



APPENDIX S ECONOMIC ASSESSMENT

# **The Plains Wind Farm Economic Assessment**

*Prepared for*

**ERM Australia Pty Ltd**

*By*



**Gillespie Economics**

**Email:** [gillecon@bigpond.net.au](mailto:gillecon@bigpond.net.au)

**Web:** [gillespieeconomics.com](http://gillespieeconomics.com)

**March 2024**

## **Disclaimer**

All surveys, forecasts, projections, findings, and recommendations made in this report are made in good faith on the basis of information available at the time; and achievement of objectives, projections or forecasts set out in this report will depend among other things on the actions of the 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.

## **Contact**

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

Mobile: 0419 448 238  
Email: [gillecon@bigpond.net.au](mailto:gillecon@bigpond.net.au)  
Web: [gillespieeconomics.com](http://gillespieeconomics.com)

## CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>1 INTRODUCTION .....</b>	<b>5</b>
1.1 PROJECT OVERVIEW .....	5
1.2 PURPOSE OF THIS REPORT .....	5
1.3 ASSESSMENT GUIDELINES AND REQUIREMENTS .....	5
1.4 STRUCTURE OF THE REPORT .....	5
<b>2 METHODOLOGY .....</b>	<b>7</b>
2.1 OVERVIEW .....	7
2.2 STUDY AREA .....	7
2.3 DESCRIPTION OF THE REGIONAL ECONOMY .....	7
2.4 INPUT-OUTPUT ANALYSIS .....	7
<b>3 THE REGIONAL ECONOMY .....</b>	<b>9</b>
3.1 INTRODUCTION .....	9
3.2 RESIDENTS OF THE REGION .....	9
3.3 ECONOMIC ACTIVITY IN THE REGION .....	12
<b>4 CONSTRUCTION ASSESSMENT .....</b>	<b>16</b>
4.1 THE PROJECT .....	16
4.1.1 <i>Impacts</i> .....	16
4.1.2 <i>Multipliers</i> .....	17
4.1.3 <i>Main Sectors Affected</i> .....	18
4.2 AGRICULTURAL IMPACTS .....	18
4.3 OTHER IMPACTS .....	19
<b>5 OPERATION PHASE .....</b>	<b>20</b>
5.1 THE PROJECT .....	20
5.1.1 <i>Impacts</i> .....	20
5.1.2 <i>Multipliers</i> .....	21
5.1.3 <i>Main Sectors Affected</i> .....	21
5.2 AGRICULTURAL IMPACTS .....	22
5.3 OTHER IMPACTS .....	22
<b>6 CUMULATIVE IMPACTS .....</b>	<b>23</b>
6.1 INTRODUCTION .....	23
6.2 POTENTIAL CUMULATIVE IMPACTS .....	23
6.2.1 <i>Initial Cumulative Labour Stimulus</i> .....	23
6.2.2 <i>Population Impact</i> .....	24
6.2.3 <i>Accommodation Impacts</i> .....	24
6.2.4 <i>Regional Job Growth</i> .....	24
6.2.5 <i>Stimulus to Regional Economic Activity</i> .....	24
6.2.6 <i>Impacts on Other Sectors of the Economy</i> .....	25
6.2.7 <i>Agricultural Impacts</i> .....	25
<b>7 MITIGATION AND MANAGEMENT MEASURES .....</b>	<b>27</b>
<b>8 CONCLUSION .....</b>	<b>28</b>
<b>9 REFERENCES .....</b>	<b>29</b>
<b>ATTACHMENT 1 – THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES .....</b>	<b>30</b>
<b>ATTACHMENT 2 – UNDERLYING ASSUMPTIONS AND INTERPRETATIONS OF INPUT-OUTPUT ANALYSIS AND MULTIPLIERS .....</b>	<b>32</b>

## EXECUTIVE SUMMARY

ENGIE is seeking approval for the construction, operation, and decommissioning of The Plains Wind Farm (the Project) including up to 188 wind turbines with a total capacity of up to approximately 1,350 Mega Watts (MW). The Project is situated about 15 kilometres (km) south of the Hay township and within the Hay Shire Local Government Area (LGA), on land that is predominately used for agricultural activities (beef cattle and sheep grazing, and some cropping).

This report assesses the potential economic impacts of the construction and operation of Project on the regional and NSW economy. It has been prepared to support and inform 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 and Environment (DPE) and against the relevant legislation and guidelines as they apply to economics.

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

Economic activity impacts in the regional and NSW economy arises from changes in:

- expenditure in the region on non-labour inputs to production;
- direct employment of local labour or in migration of labour; and
- expenditure of labour wages in the local economy.

## Methodology

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

## Existing environment

The regional economy is defined as the combined LGAs of Balranald, Hay, Edward River, Murrumbidgee, and Griffith. This is the region within which the Project is located, which has the potential to provide inputs to the Project and to derive economic benefits from the construction and operation of the Project. The population of the region in 2021 was 43,985 and has been growing at approximately four per cent of the rate of NSW. Griffith LGA accounts for 62 per cent of the total population and 64 per cent of the total labour force. The population of the region is predicted to continue to grow at an average annual rate of 0.4 percent (less than half that of the NSW population), largely driven by population growth in the Griffith LGA. The population of Balranald LGA and Hay LGA are predicted to decline, while the population of Edward River LGA and Murrumbidgee LGA will remain static (NSW DPE, 2022).

Aggregated one-digit Australian and New Zealand Standard Industry Classification (ANZSIC) place of work data indicates the significance of the *Agriculture, Forestry and Fishing* sectors followed by *Manufacturing* sectors, and *Health Care and Social Assistance* sectors. However, the main employment in the region varies between LGAs. In the Balranald LGA, Hay LGA and Murrumbidgee LGA the main employment sectors were *Agriculture, Forestry and Fishing* sectors. In the Edward River LGA the main employment sectors were *Health Care and Social Assistance* sectors followed by *Agriculture, Forestry and Fishing* sectors. In *Griffith LGA* the main employment sectors were *Manufacturing* sectors and *Health Care and Social Assistance* sectors.

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, Utilities, Construction and Agriculture, Forestry and Fishing*.

### **Potential construction impacts**

Average annual direct construction employment (full time equivalent) from the Project is estimated at 550 workers. The average annual construction impacts of the Project on the regional economy for three years are estimated at up to:

- \$200M in direct output and \$128M in indirect output.
- \$80M in direct value added and \$40M in indirect value-added.
- \$42M in direct household income and \$18M in indirect household income.
- 550 direct jobs and 298 indirect jobs.

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

- \$200M in direct output and \$399M in indirect output.
- \$80M in direct value added and \$176M in indirect value-added.
- \$59M in direct household income and \$105M in indirect household income.
- 550 direct jobs and 1,177 indirect jobs.

The construction phase of the Project will have a footprint of 1,997 ha and impact potential agricultural activity – beef cattle and sheep grazing, and some cultivation. 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. However, this is not expected to lead to any significant impacts on regional wages or prices.

### **Potential operational impacts**

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

- \$354M in direct output and \$20M in indirect output.
- \$324M in direct value added and \$9M in indirect value-added.
- \$2M in direct household income and \$3M in indirect household income.
- 40 direct jobs and 41 indirect jobs.

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

- \$354M in direct output and \$67M in indirect output.
- \$324M in direct value added and \$35M in indirect value-added.
- \$3M in direct household income and \$18M in indirect household income.
- 40 direct jobs and 186 indirect jobs.

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 an increased economic activity. However, because of the inter-linkages between sectors, many indirect businesses also benefit.

The Project operation will have more minor agricultural impacts than the construction phase i.e., 1,296 ha being unavailable for agriculture. This level of agricultural impact during the operation of the Project is negligible.

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, experience, and commitment.
- 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.
- Establishment of benefit sharing initiatives to fund community projects and provide social and economic benefits.
- Lease payments to host landowners that provide an alternative drought proof income with potential flow-on benefits to the regional economy.
- Payments to neighbours within 10km of the project to share economic benefits.
- Continued agricultural activities during the operational phase of the Project and reinstatement of full pre-project agricultural production following project decommissioning.
- Use of FIFO/DIDO and provision of workforce accommodation within the project site (approximately 15 km south of Hay) to reduce impacts on the regional labour market (wage increases and labour shortages) and reduce project housing demand on short term accommodation used for tourism and recreation.

# 1 INTRODUCTION

## 1.1 Project overview

ENGIE is seeking approval for the construction, operation, and decommissioning of The Plains Wind Farm (the Project) including up to 188 wind turbines with a total capacity of up to approximately 1,350 Mega Watts (MW). The Project is situated about 15 kilometres (km) south of the Hay township and within the Hay Shire Local Government Area (LGA), on land that is predominately used for agricultural activities (cropping and sheep grazing).

## 1.2 Purpose of this report

The Project will have a capital investment value (CIV) higher than \$30 million and will therefore trigger the provisions for State Significant Development (SSD) under Clause 20, Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). In accordance with Section 4.12(8) 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, Housing and Infrastructure (DPHI) for Development Consent.

This report has been prepared to inform the EIS and DA for the Project.

## 1.3 Assessment guidelines and requirements

The Economic Assessment was prepared in accordance with the requirements of the DPHI, which are set out in the project-specific Secretary's Environmental Assessment Requirements (SEARs), dated 16 December 2022. The SEARs identify matters which must be addressed in the EIS. Table 1.1 lists the requirements relevant to this Economic Assessment and where they are addressed in this report.

**Table 1.1 - Relevant matters raised in SEARs**

Requirement	Section addressed
The EIS must include: Economic – including any benefits of the economic impacts or benefits of the project for the region and the State as a whole,	Chapters 4, 5 and 6 of this report.
including consideration of any increase in demand for community infrastructure services, and details of how the construction workforce will be managed to minimise local impacts, including a consideration of the construction workforce accommodation	See the social impact assessment

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

There are no economic assessment guidelines for SSD wind 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 considers potential cumulative impacts on the region and State.
- Section 7 identifies measures to mitigate and manage economic impacts.
- Section 8 provides the conclusions of the assessment.

## 2 METHODOLOGY

### 2.1 Overview

The Project will generate economic activity within the regional and NSW economy, during both construction and operation. It will also result in a minor contraction in agricultural economic activity from the construction and operation footprint. 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 impact assessment is defined as the combined LGAs of Balranald, Hay, Edward River, Murrumbidgee, and Griffith. This is the region within which the Project is located, which has the potential to provide inputs to, and derive economic benefits from the construction and operation 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.

### 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), 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 Appendix A1.
- 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 Athena and production ratios in the IO tables. Indirect effects were estimated using the *EconImp* program.<sup>1</sup>

IO analysis identifies the 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.
- 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 Appendix A2. Most notably IO analysis assumes that the regional economy has access to sufficient labour and capital resources (from

---

<sup>1</sup> The *EconImp* program uses the Leontif Inverse Matrix to estimate indirect effects.

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 local or regional scale or with small scale impacts.

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

Qualitative consideration is given to potential "crowding out" impacts from the Project and cumulative projects on the region and State.

### 3 THE REGIONAL ECONOMY

#### 3.1 Introduction

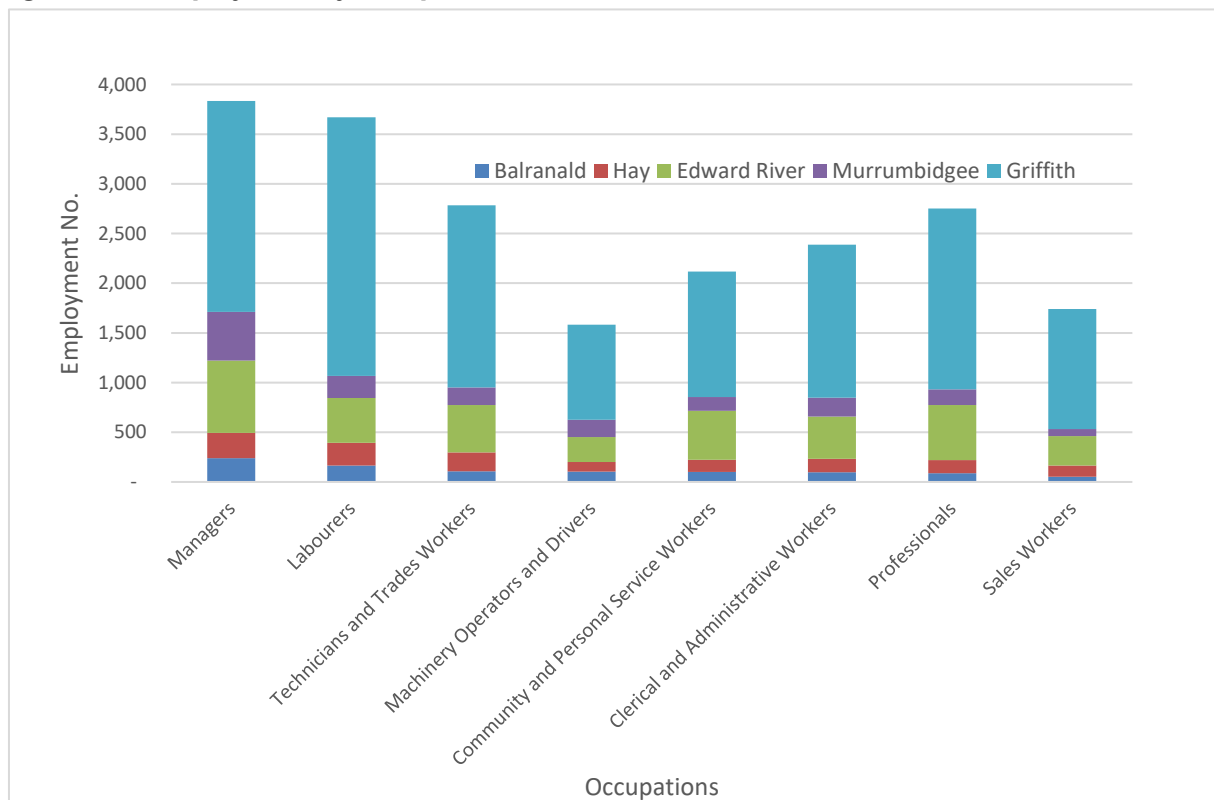
This section characterises the regional economy from two perspectives, residents of the region and workers in the region.

#### 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 43,985 and a labour force of 22,068, with Griffith LGA accounting for 62 per cent of the total population and 64 per cent of the total labour force. The median age ranged from 37 in Griffith LGA to 48 in Hay LGA. In the 2021 Census, 697 people (about 3.2 per cent of the total regional labour force) identified as being unemployed with the majority of these located in the Griffith LGA. Median weekly household incomes and median rent were highest in Griffith LGA, \$1,738 and \$290, respectively, and lowest in Hay LGA, \$1,236 and \$175, respectively.

The main occupations of usual residents<sup>2</sup> in the region (Figure 3.1) were Managers (which includes farm managers) (18.4 per cent) followed by Labourers (17.6 per cent) and Technicians and Trade Workers (13.3 per cent). While Griffith LGA has the greatest number of all occupations, the relative importance of different occupations varies by LGA. In the Griffith LGA the main occupation was Labourers followed by Managers. In all other LGAs, the main occupation was Managers followed by Labourers, except Edward River where the second main occupation was Professionals.

**Figure 3.1 – Employment by Occupation of Usual Residents**



<sup>2</sup> Employed people aged 15 years and over.

**Table 3.1 - Characteristics of Usual Residents**

	<b>Balranald</b>		<b>Hay</b>		<b>Edward River</b>		<b>Murrumbidgee</b>		<b>Griffith</b>		<b>Total Region</b>		<b>NSW</b>	
<b>Demographics</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>
Population	2,208		2,882		8,456		3,353		27,086		43,985		8,072,163	
Median Age	43		48		46		45		37				39	
In labour force	1,001	56.4	1,337	55.3	3,918	56.2	1,698	61	14,114	64.7	22,068	61.7	3,874,012	58.7
Unemployed	31	3.1	54	4	140	3.6	49	2.9	423	3.0	697	3.2	189,852	4.9
Median household weekly income	1,370		1,236		1,240		1,401		1,738				1,829	
Unoccupied private dwellings %	192	20.8	239	17.4	523	13.6	191	12.8	753	7.5	1,898	10.7	299,524	9.4
Median rent	200		175		220		190		290				420	
<b>Occupations</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>
Managers	238	24.5	256	19.9	728	14.7	490	29.8	2,121	15.5	3,833	18.4	952,131	25.8
Labourers	165	17.0	228	17.7	453	12.0	222	13.5	2,602	19.0	3,670	17.6	536,820	14.6
Technicians and Trades Workers	107	11.0	190	14.8	477	12.6	177	10.8	1,832	13.4	2,783	13.3	390,779	10.6
Machinery Operators and Drivers	103	10.6	97	7.5	251	6.7	174	10.6	958	7.0	1,583	7.6	300,966	8.2
Community and Personal Service Workers	100	10.3	122	9.5	495	13.1	137	8.3	1,262	9.2	2,116	10.1	436,589	11.9
Clerical and Administrative Workers	99	10.2	134	10.4	426	11.3	188	11.4	1,540	11.2	2,387	11.4	480,612	13.0
Professionals	88	9.0	133	10.3	553	14.7	158	9.6	1,819	13.3	2,751	13.2	294,889	8.0
Sales Workers	54	5.5	110	8.6	299	7.9	71	4.3	1,206	8.8	1,740	8.3	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. *Poultry Processing* was the most significant employment sector for residents of the region, followed by *Wine and Other Alcoholic Beverage Manufacturing*, *Hospitals (except Psychiatric Hospitals)*, *Supermarket and Grocery Stores*, and *Primary Education*. This result is driven by the significant sectors in the Griffith LGA which provides 64% of the labour force. The most significant employment sector for usual residents in other LGAs was *Grape Growing* in Balranald LGA, *Sheep Farming (Specialised)* in Hay LGA, *Other Grain Growing* in Murrumbidgee LGA and *Other Social Assistance Services* in Edward River LGA.

7.6 per cent of employed usual residents work outside the region, mainly 'no fixed address' (NSW) (3.0%), Carrathool LGA (1.1%), Leeton LGA (0.8%) and Swan Hill LGA (0.7%).

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

Balranald	%	Hay	%	Edward River	%	Murrumbidgee	%	Griffith	%	Total Region	%
Grape Growing	6.7	Sheep Farming (Specialised)	7.5	Other Social Assistance Services	4.5	Other Grain Growing	9.6	Poultry Processing	7.3	Poultry Processing	5.0
Sheep Farming (Specialised)	5.1	Local Government Administration	4.0	Hospitals (except Psychiatric Hospitals)	3.7	Grain-Sheep or Grain-Beef Cattle Farming	8.2	Wine and Other Alcoholic Beverage Manufacturing	5.9	Wine and Other Alcoholic Beverage Manufacturing	3.9
Other Fruit and Tree Nut Growing	4.6	Primary Education	3.8	Grain-Sheep or Grain-Beef Cattle Farming	3.3	Local Government Administration	4.6	Hospitals (except Psychiatric Hospitals)	3.4	Hospitals (except Psychiatric Hospitals)	3.3
Hospitals (except Psychiatric Hospitals)	4.3	Supermarket and Grocery Stores	3.4	Primary Education	3.2	Poultry Processing	3.3	Supermarket and Grocery Stores	3.0	Supermarket and Grocery Stores	2.8
Local Government Administration	4.2	State Government Administration	3.1	Supermarket and Grocery Stores	3.2	Sheep Farming (Specialised)	2.7	Primary Education	2.5	Primary Education	2.7

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 immigration<sup>3</sup> 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 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.

<sup>3</sup> Mainly due to natural endowments and comparative advantage in certain industry sectors.

Against this backdrop, it is evident that the population of the regional economy has been relatively static, growing at an average annual rate of 0.05 per cent since 2006, approximately four per cent of the rate of NSW. This population growth rate for the region is driven by the population growth rate for Griffith LGA i.e. average annual rate of 0.7 per cent since 2006, offsetting population decline in all the other LGAs.

**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
Balranald	2,507	2,353	2,330	2,207	-1.2%	-0.2%	-1.1%	-0.8%
Hay	3,483	3,085	2,984	2,883	-2.3%	-0.7%	-0.7%	-1.1%
Edward River	9,287	8,888	8,991	8,437	-0.9%	0.2%	-1.2%	-0.6%
Murrumbidgee	4,219	3,888	3,929	3,564	-1.6%	0.2%	-1.9%	-1.0%
Griffith	24,450	25,395	26,356	27,182	0.8%	0.8%	0.6%	0.7%
<b>Total Region</b>	<b>43,946</b>	<b>43,609</b>	<b>44,590</b>	<b>44,273</b>	<b>-0.2%</b>	<b>0.4%</b>	<b>-0.1%</b>	<b>0.0%</b>
<b>NSW</b>	<b>6,742,690</b>	<b>7,218,529</b>	<b>7,732,858</b>	<b>8,093,815</b>	<b>1.4%</b>	<b>1.4%</b>	<b>0.9%</b>	<b>1.3%</b>

Source: Australian Bureau of Statistics (2021-22)

The population of the region (Table 3.4) is predicted to continue to grow at an average annual rate of 0.4 percent (less than half that of the NSW population), largely driven by population growth in the Griffith LGA. The population of Balranald LGA and Hay LGA are predicted to decline, while the population of Edward River LGA and Murrumbidgee LGA will remain static (NSW DPE, 2022).

**Table 3.4 – Projected population growth**

Local Government Area	2021	2041	Change	Annual %
Balranald	2,269	1,817	-452	-0.9%
Hay	2,862	2,594	-267	-0.5%
Edward River	9,073	9,012	-62	0.0%
Murrumbidgee	3,895	3,998	103	0.1%
Griffith	27,063	31,641	4578	0.8%
<b>Total Region</b>	<b>45,162</b>	<b>49,062</b>	<b>3,900</b>	<b>0.4%</b>
<b>NSW</b>	<b>8,166,757</b>	<b>9,872,934</b>	<b>1,706,176</b>	<b>1.0%</b>

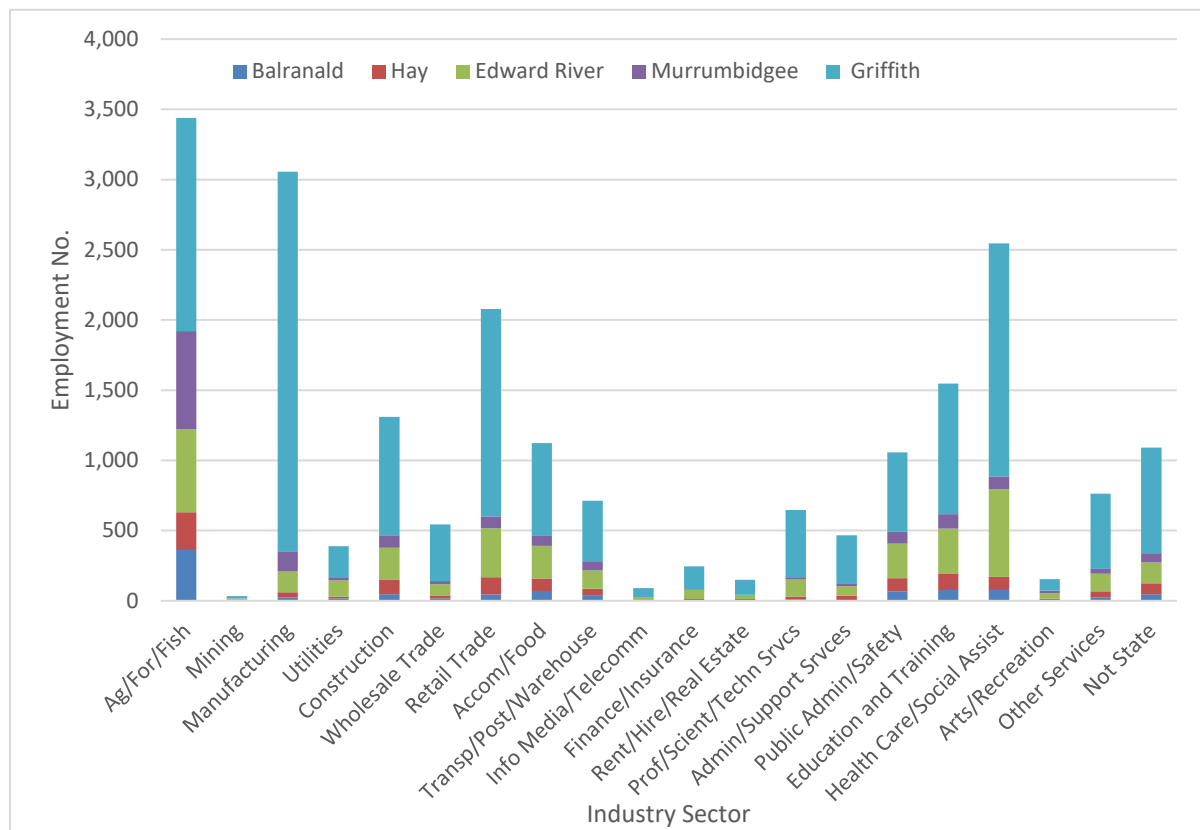
Source: NSW Department of Planning and Environment (2022)

### 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 *Agriculture, Forestry and Fishing* sectors followed by *Manufacturing* sectors, and *Health Care and Social Assistance* sectors. However, the main employment in the region varies between LGAs. In the Balranald LGA, Hay LGA and Murrumbidgee LGA the main employment sectors were *Agriculture, Forestry and Fishing* sectors. In the Edward River LGA the main employment sectors were *Health Care and Social Assistance* sectors followed by *Agriculture, Forestry and Fishing* sectors. In Griffith LGA the main employment sectors were *Manufacturing* sectors and *Health Care and Social Assistance* sectors.

10.1 per cent of people who work in the region live outside region, mainly in Leeton LGA (2.5%), Carrathool LGA (1.3%), and Murray River LGA (1.2%)

**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 *Poultry Processing*, and *Wine and Other Alcoholic Beverage Manufacturing*, *Hospitals (except Psychiatric Hospitals)*, *Supermarkets and Grocery Stores*, and *Primary Education*. (See Table 3.5). This is driven by employment in Griffith LGA. In Balranald the main industry sectors of employment is *Grape Growing* and *Sheep Farming (Specialised)*, while in Hay LGA it is *Sheep Farming (Specialised)*. In Edward River LGA the main industry sector of employment is *Other Social Assistance Services* and *Hospitals (except Psychiatric Hospitals)*. In Murrumbidgee LGA, *Wine and other Alcoholic Beverage Manufacturing* is the main employment sector.

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

Balranald	%	Hay	%	Edward River	%	Murrumbidgee	%	Griffith	%	Total Region	%
Grape Growing	8.9	Sheep Farming (Specialised)	7.1	Other Social Assistance Services	4.8	Wine and Other Alcoholic Beverage Manufacturing	10.7	Poultry Processing	7.3	Poultry Processing	5.1
Sheep Farming (Specialised)	5.7	Local Government Administration	4.4	Hospitals (except Psychiatric Hospitals)	4.2	Supermarket and Grocery Stores	8.6	Wine and Other Alcoholic Beverage Manufacturing	6.4	Wine and Other Alcoholic Beverage Manufacturing	4.2
Local Government Administration	5.5	Primary Education	3.9	Primary Education	3.5	Other Crop Growing nec	5.8	Hospitals (except Psychiatric Hospitals)	3.8	Hospitals (except Psychiatric Hospitals)	3.6
Other Fruit and Tree Nut Growing	5.4	Accommodation	3.8	Supermarket and Grocery Stores	3.5	Computer System Design and Related Services	5.0	Supermarket and Grocery Stores	3.0	Supermarket and Grocery Stores	2.8
Hospitals (except Psychiatric Hospitals)	3.9	Supermarket and Grocery Stores	3.8	Grain-Sheep or Grain-Beef Cattle Farming	3.2	Sheep Farming (Specialised)	4.6	Primary Education	2.5	Primary Education	2.8

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

The Gross Regional Product (GRP) of the regional economy was estimated at \$2.6 billion for 2020 (Gillespie Economics IO Table). The largest exporting industries (One-digit ANZSIC) are:

- *Manufacturing (\$1.3 billion)*, mainly *Meat and Meat Product Manufacturing, Wine, Spirits and Tobacco Manufacturing, and Soft Drinks, Cordial and Syrup Manufacturing.*
- *Utilities (\$0.2 billion)* mainly *Water Supply, Sewerage and Drainage Services, and Electricity Transmission.*
- *Construction (\$0.2 billion)* mainly *Heavy and Civil Engineering Construction.*
- *Agriculture, Forestry and Fishing (\$0.2 billion)* mainly *Sheep, Grains, Beef and Dairy Cattle Sector, and Other Agriculture.*

In combination these four industries accounted for \$1.9 billion in total or 76% of the total exports by industry in the region.

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.

In terms of value-added, it is estimated that *Manufacturing; Agriculture, Forestry and Fishing; Rental, Hiring and Real Estate; Health Care and Social Assistance;* and *Construction* had the highest value-added in total, equal to approximately 38% of the regional economy and 36% of regional employment - Table 3.6.<sup>4</sup>

<sup>4</sup> Gross Value Added (GVA) measures the value of goods and services produced in a region.

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

<b>Industry</b>	<b>Gross Value Added (\$m)</b>	<b>Proportion of Regional Economy (%)</b>	<b>Proportion of Regional Employment (%)</b>
Manufacturing	374	14%	15%
Agriculture/Forestry/Fishing	353	13%	17%
Rental, Hiring and Real Estate Services	242	9%	1%
Health Care and Social Assistance	217	8%	13%
Construction	193	7%	6%
<b>Total</b>	<b>1,005</b>	<b>38%</b>	<b>36%</b>

Source: Gillespie Economics IO table of the regional economy

## 4 CONSTRUCTION ASSESSMENT

### 4.1 The Project

The Project would provide economic activity to the regional and NSW economy during both the construction and operation phase. 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 three-year construction phase, monthly employment is estimated to peak at 700 full time equivalents (FTE), with average annual employment estimated at 550.<sup>5</sup> Based on the IO coefficients of the abovementioned three construction sectors in the regional IO table, \$200M 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 \$200M expenditure in the regional and NSW economy is reported in Tables 4.2 and 4.3.

**Table 4.2 – Average Annual Economic Impacts of the Construction on the Regional Economy (\$2023)**

	<b>Direct</b>	<b>Production induced</b>	<b>Consumption induced</b>	<b>Total Flow on</b>	<b>TOTAL EFFECT</b>
<b>OUTPUT (\$M)</b>	200	104	24	128	328
<i>Type 11A Ratio</i>	1.00	0.52	0.12	0.64	1.64
<b>VALUE ADDED (\$M)</b>	80	26	14	40	120
<i>Type 11A Ratio</i>	1.00	0.32	0.17	0.49	1.49
<b>INCOME (\$M)</b>	42	13	5	18	59
<i>Type 11A Ratio</i>	1.00	0.30	0.12	0.42	1.42
<b>EMPL. (No.)</b>	550	201	97	298	848
<i>Type 11A Ratio</i>	1.00	0.36	0.18	0.54	1.54

Note: Totals may have minor discrepancies due to rounding.

<sup>5</sup> 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 4.3 – Average Annual Economic Impacts of the Construction on the NSW Economy (\$2023)**

	<b>Direct</b>	<b>Production induced</b>	<b>Consumption induced</b>	<b>Total Flow on</b>	<b>TOTAL EFFECT</b>
<b>OUTPUT (\$M)</b>	200	225	174	399	599
<i>Type 11A Ratio</i>	1.00	1.12	0.87	1.99	2.99
<b>VALUE ADDED (\$M)</b>	80	79	97	176	256
<i>Type 11A Ratio</i>	1.00	0.98	1.21	2.19	3.19
<b>INCOME (\$M)</b>	59	56	50	105	165
<i>Type 11A Ratio</i>	1.00	0.94	0.83	1.78	2.78
<b>EMPL. (No.)</b>	550	558	619	1,177	1,727
<i>Type 11A Ratio</i>	1.00	1.02	1.12	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 this analysis, it is assumed that approximately 50% of the construction workforce would be from the region. Consequently, Table 4.2 has been adjusted to only include 50% of consumption-induced flow-ons. At the NSW level 75% of the construction workforce is expected to come from NSW and hence Table 3.4 has been adjusted to only include 75% of consumption-induced flow-ons.

The annual construction impacts of the Project on the regional economy (during the three-year construction phase) are estimated at up to:

- \$200M in direct output and \$128M in indirect output.
- \$80M in direct value added and \$40M in indirect value-added.
- \$42M in direct household income and \$18M in indirect household income.
- 550 direct jobs and 298 indirect jobs.

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

- \$200M in direct output and \$399M in indirect output.
- \$80M in direct value added and \$176M in indirect value-added.
- \$59M in direct household income and \$105M in indirect household income.
- 550 direct jobs and 1,177 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 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 range from 1.42 for income up to 1.64 for output. The NSW type 11A ratio multipliers for the construction workforce range from 2.78 for income up to 3.19 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.*
- *Wholesale and Retail Trade.*
- *Road Transport.*
- *Employment, Travel Agency, and Other Administrative Services.*
- *Food and Beverage Services.*
- *Structural Metal Product Manufacturing.*

For the NSW economy the *Non-Residential Property Operators and Real Estate Services* sector, *Finance* sector and *Auxiliary Finance and Insurance* sector 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.*
- *Primary and Secondary Education.*
- *Residential Care and Social Assistance.*
- *Road Transport.*

For the NSW economy the *Finance; Professional, Scientific and Technical Services; Insurance and Superannuation; Personal Services; Other Services; Non-Residential Property Operators and Real Estate Services;* are also important consumption induced flow-on sectors.

## 4.2 Agricultural impacts

Construction of the Project will impact approximately 1,997 ha of agricultural land that can be used for beef cattle and sheep grazing and some cropping. Tremain Ivey Advisory (2023) identified an annual loss of income during construction of \$178,332.

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 4.4 and 4.5.

**Table 4.4 Annual Regional Economic Impacts of Foregone Agriculture During Project Construction (\$2023)**

	<b>Direct</b>	<b>Production induced</b>	<b>Consumption induced</b>	<b>Total Flow on</b>	<b>TOTAL EFFECT</b>
<b>OUTPUT (\$M)</b>	0.18	0.09	0.03	0.12	0.30
<i>Type 11A Ratio</i>	1.00	0.50	0.19	0.69	1.69
<b>VALUE ADDED (\$M)</b>	0.07	0.04	0.02	0.06	0.13
<i>Type 11A Ratio</i>	1.00	0.55	0.27	0.82	1.82
<b>INCOME (\$M)</b>	0.02	0.02	0.01	0.02	0.05
<i>Type 11A Ratio</i>	1.00	0.76	0.32	1.08	2.08
<b>EMPL. (No.)</b>	0.46	0.31	0.14	0.45	0.91
<i>Type 11A Ratio</i>	1.00	0.67	0.30	0.97	1.97

**Table 4.5 Annual NSW Economic Impacts of Foregone Agriculture During Project Construction (\$2023)**

	<b>Direct</b>	<b>Production induced</b>	<b>Consumption induced</b>	<b>Total Flow on</b>	<b>TOTAL EFFECT</b>
<b>OUTPUT (\$M)</b>	0.18	0.16	0.15	0.31	0.49
<i>Type 11A Ratio</i>	1.00	0.89	0.85	1.75	2.75
<b>VALUE ADDED (\$M)</b>	0.07	0.08	0.08	0.16	0.23
<i>Type 11A Ratio</i>	1.00	1.05	1.18	2.23	3.23
<b>INCOME (\$M)</b>	0.03	0.05	0.04	0.09	0.12
<i>Type 11A Ratio</i>	1.00	1.59	1.48	3.07	4.07
<b>EMPL. (No.)</b>	0.46	0.52	0.54	1.06	1.52
<i>Type 11A Ratio</i>	1.00	1.13	1.17	2.30	3.30

These impacts would occur for approximately three years. It is evident from the above that agricultural impacts of less than one direct and indirect jobs to the region, and less than two direct and indirect jobs to NSW, 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 inflation 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.

Notwithstanding, 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 300 workers, no or modest observable price effects are anticipated. In any case, any "crowding out" of other economic activities represents the operation of the market system where scarce resources such as labour are reallocated to where they are most highly valued.

## 5 OPERATION PHASE

### 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.<sup>6</sup> The proponent advised of an operational employment of 40 (75% of which are assumed to already reside in the region and 100% of which assumed to reside in NSW). 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 114 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 2023 dollars) is shown in Tables 5.1 and 5.2.

**Table 5.1 - Annual Economic Impacts of the Project on the Regional Economy (\$2023)**

	<b>Direct Effect</b>	<b>Production Induced</b>	<b>Consumption Induced</b>	<b>Total Flow-on</b>	<b>TOTAL EFFECT</b>
<b>OUTPUT (\$M)</b>	354	17	3	20	373
<i>Type 11A Ratio</i>	1.00	0.05	0.01	0.06	1.06
<b>VALUE ADDED (\$M)</b>	324	7	2	9	332
<i>Type 11A Ratio</i>	1.00	0.02	0.01	0.03	1.03
<b>INCOME (\$M)</b>	2	2	1	3	5
<i>Type 11A Ratio</i>	1.00	0.93	0.26	1.19	2.19
<b>EMPL. (No.)</b>	40	29	12	41	81
<i>Type 11A Ratio</i>	1.00	0.72	0.31	1.03	2.03

**Table 5.2 - Annual Economic Impacts of the Project on the NSW Economy (\$2023)**

	<b>Direct Effect</b>	<b>Production Induced</b>	<b>Consumption Induced</b>	<b>Total Flow-on</b>	<b>TOTAL EFFECT</b>
<b>OUTPUT (\$M)</b>	354	40	27	67	421
<i>Type 11A Ratio</i>	1.00	0.11	0.08	0.19	1.19
<b>VALUE ADDED (\$M)</b>	324	19	15	35	358
<i>Type 11A Ratio</i>	1.00	0.06	0.05	0.11	1.11
<b>INCOME (\$M)</b>	3	10	8	18	21
<i>Type 11A Ratio</i>	1.00	3.21	2.42	5.63	6.63
<b>EMPL. (No.)</b>	40	89	97	186	226
<i>Type 11A Ratio</i>	1.00	2.23	2.41	4.65	5.65

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

- \$354M in direct output and \$20M in indirect output.
- \$324M in direct value added and \$9M in indirect value-added.
- \$2M in direct household income and \$3M in indirect household income.

<sup>6</sup> 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.

- 40 direct jobs and 41 indirect jobs.

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

- \$354M in direct output and \$67M in indirect output.
- \$324M in direct value added and \$35M in indirect value-added.
- \$3M in direct household income and \$18M in indirect household income.
- 40 direct jobs and 186 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.

### 5.1.2 Multipliers

The Type 11A ratio multipliers for the Project's impact on the regional economy range from 1.03 for value-added up to 2.19 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. Capital intensive projects also typically have 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 1.11 for value-added up to 6.63 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 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.*
- *Auxiliary Finance and Insurance Services.*
- *Professional, Scientific and Technical Services.*
- *Employment, Travel Agency and Other Administrative Services.*
- *Wholesale Trade.*
- *Road Transport.*

For the NSW economy the *Computer Systems Design and Related Services, and Electricity Transmission, Distribution, On-selling, and Electricity Market Operation* sector 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.*
- *Primary and Secondary Education.*
- *Residential Care and Social Assistance.*

- Road Transport.

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

## 5.2 Agricultural impacts

The Project operation will result in 1,296 ha being unavailable for agriculture. Tremain Ivey Advisory (2023) identified an annual loss of income during operation of \$115,733 per annum.

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.

**Table 5.3 Annual Regional Economic Impacts of Foregone Agriculture During Project Operation (\$2023)**

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
<b>OUTPUT (\$M)</b>	0.12	0.06	0.02	0.08	0.20
<i>Type 11A Ratio</i>	1.00	0.50	0.19	0.69	1.69
<b>VALUE ADDED (\$M)</b>	0.05	0.03	0.01	0.04	0.09
<i>Type 11A Ratio</i>	1.00	0.55	0.27	0.82	1.82
<b>INCOME (\$M)</b>	0.01	0.01	0.00	0.02	0.03
<i>Type 11A Ratio</i>	1.00	0.76	0.32	1.08	2.08
<b>EMPL. (No.)</b>	0.30	0.20	0.09	0.29	0.59
<i>Type 11A Ratio</i>	1.00	0.67	0.30	0.97	1.97

**Table 4.5 Annual NSW Economic Impacts of Foregone Agriculture During Project Operation (\$2023)**

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
<b>OUTPUT (\$M)</b>	0.12	0.10	0.10	0.20	0.32
<i>Type 11A Ratio</i>	1.00	0.89	0.85	1.75	2.75
<b>VALUE ADDED (\$M)</b>	0.05	0.05	0.06	0.10	0.15
<i>Type 11A Ratio</i>	1.00	1.05	1.18	2.23	3.23
<b>INCOME (\$M)</b>	0.02	0.03	0.03	0.06	0.08
<i>Type 11A Ratio</i>	1.00	1.59	1.48	3.07	4.07
<b>EMPL. (No.)</b>	0.30	0.34	0.35	0.69	0.99
<i>Type 11A Ratio</i>	1.00	1.13	1.17	2.30	3.30

These impacts would occur for the duration of the Project operation. It is evident from the above that the agricultural impacts from the operation of the Project are negligible.

## 5.3 Other impacts

The operation of the Project will create a small demand for regional labour resources and regional inputs to production. Consequently, no "crowding out" effects on other industry sectors are anticipated.

## **6 CUMULATIVE IMPACTS**

### **6.1 Introduction**

The Scoping Report identifies the following projects within the general region of the Project:

- Limondale Solar Farm (Operational).
- Sunraysia Solar Farm (Operational).
- Lang's Crossing Solar Farm (Approved).
- Hay Solar Farm (Approved).
- Junction Rivers Wind Farm (formerly Burrawong Wind Farm) (Prepare EIS).
- Baldon Wind Farm (Prepare EIS).
- Keri Keri Solar Farm (Prepare EIS).
- Keri Keri Wind Farm (Prepare EIS).
- Dinawan Wind Farm (Prepare EIS).
- Dinawan Solar Farm (Response to Submissions).
- Bullawah Wind Farm (Prepare EIS).
- Yanco Delta Wind Farm (Approved).
- The Plains Wind Farm (Prepare EIS).
- The Plains Solar Farm (Prepare EIS).
- EnergyConnect NSW Eastern Section (Approved).
- Currawarra Solar Farm (Approved).
- Tarleigh Park Solar Farm (Approved).
- Southdown Solar Farm (Prepare EIS).
- Finley Solar Farm (Operational).

In addition, there a plethora of renewable energy projects and transmission projects in various states of approval across the rest of NSW, Qld, and Victoria.

### **6.2 Potential cumulative impacts**

#### *6.2.1 Initial Cumulative Labour Stimulus*

The main cumulative economic impact of the projects identified above is to generate large demand for a suitably qualified construction workforce in regional areas. This labour demand will be met from:

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

### *6.2.2 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).

### *6.2.3 Accommodation Impacts*

Cumulative regional population changes driven by cumulative regional employment growth will increase demand for short-term and long-term accommodation. The impact 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 bear the cost (DAE, 2012). However, price rises also impact lower income households who may get squeezed out of the market. Provided that there are no market distortions, in the medium to longer term, the local housing and short-term accommodation supply may adjust to demand, and prices return to their previous levels (DAE, 2012).

The extent of these short turn 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, as well as adjustment of the overall housing supply in response to increased demand. Early provision of additional accommodation options can reduce housing price impacts.

### *6.2.4 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.

### *6.2.5 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.

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.

The sectors of regional economies most impacted by production induced flow-ons, associated with firms buying goods and services from each other are likely to be as follows:

- professional, scientific, and technical services.
- wholesale and retail trade.
- structural metal product manufacturing.
- road transport.
- employment, travel agency and other administrative services.
- cement lime and ready-mixed concrete manufacturing.

Consumption-induced flow-on effects in the region, associated the expenditure of wages will be mainly experienced in the following sectors:

- retail and wholesale trade.
- food and beverage services.
- health care services.
- primary and secondary education.
- residential care and social assistance services.
- road transport.
- professional, scientific, and technical services.

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.

#### *6.2.6 Impacts on Other Sectors of the Economy*

Notwithstanding the above, excess demand for construction workers can in the short run potentially 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 inflation 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 to longer term markets should adjust 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 (within the regulatory framework provided by government) where scarce resources are reallocated to where they are most highly valued. Notwithstanding, it may be associated with social impacts.

#### *6.2.7 Agricultural Impacts*

Section 4.2 and 5.2 found that the negative regional economic impacts from the use of agricultural land for the project, were very small, and small 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 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 and other inputs to production.

ENGIE 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, experience, and commitment.
- 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.
- Establishment of a Community Benefit Fund to fund community projects and support a range of benefit sharing initiatives.
- Lease payments to host landowners that provide an alternative drought proof income with potential flow-on benefits to the regional economy.
- Payments to neighbours within 10km of the project to share economic benefits.
- Continued agricultural activities during the operational phase of the Project and reinstatement of full pre-project agricultural production following project decommissioning.
- Use of FIFO/DIDO and provision of workforce accommodation within the project site (approximately 15 km south of Hay) to reduce impacts on the regional labour market (wage increases and labour shortages) and reduce project housing demand on short term accommodation used for tourism and recreation.

## **8 CONCLUSION**

The Project will provide economic activity to the regional economy during both the construction and operation phase. It would also result in a minor and insignificant contraction in regional economic activity from agricultural activity within the Project boundary and, more specifically, the development footprint. These regional economic impacts were assessed using IO analysis.

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

ENGIE 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.

## 9 REFERENCES

- 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*.
- Australian Bureau of Statistics (2021-22) *Regional population*, ABS Website, accessed 30 May 2023.
- Deloitte Access Economics (2012) *Economic and social impacts of the Warkworth Extension Project*, prepared for Singleton Council.
- IBISworld (2023) *Wind and Other Electricity Generation in Australia*, Industry Report.
- NSW Department of Planning and Environment (2022) NSW Population Projections, Planning Portal, [pp.planningportal.nsw.gov.au/populations](http://pp.planningportal.nsw.gov.au/populations)
- 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, University of New England, Armidale.
- Tremain and Ivy Advisory (2023) *Plains Wind Farm Agricultural Impact Statement*.
- 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 <i>(Steps 4-14 apply to each region for which input-output tables are required)</i>
	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.

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

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

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

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

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.