megalitre (ML) from the existing bore. Consultation with the rugby club indicates abstraction of this amount is not consistently applied, with the bore used only during drought periods, and that the need for water to be provided would only apply when water restrictions prevent the club from using town water.

The town of Cobar's water supply comes from the Burrendong Dam. The Cobar community has experienced water restrictions intermittently over the past two decades during periods in which water levels at the Burrendong Dam have become critically low due to drought conditions. This includes most recently over a 14-month period from February 2019 to April 2020. The frequency on which water restrictions may be experienced in Cobar in the future is uncertain, but for the purposes of this assessment it has been assumed the town experiences water restrictions approximately three years in ten. Based on this assumption, an average annual supply of approximately 0.3 ML is assumed to be required through make good arrangements.

PGM is proposing to monitor impacts on groundwater levels through the initial Project period to determine the extent of impacts from the Project. If drawdown as a result of the Project exceeds 2 m make good arrangements

will be enacted. A number of options are available to PGM if make good arrangements are required, and they will be explored with the rugby club. One option being explored for the longer-term is re-developing the existing bore by drilling it deeper or development of a new bore for use by the rugby club. In the interim, alternative sources of water may periodically be required where make good arrangements are needed to satisfy the rugby club's allocation.

In valuing the cost of providing 0.3 ML of water per annum, in the short-term the highest cost (and thereby worst-case) scenario for sourcing water during drought periods would be to truck the water to Cobar. This assumption has been used as it presents the worst-case / highest cost alternative, and thereby delivers the most conservative assessment of the net benefit / cost of the Project. Longer-term, a worst-case scenario of a make-good arrangement being required has been assumed, with this met by re-developing and deepening the existing bore. For the purposes of this assessment the bore has been assumed to be re-developed in 2029-30 (approximately).

The cost of transporting water by truck can vary depending on the size of the truck and distance. An estimate of $30 per kilolitre (kL) has been assumed based on a review of costs for transporting water during recent drought conditions in NSW and southern Queensland and an assumed average of approximately 30,000 litres per truck (Molloy, 2019; ABC News, 2019; 9News, 2019). This equates to an average annual cost of $9,000 for trucking water, which is assumed to commence in 2024-25 (after peak construction activity and operations activity commences) and end in 2028-29, the year prior to the bore being developed.

An indicative estimate for re-development of the bore is approximately $20,000 (EMM, unpublished). An indicative annual maintenance and replacement part cost of 2% of this initial capital cost has been assumed each year thereafter on average (assumed to be required throughout the 100 years of the assessment period).

6.3.1.9 Surface Water Impacts

The Surface water Assessment (EMM, 2020e) identifies that most water management structures are not anticipated to discharge or overflow to downstream receiving environments over the life of the Project. There may be potential for discharge / overflows during extended heavy rainfall periods from Spain's Dam (one-in-ten year events), however, this is approximately in line with existing conditions. As impacts are not anticipated to materially change from existing conditions, this impact has not been valued for inclusion in the CBA.

6.3.1.10 Subsidence Impacts

The assessment of subsidence impacts from underground mining of the Great Cobar and Gladstone deposits (Beck Engineering, 2020) indicates the surface subsidence levels and impacts to surface topology are considered negligible due to the small footprint, strong rockmass conditions, small (narrow) stopes, low extraction ratio and use of backfill. No buildings or productive land uses are anticipated to be impacted by the Project. All costs for backfilling and mitigating subsidence are included within the operating costs, and no additional costs from subsidence are included in the CBA.

6.3.1.11 Ecological Impacts (Flora / Fauna)

The Project will deliver underground mining operations entirely located within the existing mining lease area, with minimal ecological impacts anticipated. A biodiversity development assessment report (BDAR) waiver was approved for the Project acknowledging the Project will have negligible adverse impacts on native vegetation, threatened ecological communities or protected animals. As such this impact has not been valued for inclusion in the CBA.

6.3.1.12 Traffic / Transport Impacts

The Project will generate additional transport movements for the movement of labour to the New Cobar Complex, as well as transport associated general freight, movement of fuel and supplies, as well as transport of mined product. This will result in increased vehicle fuel and maintenance costs, road damage costs as well as increase the risk of accidents due to increased travel.

The Traffic Impact Assessment (EMM, 2020f) outlines:

- The Project will require eight heavy vehicle movements for mobilisation of plant and equipment for construction of TSF lifts, and again for demobilisation.
- The Project will result in an increase the maximum road train truck trips from 25 truck-loads per day (50 truck movements including return journey) for transporting ore and waste rock from the New Cobar Complex to the Peak Complex, to 50 truck-loads per day (100 truck movements per day).
- During operations, the operational workforce will travel to and from the New Cobar Complex by car, with one car per worker.
- During construction, car-pooling is expected.

The Traffic Impact Assessment examines the net increase in traffic from existing levels to understand the traffic impact at peak traffic movements. For the CBA, an estimate of the additional traffic and vehicle kilometres travelled has been developed in order to quantify and value the overall vehicle fuel and maintenance costs, road damage costs and cost of crashes due to increased travel each year. To do so, data from PGM (unpublished) regarding the existing annual levels of traffic to / from the Peak and New Cobar complexes for operational activity were used to augment the information from the Traffic Impact Assessment summarised above.

Vehicle movements estimated included:

- Construction:
    - Truck movements for mobilisation / demobilisation of plant and equipment for constructing the TSF lifts, outlined above. It was assumed these trucks travel approximately 500 kilometres (km) each trip (e.g. approximately the distance from Cobar to Sydney). Two TSF lifts are anticipated to be developed to support the Project. For the purposes of this assessment these have been assumed to be developed in 2025-26 and 2029-30, with each TSF lift taking 12 months to develop.
    - Light vehicle movements (assuming an even mix of cars and utility vehicles) for the construction workforce, based on estimated construction workforce numbers outlined in section 3.2.1.2 and an assumption of 1.5 workers per vehicle on average. These workers were assumed to travel approximately five km each way (i.e. to / from the New Cobar Complex) per day, on the assumption the non-local workforce will stay in Cobar during construction. Travel to Cobar for non-local construction workers has not been included as it is uncertain how many trips may be required.
- Operations:
    - Transport of ore between the New Cobar Complex and Peak Complex, at a maximum of 100 movements per day (as outlined above). This maximum has been assumed to be reached each year between 2026-27 and 2032-33 (i.e. during peak production), with truck movements in other years based on the percent difference from average annual production during the peak period (see section 3.2.2.1 for annual production estimates). The Traffic Impact Assessment (EMM, 2020f) indicates the distance between the New Cobar Complex and Peak Complex is approximately 6.7 km.
    - Transport of goods to the New Cobar Complex, based on an existing transport task outlined below:
        - 36 utility vehicles per annum, travelling approximately 10 km per trip (one-way).
        - 120 rigid trucks per annum, travelling approximately 40 km per trip (one-way).
        - 1,356 single trailer trucks, travelling approximately 370 km per trip (one-way).
        - 348 semi-trailer / double-trailer trucks, travelling approximately 460 km per trip (one-way).

      The existing transport task was converted to an annual transport task per tonne of ROM ore extracted and then applied to projected annual ROM ore extracted as outlined in section 3.2.2.1. The estimate of km travelled was doubled to reflect two-way travel.
    - Transport of concentrate, based on an existing estimate of 2,038 containers per annum (1,019 B-Double trucks), travelling to / from the rail interface at Hermidale (approximately 85 km). The existing transport

task was converted to an annual transport task per tonne of ROM ore extracted and then applied to projected annual ROM ore extracted as outlined in section 3.2.2.1. The estimate of km travelled was doubled to reflect two-way travel.

  - Transport of doré, based on existing transport levels associated with 750,000 tonnes of ROM ore being extracted. Estimates of number of transport movements and distance / route have not been provided in this report for security reasons.
  - Light vehicle movements for the transport of operations employees, assuming one vehicle per worker and two trips per day (i.e. to and from the New Cobar Complex). Operational workforce estimates are presented in section 3.2.2.4. It was assumed mining workers (including mining maintenance workers) travel approximately five km each way, while processing and processing maintenance workers travel 10 km each way.

- Decommissioning / rehabilitation:
  - Light vehicle movements (assuming an even mix of cars and utility vehicles) for the decommissioning / rehabilitation workforce, based on an estimate of approximately 15 FTE decommissioning / rehabilitation workers across 2033-34 (seven FTEs) and 2034-35 (eight FTEs) and an assumption of 1.5 workers per vehicle on average. These workers were assumed to travel approximately five km each way (i.e. to / from the New Cobar Complex) per day, on the assumption the non-local workforce will stay in Cobar during decommissioning / rehabilitation.

The cost of increased travel due to the Project has been measured through:

- Additional fuel and vehicle maintenance costs (road and air).
- Additional road damage costs.
- Road safety costs due to increased travel.

These costs are examined below.

Additional Fuel and Vehicle Maintenance Costs

Estimated fuel costs for road traffic were based on an average price in Cobar for diesel of approximately 125.90 centre per litre (c/L) (PetrolSpy, 2020). This price reflects the average cost for diesel as of November 16th 2020. GST of 10% and fuel excise rate of 42.30 c/L (ATO, 2020) were subtracted from these prices to provide the resource cost for diesel and unleaded petrol. Average kilometres travelled per litre of diesel were estimated at 0.11 kilometres per litre of for light vehicles, 0.09 for utility vehicles / light commercial vehicles, 0.29 for rigid trucks and 0.52 for articulated trucks/ B-doubles (ABS, 2019b).

Additional maintenance costs for road vehicles were estimated at 8.57 cents per kilometre (c/km) for utility vehicles, 13.69 c/km for armoured trucks, 14.64 c/km for heavy rigid trucks, 23.83 c/km for single-trailer articulated trucks, 27.70 c/km for B-double trucks and 6.59 c/km for light vehicles, based on data from ATAP (2016) and accounting for inflation (ABS, 2020g).

These rates were applied to the travel distances as estimated above.

Additional Road Damage Costs

Additional road damage costs were estimated at 4.46 c/km for light vehicles and utility vehicles, 10.25 c/km for armoured trucks, 15.39 c/km for heavy rigid trucks, 19.64 c/km for single-trailer articulated trucks and 25.65 c/km for B-double trucks, based on data from Transport for NSW (TfNSW, 2019) and accounting for inflation between 2019 and 2020 (ABS, 2020g).

These rates were applied to the travel distances as estimated above.

Road Safety Costs

The increase in travel may be expected to provide an increased risk of road crashes. The Traffic Impact Assessment (EMM, 2020f) outlines that Kidman Way is a sealed, two-lane undivided road approximately 7.0 metres

in width (including shoulders). While the routes travelled will incorporate more than Kidman Way, this road has been used as an indicator of the type of road that vehicles will primarily travel along. Data from ATAP (2016) provides average crash rates on non-urban roads per 100 million vehicle kilometres travelled for a range of road types and widths. Based on Kidman Way, the following average estimated crash rates per 100 million vehicle kilometres travelled were used:

- 1.25 crashes resulting in a fatality.
- 23.75 crashes resulting in serious injury.
- 45.00 crashes resulting in minor injuries/ property damage.

The following values per crash type were used, based on value estimates from ATAP (2016) inflated to 2020 dollar terms (ABS, 2020g):

- Fatal crashes (including medical costs, insurance, workplace production losses, legal costs, vehicle and property repair costs, and other costs such as travel delays and emergency service provision): approximately $2.64 million per crash.
- Serious injury crashes: approximately $599,500 per crash.
- Minor injury / property damage crashes: approximately $21,400 per crash.

These crash rates and values per crash were applied to the travel distances as estimated above.

6.3.2 Benefits

6.3.2.1 Value of Production / Revenue

Assumptions used for estimating revenues supported by the Project are summarised in sections 3.2.2.1 and 3.2.2.2.

PGM is a wholly owned subsidiary of Aurelia Metals which is an Australian company listed on the ASX. While some profits may accrue to stakeholders / shareholders outside of NSW, for simplicity the CBA has included all profits from the Project as this is where the value is generated.

6.3.2.2 Benefits to Labour

While expenditure on employees represents a cost (and is included in the operating costs in section 6.3.1.2), employment also represents a social benefit to those employed through a number of avenues, including the provision of incomes (and thereby providing higher standards of living), a sense of identity, self-worth and satisfaction. Employment has also been linked with a number of positive mental and physical health benefits.

Labour benefits are often excluded from CBA. The primary reason for this exclusion is due to the use of "shadow wages"[6] in estimating operating costs, or the use of a highly conservative assumption that the labour would otherwise be employed elsewhere with minimal difference in compensation. However, for simplicity and consistency with the LEA, this CBA has used a market wage in estimating operating costs and an assumption that labour would otherwise be employed elsewhere with minimal difference in compensation is considered inappropriate where labour would not otherwise be gainfully employed.

The impacts of COVID-19 are having a significant short-term impact on the national and NSW labour market, and research in both Australia and overseas suggests the economic ramifications of COVID-19 may be felt for decades. The Project will deliver an important continuation of employment opportunities for mining and processing at the Peak and New Cobar complexes. It is therefore considered appropriate to consider the employment supported by the Project as a benefit to those employed.

[6] The shadow wage refers to the opportunity cost of labour. Where a shadow wage (rather than market wage) is used in estimating operating costs, the labour benefit is inherently captured in the CBA and should not be measured separately.

Employment can be valued in terms of the wages and salaries labour receives less income tax and the opportunity cost to these individuals for their time. The opportunity cost is often valued based on the alternative income they would receive without the Project, either through alternative employment or through social security payments. For the purposes of this assessment it has been assumed that 25% of the wages and salaries paid to operations staff represents a net benefit to these individuals compared to the base case. Estimated labour and labour compensation is presented in sections 3.2.2.3 and 3.2.2.4.

6.4 CBA RESULTS

Table 6.2 below outlines the PV of the identified costs and benefits associated with the Project, between the financial year ended June 2023 and financial year ended June 2122, at discount rates of 4%, 7% and 10%.

The CBA modelling for the Project at the discount rate of 7% is economically desirable, with the following results:

- NPV of $281.4 million over the assessment period with total PV benefits of approximately $756.6 million compared to an aggregated PV costs of approximately $475.1 million.
- A BCR of 1.59, highlighting that the Project is estimated to return $1.59 for every dollar cost.

The CBA identifies that at a 7% discount rate the Project is economically desirable with the benefits outweighing the costs. The Project returns a desirable result across each of the discount rates examined, with the BCR ranging between 1.63 (4% discount rate) and 1.56 (10% discount rate). The CBA is insensitive to the discount rate used with minimal change in BCR across discount rates examined. The Project has an IRR of 61.1%.

Table 6.2. Summary CBA Results of Project Impacts to NSW

Impact	Total Value ($M)	PV ($M) – 4% Discount Rate	PV ($M) – 7% Discount Rate	PV ($M) – 10% Discount Rate
Costs				
Construction Costs	$66.4	$58.4	$53.3	$48.7
Operating and Closure Costs	$725.1	$519.0	$409.5	$326.8
Value of Foregone Economic Activity	Negligible			
Air Quality Impacts	Negligible			
Greenhouse Gas Emissions	$7.8	$5.5	$4.3	$3.4
Noise and Vibration Impacts	Negligible			
Visual Amenity Impacts	Negligible			
Groundwater Impacts	$0.1	$0.1	$0.0	$0.0
Surface Water Impacts	Negligible			
Subsidence Impacts	Negligible			
Ecological Impacts	Negligible			
Traffic / Transport Impacts	$14.2	$10.1	$7.9	$6.3
Total Costs	***$813.6***	***$593.1***	***$475.1***	***$385.3***
Benefits				
Value of Production	$1,246.9	$885.2	$694.5	$551.0
Benefits to Labour	$111.4	$79.1	$62.1	$49.3
Total Benefits	***$1,358.3***	***$964.3***	***$756.6***	***$600.3***
Summary				
Net Present Value (NPV)	**-**	**$371.3**	**$281.4**	**$214.9**
Benefit Cost Ratio (BCR)	**-**	**1.63**	**1.59**	**1.56**

Source: AEC.

6.5 SENSITIVITY ANALYSIS

The sensitivity analysis has been undertaken using a Monte Carlo analysis (refer to Appendix C) across the key assumptions used in the CBA modelling (the base assumptions used are outlined in section 6.3).

Each of the assumptions has been tested in isolation with all other inputs held constant, with the results reported in Table 6.3 in terms of the modelled change in NPV resulting from the variance in the base assumptions at a discount rate of 7%. The final row of the table examines each assumption simultaneously to provide a "combined" or overall sensitivity of the model findings to the assumptions used. The table also outlines the distribution used allowing for a 10% confidence interval, with the "5%" and "95%" representing a 90% probability that the distribution and NPV will be within the range outlined in the table.

The table shows that, at a discount rate of 7%, there is a 90% probability the Project will provide an NPV between $143.5 million and $417.1 million. Sensitivity testing returned a positive NPV across 99.96% of the 5,000 iterations run in Monte Carlo analysis, with the analysis most sensitive to the value of production.

Table 6.3. Sensitivity Analysis Summary, Discount Rate 7%

Variable	NPV ($M)	
	5%	95%
Costs		
Construction Costs	$272.0	$288.4
Operating and Closure Costs	$214.0	$348.8
Greenhouse Gas Emissions	$280.0	$282.8
Groundwater Impacts	$281.4	$281.4
Traffic / Transport Impacts	$278.8	$284.0
Benefits		
Value of Production	$167.1	$395.5
Benefits to Labour	$271.2	$291.6
Combined	**$143.5**	**$417.1**

Notes: The percent distributions used for each variable are provided below:
- Construction costs: maximum 30% higher, minimum 20% lower.
- Operating and closure costs: normally distributed with standard deviation of 0.1.
- Cost of greenhouse gas emissions: normally distributed with standard deviation of 0.2.
- Groundwater impacts: normally distributed with standard deviation of 0.2.
- Increased cost of transport: normally distributed with standard deviation of 0.2.
- Value of production: normally distributed with standard deviation of 0.1.
- Benefits to labour: normally distributed with standard deviation of 0.1.

Source: AEC.

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APPENDIX A: SOCIO-ECONOMIC OVERVIEW

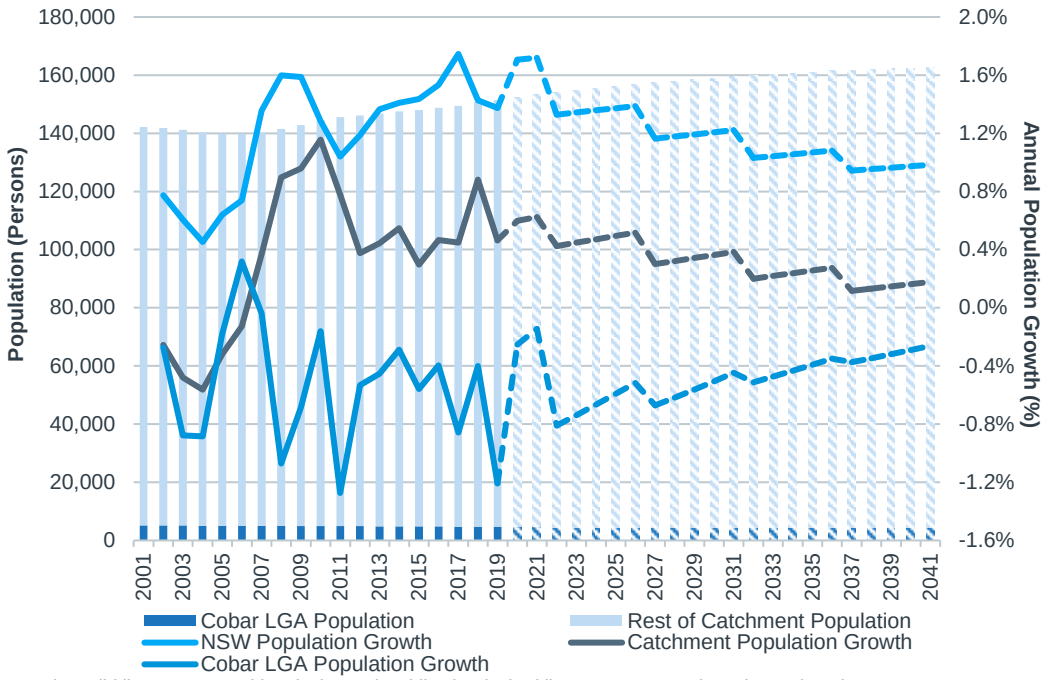
This section provides a summary of the socio-economic environment of the Catchment and Cobar, with comparisons to New South Wales. An indication of the impacts of COVID 19 has been provided where possible. The below summary is based on the most recent data available at the time of writing.

POPULATION

The Catchment recorded an estimated resident population of approximately 150,700 people in 2019, of which approximately 4,660 people resided in Cobar LGA. The Catchment represented approximately 1.9% of the New South Wales population in 2019 (ABS, 2020a). Whilst annual population growth has fluctuated over the years, the Catchment recorded average annual population growth of 0.4% between 2001 and 2019. Population growth peaked in 2010, at 1.2%, before declining to more modest levels in the following years. Whilst negative net migration is a trend for small, rural areas in regional New South Wales, the Catchment recorded positive net migration in 2018, where 36.3% of the population growth was attributed to migration (ABS, 2019a). Population growth generally trended in line with that of the State, albeit lower by 0.8 percentage points on average per annum.

Bar a small uptick in 2006, Cobar LGA's population steadily declined between 2001 and 2019, from around 5,100 residents in 2006 to around 4,660 in 2019, averaging a decline of 0.5% per annum on average. The declining population in Cobar LGA is consistent with the experience of many small, rural areas across NSW and Australia over the past few decades. Cobar LGA's population is projected to continue to decline by approximately 0.5% per annum through to 2041.

Figure A. 1. Historical and Projected Population Growth, 2001 to 2041



Note: The solid lines represent historical growth, whilst the dashed lines represent projected growth estimates.
Source: ABS (2020a), DPIE (2019),

Population projections from the Department of Planning, Industry and Environment (2019) suggest the Catchment's resident population is expected to continue to increase, though at a much slower rate than historically, with the average annual rate of growth projected to reach 0.3% from 2019 to 2041. In contrast, the State is projected to increase by 1.2% per annum on average to 2041. By 2041, the Catchment's population is projected to increase to approximately 162,700 people and is expected to represent 1.5% of the New South Wales population. Cobar LGA's population is projected to continue to decline by approximately 0.5% per annum through to 2041. These

projections are anticipated to be further reduced over the next few years, due to reduced migration resulting from the international travel ban implemented in March 2020 due to the COVID-19 pandemic.

Table A. 1. Population Projections, 2019 to 2041

Region	2019	2021	2026	2031	2036	2041	Avg Ann Growth[(a)]
Cobar LGA	4,658	4,639	4,487	4,362	4,269	4,201	-0.5%
Catchment	151,407	153,263	156,901	159,604	161,506	162,699	0.3%
NSW	8,089,817	8,369,289	8,953,226	9,499,936	10,012,300	10,503,815	1.2%

Note: (a) Average annual growth has been calculated between 2019 and 2041.
Source: ABS (2020a), DPIE (2019).

ECONOMY

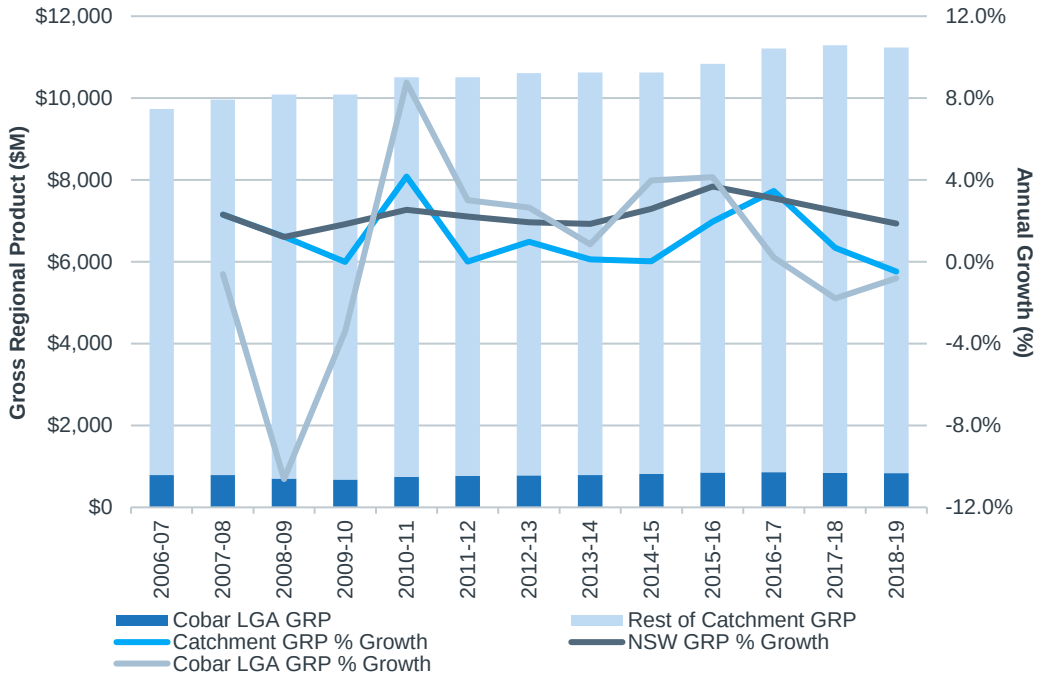
In 2018-19, the Catchment's economy recorded a GRP of approximately $11.2 billion in chain volume terms[7] (AEC, unpublished[a]). This accounted for 1.8% of New South Wales GSP for the year. Between 2006-07 and 2018-19, the economy recorded average annual growth of approximately 1.2% (compared to 2.3% for the State). Annual growth over the period since 2006-07 has been volatile, primarily influenced by fluctuations in the Catchment's two largest industries (in terms of contribution to GRP), mining and agriculture, which contributed to 16.8% and 8.7% of total sector Gross Value Added (GVA) activity[8], respectively, in 2018-19. The strongest growth was recorded in 2010-11 (4.2%), attributed to the substantial (31.0%) annual growth recorded in the agricultural, forestry and fishing industry in that year. Healthcare and social assistance industry activity also plays an important role in generating economic activity for the Catchment, representing 8.6% of GVA in 2018-19 due to the service centre role of Dubbo Regional and Orange. Mining activity is anticipated to increase in the coming years, with two proposed mines – the CleanTeQ Sunrise Project and the McPhillamys Gold Project (NSW Mining, 2020).

Cobar LGA accounted for 7.4% of the Catchment's GRP in 2018-19. Cobar LGA's economy recorded significant fluctuations between 2006-07 to 2018-19 due to its high reliance (75.8%) on mining industry activity. Cobar LGA's economic growth tracked growth in the mining industry, recording its lowest growth in 2008-09 before peaking in 2010-11. Three mines currently operate in Cobar LGA, including the Endeavor Mine, CSA Mine, and Peakhill Gold Mine (NSW Mining, 2020).

[7] Estimates of GRP are presented in 2018-19 real price terms.

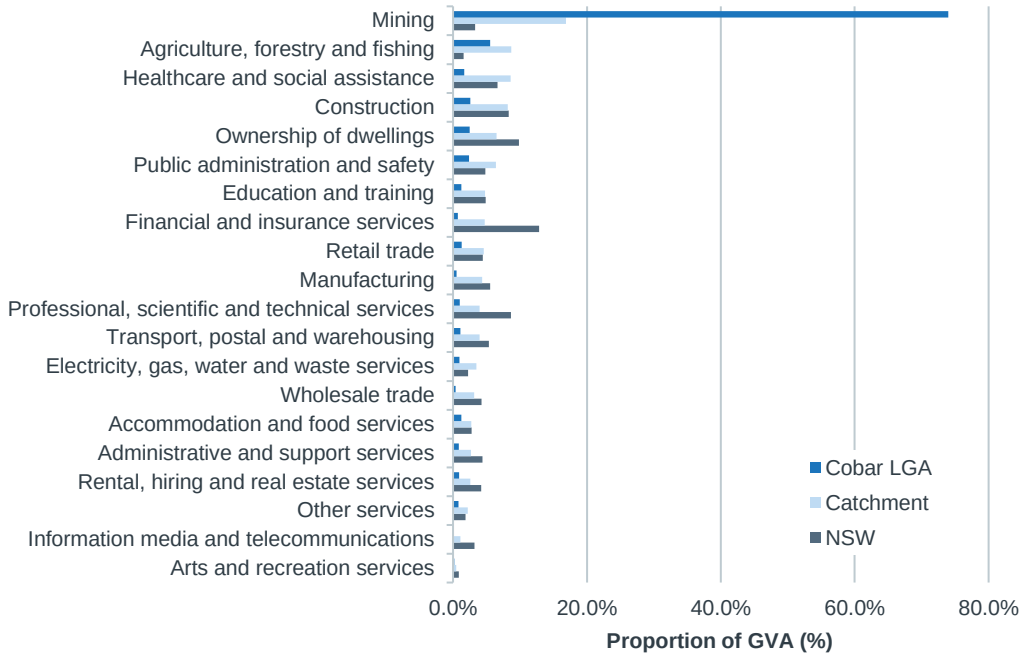
[8] Sector GVA represents the contribution of all industries as well as the sector of ownership of dwellings to GRP, excluding taxes less subsidies on products.

Figure A. 2. Gross Regional Product ($M), Chain Volume Measures, 2006-07 to 2018-19



Source: AEC (unpublished[a]).

Figure A. 3. Industry Share of Gross Value Add, 2018-19



Source: AEC (unpublished[a]).

An indicative estimate of the impact of COVID-19 to the NSW and Catchment economy to 22 September 2020 has been developed based on data from the Australian Bureau of Statistics (ABS, 2020b) outlining impacts on employment at the State level by industry. Employment impacts for the Catchment were developed assuming the proportional change in industry activity at the State have been experienced in the Catchment as well. Impacts on GRP were estimated assuming the value-added activity per employee in 2018-19 holds constant.

The impact on Gross Value Added (GVA) has been slightly less pronounced than that for the State, with the Catchment recording a decline of approximately $215 million in GVA due to the pandemic, a decline of 2.2%, compared to a decline of 3.1% for the State. In contrast to the Catchment overall, Cobar LGA has recorded a small

($7 million) increase in total GVA (or 1.0%), indicating that mining activity has been sustained throughout the pandemic and supported the local economy.

Table A. 2. COVID-19 GVA Impact, as of 22 August 2020

Area	2018-19 GVA ($M)	Estimated GVA as of 22 August 2020 ($M)	Numerical Change	Percentage Change
Cobar LGA	$750	$757	$7	1.0%
Catchment	$9,712	$9,497	-$215	-2.2%
NSW	$523,080	$506,789	-$16,291	-3.1%

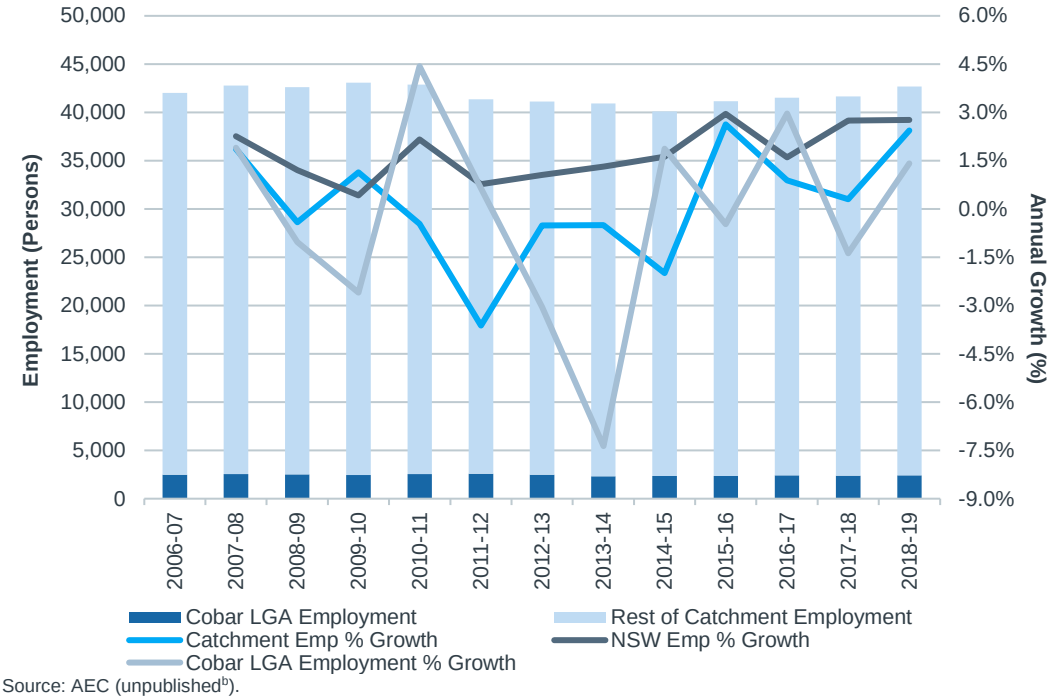
Source: ABS (2020b), AEC.

LABOUR MARKET

The number of workers in the Catchment (by place of work) displayed growth between 2006-07 and 2009 10 to a peak of nearly 43,100 jobs, but then contracted considerably over the next five years to around 40,100 jobs in 2014 15. Employment growth has since recovered to reach approximately 42,660 workers in 2019. The largest employing industry in the Catchment is healthcare and social assistance, representing 16.5% of jobs in 2018-19, followed by agriculture, forestry, and fishing (11.3%) and retail trade (9.1%). All key industries have a significant impact on fluctuations in employment.

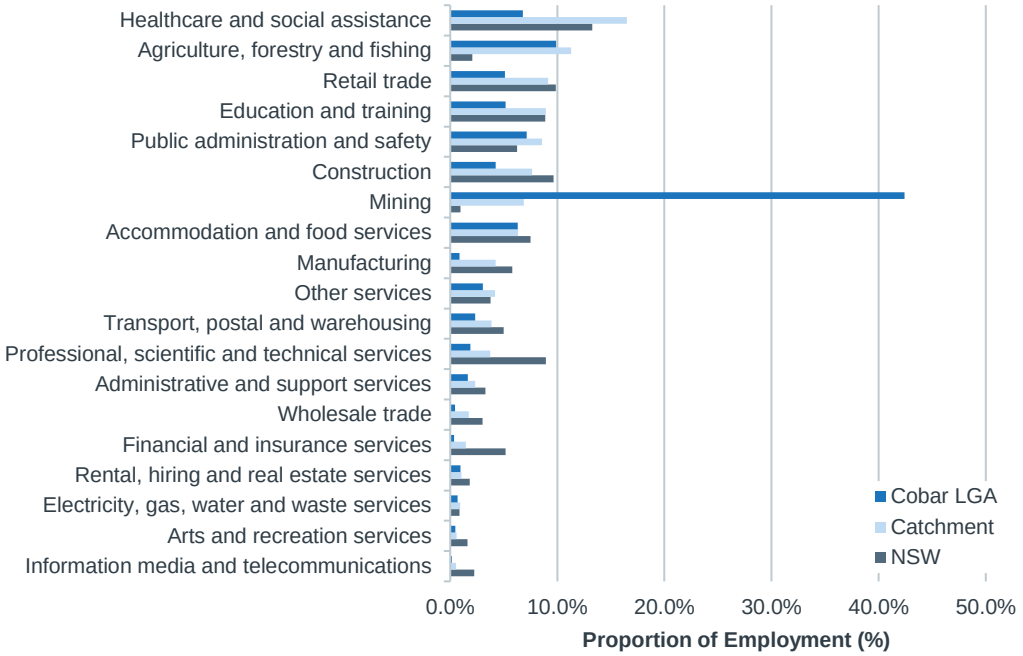
Cobar LGA represented 5.7% of the Catchment's total employment in 2018-19. The mining industry is the largest employer in Cobar LGA, directly employing 42.4% of jobs in the LGA in 2018-19. Mining jobs in Cobar LGA have increased from just over 900 jobs in 2006-07 to more than 1,000 jobs in 2018-19; however, over this same period employment in all other industries (in aggregate) has declined from 1,580 jobs to 1,390.

Figure A. 4. Total Employment, PoW, 2006-07 to 2018-19



Source: AEC (unpublished[b]).

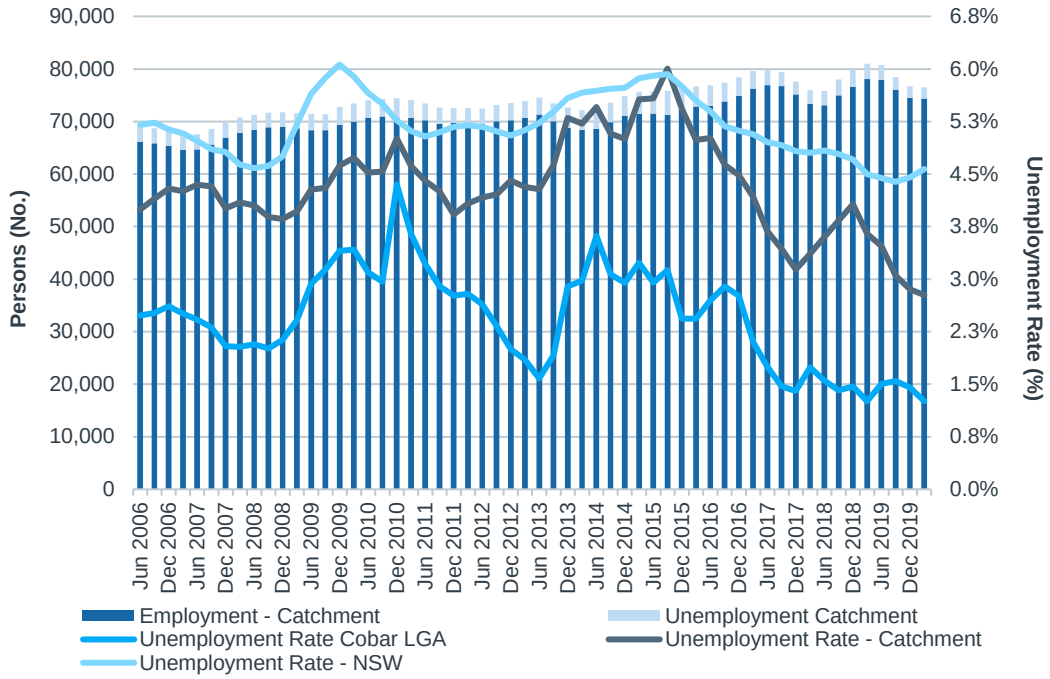
Figure A. 5. Employment by Industry, PoW, 2018-19



Source: AEC (unpublished[b]).

As of March 2020, the unemployment rate in the Catchment equated to 2.8% (lower than the 4.6% recorded for NSW) (DoESE, 2020). Cobar LGA recorded an even smaller unemployment rate for this quarter, at 1.3%. Unemployment rates in the Catchment and Cobar LGA have generally been well below NSW since June 2006, which is consistent with many regional and rural areas across NSW and Australia, in particular mining areas such as Cobar LGA. This is partly due to the importance of job prospects in attracting and retaining population in these regions, with many people leaving the region when jobs are unavailable.

Figure A. 6. Labour Force and Unemployment



Source: DoESE (2020).

Indicative estimates suggest, as of 22 September 2020, the pandemic has resulted in a decline of approximately 2,200 employees (or 3.3%) in the Catchment compared to 2018-19 estimates. This is slightly lower than that of the

State, which is estimated to have recorded a 3.9% decline in employment over the same period. Though recording a small increase in GVA, Cobar LGA is estimated to have recorded a decline of 35 employees (or 1.5%).

Table A. 3. COVID-19 Employment Impact, as of 22 August 2020

Area	2018-19 Employment	Estimated Employment as of 22 August 2020	Numerical Change	Percentage Change
Cobar LGA	2,414	2,379	-35	-1.5%
Catchment	67,120	64,916	-2,204	-3.3%
NSW	3,600,987	3,460,648	-140,339	-3.9%

Source: ABS (2020b), AEC.

The JobKeeper Payment Scheme was introduced in April 2020 to support businesses and individuals during the pandemic by providing $1,500 payments to employers for eligible employees each fortnight. In the Catchment, approximately 5,000 businesses applied for JobKeeper in April, followed by approximately 5,400 businesses in May, and 5,500 in June (Treasury, 2020). In Cobar, approximately 220 businesses applied for JobKeeper in April, 230 in May, and 240 in June. There is potential that some of the small-medium businesses covered by the JobKeeper payment may struggle to recover once the payment has ended.

Table A. 4. JobKeeper Application Counts, April to June 2020 [(a, b)]

Area	April Application Count	May Application Count	June Application Counts	Average Monthly Growth (%)
Cobar LGA	217	230	237	4.7%
Catchment	5,018	5,373	5,552	5.2%
NSW	310,987	327,154	332,380	3.4%

Notes: (a) JobKeeper application counts were available at the postcode level, however, postcodes which recorded less than 5 applications did not provide data. Hence, the above estimates record a slight undercount on true volumes. (b) JobKeeper application counts are not cumulative between months.
Source: Treasury (2020).

The industry composition of the economy is also reflected in the occupational breakdown of workers. Professionals were the most prevalent occupation held in the Catchment in 2016 (17.8%) (ABS, 2017). Managers were the second most prevalent occupation held (15.6%) likely reflective of the large number of farmers owning their own businesses. Technicians and trades workers represent 14.7% of workers, driven by mining and manufacturing activity.

Cobar LGA's occupational breakdown reflects the significantly high concentration of mining activity, with 21.4% of total workers recording their occupation as machinery operators and drivers, 20.4% as technicians and trades workers, and 15.2% as managers.

Table A. 5. Employment by Occupation, PoW, 2016

Occupation	Cobar	Catchment	NSW
Managers	15.2%	15.6%	13.7%
Professionals	11.9%	17.8%	24.1%
Technicians & Trades Workers	20.4%	14.7%	12.9%
Community & Personal Service Workers	7.7%	11.7%	10.6%
Clerical & Administrative Workers	8.6%	12.3%	14.1%
Sales Workers	4.4%	9.2%	9.4%
Machinery Operators & Drivers	21.4%	7.5%	6.2%
Labourers	10.5%	11.2%	9.0%
Total	**100.0%**	**100.0%**	**100.0%**

Source: ABS (2017).

In 2016, approximately 60,500 people lived and worked in the Catchment, whilst approximately 3,400 people were classified as imported labour (i.e. lived elsewhere but worked in the Catchment), and approximately 2,100 people as exported labour (i.e. worked elsewhere by lived in the Catchment) (ABS, 2017). Based on these figures, the

Catchment is 94.7% self-sufficient[9], indicating that the majority of jobs in the local area are held by residents and there is an appropriate match between skillsets held by residents and the jobs that are available. This is largely due to the high number of healthcare and social assistance workers who live and work in the Catchment, representing the service centre nature of the Orange and Dubbo Regional within the Catchment. The Catchment has a higher self-containment[10] rate (96.6%), reflecting that the vast majority of residents of the Catchment found suitable work in their region of residence, or relocated to the region for work purposes.

Within the Catchment, approximately 2,344 people worked in Cobar LGA. Of this, 2,056 people lived and worked in the area, whilst 288 people were classified as imported labour. Imported labour was particularly evident in the mining and agriculture, forestry, and fishing industries.

Table A. 6. Journey to Work by Job Location, Catchment, 2016

Industry	Live and Work Local[(a)]	Imported Labour[(b)]	Total Local Workers (PoW)[(c)]	Exported Labour[(d)]
Agriculture, Forestry and Fishing	6,033	284	6,318	219
Mining	2,397	427	2,824	495
Manufacturing	3,000	135	3,135	151
Electricity, Gas, Water and Waste Services	743	33	776	8
Construction	4,620	199	4,819	156
Wholesale Trade	1,405	63	1,467	34
Retail Trade	6,384	218	6,602	107
Accommodation and Food Services	4,242	150	4,392	77
Transport, Postal and Warehousing	2,438	119	2,557	85
Information Media and Telecommunications	454	19	474	13
Financial and Insurance Services	927	29	956	24
Rental, Hiring and Real Estate Services	670	22	692	3
Professional, Scientific and Technical Services	2,317	102	2,419	59
Administrative and Support Services	1,677	91	1,768	54
Public Administration and Safety	4,675	315	4,990	131
Education and Training	5,718	367	6,085	233
Health Care and Social Assistance	9,573	667	10,240	226
Arts and Recreation Services	607	17	624	23
Other Services	2,604	107	2,711	47
Total	**60,486**	**3,363**	**63,849**	**2,146**

Notes: (a) The number of workers that both live and work in the catchment. (b) The number of workers that work in the catchment but live elsewhere (i.e. people that do not live in the catchment but commute to or temporarily stay in the catchment for work). (c) The combination of the first and second column, representing the total jobs located in the catchment (i.e. place of work employment data). (d) The number of workers that live in the catchment but work elsewhere (i.e. people that live in the catchment but commute from or temporarily stay outside the catchment for work). The combination of this column with the first column represents the total number of people residing in the catchment that have a job (i.e. place of usual residence employment data).
Source: ABS (2017).

Average annual income in the Catchment was lower than the NSW average in 2016 ($57,379 per annum on average compared to $64,166 for the State). Cobar LGA reported a significantly higher average income in 2016, by comparison to the Catchment, at $75,629 per annum on average, likely due to the high proportion of mining employees working in the area.

[9] Self-sufficiency refers to the proportion of people that live and work in the Catchment compared to the total that work in the Catchment. A higher self-sufficiency rate is preferable.

[10] Self-containment refers to the proportion of people that live and work in the Catchment compared to the total that live in the Catchment. A higher self-containment rate is preferable.

Table A. 7. Income by Industry, PoW, 2016

Industry	Cobar LGA	Catchment	NSW
Agriculture, Forestry and Fishing	$53,599	$51,458	$49,799
Mining	$111,430	$103,175	$106,960
Manufacturing	$62,385	$55,114	$66,284
Electricity, Gas, Water and Waste Services	$47,638	$77,065	$89,361
Construction	$55,152	$57,684	$65,118
Wholesale Trade	$57,956	$58,250	$74,796
Retail Trade	$33,436	$37,658	$42,092
Accommodation and Food Services	$32,193	$31,014	$33,393
Transport, Postal and Warehousing	$61,112	$57,390	$65,014
Information Media and Telecommunications	-	$54,067	$86,924
Financial and Insurance Services	$24,041	$69,676	$98,110
Rental, Hiring and Real Estate Services	$54,876	$63,917	$73,014
Professional, Scientific and Technical Services	$70,368	$66,661	$85,270
Administrative and Support Services	$44,756	$42,627	$51,409
Public Administration and Safety	$70,081	$76,547	$79,977
Education and Training	$59,193	$65,401	$66,048
Health Care and Social Assistance	$53,445	$60,824	$61,008
Arts and Recreation Services	$58,474	$42,465	$50,714
Other Services	$61,551	$46,312	$48,904
Total	**$75,629**	**$57,379**	**$64,166**

Source: ABS (2017).

PROPERTY MARKET

The Catchment's property market is currently characterised by declining demand for residential dwellings, low diversity of housing stock, and low house prices and rents afforded by limited demand and regional areas lagging price growth of metropolitan areas.

The declining demand for residential dwellings is evidenced by building approval trends. Residential approval volumes in the Catchment have experienced a decline in recent years, declining by 3.1% on average per annum since 2012-13 (compared to growth of 1.5% for NSW) (ABS, 2020c). This contraction is indicative of reduced dwelling development in the region, which is reflective of low levels of population growth and demand for housing stock. Despite the reduced demand for residential dwellings, residential approval values have increased by 0.6% over the same period, though this still lags the growth recorded by the State (4.7%) (ABS, 2020c).

Cobar LGA recorded a more significant decline in demand for residential dwellings over the 2012-13 to 2019-20 period, with residential approval volumes declining by 15.8% since 2012-13, whilst values declined by 13.9%. It is important to note that these percentage change estimates are off small volumes and hence are not indicative of significant residential development activity. This is consistent with the steady population decline Cobar LGA has experienced in recent years.

Table A. 8. Residential Building Approval Values ($000) and Volumes (No.)

Financial Year	Cobar LGA	Catchment	NSW
Value			
2012-13	$3,396	$203,309	$13,316,343
2013-14	$1,069	$217,632	$16,543,353
2014-15	$606	$222,612	$19,737,860
2015-16	$976	$309,260	$24,561,262
2016-17	$581	$245,013	$25,433,781
2017-18	$1,082	$271,612	$26,688,321
2018-19	$820	$237,324	$21,869,021

Financial Year	Cobar LGA	Catchment	NSW
2019-20 YTD[(a)]	$1,187	$211,331	$18,389,347
Average Annual Growth (2012-13 to 2018-19)	-13.9%	0.6%	4.7%
Number			
2012-13	10	720	42,789
2013-14	2	824	54,067
2014-15	2	781	63,344
2015-16	2	1,044	73,314
2016-17	1	798	73,045
2017-18	2	847	72,630
2018-19	3	685	57,423
2019-20 YTD[(a)]	3	578	47,384
Average Annual Growth (2012-13 to 2018-19)	-15.8%	-3.1%	1.5%

Note: (a) Includes building approvals up to June 2020.
Source: ABS (2020c).

Table A. 9. Non-Residential Building Approval Values ($000)

Financial Year	Cobar LGA	Catchment	NSW
Value			
2012-13	$240	$114,328	$8,702,809
2013-14	$90	$227,139	$12,428,147
2014-15	$1,338	$144,140	$9,377,691
2015-16	$198	$183,431	$11,289,934
2016-17	$211	$228,127	$14,358,156
2017-18	$1,149	$222,335	$14,681,503
2018-19	$40,332	$405,288	$16,608,114
2019-20 YTD[(a)]	$5,028	$179,943	$17,087,615
Average Annual Growth (2012-13 to 2018-19)	54.4%	6.7%	10.1%

Note: (a) Includes building approvals up to June 2020.
Source: ABS (2020c).

Approximately 63,650 dwellings were recorded in the Catchment in 2016, of which approximately 2,430 were located in Cobar LGA. Due to the rural nature (and availability of large land lots for separate houses), the Catchment recorded a low level of diversity in housing stock compared to the State in 2016, with approximately 86.5% of private dwellings recorded as separate housing compared to 65.3% in NSW (ABS, 2017). Cobar LGA recorded a similar trend with 82.6% of private dwellings recorded as separate housing, however, also recorded a higher proportion of caravan, cabin, houseboat dwellings than both the Catchment and State (3.5%).

Table A. 10. Dwelling Structure, 2016

Dwelling Structure	Cobar LGA	Catchment	NSW
Separate house	82.6%	86.5%	65.3%
Semi-detached / Flat, unit or apartment	12.3%	11.5%	33.3%
Caravan, cabin, houseboat	3.5%	1.1%	0.8%
Improvised home, tent, sleepers out	0.7%	0.1%	0.2%
House or flat attached to a shop, office, etc.	0.9%	0.8%	0.4%
Total (%)	**100.0%**	**100.0%**	**100.0%**
Total (No.)	**2,431**	**63,648**	**3,059,528**

Source: ABS (2017).

In 2016, the majority of occupied private dwellings in the Catchment were owned outright (35.6%), followed by being owned with a mortgage (32.1%) and rented (29.6%). Compared to the State, a slightly higher proportion of residents in the Catchment had paid off their mortgage, and a slightly smaller proportion of properties were rented.

Table A. 11. Housing Tenure, 2016

Housing Tenure	Cobar LGA	Catchment	NSW
Owned outright	34.5%	35.6%	33.3%
Owned with a mortgage	24.8%	32.1%	32.9%
Being purchased under a shared equity scheme	0.0%	0.1%	0.1%
Rented	36.1%	29.6%	31.8%
Being occupied rent-free	3.2%	1.7%	1.0%
Being occupied under a life tenure scheme	0.2%	0.5%	0.5%
Other tenure type	1.2%	0.5%	0.5%
Total	**100.0%**	**100.0%**	**100.0%**

Source: ABS (2017).

Approximately 20.4% of Cobar LGA's housing stock is comprised of unoccupied private dwellings, compared to 11.4% for the Catchment and 9.3% for the State. This indicates that despite the Project involving no expansion of the current accommodation village, Cobar LGA has sufficient accommodation for any additional workers the Project may bring to the area.

Table A. 12. Dwelling Type, 2016

Dwelling Type	Cobar LGA	Catchment	NSW
Occupied private dwellings	79.0%	88.1%	90.5%
Unoccupied private dwellings	20.4%	11.4%	9.3%
Non-private dwellings	0.6%	0.5%	0.2%
Migratory	0.0%	0.0%	0.0%
Total	**100.0%**	**100.0%**	**100.0%**

ABS (2017).

Property market activity in the Catchment is primarily centred around the key service centres of Dubbo Regional LGA and Orange LGA. Since June 2017, the majority of house sales activity occurred in Dubbo Regional LGA and Orange LGA, which averaged between 200 and 210 sales per quarter each. In line with these low levels of activity, the median sales price within each LGA in the Catchment is typically below half the values recorded for the State, though have generally increased across the Catchment since June 2017 (with the exception of Cobar LGA and Dubbo Regional LGA). This is likely due to house price growth typically lagging that of metropolitan areas. There is limited evidence supporting any large improvement in house sales prices, with declining demand for housing stock. Furthermore, CoreLogic (2020) revealed that whilst regional areas have recorded higher growth in dwelling values than cities, there has still been a slowdown in property market activity as a result of the pandemic.

Cobar LGA recorded a significantly lower median sales price in December 2019 by comparison to the average since June 2017 ($104,000 compared to $176,900). Sales activity in Cobar LGA was recorded below 30 sales for each quarter since June 2017, indicative of low levels of activity.

Similar to housing sales activity, rental activity is primarily concentrated in Dubbo Regional and Orange LGAs. Minimal rental activity has been recorded each of the other LGAs comprising the Catchment, with rents typically falling well below the State average. Cobar LGA recorded a significantly lower rental price by comparison to the State (i.e. $220 per week in December 2019 compared to $480 per week). The number of bonds lodged has declined by comparison to the peaks recorded in mid-2018.

Table A. 13. Median Sales Price by LGA [a, b] ($)

Quarter	Cobar	Bogan	Warren	Gilgandra	Narromine	Orange	Parkes	Lachlan	Dubbo Regional	Cabonne	NSW
Jun-17	$182,050	-	-	-	$223,280	$389,400	$245,080	$153,570	$342,390	$372,150	$891,910
Sep-17	$180,000	$133,500	-	$126,250	$230,000	$365,000	$236,500	$167,000	$323,500	$250,000	$662,000
Dec-17	$158,000	$135,000	-	$160,000	$203,000	$389,000	$246,000	$176,000	$340,000	$340,000	$675,000
Mar-18	-	-	-	-	$208,000	$390,000	$215,000	$128,000	$350,000	$300,000	$655,000
Jun-18	-	$135,000	$165,000	-	$220,000	$391,000	$250,000	$150,000	$358,000	$344,000	$660,000
Sep-18	$195,000	-	-	-	$240,000	$415,000	$255,000	$188,000	$345,000	$325,000	$625,000
Dec-18	$194,000	-	-	$170,000	$243,000	$415,000	$255,000	$188,000	$345,000	$340,000	$650,000
Mar-19	-	-	-	$169,000	-	$403,000	$271,000	$137,000	$350,000	$210,000	$635,000
Jun-19	$225,000	-	-	$218,000	$224,000	$400,000	$260,000	$130,000	$350,000	$348,000	$651,000
Sep-19	-	-	-	-	-	$415,000	$225,000	$123,000	$329,000	$350,000	$665,000
Dec-19	$104,000	-	-	-	$300,000	$435,000	$318,000	-	$340,000	$394,000	$680,000

Notes: (a) The data has been provided at an individual LGA level, as sale volumes are not available for all LGAs in order to provide a weighted average for the Catchment. (b) A '-' represents that 10 or less properties were sold. The exact number has not been recorded due to privacy reasons.
Source: FACS (2020).

Table A. 14. Number of Sales by LGA [a, b, c]

Quarter	Cobar	Bogan	Warren	Gilgandra	Narromine	Orange	Parkes	Lachlan	Dubbo Regional	Cabonne	NSW
Jun-17	s	-	-	-	s	237	38	s	228	36	32,161
Sep-17	s	s	-	s	s	267	76	s	242	51	33,929
Dec-17	s	s	-	s	32	269	72	s	252	54	32,168
Mar-18	-	-	-	-	s	231	61	s	209	39	26,046
Jun-18	-	s	s	-	s	232	60	s	218	36	27,471
Sep-18	s	-	-	-	s	184	87	s	190	31	20,378
Dec-18	s	-	-	s	s	197	97	s	213	36	24,883
Mar-19	-	-	-	s	-	144	36	s	167	s	19,558
Jun-19	s	-	-	s	s	195	64	s	183	32	25,870
Sep-19	-	-	-	-	-	203	61	s	201	33	28,326
Dec-19	s	-	-	-	s	162	44	-	183	s	25,800

Notes: (a) The data has been provided at an individual LGA level, as sale volumes are not available for all LGAs in order to provide a weighted average for the Catchment. (b) An 's' indicates that 30 or less properties were sold. The exact number has not been recorded due to privacy reasons. (c) A '-' represents that 10 or less properties were sold. The exact number has not been recorded due to privacy reasons.
Source: FACS (2020).

Table A. 15. Median Rent by LGA[a, b] ($)

Quarter	Cobar	Bogan	Warren	Gilgandra	Narromine	Orange	Parkes	Lachlan	Dubbo Regional	Cabonne	NSW
Sep-17	$200	$220	$220	$220	$255	$320	$250	$210	$318	$250	$470
Dec-17	$156	-	$200	$230	$270	$320	$270	$210	$320	$250	$475
Mar-18	$158	$170	$200	$180	$240	$330	$250	$220	$310	$265	$480
Jun-18	$168	-	$210	$235	$273	$330	$260	$200	$320	$263	$480
Sep-18	$210	$250	$200	$215	$260	$330	$250	$235	$320	$280	$480
Dec-18	$171	$180	$218	$215	$260	$330	$295	$200	$315	$260	$480
Mar-19	$200	$250	$230	$190	$240	$350	$290	$245	$320	$250	$480
Jun-19	$200	$240	$285	$188	$250	$350	$283	$220	$310	$300	$475
Sep-19	$250	$250	$225	$230	$280	$350	$310	$200	$330	$255	$480
Dec-19	$240	-	-	$248	$250	$350	$320	$200	$310	$300	$470
Mar-20	$220	$250	$220	$240	$270	$350	$300	$225	$330	$290	$480

Notes: (a) The data has been provided at an individual LGA level, as rental bond volumes are not available for all LGAs in order to provide a weighted average for the Catchment. (b) A '-' represents that 10 or less bonds were lodged. The exact number has not been recorded due to privacy reasons.
Source: FACS (2020).

Table A. 16. Number of Rental Bonds Lodged by LGA[a, b, c]

Quarter	Cobar	Bogan	Warren	Gilgandra	Narromine	Orange	Parkes	Lachlan	Dubbo Regional	Cabonne	NSW
Sep-17	63	s	s	s	40	514	101	s	484	35	72,549
Dec-17	78	-	s	s	38	425	94	s	550	44	69,224
Mar-18	84	s	35	s	31	521	120	s	553	45	75,910
Jun-18	84	-	s	s	44	440	105	s	554	46	73,113
Sep-18	72	s	s	43	34	435	109	s	526	33	78,257
Dec-18	62	s	s	s	62	508	102	s	527	31	74,093
Mar-19	77	s	s	33	41	516	116	s	587	34	81,189
Jun-19	73	s	s	s	36	392	104	s	517	40	74,871
Sep-19	74	s	s	s	42	473	109	s	558	44	83,778
Dec-19	47	-	-	s	38	472	94	s	506	34	76,552
Mar-20	71	s	s	s	33	463	116	32	498	61	82,731

Notes: (a) The data has been provided at an individual LGA level, as rental bond volumes are not available for all LGAs in the Catchment. (b) A '-' represents that 10 or less bonds were lodged. The exact number has not been recorded due to privacy reasons. (c) An 's' indicates that 30 or less bonds were lodged. The exact number has not been recorded due to privacy reasons.
Source: FACS (2020).

APPENDIX B: INPUT-OUTPUT METHODOLOGY

INPUT-OUTPUT MODEL OVERVIEW

IO analysis demonstrates inter-industry relationships in an economy, depicting how the output of one industry is purchased by other industries, households, the government and external parties (i.e. exports), as well as expenditure on other factors of production such as labour, capital and imports. IO analysis shows the direct and indirect (flow-on) effects of one sector on other sectors and the general economy. As such, IO modelling can be used to demonstrate the economic contribution of a sector on the overall economy and how much the economy relies on this sector or to examine a change in final demand of any one sector and the resultant change in activity of its supporting sectors.

The economic contribution can be traced through the economic system via:

- **Initial stimulus (direct) impacts**, which represent the economic activity of the industry directly experiencing the stimulus.
- **Flow-on impacts**, which are disaggregated to:
    - **Production induced effects (type I flow-on)**, which comprise the effects from:
        - Direct expenditure on goods and services by the industry experiencing the stimulus (direct suppliers to the industry), known as the first round or direct requirements effects.[11]
        - The second and subsequent round effects of increased purchases by suppliers in response to increased sales, known as the industry support effects.
    - **Household consumption effects (type II flow-on)**, which represent the consumption induced activity from additional household expenditure on goods and services resulting from additional wages and salaries being paid within the economic system.

These effects can be identified through the examination of four types of impacts:

- **Output**: Refers to the gross value of goods and services transacted, including the costs of goods and services used in the development and provision of the final product. Output typically overstates the economic impacts as it counts all goods and services used in one stage of production as an input to later stages of production, hence counting their contribution more than once.
- **Gross product**: Refers to the value of output after deducting the cost of goods and services inputs in the production process. Gross product (e.g. GRP) defines a true net economic contribution and is subsequently the preferred measure for assessing economic impacts.
- **Income**: Measures the level of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the project.
- **Employment**: Refers to the part-time and full-time employment positions generated by the economic shock, both directly and indirectly through flow-on activity, and is expressed in terms of full time equivalent (FTE) positions.

IO multipliers can be derived from open (Type I) IO models or closed (Type II) models. Open models show the direct effects of spending in a particular industry as well as the indirect or flow-on (industrial support) effects of additional activities undertaken by industries increasing their activity in response to the direct spending.

Closed models re-circulate the labour income earned as a result of the initial spending through other industry and commodity groups to estimate consumption induced effects (or impacts from increased household consumption).

[11] Modelling note: In assessing construction impacts, AEC's modelling approach treats subcontractors in the construction services sector engaged through first round effects as part of the initial stimulus impact rather than as part of the production induced impact.

MODEL DEVELOPMENT

Multipliers used in this assessment are derived from sub-regional transaction tables developed specifically for this project. The process of developing a sub-regional transaction table involves developing regional estimates of gross production and purchasing patterns based on a parent table, in this case, the 2017-18 Australian transaction table (ABS, 2020e).

Estimates of gross production (by industry) in the study areas were developed based on the percent contribution to employment (by place of work) of the study areas to the Australian economy (ABS, 2012; ABS, 2017; ABS, 2020f; DoESE, 2020), and applied to Australian gross output identified in the 2017-18 Australian table.

Industry purchasing patterns within the study area were estimated using a process of cross industry location quotients and demand-supply pool production functions as described in West (1993).

Where appropriate, values were rebased from 2017-18 (as used in the Australian national IO transaction tables) to current year values using the Consumer Price Index (ABS, 2020g).

MODELLING ASSUMPTIONS

The key assumptions and limitations of IO analysis include:

- **Lack of supply-side constraints**: The most significant limitation of economic impact analysis using IO multipliers is the implicit assumption that the economy has no supply-side constraints so the supply of each good is perfectly elastic. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.
- **Fixed prices**: Constraints on the availability of inputs, such as skilled labour, require prices to act as a rationing device. In assessments using IO multipliers, where factors of production are assumed to be limitless, this rationing response is assumed not to occur. The system is in equilibrium at given prices, and prices are assumed to be unaffected by policy and any crowding out effects are not captured. This is not the case in an economic system subject to external influences.
- **Fixed ratios for intermediate inputs and production (linear production function)**: Economic impact analysis using IO multipliers implicitly assumes that there is a fixed input structure in each industry and fixed ratios for production. That is, the input function is generally assumed linear and homogenous of degree one (which implies constant returns to scale and no substitution between inputs). As such, impact analysis using IO multipliers can be seen to describe average effects, not marginal effects. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount. Further, it is assumed each commodity (or group of commodities) is supplied by a single industry or sector of production. This implies there is only one method used to produce each commodity and that each sector has only one primary output.
- **No allowance for economies of scope**: The total effect of carrying on several types of production is the sum of the separate effects. This rules out external economies and diseconomies and is known simply as the “additivity assumption”. This generally does not reflect real world operations.
- **No allowance for purchasers’ marginal responses to change**: Economic impact analysis using multipliers assumes that households consume goods and services in exact proportions to their initial budget shares. For example, the household budget share of some goods might increase as household income increases. This equally applies to industrial consumption of intermediate inputs and factors of production.
- **Absence of budget constraints**: Assessments of economic impacts using multipliers that consider consumption induced effects (type two multipliers) implicitly assume that household and government consumption is not subject to budget constraints.

Despite these limitations, IO techniques provide a solid approach for taking account of the inter-relationships between the various sectors of the economy in the short-term and provide useful insight into the quantum of final demand for goods and services, both directly and indirectly, likely to be generated by a project.

In addition to the general limitations of IO analysis, there are two other factors that need to be considered when assessing the outputs of sub-regional transaction table developed using this approach, namely:

- It is assumed the sub-region has similar technology and demand/ consumption patterns as the parent (Australia) table (e.g. the ratio of employee compensation to employees for each industry is held constant).
- Intra-regional cross-industry purchasing patterns for a given sector vary from the national tables depending on the prominence of the sector in the regional economy compared to its input sectors. Typically, sectors that are more prominent in the region (compared to the national economy) will be assessed as purchasing a higher proportion of imports from input sectors than at the national level, and vice versa.

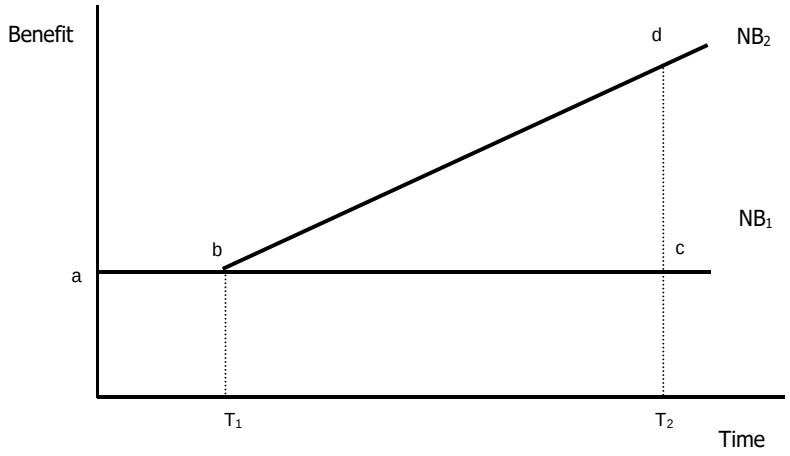
APPENDIX C: CBA METHODOLOGY

STEP 1: DEFINE THE SCOPE AND BOUNDARY

To enable a robust determination of the net benefits of undertaking a given project, it is necessary to specify base case and alternative case scenarios. The base case scenario represents the 'without project' scenario and the alternative or 'with project' scenario examines the impact with the project in place.

The base case (without) scenario is represented by line NB_1 (bc) over time T_1 to T_2 in Figure C.1. The investment in the project at time T_1 is likely to generate a benefit, which is represented by line NB_2 (bd). Therefore, the net benefit flowing from investment in the project is identified by calculating the area (bcd) between NB_1 and NB_2.

Figure C.1. With and Without Scenarios



Source: AEC.

STEP 2: IDENTIFY COSTS AND BENEFITS

A comprehensive quantitative specification of the benefits and costs included in the evaluation and their various timings is required and includes a clear outline of all major underlying assumptions. These impacts, both positive and negative, are then tabulated and where possible valued in dollar terms.

Some impacts may not be quantifiable. Where this occurs the impacts and their respective magnitudes will be examined qualitatively for consideration in the overall analysis.

Financing costs are not included in a CBA. As a method of project appraisal, CBA examines a project's profitability independently of the terms on which debt finance is arranged. This does not mean, however, that the cost of capital is not considered in CBA, as the capital expenses are included in the year in which the transaction occurs, and the discount rate (discussed below in Step 5) should be selected to provide a good indication of the opportunity cost of funds, as determined by the capital market.

STEP 3: QUANTIFY AND VALUE COSTS AND BENEFITS

CBA attempts to measure the value of all costs and benefits that are expected to result from the activity in economic terms. It includes estimating costs and benefits that are 'unpriced' and not the subject of normal market transactions but which nevertheless entail the use of real resources. These attributes are referred to as 'non-market' goods or impacts. In each of these cases, quantification of the effects in money terms is an important part of the evaluation.

However, projects frequently have non-market impacts that are difficult to quantify. Where the impact does not have a readily identifiable dollar value, proxies and other measures should be developed as these issues represent real costs and benefits.

One commonly used method of approximating values for non-market impacts is 'benefit transfer'. Benefit transfer (BT) means taking already calculated values from previously conducted studies and applying them to different study sites and situations. In light of the significant costs and technical skills needed in using the methodologies outlined in the table above, for many policy makers utilising BT techniques can provide an adequate solution.

Context is extremely important when deciding which values to transfer and from where. Factors such as population, number of households, and regional characteristics should be considered when undertaking benefit transfer. For example, as population density increases over time, individual households may value nearby open space and parks more highly. Other factors to be considered include, depending on the location of the original study, utilising foreign exchange rates, demographic data, and respective inflation rates.

Benefit transfer should only be regarded as an approximation. Transferring values from similar regions with similar markets is important, and results can be misleading if values are transferred between countries that have starkly different economies (for example a benefit transfer from the Solomon Islands to Vancouver would likely have only limited applicability). However, sometimes only an indicative value for environmental assets is all that is required.

STEP 4: TABULATE ANNUAL COSTS AND BENEFITS

All identified and quantified benefits and costs are tabulated to identify where and how often they occur. Tabulation provides an easy method for checking that all the issues and outcomes identified have been addressed and provides a picture of the flow of costs, benefits and their sources.

STEP 5: CALCULATE THE NET BENEFIT IN DOLLAR TERMS

As costs and benefits are specified over time it is necessary to reduce the stream of benefits and costs to present values. The present value concept is based on the time value of money – the idea that a dollar received today is worth more than a dollar to be received in the future. The present value of a cash flow is the equivalent value of the future cashflow should the entire cashflow be received today. The time value of money is determined by the given discount rate to enable the comparison of options by a common measure.

The selection of appropriate discount rates is of particular importance because they apply to much of the decision criteria and consequently the interpretation of results. The higher the discount rate, the less weight or importance is placed on future cash flows.

The choice of discount rates should reflect the weighted average cost of capital (WACC). For this analysis, a base discount rate of seven percent has been used to represent the minimum rate of return, which is in line with NSW and Australian Government guidelines. As all values used in the CBA are in real terms, the discount rate does not incorporate inflation (i.e. it is a real discount rate, as opposed to a nominal discount rate).

To assess the sensitivity of the project to the discount rate used, discount rates either side of the base discount rate (seven percent) have also been examined (four percent and ten percent).

The formula for determining the present value is:

$$PV = \frac{FV_n}{(1+r)^n}$$

Where:

PV = present value today

FV = future value n periods from now

r = discount rate per period

n = number of periods

Extending this to a series of cash flows the present value is calculated as:

$$PV = \frac{FV_1}{(1+r)^1} + \frac{FV_2}{(1+r)^2} + \cdots + \frac{FV_n}{(1+r)^n}$$

Once the stream of costs and benefits have been reduced to their present values the Net Present Value (NPV) can be calculated as the difference between the present value of benefits and present value of costs. If the present value of benefits is greater than the present value of costs, then the option or project would have a net economic benefit.

In addition to the NPV, the internal rate of return (IRR) and benefit-cost ratio (BCR) can provide useful information regarding the attractiveness of a project. The IRR provides an estimate of the discount rate at which the NPV of the project equals zero, i.e. it represents the maximum WACC at which the project would be deemed desirable. However, in terms of whether a project is considered desirable or not, the IRR and BCR will always return the same result as the NPV decision criterion.

STEP 6: SENSITIVITY ANALYSIS

Sensitivity analysis allows for the testing of the key assumptions and the identification of the critical variables within the analysis to gain greater insight into the drivers to the case being examined.

A series of Monte Carlo analyses has been conducted to test the sensitivity of the model outputs to changes in key variables. Monte Carlo simulation is a computerised technique that provides decision-makers with a range of possible outcomes and the probabilities they will occur for any choice of action. Monte Carlo simulation works by building models of possible results by substituting a range of values – the probability distribution – for any factor that has inherent uncertainty. It then calculates results over and over, each time using a different set of random values from the probability functions. The outputs from Monte Carlo simulation are distributions of possible outcome values.

During a Monte Carlo simulation, values are sampled at random from the input probability distributions. Each set of samples is called an iteration, and the resulting outcome from that sample is recorded. Monte Carlo simulation does these hundreds or thousands of times, and the result is a probability distribution of possible outcomes. In this way, Monte Carlo simulation provides a comprehensive view of what may happen. It describes what could happen and how likely it is to happen.

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