

Brewongle Solar Farm Economic Assessment

Prepared for

Environmental Resource Management Australia Pty Ltd

By



Gillespie Economics

March 2025

Contact

Dr Rob Gillespie
Principal
Gillespie Economics
114/5 Wulumay Close
Rozelle, NSW 2039

Mobile: 0419 448 238

Email: gillecon@bigpond.net.au

gillespieeconomics@gmail.com

Web: gillespieeconomics.com

Disclaimer: All surveys, forecasts, projections, and recommendations made in reports or studies associated with the Project are made in good faith on the basis of information available at the time; and achievement of objectives, projections or forecasts set out in such reports or studies will depend among other things on the actions of the proponent, NSW Government, and their agents, over which we have no control. Notwithstanding anything contained therein, neither Gillespie Economics nor its servants or agents will, except as the law may require, be liable for any loss or other consequences arising out of the Project.

Document preparation history

Revision	Prepared By	Date	Reviewed By	Date
Preliminary Draft	Dr Rob Gillespie	15/10/24	Meg Coles David Dique	21/1/25
Draft 1	Dr Rob Gillespie	1/2/25	Patrick Dale	11/2/25
Draft 2	Dr Rob Gillespie	13/2/25		
Final	Dr Rob Gillespie	7/3/25		

CONTENTS

EXECUTIVE SUMMARY	3
1 INTRODUCTION	7
1.1 PROJECT OVERVIEW.....	7
1.2 PURPOSE OF THIS REPORT	7
1.3 ASSESSMENT GUIDELINES AND REQUIREMENTS.....	7
1.4 STRUCTURE OF THE REPORT	7
2 METHODOLOGY	9
2.1 OVERVIEW.....	9
2.2 STUDY AREA.....	9
2.3 DESCRIPTION OF THE REGIONAL ECONOMY.....	9
2.4 INPUT-OUTPUT ANALYSIS.....	9
3 THE REGIONAL ECONOMY.....	11
3.1 INTRODUCTION.....	11
3.2 RESIDENTS OF THE REGION.....	11
3.3 ECONOMIC ACTIVITY IN THE REGION	13
4 CONSTRUCTION IMPACTS.....	16
4.1 THE PROJECT	16
4.1.1 <i>Impacts</i>	16
4.1.2 <i>Multipliers</i>	18
4.1.3 <i>Main Sectors Affected</i>	19
4.2 AGRICULTURAL IMPACTS	19
4.3 OTHER IMPACTS	20
5 OPERATION IMPACTS	22
5.1 THE PROJECT	22
5.1.1 <i>Impacts</i>	22
5.1.2 <i>Multipliers</i>	23
5.1.3 <i>Main Sectors Affected</i>	23
5.2 AGRICULTURAL IMPACTS	24
5.3 OTHER IMPACTS	24
6 DECOMMISSIONING IMPACTS.....	27
7 CUMULATIVE IMPACTS.....	28
7.1 APPROACH TO CUMULATIVE IMPACTS.....	28
7.2 POTENTIAL CUMULATIVE IMPACTS	28
7.2.1 <i>Initial Cumulative Labour Stimulus</i>	28
7.2.2 <i>Population Impact</i>	28
7.2.3 <i>Accommodation Impacts</i>	29
7.2.4 <i>Regional Job Growth</i>	29
7.2.5 <i>Stimulus to Regional Economic Activity</i>	29
7.2.6 <i>Impacts on Other Sectors of the Economy</i>	30
7.2.8 <i>Mitigation Measures</i>	30
8 MITIGATION AND MANAGEMENT MEASURES	31
9 CONCLUSION	32
10 REFERENCES	33

ATTACHMENT 1 – THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES..... 34
**ATTACHMENT 2 – UNDERLYING ASSUMPTIONS AND INTERPRETATIONS OF INPUT-OUTPUT
ANALYSIS AND MULTIPLIERS 36**

DEFINITIONS

Consumption-induced flow-on	the spending by households of the extra income they derive from the production of the extra \$1 of output and production induced effects. This spending in turn generates further production by industries.
Economic activity	measures of economic activity include output, value-added, income and employment.
Economic impact	refers to the effect of a project on economic activity within a local area, region, state or nation.
Employment	the number of people employed (including full-time and part-time).
Gross regional product	one of several measures of the size of an economy. It is the market value of all final goods and services produced by all firms in an economy.
Direct impact	economic activity of the project itself e.g. revenue, employment, value-added and wages/income.
Household income	the wages paid to employees including imputed wages for self-employed and business owners.
Indirect impact	economic activity that arises from the project purchasing inputs to production and the supplier of those inputs to production in turn purchasing inputs to its production etc, and employment from the project spending their wages to purchase goods and services, and the provider of those goods and services in turn purchasing goods and services etc.
Input-output analysis	a method to assess the direct and indirect economic activity generated by a proposal through spending.
Multiplier	a summary measures used for predicting the total impact on all industries in an economy from changes in the demand for the output of any one industry. There are many types of multipliers.
Output	total revenue or business turnover.
Production-induced flow-on	the sum of the first-round effects and industrial support effects (i.e. the total amount of output from all industries in the economy required to produce the initial change in output).
Type 11a ratio multiplier	summarises the total impact on all industries in an economy in relation to the initial own sector effect e.g. total income effect from an initial income effect and total employment effect from an initial employment effect, etc.
Value-added	the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services bought in to produce the gross regional output.

EXECUTIVE SUMMARY

Introduction

Edify Energy Pty Ltd proposes to construct, operate, maintain, and decommission the Brewongle Solar Farm (Project), located 12 km south-east of Bathurst within the Bathurst Regional Council Local Government Area (LGA), New South Wales (NSW).

The Project is State Significant Development (SSD) pursuant to schedule 1 of State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). This Economic Assessment analyses the potential economic impacts of the construction, operation and decommissioning of the Project on the regional and NSW economy. It forms part of the Environmental Impact Statement (EIS) for the Project.

The impacts have been assessed in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Housing and Infrastructure (DPHI) and against the relevant legislation and guidelines as they apply to economics.

The Project has the potential to provide economic activity to the regional and NSW economy during the construction, operation and decommissioning phases.

Economic activity impacts in the regional and NSW economy arise:

- directly from the location of new economic activity (the Project) in the region.
- indirectly from expenditure in the region on nonlabour inputs to production.
- indirectly from expenditure of labour wages.

Methodology

These regional and NSW economic impacts are assessed using input-output (IO) analysis. Qualitative consideration is also given to potential impacts of the Project, and cumulative projects, on demand for regional and NSW labour resources and other inputs to production.

Existing environment

The study area/regional economy for this economic assessment is defined as the Bathurst Regional LGA. This is the region within which the Project is located, and which has the potential to provide labour and nonlabour inputs to, and derive economic benefits from, the construction, operation and decommissioning of the Project. It is also the region that may experience impacts from reduction in agricultural activity and from increased demand for labour and other inputs to production. While the region is the focus of the analysis, impacts on the NSW economy are also assessed.

In 2021 the population of the region was 43,567 and the labour force was 20,460. The population of the region has been growing at a rate of 1.2 per cent per annum, similar to the population growth rate of NSW (1.3 per cent per annum).

Aggregated one-digit Australian and New Zealand Industry Classification (ANZSIC) place of work data for the region indicates the significance of the *Health Care and Social Assistance* sector, *Education and Training* sector and *Retail Trade* sector.

Exporting sectors are key drivers of regional economies and reflect a region's endowments and competitive advantages. Using the one-digit ANZSIC, the largest exporting industries in the region by value are *Manufacturing*, *Education and Training*, *Public Administration and Safety*, *Health Care and Social Assistance*, and *Accommodation and Food Services*.

Potential construction impacts

Construction will occur over an 18-month period. The total construction impacts of the Project on the regional economy over this period are estimated at up to:

- between \$84M and \$87M in annual direct and indirect output.
- between \$29M and \$30M in annual direct and indirect value-added.
- \$18M in annual direct and indirect household income.
- between 137 and 146 direct and indirect jobs.

The total construction impacts of the Project on the NSW economy during the 18-months of construction are estimated at up to:

- \$148M in annual direct and indirect output.
- \$62M in annual direct and indirect value added.
- \$40M in annual direct and indirect household income.
- 276 direct and indirect jobs.

The construction phase of the Project will result in a temporary reduction in up to 153 ha of land available for agricultural activity. The economic activity impacts associated with this were assessed and identified as negligible relative to the economic activity impacts of the Project construction.

The construction of the Project will create demand for regional labour resources and regional inputs to production which are unlikely to result in any observable regional wage or price increases.

Potential operational impacts

The Project operation is estimated to make up to the following contribution to the regional economy for at least 30 years:

- \$11M in annual direct and indirect regional output (\$330M in direct and indirect output over the Project life).
- \$9M in annual direct and indirect regional value-added (\$270M in direct and indirect value-added over the Project life).
- \$1M in annual direct and indirect household income (\$30M in direct and indirect household income over the Project life).
- 8 direct and indirect jobs (240 direct and indirect job years over the Project life).

The Project operation is estimated to make up to the following contribution to the NSW economy for 30 years:

- \$13M in annual direct and indirect regional output (\$390M in direct and indirect output over the Project life).
- \$10M in annual direct and indirect regional value-added (\$300M in direct and indirect value-added over the Project life).
- \$1M in annual direct and indirect household income (\$30M in direct and indirect household income over the Project life).
- 14 direct and indirect jobs (420 direct and indirect job years over the Project life).

The construction and operation impacts are larger for the NSW economy because there is less leakage of direct and indirect expenditure out of the NSW economy compared to the regional economy i.e., the NSW economy because of its size and diversity is better placed to provide more of the inputs to production than the regional economy.

Businesses that can provide the inputs to the production process required by the Project and/or the products and services required by the workforce would directly benefit from the Project by way of increased economic activity. However, because of the inter-linkages between sectors, many indirect businesses also benefit.

The Project operation will have negligible agricultural impacts because sheep will be able to graze between solar panels and other infrastructure (Minesoils, 2023).

The operation of the Project will create a small demand for regional labour resources and regional inputs to production. Consequently, no wage or price increases or production shortages are anticipated.

Cumulative impact assessment

The main cumulative economic impact of this and other prospective projects in the region is to generate large demand for a suitably qualified construction workforce in the region and surrounds. This demand can help address the jobs growth imbalance between Australia's biggest cities and regions. The Project will provide opportunities for the existing and future regional workforces, attracting middle skilled and high skilled workers and families to regional areas, reducing outmigration of the regional workforce to look for employment in cities, and increase regional labour force participation.

Notwithstanding, cumulative demand for construction workers can in the short run potentially lead to increased construction wages, attraction of workers from other relevant sub-sectors and sectors of the economy leading to labour shortages in these other areas of the economy (and associated shortages of goods and services), rising prices as firms pass wage costs onto consumers. The extent of these impacts for regional economies will depend on the balance of labour supply from inside the region, outside the region and drive-in drive-out (DIDO)/fly-in fly-out (FIFO), as well as adjustment of the overall labour market to respond to increased demand.

In addition, in the short run excess demand for inputs to construction such as quarry materials and concrete can result in rising costs for these factor inputs and potentially shortages for other uses.

These potential impacts will be more likely and larger as a result of cumulative projects across the region and the State, than from the individual project.

Management measures

The positive local employment and business opportunities can be maximised via:

- Employment of regional residents where they have the required skills and experience.
- Participating, as appropriate, in business groups, events or programs in the regional community.
- Locally sourcing non-labour inputs to production where local producers can be cost and quality competitive.
- Edify and Bathurst Regional Council negotiating a Voluntary Planning Agreement to be managed by Bathurst Regional Council.
- Establishment of a Community Benefit Fund to be managed by Edify with the intention of supporting local non-profit organisations, community programs/events, local businesses, training, and services/infrastructure.
- Lease payments to host landowners that provide an alternative drought proof income with potential flow-on benefits to the regional economy.
- Continued agricultural activities during the operational phase of the Project and reinstatement of full pre-Project agricultural production following Project decommissioning.

1 INTRODUCTION

1.1 Project overview

Edify Energy Pty Ltd (Edify or the Applicant) proposes to construct, operate, and decommission the Brewongle Solar Farm (Project), located 12 km south-east of Bathurst within the Bathurst Regional Council Local Government Area.

The Project comprises:

- solar photovoltaic energy generating facility with an estimated capacity of 90 MW.
- associated infrastructure, including transmission connection works and battery energy storage of up to 90 MW / 180 MWh.

The main objective of the Project is to generate renewable energy, consistent with NSW Government policy for development of infrastructure for renewable energy generation and storage.

1.2 Purpose of this report

The Project is State Significant Development (SSD) pursuant to schedule 1 of State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). Accordingly, approval for the Project is required under part 4, division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). In accordance with the provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act), a development application (DA) for SSD must be accompanied by an environmental impact statement (EIS) that is lodged with the NSW Department of Planning and Environment (DPE) for Development Consent.

This report has been prepared to inform the EIS and development application (DA) for the Project.

1.3 Assessment guidelines and requirements

This assessment has been prepared in accordance with requirements of the NSW Department of Planning, Housing and Infrastructure (DPHI) which were set out in the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Project, issued on 22 December 2023. The SEARs identify matters which must be addressed in the EIS. Table 1.1 lists individual requirements relevant to this Economic Assessment and where they have been addressed.

Table 1.1 – Economic Assessment Related SEARs

Requirement	Section addressed
The EIS must address the following:	
an assessment of the economic impacts or benefits of the Project for the region and the State as a whole, and	Chapters 4, 5, 6 and 7 of this report.
provide details of any proposed voluntary benefit sharing programs in accordance with the Solar Guideline.	See the Social Impact Statement

To inform preparation of the SEARs, DPHI invited relevant government agencies to advise on matters to be addressed in the EIS. These matters were considered by the Secretary when preparing the SEARs.

There are no economic assessment guidelines for SSD solar farm projects.

1.4 Structure of the report

This report is structured as follows:

- Section 2 outlines the methodology used for the Economic Assessment.
- Section 3 provides an overview of the regional economy within which the Project is located.

- Section 4 assesses the economic impacts of construction of the Project on the regional and NSW economy.
- Section 5 assesses the economic impacts of operation of the Project on the regional and NSW economy.
- Section 6 assesses the economic impacts of decommissioning of the Project on the regional and NSW economy.
- Section 7 considers potential cumulative impacts on the region and State.
- Section 8 identifies measures to mitigate and manage economic impacts.
- Section 9 provides the conclusions of the assessment.

2 Methodology

2.1 Overview

The Project has the potential to generate economic activity within the regional and NSW economy, during both construction, operation and decommissioning. The assessment of these potential economic impacts has been undertaken using input-output (IO) analysis. Other potential impacts are discussed qualitatively.

2.2 Study area

The study area/regional economy for this economic assessment is defined as the Bathurst LGA. This is the region which has the potential to provide labour and nonlabour inputs to, and derive economic benefits from, the construction and operation of the Project. and from increased demand for labour and other inputs to production. While the region is the focus of the analysis, impacts on the NSW (State) economy are also assessed.

2.3 Description of the regional economy

Prior to the assessment of impacts using IO analysis, a description of the regional economy is provided. This is based on Australian Bureau of Statistics (ABS) Census of Population and Housing data and information from the model of the regional economy developed for the IO analysis. Data is provided at different levels of aggregation i.e., one-digit and four-digit Australian and New Zealand Standard Industrial Classification (ANZSIC),¹ to provide a more complete picture of the regional economy.

2.4 Input-output analysis

IO analysis is used to assess the direct and indirect impacts (gross economic footprint) of the construction and operation of the Project on the regional and NSW economy.

IO analysis involves two key steps:

- Development of an appropriate IO table (regional transaction table) that can be used to identify the economic structure of the region and multipliers for each existing sector of the economy. IO tables for the regional and NSW economy were developed using the Generation of Regional Input Output Tables (GRIT) procedure developed by the University of Queensland and recognised internationally - Refer to Attachment 1.
- Identification of the direct impact or stimulus of the Project, in a form that is compatible with the IO equations, so that the IO multipliers and flow-on effects for the impacts or stimulus of the Project can then be estimated (West, 1993). The direct impact of the Project was estimated from data provided by the proponent and production ratios in the IO tables. Indirect effects were estimated using the *EconImp* program.²

IO analysis identifies the direct and indirect economic activity of a project on the economy in terms of four main indicators:

- Gross regional output – the gross value of business turnover in a region.
- Value-added – the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services bought in to produce the gross regional output. These costs exclude wage costs.
- Income – the wages paid to employees including imputed wages for self-employed and business owners.

¹ The ANZSIC classifies industries at four levels – Divisions (the broadest level), Subdivisions, Groups and Classes (the finest level). The broadest level of Divisions (one-digit level) comprises 17 industries and provides a broad overall picture of the economy. The finest level of Classes (four-digit level) comprises 720 industry categories.

² The *EconImp* program uses the Leontif Inverse Matrix to estimate indirect effects.

- Employment – the number of people employed (including self-employed, full-time, and part-time).

The IO method is based on several assumptions that are outlined in Attachment 2. Most notably IO analysis assumes that the regional economy has access to sufficient labour and capital resources (from both inside and outside the region) so that an individual project does not result in any regional price changes e.g., wages in other industries or house rentals, which would lead to contractions (“crowding out”) of economic activity in other sectors in the same region. Any “crowding out” is assumed to occur outside the region where the project is concentrated, and the regional impact analysis is focused. A dynamic computable general equilibrium modelling approach may overcome the limitation of IO analysis but is unlikely to be warranted at a local or regional scale or with small scale impacts.

The consequence of the assumptions of IO analysis, is that IO modelling provides an upper bound estimate of the gross economic impact or footprint of the Project which is also an upper bound estimate of net economic activity impacts.

Qualitative consideration is given to potential property value impacts and “crowding out” impacts from the Project on the region and State, as well as the cumulative impacts of multiple renewable energy and other projects.

3 THE REGIONAL ECONOMY

3.1 Introduction

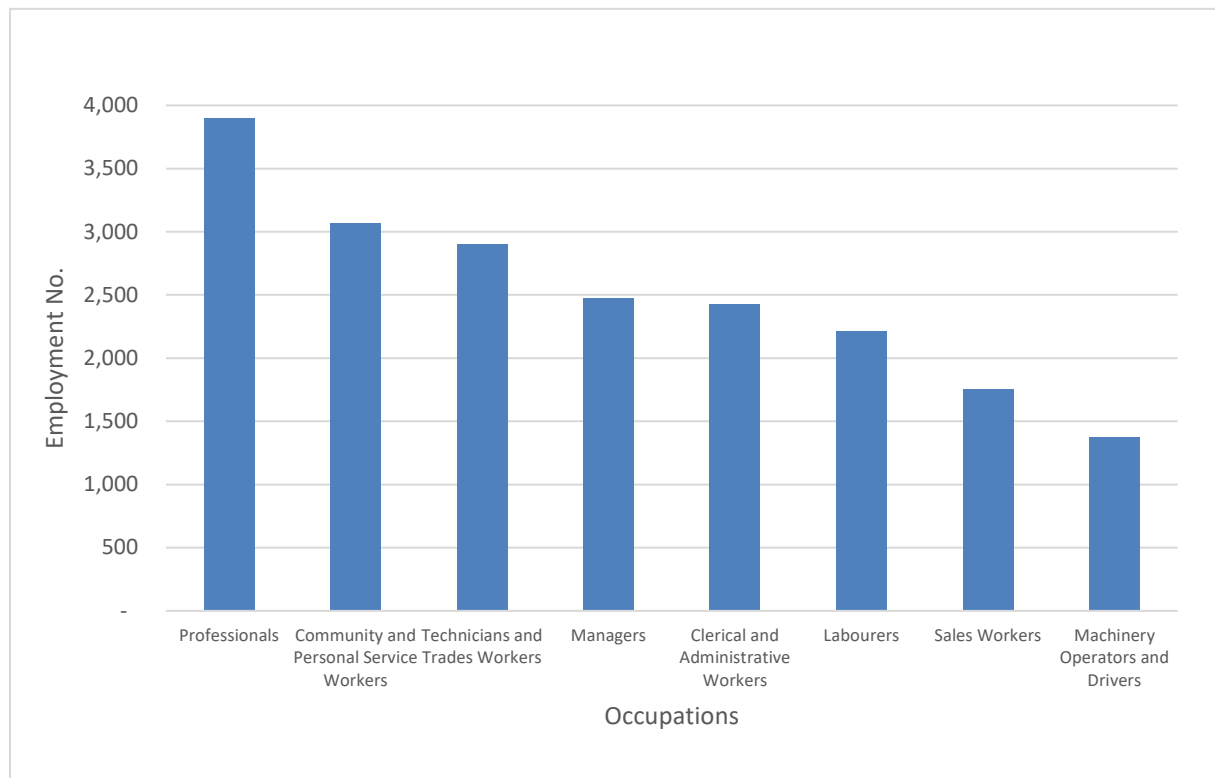
This section characterises the regional economy from two perspectives, residents of the region and workers in the region.

3.2 Residents of the Region

Table 3.1 provides some characteristics of the usual residents of the regional economy based on the 2021 ABS Census of Population and Housing. In 2021, the region had a population of 43,567 and a median age of 38 compared to 39 for NSW. The labour force for the region was 20,460, which was 47 per cent of the population. In 2021 there were 863 people unemployed, an unemployment rate of 4.2 per cent which was lower than the unemployment rate for NSW (4.9 per cent).

The main occupations of usual residents³ in the region (Figure 3.1) were Professionals (19 per cent) followed by Community and Personal Service Workers (15 per cent) and Technicians and Trades Workers (14 per cent).

Figure 3.1 – Employment by Occupation of Usual Residents



³ Employed people aged 15 years and over.

Table 3.1 - Characteristics of Usual Residents

	Bathurst Regional		NSW	
	No.	%	No.	%
Demographics				
Population	43,567	NA	8,072,163	NA
Median Age	38	NA	39	NA
In labour force	20,460	47.0	3,874,012	48.0
Unemployed	863	4.2	189,852	4.9
Median household weekly income	1,585	NA	1,829	NA
Unoccupied private dwellings %	1,580	9.0	299,524	9.4
Median rent	320	NA	420	NA
Occupations	No.	%	No.	%
Professionals	3,898	19.1	952,131	25.8
Community and Personal Service Workers	3,068	15.0	390,779	10.6
Technicians and Trades Workers	2,903	14.2	436,589	11.9
Managers	2,471	12.1	536,820	14.6
Clerical and Administrative Workers	2,426	11.9	480,612	13.0
Labourers	2,211	10.8	300,966	8.2
Sales Workers	1,755	8.6	294,889	8.0
Machinery Operators and Drivers	1,376	6.7	222,186	6.0

Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Community Profiles

The main four-digit ANZSIC industry sectors in which usual residents were employed in 2021 is provided in Table 3.2. *Hospitals (except Psychiatric Hospitals), Other Social Assistance Services, State Government Administration, Aged Care Residential Services and Supermarket and Grocery Stores*, were the most significant employment sectors for residents of the region.

Fourteen per cent of employed usual residents work outside the region, mainly Orange LGA (4.0 per cent), Lithgow LGA (2.7 per cent), Oberon (2.1 per cent) and Blayney (1.7 per cent) (.id, 2024).

Table 3.2 - Top 5 Industry Sectors of Employment for Usual Residents (Four Digit ANZSIC)

Bathurst Regional	No.	%
Hospitals (except Psychiatric Hospitals)	865	4.2
Other Social Assistance Services	811	4.0
State Government Administration	675	3.3
Aged Care Residential Services	613	3.0
Supermarket and Grocery Stores	536	2.6

Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Community Profiles

An indication of the health of an economy can be gained from population changes. This theory of regional economic growth suggests that places that can attract population immigration⁴ create increased demand for goods and services and thus more jobs. This growth leads to increasing local multiplier effects, scale economies and an increase in the rate of innovation and capital availability

⁴ Mainly due to natural endowments and comparative advantage in certain industry sectors.

(Sorensen, 1990). Conversely, population losses can contribute to a cycle of decline whereby reduced populations results in closure of services, which in turn makes it difficult to attract new populations (Sorensen, 1990).

Trends in regional economies of NSW because of globalisation and associated structural adjustment include:

- Loss of significant industries such as abattoirs and timber mills from many rural areas.
- Increased mechanisation of agriculture and aggregation of properties, resulting in loss of employment opportunities in this industry.
- Growth of regional centres, at the expense of smaller towns.
- Preference of Australians for coastal living, particularly for retirement.
- Preference of many of today's fastest growing industries for locating in large cities (Collits, 2000).

The result is that there has been declining population in many rural LGAs that are in non-coastal areas in NSW. There has also been a decline in the population of smaller towns even in regions where the population has been growing.

Against this backdrop, it is evident that the population of the regional economy has been growing at an average annual rate of 1.2 per cent since 2006, compared to 1.3 per cent per annum for NSW.

Table 3.3 - Population growth

Local Government Area	Population				Average Annual Growth Rate			
	2006	2011	2016	2021	2006 - 2011	2011 - 2016	2016 - 2021	2006 - 2021
Bathurst Regional	36,916	39,960	42,244	43,674	1.6%	1.1%	0.7%	1.2%
NSW	6,742,690	7,218,529	7,732,858	8,093,815	1.4%	1.4%	0.9%	1.3%

Source: Australian Bureau of Statistics, 2023 Estimated Resident Population, Local Government Areas, Australia

The population of the region (Table 3.4) is predicted to continue to grow at an average annual rate of 1.4 percent, greater than that of NSW (1.0 per cent) (NSW DPE, 2022).

Table 3.4 – Projected population growth

Local Government Area	2021	2041	Change	Annual %
Bathurst Regional	44,370	57,060	12,690	1.4%
NSW	8,166,757	9,872,934	1,706,177	1.0%

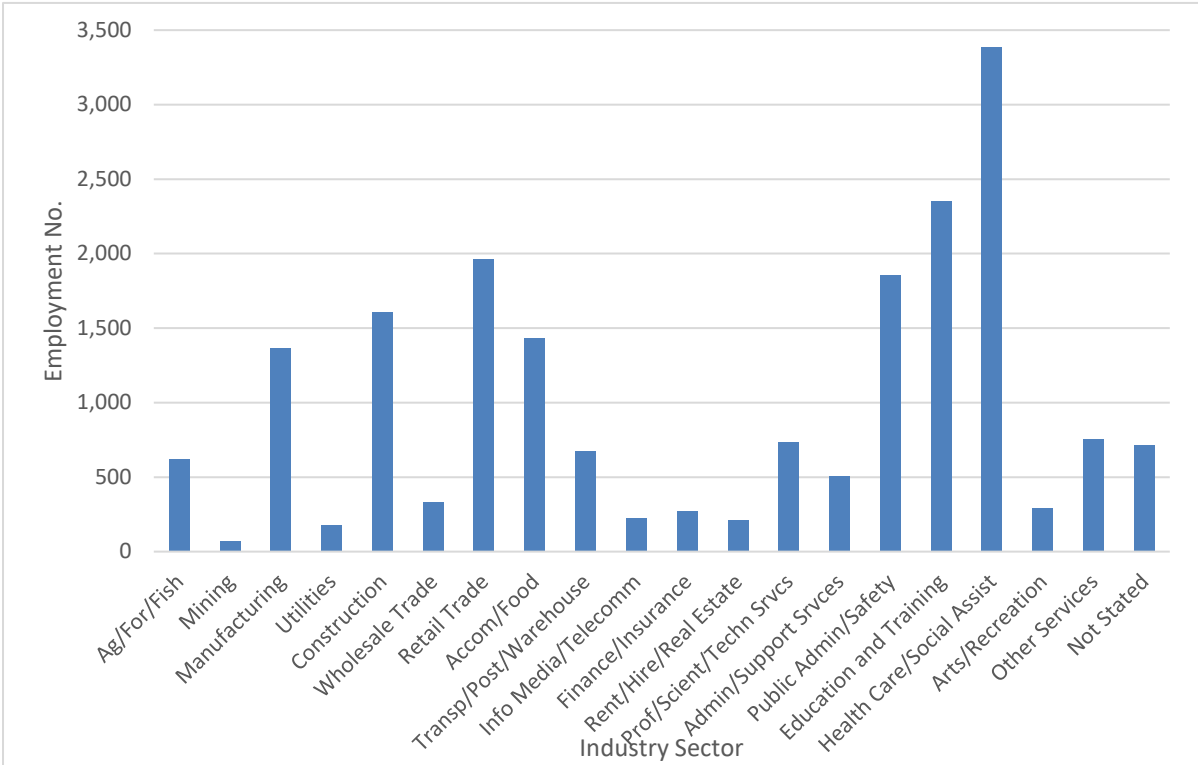
Source: NSW Department of Planning and Environment (2022)

3.3 Economic Activity in the Region

An indication of the nature of the regional economy can be gained by examining one-digit ANZSIC place of work employment by industry data - refer to Figure 3.2. This indicates the significance of the *Health Care and Social Assistance* sector, *Education and Training* sector and *Retail Trade* sector.

Fourteen per cent of people who work in the region live outside the region, mainly in Lithgow (2.6 per cent), Orange (2.6 per cent), Oberon (2.4 per cent) and Blayney (2.0 per cent).

Figure 3.2 - Place of work employment by industry (One-digit ANZSIC)



Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Working Population Profiles

At the more disaggregated level (place of work employment by four-digit ANZSIC) the main industry sectors of employment in the region are *Hospitals (except Psychiatric Hospitals), Other Social Assistance Services, State Government Administration, Higher Education and Aged Care Residential Services* (see Table 3.5).

Table 3.5 - Place of Work Top 5 Industry Sectors of Employment (Four-digit ANZSIC Sectors)

Bathurst Regional	%
Hospitals (except Psychiatric Hospitals)	4.5
Other Social Assistance Services	4.3
State Government Administration	3.5
Higher Education	3.3
Aged Care Residential Services	3.3

Source: Australian Bureau of Statistics, 2021 Census of Population and Housing, Table Builder

Exporting sectors are based on a region’s endowments and competitive advantages, and in regional economic development economics are the key drivers of the economy. The largest exporting industries (One-digit ANZSIC) are:

- *Manufacturing (\$521.2 million) mainly Food Product Manufacturing.*
- *Education and Training (\$141 million) mainly Tertiary Education.*
- *Public Administration and Safety (\$128 million) mainly Public Order, Safety and Regulatory Services, and Public Administration.*
- *Health Care and Social Assistance (\$110 million) mainly Social Assistance Services.*
- *Accommodation and Food Services (\$101 million) (Profile.id, 2024).*

In combination these five industries accounted for \$1,001 million in total or 68% of the total exports by industry in the region.

In terms of value-added, the ANZSIC one-digit industry sectors of *Health Care and Social Assistance, Education and Training, Public Administration and Safety, Manufacturing and Construction* had the highest value-added in total, equal to approximately 50% of the regional economy and 56% of regional employment - Table 3.6.

Table 3.6 - Gross Value Added for the 5 Largest Industries in the regional economy (ANZSIC One Digit)

Industry	Gross Value Added (\$m)	Proportion of Regional Economy (%)	Proportion of Regional Employment (%)
Health Care and Social Assistance	336	14	18
Education and Training	239	10	11
Public Administration and Safety	209	9	9
Manufacturing	204	9	7
Construction	199	8	11
Total	1,186	50	56

Source: Profile.id (2024) Bathurst Regional Council economic profile

4 CONSTRUCTION IMPACTS

4.1 The Project

The Project would provide economic activity to the regional and NSW economy during the construction, operation and decommissioning phases. It could also result in some reduction in regional economic activity from foregone agricultural activity within the disturbance footprint.

4.1.1 Impacts

Construction expenditure is associated with manufacturing of equipment and expenditure across the following three construction sectors of the IO industry classification:

- The *Heavy and Civil Engineering Construction Sector* which includes businesses involved in engineering construction and project management services for a diverse range of activities including on-site assembly of heavy electrical machinery from prefabricated components, transmission lines, road construction etc.
- The *Construction Services Sector* which includes businesses involved in earthmoving work such as levelling of construction sites, excavation of foundations, trench digging, concreting services, electrical services, hire of earthmoving plant with operator etc.
- The *Non-Residential Building Construction Sector* which includes businesses engaged in the construction of industrial buildings.

Conservatively, all machinery manufacturing is assumed to occur outside the region/NSW.

Over the 18 months construction phase, average annual construction employment is estimated at 88, with a peak workforce of 200.⁵

Based on the IO coefficients of the abovementioned three construction sectors in the regional IO table, \$30M of expenditure would be required across these sectors to generate this level of onsite workforce for a year.

The estimated direct and indirect regional economic impact of \$30M expenditure in the regional and NSW economy is reported in Tables 4.2 and 4.3.

⁵ The IO model of the regional economy is based on average annual revenue, expenditure, and employment for each industry sector. So, to model impacts it is necessary to base it on average annual employment impacts rather than peak employment.

Table 4.2 – Average Annual Economic Impacts of the Construction on the Regional Economy (\$2024)

20% Locally Sourced	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	30	23	2	26	56
<i>Type 11A Ratio</i>	1.00	0.77	0.07	0.85	1.85
VALUE ADDED (\$M)	12	5	1	7	19
<i>Type 11A Ratio</i>	1.00	0.43	0.10	0.54	1.54
INCOME (\$M)	8	3	1	4	12
<i>Type 11A Ratio</i>	1.00	0.38	0.07	0.45	1.45
EMPL. (No.)	88	39	9	49	137
<i>Type 11A Ratio</i>	1.00	0.44	0.11	0.55	1.55
40% Locally Sourced	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	30	23	4	28	58
<i>Type 11A Ratio</i>	1.00	0.77	0.15	0.92	1.92
VALUE ADDED (\$M)	12	5	3	8	20
<i>Type 11A Ratio</i>	1.00	0.43	0.21	0.64	1.64
INCOME (\$M)	8	3	1	4	12
<i>Type 11A Ratio</i>	1.00	0.38	0.15	0.53	1.53
EMPL. (No.)	88	39	19	58	146
<i>Type 11A Ratio</i>	1.00	0.44	0.22	0.66	1.66

Note: Totals may have minor discrepancies due to rounding.

Table 4.3 – Average Annual Economic Impacts of the Construction on the NSW Economy (\$2024)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	30	34	34	68	98
<i>Type 11A Ratio</i>	1.00	1.14	1.13	2.27	3.27
VALUE ADDED (\$M)	12	11	18	29	42
<i>Type 11A Ratio</i>	1.00	0.86	1.49	2.34	3.34
INCOME (\$M)	10	7	10	17	27
<i>Type 11A Ratio</i>	1.00	0.74	1.01	1.75	2.75
EMPL. (No.)	88	69	120	188	276
<i>Type 11A Ratio</i>	1.00	0.78	1.36	2.14	3.14

Note: Totals may have minor discrepancies due to rounding.

In estimating the average annual regional impacts, it is important to separate the flow-on effects that are associated with firms buying goods and services from each other (production-induced effects) and the flow-on effects that are associated with employing people who subsequently buy goods and services as households (consumption-induced effects). This is because these two effects operate in different ways and have different spatial impacts.

Production-induced effects occur in a near-proportional way within a region, whereas the consumption-induced flow-on effects only occur in a proportional way if workers and their families are in the region or migrate into the region. Where workers commute from outside the region, some of the consumption-induced flow-on effects leak from the region.

For the purposes of the modelling, two scenarios were modelled for consumption induced flow-on effects at the regional level (refer to Table 4.2). The first is where 20% of the workforce is sourced from the region and hence 20% of consumption induced flow-on effects are captured by the region. The

second is where 40% of the workforce is sourced from the region and hence 40% of flow-on effects are captured by the region.⁶

All of the workforce are assumed to come from NSW and all of consumption induced impacts are included in Table 4.3.

The average annual construction impacts of the Project on the regional economy during the full year of construction are estimated at up to:

- between \$56M and \$58M in annual direct and indirect output.
- between \$19M and \$20M in annual direct and indirect value-added.
- \$12M in annual direct and indirect household income.
- between 137 and 146 direct and indirect jobs.

Impacts in the second year of construction (6 months) will be half the above level of impacts.

Consequently, total construction impacts of the Project on the regional economy during the 18-months of construction are estimated at up to:

- between \$84M and \$87M in annual direct and indirect output.
- between \$29M and \$30M in annual direct and indirect value-added.
- \$18M in annual direct and indirect household income.
- between 137 and 146 direct and indirect jobs.

The average annual construction impacts of the Project on the NSW economy during the full year of construction are estimated at up to:

- \$98M in annual direct and indirect output.
- \$42M in annual direct and indirect value added.
- \$27M in annual direct and indirect household income.
- 276 direct and indirect jobs.

Impacts in the second year of construction (6 months) will be half the above level of impacts.

Consequently, the total construction impacts of the Project on the NSW economy during the 18-months of construction are estimated at up to:

- \$148M in annual direct and indirect output.
- \$62M in annual direct and indirect value added.
- \$40M in annual direct and indirect household income.
- 276 direct and indirect jobs.

The impacts are larger for the NSW economy because there is less leakage of direct and indirect expenditure out of the NSW economy compared to the regional economy and hence greater production induced and consumption induced flow-on effects.

4.1.2 Multipliers

Multipliers are summary measures used for predicting the total impact on all industries in an economy from changes in the demand for the output of any one industry (ABS, 1995). There are many types of multipliers that can be generated from IO analysis (refer to Attachment 2). Type 11A ratio multipliers summarise the total impact on all industries in an economy in relation to the initial own sector effect

⁶ The percentage sourced from the region will be subject to availability of suitably skilled labour.

e.g., total income effect from an initial income effect and total employment effect from an initial employment effect, etc.

At the regional level, the adjusted type 11A ratio multipliers for the construction workforce of the Project under the 20% locally sourced scenario range from 1.45 for income up to 1.85 for output. The multipliers are larger under the 40% locally sourced scenario due to increased consumption induced flow-ons. The NSW type 11A ratio multipliers for the construction workforce range from 2.75 for income up to 3.34 for value added. The multipliers are large for the NSW economy because of the greater level of intersectoral linkages in the larger economy and hence larger level of flow-on impacts i.e. less leakages compared to the regional economy.

4.1.3 Main Sectors Affected

The IO analysis indicates construction is most likely to directly impact the *Heavy and Civil Engineering Construction Sector*, *Construction Services Sector* and *Non-Residential Building Construction Sector*. Flow-on impacts from the construction of the Project are likely to affect several different sectors of the regional and NSW economy.

The sectors of the regional economy most impacted by output, value-added, income and employment production induced flow-ons are likely to be as follows:

- *Professional, Scientific and Technical Services.*
- *Residential Building Construction.*
- *Wholesale and Retail Trade.*
- *Road Transport.*
- *Cement Lime and Ready-Mixed Concrete Manufacturing.*
- *Non-Residential Property Operators and Real Estate Services.*
- *Employment, Travel Agency and Other Administrative Services*
- *Building Cleaning, Pest Control and Other Support Services.*

For the NSW economy the *Finance sector*, *Auxiliary Finance and Insurance sector*, and *Non-Residential Property Operators and Real Estate Services* are also important production induced flow-on sectors.

Consumption induced flow-on effects in the region will be mainly in the following sectors:

- *Retail and Wholesale Trade.*
- *Food and Beverage Services.*
- *Health Care Services.*
- *Actual Rent for Housing.*
- *Primary and Secondary Education.*
- *Residential Care and Social Assistance.*
- *Technical, Vocational and Tertiary Education Services (incl undergraduate and postgraduate)*
- *Construction Services.*

For the NSW economy the *Finance; Professional, Scientific and Technical Services; Insurance and Superannuation; Employment, Travel Agency and Other Administrative Services*, are also important consumption induced flow-on sectors.

4.2 Agricultural impacts

Construction of the Project will impact up to 153 ha of agricultural land. Based on the NSW DPI gross margin budget for Merino Ewes (20 micron) – Merino Rams (Minesoils, 2023), 153 ha of impacted sheep grazing would result in \$121,524 per annum in reduced revenue. Using revenue, expenditure and

employment ratios in the *Sheep, Grain, Beef and Dairy Cattle* sector of the regional and NSW IO table, the direct and indirect impact of this level of revenue is summarised in Tables 4.5 and 4.6. Indirect impacts include economic activity associated with suppliers to agricultural production. These impacts would occur for approximately 18 months.

Table 4.5 Annual Regional Economic Impacts of Foregone Agriculture During Project Construction (\$2024)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	0.12	0.05	0.03	0.08	0.20
<i>Type 11A Ratio</i>	1.00	0.45	0.22	0.67	1.67
VALUE ADDED (\$M)	0.06	0.02	0.02	0.04	0.10
<i>Type 11A Ratio</i>	1.00	0.42	0.27	0.69	1.69
INCOME (\$M)	0.02	0.01	0.01	0.02	0.03
<i>Type 11A Ratio</i>	1.00	0.76	0.47	1.23	2.23
EMPL. (No.)	0.26	0.17	0.11	0.29	0.55
<i>Type 11A Ratio</i>	1.00	0.68	0.44	1.12	2.12

Table 4.6 Annual NSW Economic Impacts of Foregone Agriculture During Project Construction (\$2024)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	0.12	0.09	0.08	0.17	0.30
<i>Type 11A Ratio</i>	1.00	0.75	0.69	1.44	2.44
VALUE ADDED (\$M)	0.06	0.04	0.05	0.09	0.14
<i>Type 11A Ratio</i>	1.00	0.75	0.80	1.54	2.54
INCOME (\$M)	0.02	0.02	0.02	0.05	0.07
<i>Type 11A Ratio</i>	1.00	1.47	1.44	2.91	3.91
EMPL. (No.)	0.26	0.27	0.29	0.56	0.82
<i>Type 11A Ratio</i>	1.00	1.05	1.14	2.20	3.20

The annual regional direct and indirect impact of foregone agriculture during Project construction is estimated at up to:

- \$0.20M in annual direct and indirect regional output.
- \$0.10M in annual direct and indirect regional value-added.
- \$0.03M in annual direct and indirect household income.
- 0.55 direct and indirect jobs.

This represents less than 0.08% of direct agricultural economic activity in the region.

It is evident from the above that agricultural impacts from the construction of the Project are negligible.

4.3 Other impacts

The construction of the proposed Project will create demand for regional labour resources and regional inputs to production. Where there is excess capacity in the regional economy, or the region has access to labour and other resources from outside the region this demand will increase economic activity in the region as per the above analysis.

Non-marginal changes in labour demand from an individual project can in the short run potentially lead to increased construction wages, attraction of workers from other relevant sectors of the economy leading to labour shortages in these other areas of the economy (and associated shortages of goods and services), rising prices as firms pass wage costs onto consumers etc. The extent of these impacts for regional economies will depend on the balance of labour supply from inside the region, outside the

region and drive-in drive-out (DIDO)/fly-in fly-out (FIFO), as well as adjustment of the overall labour market to respond to increased demand e.g., increased labour force participation.

In addition, in the short run excess demand for inputs to construction of an individual project such as quarry materials, concrete etc can result in rising costs for these factor inputs and potentially shortages for other uses.

Whether, and the extent to which these types of effects will arise from an individual project is uncertain. For this Project where direct average annual construction demand is for in the order of 88 workers (with approximately 18 to 35 sourced from the region) in a region with a labour force of 20,460, no observable wage price effects are likely. Notwithstanding, any "crowding out" of other economic activities represents the operation of the market system where scarce resources are reallocated to where they are most highly valued and where society will benefit the most from them. This reallocation of resources is therefore a positive impact for the economy not a negative.

5 OPERATION IMPACTS

5.1 The Project

For the analysis of the operational phase of the Project, a new Project operation sector was inserted into regional and NSW IO tables reflecting average annual operation.

This sector is based on costs and revenues/output at the Project boundary. Output was estimated from the installed capacity and an estimate of the wholesale bundled electricity and renewable energy certificate revenue per annum, net of transmission costs.⁷ The proponent advised of an operational employment of five (all of which are assumed to reside in the region). Wages for this level of employment were based on IBISworld (2023). Total nonwage expenditure was estimated from Aurecon (2022). Nonwage expenditure was allocated between imports and 115 intermediate sectors as per the coefficients in the *Electricity Generation* sector of the region and NSW IO models.

5.1.1 Impacts

On this basis the total and disaggregated average annual impacts of the Project on the regional and NSW economy (in 2024 dollars) is shown in Tables 5.1 and 5.2.

Table 5.1 – Annual Economic Impacts of the Project on the Regional Economy (\$2024)

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT (\$M)	9.69	0.69	0.48	1.17	10.85
<i>Type 11A Ratio</i>	1.00	0.07	0.05	0.12	1.12
VALUE ADDED (\$M)	8.17	0.29	0.27	0.56	8.73
<i>Type 11A Ratio</i>	1.00	0.03	0.03	0.07	1.07
INCOME (\$M)	0.33	0.14	0.12	0.26	0.60
<i>Type 11A Ratio</i>	1.00	0.42	0.37	0.79	1.79
EMPL. (No.)	5.00	1.40	2.02	3.41	8.41
<i>Type 11A Ratio</i>	1.00	0.28	0.40	0.68	1.68

Table 5.2 – Annual Economic Impacts of the Project on the NSW Economy (\$2024)

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT (\$M)	9.69	1.81	1.57	3.38	13.07
<i>Type 11A Ratio</i>	1.00	0.19	0.16	0.35	1.35
VALUE ADDED (\$M)	8.17	0.78	0.85	1.63	9.81
<i>Type 11A Ratio</i>	1.00	0.10	0.10	0.20	1.20
INCOME (\$M)	0.33	0.45	0.46	0.91	1.24
<i>Type 11A Ratio</i>	1.00	1.36	1.37	2.73	3.73
EMPL. (No.)	5.00	3.89	5.53	9.41	14.41
<i>Type 11A Ratio</i>	1.00	0.78	1.11	1.88	2.88

The Project operation is estimated to make up to the following contribution to the regional economy:

- \$11M in annual direct and indirect regional output (\$330M in direct and indirect output over the Project life).
- \$9M in annual direct and indirect regional value-added (\$270M in direct and indirect value-added over the Project life).
- \$1M in annual direct and indirect household income (\$30M in direct and indirect household income over the Project life).

⁷ This is a residual pricing approach to estimate value at the Project boundary. Transmission impacts are not part of the Project and have not been assessed in the EIS.

- 8 direct and indirect jobs (240 direct and indirect job years over the Project life).

The Project operation is estimated to make up to the following contribution to the NSW economy:

- \$13M in annual direct and indirect regional output (\$390M in direct and indirect output over the Project life).
- \$10M in annual direct and indirect regional value-added (\$300M in direct and indirect value-added over the Project life).
- \$1M in annual direct and indirect household income (\$30M in direct and indirect household income over the Project life).
- 14 direct and indirect jobs (420 direct and indirect job years over the Project life).

The impacts are larger for the NSW economy because there is less leakage of direct and indirect expenditure out of the NSW economy compared to the regional economy.

5.1.2 Multipliers

The Type 11A ratio multipliers for the Project's impact on the regional economy range from 1.07 for value-added up to 1.79 for income. Capital intensive developments tend to have a high level of linkage with other sectors in an economy thus contributing relatively high rates of flow-on employment and income while at the same time only having a lower level of direct employment and income (relative to output levels). This tends to lead to a relatively high ratio multiplier for employment and income. The Project also has a relatively low ratio multiplier for output and value-added reflecting the relatively high direct output and value-added compared to that in flow-on sectors.

The NSW Type 11A ratio multipliers for the Project range from 1.20 for value-added up to 3.73 for income. The multipliers are large for the NSW economy because of the greater level of intersectoral linkages in the larger economy and hence larger level of flow-on impacts i.e., less leakages compared to the regional economy.

5.1.3 Main Sectors Affected

The sectors of the regional and NSW economy most impacted by output, value-added, income and employment production induced flow-ons are likely to be as follows:

- *Electricity Transmission, Distribution, On Selling and Electricity Market Operation.*
- *Finance.*
- *Construction Services.*
- *Professional, Scientific and Technical Services.*
- *Employment, Travel Agency and Other Administrative Services.*
- *Wholesale Trade.*
- *Road Transport.*
- *Auxiliary Finance and Insurance Services.*
- *Telecommunication Services.*

Consumption induced flow-on effects in the region will be mainly in the following sectors:

- *Retail and Wholesale Trade.*
- *Food and Beverage Services.*
- *Health Care Services.*
- *Actual Rent for Housing.*
- *Construction Services.*

- *Primary and Secondary Education.*
- *Residential Care and Social Assistance.*
- *Technical, Vocational and Tertiary Education Services.*

For the NSW economy the *Finance; Professional, Scientific and Technical Services; and Employment, Travel Agency and Other Administrative Service* sectors are also important consumption induced flow-on sectors.

5.2 Agricultural impacts

The Project operation is assumed to impact up to 153ha of sheep grazing land. This is a worst-case scenario because the proponent is planning to implement agrisolar once the Project is operational. Notwithstanding, based on the NSW DPI gross margin budget for Merino Ewes (20 micron) – Merino Rams (Minesoils, 2023), 153 ha of impacted sheep grazing would result in \$121,524 per annum in reduced revenue. Using revenue, expenditure and employment ratios in the *Sheep, Grain, Beef and Dairy Cattle* sector of the regional and NSW IO table, the direct and indirect impact of this level of revenue is summarised in Tables 5.3 and 5.4. Indirect impacts include economic activity associated with suppliers to agricultural production. These impacts would occur for the duration of the Project operation.

Table 5.3 Annual Regional Economic Impacts of Foregone Agriculture During Project Operation (\$2024)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	0.12	0.05	0.03	0.08	0.20
<i>Type 11A Ratio</i>	1.00	0.45	0.22	0.67	1.67
VALUE ADDED (\$M)	0.06	0.02	0.02	0.04	0.10
<i>Type 11A Ratio</i>	1.00	0.42	0.27	0.69	1.69
INCOME (\$M)	0.02	0.01	0.01	0.02	0.03
<i>Type 11A Ratio</i>	1.00	0.76	0.47	1.23	2.23
EMPL. (No.)	0.26	0.17	0.11	0.29	0.55
<i>Type 11A Ratio</i>	1.00	0.68	0.44	1.12	2.12

Table 5.4 Annual NSW Economic Impacts of Foregone Agriculture During Project Operation (\$2024)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	0.12	0.09	0.08	0.17	0.30
<i>Type 11A Ratio</i>	1.00	0.75	0.69	1.44	2.44
VALUE ADDED (\$M)	0.06	0.04	0.05	0.09	0.14
<i>Type 11A Ratio</i>	1.00	0.75	0.80	1.54	2.54
INCOME (\$M)	0.02	0.02	0.02	0.05	0.07
<i>Type 11A Ratio</i>	1.00	1.47	1.44	2.91	3.91
EMPL. (No.)	0.26	0.27	0.29	0.56	0.82
<i>Type 11A Ratio</i>	1.00	1.05	1.14	2.20	3.20

These annual agricultural impacts are minor.

5.3 Other impacts

5.3.1 Crowding Out

The operation of the Project will create a very small demand for regional labour resources (five direct jobs in a labour market of 20,460) and regional inputs to production (that from the IO analysis represent 0.03% of interindustry transactions in the region). Consequently, no material "crowding out" effects on other industry sectors are anticipated.

5.3.2 Property Value Impacts

The economic value of private land is determined by the interaction of demand and supply in the market, with the market price for land reflecting the willingness to pay of a potential purchaser. Willingness to pay reflects the discounted future potential returns from the land (whether from agriculture, rural residential uses, mining and extractive industries, recreation uses and potential (real or otherwise) to convert to higher value uses e.g. rural residential, urban, industrial or commercial uses. These potential future returns reflect the structural, access and environmental attributes of the land.

Structural attributes include lot size and shape, house attributes, other property improvements, land capability, resource endowments, current zoning, future subdivision potential, road frontage, water, sewerage, electricity, communication services etc.

Access includes proximity to major cities and the employment and community and the social services this offers.

Environmental attributes may include:

- noise, water quality and scenic amenity all of which positively impact land values.
- the presence of native vegetation and biodiversity which can have a positive impact on private land values in terms of amenity and a negative impact on private land values in terms of restrictions on current and potential use of the land.
- the presence of hazards such as flood prone land and bushfire hazard which reduce private land values by limiting land use opportunities or increase land values by supporting particular farming activity e.g. floodplains.

The value of private lands on the urban fringe are potentially determined by both agricultural characteristics of the land (i.e. future potential agricultural returns) and urban influences including access to the urban area (and associated physical and social infrastructure including employment, schools, hospitals etc.) and potential for urban conversion.

Where no potential for urban conversion exists in the next 20 to 30 years, potential agricultural production and/or access to urban areas (employment and physical and social infrastructure) are likely to be major potential determinants of land values. Given enough distance from an urban area, land parcels are valued for agricultural uses only (Guiling *et al* 2009) and land values increase linearly with size.

Most of the focus on potential property value impacts of renewable energy projects in Australia has been on wind farms. Preston Rowe Patterson (2009) in a study of the impact of windfarms on property values found that properties in rural/agricultural areas appeared to be the least affected by wind farm development, with no reductions found near any of the eight windfarms investigated. The only properties where a possible effect was observed were lifestyle properties in Victoria within 500 m of a windfarm.

A literature review by Urbis (2016) of Australian and international studies found that the majority of published reports conclude that there is no impact or a limited defined impact of windfarms on property values. Those studies which identified a negative impact are based in the northern hemisphere and are associated with countries with higher population densities and a greater number of traditional residential and lifestyle properties affected by wind farms. This is generally contrary to the Australian experience, with most wind farms being located in low population density environments that derive the majority of their value from productive farming purposes (Urbis 2016).

Urbis (2016) undertook an assessment of the impact of windfarms on surrounding land values in NSW and Victoria. It found that there is insufficient sales data to provide a definitive answer utilising statistically robust quantitative analysis techniques. However, from its case study assessments it did not identify any conclusive trends that would indicate that wind farms have negative impacts on property values. Its property resale analysis indicated that all of the properties examined demonstrated capital

growth that aligned with the broader property market at the time. Consequently, Urbis (2016, p. 21) concluded:

"In our professional opinion, appropriately located windfarms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values."

With this finding in relation to the more visually prominent wind farms, solar farms are also likely to have negligible impact on surrounding property values. This is supported by overseas studies that have investigated the impact of utility-scale solar farms on property values (American Clean Power Association, 2021).

A study by the University of Rhode Island (Al-Hamoodah et al. 2018) evaluated 208 solar facilities, 71,373 housing sales occurring within one-mile of solar facilities (Test Group), and 343,921 sales between one-to-three miles of a solar facility (Control Group). The study found no negative impacts to residential home values near solar arrays in rural areas.

Similar results were found in a study of 451 solar farms in North Carolina. "Across many samples and specifications, we find no direct negative or positive spillover effect of a solar farm construction on nearby agricultural land values" (Abashidze and Taylor 2022, p. 327)

6 DECOMMISSIONING IMPACTS

At the end of the operating life of the Project the proponent may:

- replace the solar panels with new technology (subject to landholder agreements, planning approvals and the condition of the equipment).
- decommission the Project and remove solar panels and associated infrastructure and rehabilitate the land to the current agricultural quality.

At this stage it is not known which of these options will be adopted.

However, from an economic impact perspective both will provide stimulus to the regional and NSW economy via spending on inputs to refurbishment or decommissioning, and demand for labour and associated wage expenditure. These economic impacts would only be short-term and less than those associated with the construction of the Project.

7 CUMULATIVE IMPACTS

7.1 Approach to cumulative impacts

The cumulative impact assessment approach involves considering the impacts of the Project together with the impacts of other relevant future projects on economic activity. Relevant major projects in the Bathurst Regional LGA and surrounding region include:

- Glanmire Solar Farm.
- Panorama BESS.
- Central West Pumped Hydro.
- Great Western BESS.
- Tallawang Solar Farm.
- Stubbo Solar Farm.
- McPhillamys Gold Project.
- Wallerawang BESS.

The cumulative impact of multiple projects in the region will see the magnification of impacts addressed in this report and competition for resources. These are discussed qualitatively below based on general principles of supply and demand and reference to available reports on cumulative impacts of regional projects.

7.2 Potential cumulative impacts

7.2.1 Initial Cumulative Labour Stimulus

The main cumulative economic impact of these projects (and other regional projects that are not related to energy) is to generate a large demand for a suitably qualified construction workforce in the region.

This labour demand will be met from:

- the region:
 - the unemployment pool.
 - increased labour force participation.
 - workers from other industries.
- the rest of NSW and Australia, with labour:
 - moving into the region to live during the employment period; or
 - commuting from outside the region e.g. Fly-in-fly-out (FIFO) and Drive-in-drive-out (DIDO).

7.2.2 Population Impact

It is unlikely all the cumulative labour demand can be met from the existing residents of the region, only. To the extent that the cumulative job stimulus results in workers (and their families) relocating to regional areas, even temporarily, or workers from the region not emigrating from the region in search of work, this can provide population growth (or abate population decline), including in areas experiencing population decline. Trends in regional economies of NSW (because of globalization and associated structural adjustment) has resulted in many non-coastal rural areas in NSW experiencing population decline. There has also been a decline in the population of smaller towns even in regions where the population has been growing.

Population growth is an important driver of the health of regional economies. Places that can attract population immigration create increased demand for goods and services and thus more jobs. This growth leads to increasing local multiplier effects, scale economies and an increase in the rate of innovation and capital availability (Sorensen, 1990). Conversely, population losses can contribute to a

'vicious cycle' of decline whereby reduced populations results in closure of services, which in turn makes it difficult to attract new populations (Sorensen 1990).

7.2.3 Accommodation Impacts

Cumulative regional population changes driven by cumulative regional employment growth will increase demand for short-term and long-term accommodation. The impacts can be increases in housing prices and rents, and shortages of short-term accommodation that might otherwise be used for tourism or other purposes.

From an economic perspective, increases in the cost of housing are predominantly a transfer between local owners and renters, or local owners and buyers. The existing homeowners and accommodation providers of the property benefit when this happens, and the renters/buyers lose (DAE, 2012). However, price rises also impact lower income households who may get squeezed out of the market. In situations where there are no market distortions, and cumulative population changes are longer term, the local housing supply would normally adjust to demand and prices return to their previous levels (DAE, 2012). However, given the more temporary nature of population change, normal longer term housing supply adjustments may be tempered and so there will be a need to encourage and facilitate the provision of additional accommodation including temporary workforce camps, adaptive reuse or extension of existing buildings, use of existing granny flats and spare bedrooms, use of vacant housing etc.

The extent of residual housing price impacts for regional economies would depend on the balance of labour supply from inside the region, outside the region and DIDO/FIFO, the level of provision of workforce accommodation facilities, and other accommodation options, as well as adjustment of the overall housing supply in response to increased demand. Early provision of additional accommodation can reduce housing price impacts.

7.2.4 Regional Job Growth

Cumulative demand for labour in regional areas can help address the jobs growth imbalance between Australia's biggest cities which have grown by an average of 2.4 per cent per annum since 2000 and the regions which have grown at 1.0 per cent per annum (Sobyra, 2022). This imbalance has been attributed to the economy creating relatively more demand for high skilled jobs than previously with the vast majority of these located in big cities rather than regions (Sobyra, 2022).

Regional jobs growth from the cumulative project demand can partly offset this trend by providing opportunities for the existing and future regional workforces, attracting middle-and high-skilled workers and families to regional areas, reducing outmigration of the regional workforce to look for employment in cities, and increase regional labour force participation. Regional projects can therefore provide a boom to non-coastal regional economies that have experienced low growth or decline because of globalisation and associated structural adjustment.

7.2.5 Stimulus to Regional Economic Activity

Cumulative projects in regional NSW will provide a substantial boost in direct economic activity in the region as well as flow-on economic activity to businesses that are able to supply the goods and services:

- required for project construction and operation; and
- demanded by workers i.e. expenditure of wages.

Based on the Economic Assessment in Sections 4 and 5, cumulative project construction is most likely to directly impact the heavy and civil engineering construction sector, construction services sector and non-residential building construction sector, and will indirectly impact a range of sectors.

However, any business that can provide the goods and services demanded for project construction and operation, and by workers, will benefit from the cumulative economic activity.

7.2.6 Impacts on Other Sectors of the Economy

Notwithstanding the above, excess demand for construction workers can in the short run lead to increased construction sector (and other sector) wages, attraction of workers from other relevant sectors of the economy leading to labour shortages in these other areas of the economy (and associated shortages of goods and services), rising prices as firms pass wage costs onto consumers etc.

In addition, in the short run, excess demand for inputs to construction such as quarry materials, concrete etc can result in rising costs (prices) for these factor inputs and potentially shortages for other uses. The extent of these short run impacts for regional economies would depend on the balance of labour supply from inside the region, outside the region and DIDO/FIFO, as well as adjustment of the overall labour market, and other markets, in response to increased demand. However, in the medium-term markets will adjust to some extent (e.g. increased labour force participation, new quarry proposals to supply demand for aggregate etc) and enable wages and prices to return to previous levels.

Notwithstanding, any price increases and crowding out of other economic activities in the region represents the operation of the market system where scarce resources are reallocated to where they are most highly valued and where society would benefit the most from them. This reallocation of resources is therefore a positive thing for the economy not a negative. Notwithstanding, it may be associated with social impacts.

7.2.7 Agricultural Impacts

The economic assessment in sections 4 and 5, found that the negative regional economic impacts from the use of agricultural land for the Project, were very small, and negligible in comparison to the positive regional economic activity from the Project. This finding reflects the small disturbance footprint of the Project and the lower value agricultural activity being impacted.

These findings are likely to be the same across most renewable energy projects e.g. for wind farm projects turbine location tends to be on low land capability soils. The cumulative impact of projects on the regional economic activity of agriculture is therefore likely to be minor.

7.2.8 Mitigation Measures

The magnitude and duration of cumulative wage, price and supply shortages will largely depend on the ability of the labour, housing, and other markets to make supply adjustments.

Greater use of FIFO/DIDO and workforce accommodation will reduce impacts on the regional labour market (wage increases and labour shortages) and accommodation market (price/rent increases) but will also reduce regional economic activity benefits, because FIFO/DIDO workers will repatriate most of their income back to their home region.

The ability of the labour, housing, and other markets to make timely supply adjustments, may in some instances (e.g. housing supply adjustments, new quarry proposals) be impacted by local planning systems, and so Council's should be cognisant of the consequences of their decisions and the impacts of delays.

8 MITIGATION AND MANAGEMENT MEASURES

It is evident from Section 4 and 5 that the economic activity associated with the construction and operation of the Project would outweigh the loss of economic activity from the minor and temporary impact on agricultural production. However, at the same time it would create a demand for a suitably qualified construction workforce in the region.

The proponent proposes to work in partnership with the local councils and community to help maximise the projected economic regional benefits whilst minimising any impacts. In this respect, a range of general economic mitigation and management measures are proposed and would include:

- Employment of regional residents where they have the required skills and experience.
- Participating, as appropriate, in business groups, events or programs in the regional community.
- Locally sourcing non-labour inputs to production where local producers can be cost and quality competitive.
- Edify and Bathurst Region Council negotiating a Voluntary Planning Agreement to be managed by Bathurst Regional Council.
- Establishment of a Community Benefit Fund to be managed by Edify with the intention of supporting local non-profit organisations, community programs/events, local businesses, training, and services/infrastructure.
- Lease payments to host landowners that provide an alternative income with potential flow-on benefits to the regional economy.
- Potential for agricultural activities such as sheep grazing (agrisolar) during the operational phase of the Project and reinstatement of full pre-project agricultural production following Project decommissioning.

The Agricultural Impact Assessment (Appendix N of the EIS) and the Social Impact Assessment (Appendix U of the EIS) provides additional management measures which are relevant to the impacts discussed in this report.

9 CONCLUSION

The Project will provide economic activity to the regional economy during the construction, operation and decommissioning phases. These regional economic impacts were assessed using IO analysis.

The construction, operation and decommissioning of the Project will have positive net impacts on the level of economic activity in the regional and NSW economy.

The proponent proposes to work in partnership with local councils and the local community so that, as far as possible, the benefits of the projected economic growth in the region are maximised and impacts minimised. In this respect, a range of general economic impact mitigation and management measures are proposed.

10 REFERENCES

- Abashidze, N. and Taylor, L. (2022) Utility -Scale Solar Farms and agricultural Land Values. *Land Economics*, V. 99, Issue 3, p.327.
- Al-Hamoodah, L., Koppa, K., Schieve, E., Reeves, C., Hoen, B., Seel, J., and Rai, V. (2018) *An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations*. Policy Research Project, LGJ School of Public Affairs, The University of Texas at Austin, May 2018.
- American Clean Power Association (2021) *Property Values and Utility-Scale Solar Facilities*.
- Aurecon (2022) *2022 Costs and Technical Parameter Review*, prepared for the Australian Energy Market Operator.
- Australian Bureau of Statistics (1995) *Information Paper Australian National Accounts Introduction to Input-Output Multipliers*. Cat. No. 5246.0.
- Australian Bureau of Statistics, *2021 Census of Population and Housing, Community Profiles*.
- Australian Bureau of Statistics, *2021 Census of Population and Housing, Working Population Profiles*.
- Deloitte Access Economics (2012) *Economic and social impacts of the Warkworth Extension Project*, prepared for Singleton Council.
- IBISworld (2023) *Solar Electricity Generation in Australia, Industry Report*.
- Minesoils (2023) Appendix L Soil and Agricultural Impact Assessment. In: Edify (2023) *Brewongle Solar Farm Scoping Report*, Edify, Queensland, p. 91.
- NSW Department of Planning and Environment (2022) *NSW Population Projections*, Planning Portal.
- NSW DPI (2023) *Gross Margin Budget for Merino Ewes (20 micron) – Merino Rams*, www.dpi.nsw.gov.au/agriculture/budgets/livestock, accessed 30 July 2024.
- Preston Rowe Patterson (2009) *Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia*, prepared for the NSW Valuer General.
- Profile.id (2024) *Bathurst Regional Council economic profile*. economy.id.com.au/bathurst.
- Sobyra, R., Sigler, T., and Charles-Edwards, E. (2022) Unbalanced growth in the labourscape: explaining regional employment divergence. *Regional Studies*, V. 56, No. 7, pp. 1059-1070.
- Sorensen, A.D. (1990) Virtuous Cycles of Growth and Vicious Cycles of Decline: Regional Economic Change in Northern NSW. In *Change and Adjustment in Northern New South Wales*. Ed D.J. Walmsley, The University of New England, Armidale.
- Urbis (2016) *Review of the Impact of Wind Farms on Property Values*, State of NSW and the Office of Environment and Heritage.
- West, G. (1993) *Input-Output Analysis for Practitioners, Version 7.1, User's Guide*.

ATTACHMENT 1 – THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES

The Generation of Regional Input-Output Tables (GRIT) system was designed to:

- combine the benefits of survey-based tables (accuracy and understanding of the economic structure) with those of non-survey tables (speed and low cost).
- enable the tables to be compiled from other recently compiled tables.
- allow tables to be constructed for any region for which certain minimum amounts of data were available.
- develop regional tables from national tables using available region-specific data.
- produce tables consistent with the national tables in terms of sector classification and accounting conventions.
- proceed in a number of clearly defined stages.
- provide for the possibility of ready updates of the tables.

The resultant GRIT procedure has a number of well-defined steps. Of particular significance are those that involve the analyst incorporating region-specific data and information specific to the objectives of the study. The analyst has to be satisfied about the accuracy of the information used for the important sectors. The method allows the analyst to allocate available research resources to improving the data for those sectors of the economy that are most important for the study.

An important characteristic of GRIT-produced tables relates to their accuracy. In the past, survey-based tables involved gathering data for every cell in the table, thereby building up a table with considerable accuracy. A fundamental principle of the GRIT method is that not all cells in the table are equally important. Some are not important because they are of very small value and, therefore, have no possibility of having a significant effect on the estimates of multipliers and economic impacts. Others are not important because of the lack of linkages that relate to the particular sectors that are being studied. Therefore, the GRIT procedure involves determining those sectors and, in some cases, cells that are of particular significance for the analysis. These represent the main targets for the allocation of research resources in data gathering. For the remainder of the table, the aim is for it to be 'holistically' accurate (Jensen, 1980). This means a generally accurate representation of the economy is provided by the table, but does not guarantee the accuracy of any particular cell. A summary of the steps involved in the GRIT process is shown in Table A1.1 (Powell and Chalmers, 1995).

Table A1.1**The GRIT Method**

Phase	Step	Action
PHASE I	1	ADJUSTMENTS TO NATIONAL TABLE Selection of national input-output table (1114-sector table with direct allocation of all imports, in basic values).
	2	Adjustment of national table for updating.
	3	Adjustment for international trade.
PHASE II		ADJUSTMENTS FOR REGIONAL IMPORTS (Steps 4-14 apply to each region for which input-output tables are required)
	4	Calculation of 'non-existent' sectors.
	5	Calculation of remaining imports.
PHASE III		DEFINITION OF REGIONAL SECTORS
	6	Insertion of disaggregated superior data.
	7	Aggregation of sectors.
	8	Insertion of aggregated superior data.
PHASE IV		DERIVATION OF PROTOTYPE TRANSACTIONS TABLES
	9	Derivation of transactions values.
	10	Adjustments to complete the prototype tables.
	11	Derivation of inverses and multipliers for prototype tables.
PHASE V		DERIVATION OF FINAL TRANSACTIONS TABLES
	12	Final superior data insertions and other adjustments.
	13	Derivation of final transactions tables.
	14	Derivation of inverses and multipliers for final tables.

Source: Bayne and West (1988).

REFERENCES

Bayne, B. and West, G. (1988) *GRIT – Generation of Regional Input-Output Tables: Users Reference Manual*. Australian Regional Developments No. 15, Office of Local Government, Department of Immigration, Local Government and Ethnic Affairs, AGPS.

Jensen, G. (1980) The concept of accuracy in regional input-output models. *International Regional Science Review*, 5:2, pp.139-54.

Powell, R. and Chalmers, L. (1995) *The Regional Economic Impact of Gibraltar Range and Dorrigo National Park*. A Report for the NSW National Parks and Wildlife Service.

ATTACHMENT 2 – UNDERLYING ASSUMPTIONS AND INTERPRETATIONS OF INPUT-OUTPUT ANALYSIS AND MULTIPLIERS

1. “The *basic assumptions* in IO analysis include the following:
 - there is a fixed input structure in each industry, described by fixed technological coefficients (evidence from comparisons between IO tables for the same country over time have indicated that material input requirements tend to be stable and change but slowly; however, requirements for primary factors of production, that is labour and capital, are probably less constant).
 - all products of an industry are identical or are made in fixed proportions to each other.
 - each industry exhibits constant returns to scale in production.
 - unlimited labour and capital are available at fixed prices; that is, any change in the demand for productive factors will not induce any change in their cost (in reality, constraints such as limited skilled labour or investment funds lead to competition for resources among industries, which in turn raises the prices of these scarce factors of production and of industry output generally in the face of strong demand).
 - there are no other constraints, such as the balance of payments or the actions of government, on the response of each industry to a stimulus.
2. The multipliers therefore describe *average effects, not marginal effects*, and thus do not take account of economies of scale, unused capacity or technological change. Generally, average effects are expected to be higher than the marginal effects.
3. The IO tables underlying multiplier analysis only take account of one form of *interdependence*, namely the sales and purchase links between industries. Other interdependence such as collective competition for factors of production, changes in commodity prices which induce producers and consumers to alter the mix of their purchases and other constraints which operate on the economy as a whole are not generally taken into account.
4. The combination of the assumptions used and the excluded interdependence means that IO multipliers are higher than would realistically be the case. In other words, they tend to *overstate* the potential impact of final demand stimulus. The overstatement is potentially more serious when large changes in demand and production are considered.
5. The multipliers also do not account for some important pre-existing conditions. This is especially true of Type II multipliers, in which employment generated and income earned induce further increases in demand. The implicit assumption is that those taken into employment were previously unemployed and were previously consuming nothing. In reality, however, not all 'new' employment would be drawn from the ranks of the unemployed; and to the extent that it was, those previously unemployed would presumably have consumed out of income support measures and personal savings. Employment, output and income responses are therefore overstated by the multipliers for these additional reasons.
6. The most *appropriate interpretation* of multipliers is that they provide a relative measure (to be compared with other industries) of the interdependence between one industry and the rest of the economy which arises solely from purchases and sales of industry output based on estimates of transactions occurring over a (recent) historical period. Progressive departure from these conditions would progressively reduce the precision of multipliers as predictive device” (ABS 1995, p.24).

Multipliers indicate the total impact of changes in demand for the output of any one industry on all industries in an economy (ABS, 1995). Conventional output, employment, value-added and income multipliers show the output, employment, value-added and income responses to an initial output stimulus (Jensen and West, 1986).

Components of the conventional output multiplier are as follows:

Initial effect - which is the initial output stimulus, usually a \$1 change in output from a particular industry (Powell and Chalmers, 1995; ABS, 1995).

First round effects - the amount of output from all intermediate sectors of the economy required to produce the initial \$1 change in output from the particular industry (Powell and Chalmers, 1995; ABS, 1995).

Industrial support effects - the subsequent or induced extra output from intermediate sectors arising from the first round effects (Powell and Chalmers, 1995; ABS, 1995).

Production induced effects - the sum of the first round effects and industrial support effects (i.e. the total amount of output from all industries in the economy required to produce the initial \$1 change in output) (Powell and Chalmers, 1995; ABS, 1995).

Consumption induced effects - the spending by households of the extra income they derive from the production of the extra \$1 of output and production induced effects. This spending in turn generates further production by industries (Powell and Chalmers, 1995; ABS, 1995).

The *simple multiplier* is the initial effect plus the production induced effects.

The *total multiplier* is the sum of the initial effect plus the production-induced effect and consumption-induced effect.

Conventional employment, value-added and income multipliers have similar components to the output multiplier, however, through conversion using the respective coefficients show the employment, value-added and income responses to an initial output stimulus (Jensen and West, 1986).

For employment, value-added and income, it is also possible to derive relationships between the initial or own sector effect and flow-on effects. For example, the flow-on income effects from an initial income effect or the flow-on employment effects from an initial employment effect, etc. These own sector relationships are referred to as ratio multipliers, although they are not technically multipliers because there is no direct line of causation between the elements of the multiplier. For instance, it is not the initial change in income that leads to income flow-on effects, both are the result of an output stimulus (Jensen and West, 1986).

A description of the different ratio multipliers is given below.

Type 1A Ratio Multiplier = $\frac{\text{Initial} + \text{First Round Effects}}{\text{Initial Effects}}$

Type 1B Ratio Multiplier = $\frac{\text{Initial} + \text{Production Induced Effects}}{\text{Initial Effects}}$

Type 11A Ratio Multiplier = $\frac{\text{Initial} + \text{Production Induced} + \text{Consumption Induced Effects}}{\text{Initial Effects}}$

Type 11B Ratio Multiplier = $\frac{\text{Flow-on Effects}}{\text{Initial Effects}}$

Source: Centre for Farm Planning and Land Management (1989).

REFERENCES

Australian Bureau of Statistics (1995) Information Paper Australian National Accounts Introduction to Input-Output Multipliers. Cat. No. 5246.0.

Centre for Farm Planning and Land Management (1989) *Consultants report to State plantations impact study*. CFPLM, University of Melbourne.

Jensen, R. and West, G. (1986) *Input-output for Practitioners: Theory and Applications*. Prepared for Department of Local Government and Administrative Services, Local Government and Regional Development Division, Australian Government Publishing Service.

Powell, R. and Chalmers, L. (1995) *The Regional Economic Impact of Gibraltar Range and Dorrigo National Park*. A Report for the NSW National Parks and Wildlife Service.