

Panorama Battery Energy Storage System Economic Assessment

Prepared for

Panorama BESS SubCo Pty Ltd

By



Gillespie Economics

Email: gillecon@bigpond.net.au

Web: gillespieeconomics.com

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Contact

Dr Rob Gillespie

Principal

Gillespie Economics

Mobile: 0419 448 238

Email: gillecon@bigpond.net.au

Web: gillespieeconomics.com

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TABLE OF CONTENTS

EXECUTIVE SUMMARY 2

1 INTRODUCTION 5

 1.1 PROJECT OVERVIEW.....5

 1.2 PURPOSE OF THIS REPORT5

 1.3 ASSESSMENT GUIDELINES AND REQUIREMENTS.....5

 1.4 STRUCTURE OF THE REPORT6

2 METHODOLOGY 7

 2.1 OVERVIEW.....7

 2.2 STUDY AREA.....7

 2.3 DESCRIPTION OF THE REGIONAL ECONOMY.....7

 2.4 INPUT-OUTPUT ANALYSIS.....7

3 THE REGIONAL ECONOMY 9

 3.1 INTRODUCTION.....9

 3.2 RESIDENTS OF THE REGION.....9

 3.3 ECONOMIC ACTIVITY IN THE REGION11

4 CONSTRUCTION ASSESSMENT 13

 4.1 THE BESS.....13

 4.1.1 *Impacts*13

 4.3 *Multipliers*14

 4.4 *Main Sectors Affected*.....15

 4.2 AGRICULTURAL IMPACTS15

 4.3 OTHER IMPACTS16

5 OPERATION PHASE 17

 5.1 THE BESS.....17

 5.1.1 *Impacts*17

 5.1.2 *Multipliers*18

 5.1.3 *Main Sectors Affected*.....18

 5.2 AGRICULTURAL IMPACTS18

 5.3 OTHER IMPACTS18

6 CUMULATIVE IMPACTS 19

 6.1 APPROACH TO CUMULATIVE IMPACTS19

 6.2 POTENTIAL CUMULATIVE IMPACTS19

7 MITIGATION AND MANAGEMENT MEASURES 21

8 CONCLUSION 22

9 REFERENCES 23

ATTACHMENT 1 – THE GRIT SYSTEM FOR GENERATING INPUT-OUTPUT TABLES..... 24

ATTACHMENT 2 – UNDERLYING ASSUMPTIONS AND INTERPRETATIONS OF INPUT-OUTPUT ANALYSIS AND MULTIPLIERS 26

EXECUTIVE SUMMARY

Panorama BESS SubCo Pty Ltd (Panorama BESS SubCo) is seeking approval for the construction, operation, and decommissioning of a Battery Energy Storage System (BESS) with a capacity of 100 Megawatts (MW), 200 Megawatt Hours (MWH) and associated ancillary infrastructure adjacent to an existing 132 kV substation operated by TransGrid in Evans Plains, NSW (the Project).

This report assesses the potential economic impacts of the construction and operation of BESS 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.

Methodology

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.

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 regional economy is defined as the Bathurst Regional Local Government Area (LGA). The population of the region in 2021 was 43,567 and has been growing strongly over time. Aggregated one-digit Australian and New Zealand Industry Classification (ANZSIC) place of work data indicates the significance of the *Health Care and Social Assistance* sectors, *Education and Training* sectors, and *Retail Trade* sectors.

Exporting sectors are key drivers of regional economies and reflect a region's endowments and competitive advantages. Using the IO industry sector classifications, the largest exporting industries by value are *Manufacturing*, *Education and Training and Agriculture, Forestry and Fishing*.

Potential construction impacts

Average annual direct construction employment (full time equivalent) from the Project is estimated at 20 workers. The average annual construction impacts of the Project on the regional economy for approximately 12-15 months are estimated at up to:

- \$12M in annual direct and indirect output.
- \$5M in annual direct and indirect value-added.
- \$2M in annual direct and indirect household income.
- 34 direct and indirect jobs.

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

- \$20M in annual direct and indirect output.
- \$9M in annual direct and indirect value added.
- \$6M in annual direct and indirect household income.
- 63 direct and indirect jobs.

The construction of the Project will result in a reduction in approximately 2 ha of land available for agricultural activity – beef grazing. These impacts were assessed and identified as negligible.

The construction of the Project will create demand for regional labour resources and regional inputs to production. This has the potential in the short run to 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 inflation as firms pass wage costs onto consumers etc. 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. However, whether, and the extent to which these types of effects will arise from an individual project is uncertain. For this Project where direct construction demand is for in the order of 20 workers no observable price effects are anticipated.

Potential operational impacts

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

- \$2.7M in annual direct and indirect regional output.
- \$1.1M in annual direct and indirect regional value-added.
- \$0.3M in annual direct and indirect household income.
- 4 direct and indirect jobs.

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

- \$3.7M in annual direct and indirect regional output.
- \$1.6M in annual direct and indirect regional value-added.
- \$0.7M in annual direct and indirect household income.
- 7 direct and 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 impact a similar area of agricultural land as construction i.e. 2 ha of agricultural land that is currently used for beef cattle. 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 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.

In addition, in the short run excess demand for inputs to construction such as quarry materials, concrete etc 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 and can demonstrate a cultural fit with the organisation.
- Participating, as appropriate, in business group meetings, events or programs in the regional community.
- Locally sourcing non-labour inputs to production where local producers can be cost and quality competitive.
- Provision of community grants through various initiatives and programs within the local community, including the education, arts, sporting, and culture sectors.

1 INTRODUCTION

1.1 Project overview

Panorama BESS SubCo Pty Ltd (Panorama BESS SubCo) is seeking approval for the construction, operation, and decommissioning of a Battery Energy Storage System (BESS) with a capacity of 100 Megawatts (MW), 200 Megawatt Hours (MWH) and associated ancillary infrastructure adjacent to an existing 132 kV substation operated by TransGrid in Evans Plains, NSW (the Project).

The key elements of the Project include the following:

- Installation and operation of a SolBank BESS including battery enclosures, inverters, and transformers.
- Associated ancillary infrastructure including:
 - A 132kV underground cable and 33/132kv switching station.
 - Formalisation of existing access from Mid Western Highway and existing access road within Lot 2 DP 864272 to accommodate heavy vehicles.
 - Proposed access road from the BESS to connect to the existing access road within Lot 2 DP 864272.
 - Operations and maintenance (O&M) building.
 - Stormwater management infrastructure, lighting, and security fencing.
 - Construction laydown areas.
- Decommissioning of the SolBank BESS at the end of life (EOL) including disassembly and removal of associated infrastructure from the site, to be returned as close as possible to its existing condition.

The Project is proposed to be constructed and operated on Lot 2 DP 864272 at 800 Mid-Western Highway and Lot 521 DP 603541 at 749 Mid-Western Highway, Evans Plains NSW. The development site is located approximately 2.5 kilometres (km) to the west of the suburb of Robin Hill and approximately 5.8km south-west of the City of Bathurst.

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 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 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

The Economic Assessment was prepared in accordance with the requirements of the NSW Department of Planning and Environment (DPE), which are set out in the Secretary's Environmental Assessment Requirements (SEARs) for the Project, dated 9 December 2022. The SEARs identify matters which must be addressed in the EIS. Table 1.1 lists the individual 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: an assessment of the economic impacts or benefits of the project for the region and the State as a whole	Chapters 5 and 6 of this report.

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 BESSs.

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.
- Conclusions are provided in Section 8.

2 METHODOLOGY

2.1 Overview

The Project would generate economic activity within the regional and NSW economy, during construction and operation. It would also result in some 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 Bathurst Regional Local Government Area (LGA). This is the region within which the Project is located and has the potential to provide inputs to the Project 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:

- Construction 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 Panorama BESS SubCo and production ratios in the IO tables. Indirect effects were estimated using the *EconImp* program.¹

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

¹ 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 Bathurst Regional LGA based on the 2021 ABS Census of Population and Housing. In 2021, the regional economy had a population of 43,567 and a labour force of 21,317. In 2021, there were 863 people unemployed.

The main occupations of usual residents were Professionals, followed by Community and Personal Service Workers.

Table 3.1 - Characteristics of Usual Residents

	Bathurst Regional	
Demographics	No.	%
Population	43,567	
Median Age	38	
In labour force	21,317	48.9
Unemployed	863	4.0
Median household weekly income	1,585	
Unoccupied private dwellings %	1,580	9.0
Median rent	320	
Occupations	No.	%
Professionals	3,898	19.1
Community and Personal Service Workers	3,068	15.0
Technicians and Trades Workers	2,903	14.2
Managers	2,471	12.1
Clerical and Administrative Workers	2,426	11.9
Labourers	2,211	10.8
Sales Workers	1,755	8.6
Machinery Operators and Drivers	1,376	6.7

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 are provided in Table 3.2. *Hospitals (except Psychiatric Hospital)* is the main sector of employment for usual residents followed by *Other Social Assistance Services and State Government Administration*.

14.0% of employed usual residents work outside the Bathurst Region LGA, mainly in Orange LGA, No usual address (NSW), Lithgow LGA, Oberon LGA and Blayney LGA (.idcommunity 2022).

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

	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 immigration² 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).

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 region has been growing strongly (1.4% per annum from 2006-2021), albeit slightly less than the population growth rate for NSW (1.6% per annum from 2006-2021).

² Mainly due to natural endowments and comparative advantage in certain industry sectors.

Table 3.3 - Population growth

	Population				Average Annual Growth Rate			
	2006	2011	2016	2021	2006 - 2011	2011 - 2016	2016 - 2021	2006 - 2021
Bathurst Regional	35,845	38,519	41,300	43,567	1.5%	1.4%	1.1%	1.4%
NSW	6,549,177	6,917,658	7,480,228	8,072,163	1.1%	1.6%	1.6%	1.6%

Source: Australian Bureau of Statistics, 2006, 2011, 2016 and 2021 Census of Population and Housing, Community Profiles

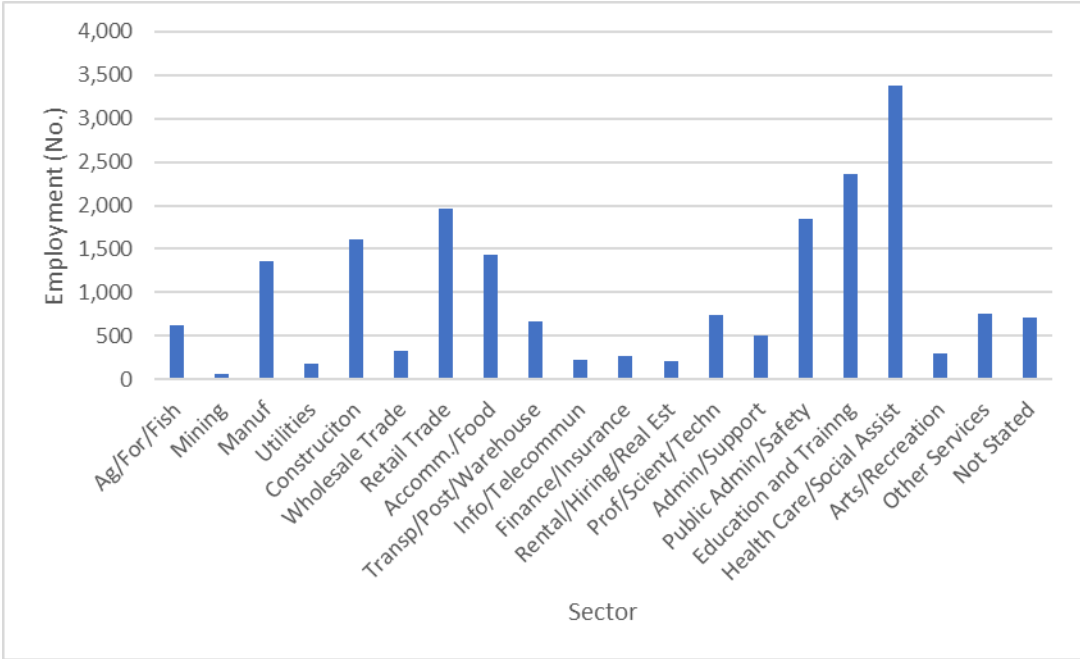
The population of the Bathurst Regional LGA is expected to continue to grow strongly in the future (NSW Government, 2020).

3.3 Economic Activity in the Region

An indication of the nature of the regional economy can be gained by examining place of work employment by industry data - refer to Figure 3.1. This indicates the significance of the *Health Care and Social Assistance* sectors followed by *Education and Training* sectors, and *Retail Trade* sectors.

86.2% of people who work in the region also live in the region. The main source of workers who live outside the region is from Lithgow, Orange, Oberon and Blayney LGAs (.idcommunity 2022).

Figure 3.1 - 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 Age Care Residential Services*. (See Table 3.3.).

Table 3.3 - Place of Work Top 5 Industry Sectors of Employment (Four-digit ANZSIC Sectors)

	No.	%
Hospitals (except Psychiatric Hospitals)	720	4.3%
Other Social Assistance Services	691	4.2%
State Government Administration	541	3.4%
Higher Education	467	3.2%
Aged Care Residential Services	543	3.2%

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 \$2.55 billion for 2021. The region is a net importer, with exports out of the region of \$1,641.9M and imports into the region of \$2,601.7 million (.idcommunity,2022). The largest exporting industries (One-digit ANZSIC) are:

- *Manufacturing (\$896 million or 54.6%)*
- *Education and Training (\$249 million or 15.2%)*
- *Agriculture, Forestry and Fishing (\$97 million or 5.9%)*

In combination these three industries accounted for \$1,242 million in total or 75.6% of the total exports by industry in the Bathurst Regional LGA (.idcommunity, 2022).

Exporting sectors are based on a region's endowments and competitive advantages, and in regional economic development economics are considered to be the key drivers of the economy.

Conversely, the largest importing industries (One-digit ANZSIC) in the region are:

- *Manufacturing (\$928 million or 35.7%)*
- *Agriculture, Forestry and Fishing (\$305 million or 11.7%)*
- *Financial and Insurance Services (\$240 million or 9.2%)*

In combination these three industries accounted for \$1,473 million in total or 56.6% of the total imports by industry in the Bathurst Regional LGA (.idcommunity, 2022) .

In terms of value-added, it is estimated that *Education and Training; Manufacturing; Construction; Health Care and Social Assistance; and Public Administration and Safety* had the highest value-added in total, equal to approximately 58% of the regional economy and 56% of regional employment - Table 3.4.³

Table 3.4 - 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 (%)
Education and Training	287.7	13.8	13.5
Manufacturing	269.3	12.9	10.7
Construction	232.9	11.2	9.6
Health Care and Social Assistance	229.9	11.0	14.7
Public Administration and Safety	182.6	8.8	7.9

Source: (.idcommunity (2022)

³ Gross Value Added (GVA) measures the value of goods and services produced in a region.

4 CONSTRUCTION ASSESSMENT

4.1 The BESS

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 machinery and expenditure across the following three construction sectors of the IO industry classification (ABS 2022):

- 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 12–15 month construction phase, average annual construction employment is estimated at 20 full-time equivalents with 50% sourced from the region.

Based on the IO coefficients of the abovementioned three construction sectors in the regional IO table, \$6 per annum of expenditure would be required across these sectors to generate this level of onsite workforce.

The estimated direct and indirect regional economic impact of \$6 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 Workforce on the Regional Economy (\$2022)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	6	5	1	6	12
<i>Type 11A Ratio</i>	1.00	0.76	0.18	0.94	1.94
VALUE ADDED (\$M)	3	1	1	2	5
<i>Type 11A Ratio</i>	1.00	0.40	0.24	0.63	1.63
INCOME (\$M)	2	1	0	1	2
<i>Type 11A Ratio</i>	1.00	0.38	0.16	0.54	1.54
EMPL. (No.)	20	9	5	14	34
<i>Type 11A Ratio</i>	1.00	0.45	0.25	0.70	1.70

Note: Totals may have minor discrepancies due to rounding.

Table 4.3 – Average Annual Economic Impacts of the Construction Workforce on the NSW Economy (\$2022)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	6	7	7	14	20
<i>Type 11A Ratio</i>	1.00	1.12	1.11	2.23	3.23
VALUE ADDED (\$M)	3	2	4	6	9
<i>Type 11A Ratio</i>	1.00	0.79	1.40	2.19	3.19
INCOME (\$M)	2	2	2	3	6
<i>Type 11A Ratio</i>	1.00	0.72	0.95	1.68	2.68
EMPL. (No.)	20	16	26	43	63
<i>Type 11A Ratio</i>	1.00	0.80	1.32	2.13	3.13

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. It is estimated that approximately 50% of the construction workforce is expected to be from the region. Consequently, Table 4.2 has been adjusted to only include 50% of consumption-induced flow-ons. At the NSW level all the construction workforce is expected to come from NSW and hence no adjustment to consumption-induced flow-ons is made.

The average annual construction impacts of the Project on the regional economy for 12-15 months are estimated at up to:

- \$12M in annual direct and indirect output.
- \$5M in annual direct and indirect value-added.
- \$2M in annual direct and indirect household income.
- 34 direct and indirect jobs.

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

- \$20M in annual direct and indirect output.
- \$9M in annual direct and indirect value added.
- \$6M in annual direct and indirect household income.
- 63 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.

4.3 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 1.54 for income up to 1.94 for output. The NSW type 11A ratio multipliers for the construction workforce range from 2.68 for income up to 3.23 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.

4.4 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.*
- *non-residential property operators and real estate services*
- *employment, travel agency and other administrative services*
- *cement lime and ready-mixed concrete manufacturing.*

For the NSW economy the *residential building construction and finance 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.*

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 2.0 ha of agricultural land that is currently available for beef cattle. Some indication of the magnitude of foregone beef cattle production can be obtained by assuming gross revenue equivalent to that of the NSW DPI Gross Margin Budget for Grow Out Steers i.e. \$1,270/ha. On this basis, foregone agriculture during Project construction would be in the order of \$2,540 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 4.4 and 4.5.

Table 4.4 Annual Regional Economic Impacts of Foregone Agriculture During Project Construction (\$2022)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	0.0025	0.0013	0.0007	0.0020	0.0045
<i>Type 11A Ratio</i>	1.00	0.53	0.26	0.79	1.79
VALUE ADDED (\$M)	0.0009	0.0006	0.0004	0.0010	0.0019
<i>Type 11A Ratio</i>	1.00	0.63	0.41	1.04	2.04
INCOME (\$M)	0.0004	0.0003	0.0002	0.0005	0.0008
<i>Type 11A Ratio</i>	1.00	0.82	0.42	1.24	2.24
EMPL. (No.)	0.0075	0.0054	0.0029	0.0083	0.0158
<i>Type 11A Ratio</i>	1.00	0.72	0.39	1.11	2.11

Table 4.5 Annual NSW Economic Impacts of Foregone Agriculture During Project Construction (\$2022)

	Direct	Production induced	Consumption induced	Total Flow on	TOTAL EFFECT
OUTPUT (\$M)	0.0025	0.0023	0.0022	0.0045	0.0070
<i>Type 11A Ratio</i>	1.00	0.91	0.85	1.76	2.76
VALUE ADDED (\$M)	0.0009	0.0011	0.0012	0.0023	0.0032
<i>Type 11A Ratio</i>	1.00	1.16	1.29	2.45	3.45
INCOME (\$M)	0.0004	0.0007	0.0006	0.0013	0.0017
<i>Type 11A Ratio</i>	1.00	1.51	1.38	2.89	3.89
EMPL. (No.)	0.0075	0.0083	0.0082	0.0165	0.0240
<i>Type 11A Ratio</i>	1.00	1.11	1.10	2.21	3.21

It is evident from the above that the 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 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 construction demand is for in the order of 20 workers no 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 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 thing for the economy not a negative. Notwithstanding, it may be associated with social impacts.

5 OPERATION PHASE

5.1 The BESS

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 was based on an estimated operational employment of 1 (100% of which are assumed to reside in the region) and an output and expenditure profile as per the coefficients in the *electricity transmission, distribution, on selling and electricity market operation* sector of the regional and NSW IO models. The direct and indirect impact of this sector was estimated using the *EconImp* program.

5.1.1 Impacts

On this basis the total and disaggregated average annual impacts of the Project on the regional and NSW economy (in 2022 dollars) is shown in Tables 5.1 and 5.2.

Table 5.1 - Annual Economic Impacts of the Project on the Regional Economy (\$2022)

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT (\$M)	1.4	1.1	0.3	1.3	2.7
<i>Type 11A Ratio</i>	1.00	0.76	0.20	0.96	1.96
VALUE ADDED (\$M)	0.5	0.4	0.2	0.6	1.1
<i>Type 11A Ratio</i>	1.00	0.80	0.31	1.12	2.12
INCOME (\$M)	0.1	0.2	0.1	0.2	0.3
<i>Type 11A Ratio</i>	1.00	1.25	0.53	1.78	2.78
EMPL. (No.)	1.0	1.7	1.3	3.0	4.0
<i>Type 11A Ratio</i>	1.00	1.72	1.25	2.97	3.97

Table 5.2 - Annual Economic Impacts of the Project on the NSW Economy (\$2022)

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT (\$M)	1.4	1.5	0.9	2.3	3.7
<i>Type 11A Ratio</i>	1.00	1.05	0.64	1.69	2.69
VALUE ADDED (\$M)	0.5	0.6	0.5	1.1	1.6
<i>Type 11A Ratio</i>	1.00	1.21	0.95	2.15	3.15
INCOME (\$M)	0.1	0.3	0.3	0.6	0.7
<i>Type 11A Ratio</i>	1.00	2.23	1.78	4.00	5.00
EMPL. (No.)	1.0	2.8	3.4	6.2	7.2
<i>Type 11A Ratio</i>	1.00	2.85	3.38	6.23	7.23

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

- \$2.7M in annual direct and indirect regional output.
- \$1.1M in annual direct and indirect regional value-added.
- \$0.3M in annual direct and indirect household income.
- 4 direct and indirect jobs.

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

- \$3.7M in annual direct and indirect regional output.
- \$1.6M in annual direct and indirect regional value-added.
- \$0.7M in annual direct and indirect household income.
- 7 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.

5.1.2 Multipliers

The Type 11A ratio multipliers for the Project's impact on the regional economy range from 1.96 for output up to 3.97 for employment. 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 while at the same time only having a lower level of direct employment (relative to output levels). This tends to lead to a relatively high ratio multiplier for employment. A lower ratio multiplier for income (compared to employment) also generally occurs because of comparatively higher wage levels in the Project compared to incomes in the sectors that would experience flow-on effects from the Project. 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 2.69 for output up to 7.23 for employment. 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

Flow-on impacts from the Project are likely to affect several different sectors of the regional and NSW economy. The regional sectors most impacted by output, value-added, income and employment flow-ons are likely to be:

- *electricity generation.*
- *electricity transmission, distribution, on selling and electricity market operation.*
- *construction services.*
- *retail trade.*
- *wholesale trade.*
- *professional, scientific, and technical services.*
- *auxiliary finance and insurance services.*
- *employment, travel agency and other administrative services.*

For the NSW economy, the *finance sector* is also relevant.

5.2 Agricultural impacts

The Project operation will impact a similar area of agricultural land as construction i.e. 2 ha of agricultural land that is currently used for beef cattle. The magnitude of foregone beef cattle production is therefore as estimated in Section 4.2. This level of agricultural impact during the operation of the Project is negligible.

5.3 Other impacts

The operation of the Project will create a very 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 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. The relevant projects are outlined in Table 6.1.

Table 6.1 Significant Projects in the Bathurst Regional LGA

Project	Description	Status	Areas of Potential Cumulative Impact
Bathurst Second Circuit (SSD-9681)	The Bathurst Second Circuit proposes a FIA Grade 2/FIM Grade A National Circuit (4km), Club Circuit (2km) and associated pit building and paddock, spectator zone, vehicular and pedestrian accesses and carparks, track safety structures.	Prepare EIS	Demand for construction workforce and construction inputs
Glanmire Solar Farm (SSD-21208499)	Development of a 60 MW solar farm, associated infrastructure and potential battery storage.	Under assessment	Demand for construction workforce and construction inputs
Bathurst Integrated Medical Centre (SSD-30394840)	Construction and use of an integrated medical facility providing hospital, medical centre and education uses and ancillary multilevel carpark to service the medical facility and other surrounding uses within the Bathurst Town Centre.	Prepare EIS	Demand for construction workforce and construction inputs
St Stanislaus College Major Upgrade and Refurbishment (PPSWES-171)	The partial demolition, and alterations and additions to the existing educational facility	Under assessment	Demand for construction workforce and construction inputs

6.2 Potential cumulative impacts

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 demand can help address the jobs growth imbalance between Australia's biggest cities which have grown by an average of 2.4% per annum since 2000 and the regions which have grown at 1.0% per annum (Sobyra et al., 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 et al., 2022).

Regional jobs can partly offset this trend by providing 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. 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.

Notwithstanding, excess demand for construction workers that has been generated by the government policy driven renewable energy transition 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 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 DIDO/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, concrete etc can result in rising costs for these factor inputs and potentially shortages for other uses.

7 MITIGATION AND MANAGEMENT MEASURES

It is evident from Section 4 and 5 that construction and operation of the Project will have net positive impacts on the level of economic activity in the regional economy. However, at the same time it would create a demand for a suitably qualified construction workforce in the region.

Panorama BESS SubCo proposes to work in partnership with the Bathurst Regional Council and the local 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 and can demonstrate a cultural fit with the organisation.
- Participating, as appropriate, in business group meetings, events or programs in the regional community.
- Locally sourcing non-labour inputs to production where local producers can be cost and quality competitive.
- Provision of community grants through various initiatives and programs within the local community, including the education, arts, sporting, and culture sectors.

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.

Panorama BESS SubCo proposes to work in partnership with the Bathurst Regional Council 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 and would include:

- Employment of regional residents where they have the required skills and experience and can demonstrate a cultural fit with the organisation.
- Participating, as appropriate, in business group meetings, events or programs in the regional community.
- Locally sourcing non-labour inputs to production where local producers can be cost and quality competitive.
- Provision of community grants through various initiatives and programs within the local community, including the education, arts, sporting, and culture sectors.

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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).

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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).

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