



APPENDIX Q

ECONOMIC IMPACT ASSESSMENT



ERM  
ENERGET1°C5

# Economic Impact Assessment

Willavale Park Battery Energy Storage  
System

PREPARED FOR

X-ELIO<sup>+</sup>

X-Elio Willavale Park Pty Ltd

DATE

3 November 2025

PROJECT NUMBER

0678952



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# Economic Impact Assessment

Willavale Park Battery Energy Storage System  
0678952



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## CONTENTS

<b>1.</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	PROJECT OVERVIEW	1
1.2	PURPOSE OF THIS REPORT	2
1.3	ASSESSMENT GUIDELINES AND REQUIREMENTS	2
1.4	STRUCTURE OF THE REPORT	2
<b>2.</b>	<b>METHODOLOGY</b>	<b>1</b>
2.1	OVERVIEW	1
2.2	STUDY AREA	1
2.3	INPUT-OUTPUT ANALYSIS	1
2.4	DIRECT AND INDIRECT IMPACTS	2
<b>3.</b>	<b>DESCRIPTION OF REGIONAL ECONOMY</b>	<b>4</b>
3.1	RESIDENTS OF THE REGION	4
3.2	HOUSING	8
3.3	POPULATION GROWTH	8
3.4	ECONOMIC STRUCTURE	8
3.5	SUMMARY	9
<b>4.</b>	<b>CONSTRUCTION PHASE</b>	<b>11</b>
4.1	THE PROJECT	11
4.2	DIRECT AND INDIRECT IMPACTS	11
4.2.1	Regional impacts	11
4.2.2	State Impacts	12
4.3	OTHER IMPACTS	13
4.3.1	Agricultural impacts	13
4.3.2	Housing impacts	14
<b>5.</b>	<b>OPERATION PHASE</b>	<b>16</b>
5.1	THE PROJECT	16
5.2	DIRECT AND INDIRECT IMPACTS	16
5.2.1	Regional impacts	16
5.2.2	State impacts	17
5.3	OTHER IMPACTS	18
5.3.1	Agricultural impacts	18
5.3.2	Housing impacts	18
<b>6.</b>	<b>CUMULATIVE IMPACTS</b>	<b>19</b>
6.1	INTRODUCTION	19
6.2	POTENTIAL CUMULATIVE IMPACTS	19
6.2.1	Nearby renewable energy and related projects	19
6.2.2	Labour force	22
6.2.3	Resident population	22
6.2.4	Housing impacts	22
6.2.5	Prices	22
<b>7.</b>	<b>BENEFIT SHARING SCHEMES</b>	<b>23</b>

8. CONCLUSION	25
REFERENCES	26
APPENDIX A THE INPUT-OUTPUT FRAMEWORK	28

## LIST OF TABLES

TABLE 1-1	PROJECT SUMMARY	1
TABLE 2-1	STUDY AREA FOR ECONOMIC ASSESSMENT	1
TABLE 3-1	CHARACTERISTICS OF USUAL RESIDENTS OF THE REGIONAL ECONOMY	4
TABLE 3-2	TOP 5 INDUSTRY SECTORS OF EMPLOYMENT FOR USUAL RESIDENTS (FOUR DIGIT ANZSIC)	7
TABLE 3-3	POPULATION GROWTH	8
TABLE 3-4	PROJECTED POPULATION GROWTH	8
TABLE 3-5	GROSS REGIONAL OUTPUT FOR THE 5 LARGEST INDUSTRIES IN THE REGIONAL ECONOMY (ANZSIC ONE DIGIT) (\$2024)	9
TABLE 3-6	GROSS VALUE ADDED FOR THE 5 LARGEST INDUSTRIES IN THE REGIONAL ECONOMY (ANZSIC ONE DIGIT) (\$2024)	9
TABLE 4-1	AVERAGE ANNUAL ECONOMIC IMPACTS OF THE CONSTRUCTION ON THE REGIONAL ECONOMY (\$2024)	12
TABLE 4-2	AVERAGE ANNUAL ECONOMIC IMPACTS OF THE CONSTRUCTION ON THE STATE ECONOMY (\$2024)	13
TABLE 4-3	ANNUAL ECONOMIC IMPACTS OF FORGONE AGRICULTURE ON THE REGIONAL ECONOMY (\$2024)	14
TABLE 4-4	ANNUAL ECONOMIC IMPACTS OF FORGONE AGRICULTURE ON THE STATE ECONOMY (\$2024)	14
TABLE 4-5	LIST OF POTENTIAL TOWNS/CITIES WHERE PERSONNEL WOULD BE BASED AND EXPECTED PROPORTIONS	14
TABLE 5-1	AVERAGE ANNUAL ECONOMIC IMPACTS OF THE PROJECT ON THE REGIONAL ECONOMY (\$2024)	16
TABLE 5-2	AVERAGE ANNUAL ECONOMIC IMPACTS OF THE PROJECT ON THE STATE ECONOMY (\$2024)	17
TABLE 6-1	PROJECT CONSTRUCTION TIMELINES OF NEARBY RELEVANT PROJECTS	20
TABLE 7-1	LOCAL BENEFITS DETAILS (\$2026)	23
TABLE 7-2	MAXIMUM VALUE OF BENEFIT SHARING (PER ANNUM \$2024)	24
TABLE 7-3	PRIVATE AGREEMENTS (PER ANNUM \$2024)	24

## LIST OF FIGURES

FIGURE 1-1	PROJECT LOCALITY	1
FIGURE 3-1	REGIONAL ECONOMY EMPLOYMENT BY INDUSTRY (ONE-DIGIT ANZSIC) AND OCCUPATIONS FOR GOULBURN MULWAREE	6
FIGURE 3-2	TOP INDUSTRIES OF EMPLOYMENT FOR GOULBURN MULWAREE LGA	7

## ACRONYMS AND ABBREVIATIONS

Name	Description
<b>Terminologies</b>	
Applicant	X-Elio Willavale Park Pty Ltd
Project	Willavale Park BESS
Project Area	The area to which the development application applies. This area encompasses temporary and permanent Project infrastructure, and additional areas that have been excluded from the project design.
Development Footprint	Maximum area directly impacted by Project construction and operation. The Disturbance Area is located entirely within the Project Area, and will be subject to permanent disturbance during construction and operation of the BESS until decommissioning. Additionally, there is the External Road Work Study Area that is required for the upgrades to Wollogorang Road.
<b>Acts</b>	
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
<b>Acronyms and Abbreviations</b>	
ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industrial Classification
BESS	Battery Energy Storage System
CGE	Computable general equilibrium
DIDO	Drive-in drive-out
EIS	Environmental Impact Statement
FIFO	Fly-in fly-out
FTE	Full time equivalent
ha	hectares
IO	input-output
kV	Kilovolt
LGA	Local Government Area
MW	Megawatt
MWh	Megawatt hours
NSW	New South Wales
REIA	Real Estate Institute of Australia
SSD	State Significant Development
SEARs	Secretary's Environmental Assessment Requirements

## EXECUTIVE SUMMARY

X-Elio Willavale Park Pty Ltd (the Applicant) is seeking approval for the construction, operation, and decommissioning of the Willavale Park Battery Energy Storage System (BESS) (the Project), a renewable energy development in Wollongorang, NSW, 2581. The Project is situated within the Goulburn Mulwaree Local Government Area (LGA). The Project is proposed to commence construction in Q2 2026, and commissioning and operation is anticipated from 2027.

This report assesses the potential economic impacts of the construction and operation of the Project on the regional and state economy using input-output (IO) analysis. It has been prepared to support and inform the Environmental Impact Statement (EIS) for the Project. The Project impacts have been assessed in accordance with the 2022 Secretary's Environmental Assessment Requirements (SEARs) issued by the then NSW Department of Planning and Environment (DPE) and in line with the relevant legislation and guidelines. The SEARs were issued on 12/12/2024 under the application number SSD-78100252.

### POTENTIAL BENEFITS DURING THE CONSTRUCTION AND OPERATION PHASES

The Project will support economic activity that benefits the regional and state economy during both the construction and operation phases. During the construction phase agricultural production on the construction site will be disrupted, with potentially minor impacts also anticipated on neighbouring properties. The Project has proposed to work with neighbours to minimise any disruption. Based on our assessment the economic benefits of the Project will outweigh the loss of agricultural production.

Increased economic activity in the regional and state economy arise from:

- Expenditure in the region and state on non-labour inputs to production;
- Direct employment of local labour or in migration of labour;
- Temporary increases in the local resident population; and
- Expenditure of wage income in the local economy.

Most of the economic impact will be in the Construction sector and Electricity sector with significant flow-on effects to the Manufacturing, Professional and Scientific services and Financial and insurance services. Our analysis estimates the Project will stimulate increased annual total economic output of:

Our analysis estimates the Project will stimulate increased annual total economic output of:

- \$165 million during the construction phase for the regional economy,
- \$184 million during the construction phase for the state economy,
- \$92 million during the operation phase for the regional economy,
- \$112 million during the operation phase for the state economy.

Our analysis estimates the Project will generate:

- 106 Full Time Equivalent (FTE) jobs annually during the construction phase in the regional economy,
- 125 FTE annually during the construction phase in the state economy,
- 7 FTE jobs annually during the operation phase in the regional economy,
- 8 FTE jobs annually during the operation phase in the state economy.

The Project represents significant economic benefits to the region and the state. It is likely that some employment will be from outside the region, given the limited labour force available in the region. Current unemployment in the Goulburn Mulwaree LGA is 4% which provides limited labour force flexibility for the Project. There are less than 1,500 people currently employed in the construction industry. It is expected that during the construction phase the labour force will reside in Goulburn (50%), Yass (35%) and Canberra (15%) (Environmental Resources Management (ERM), 2024).

### **MANAGING THE COMMUNITY IMPACTS OF INCREASED ECONOMIC ACTIVITY**

Given the prevailing local market conditions, this investment and renewables investment more broadly may also have unintended negative impacts on the local community. Whilst this Project is relatively small, any negative impact will be amplified by the cumulative impact of slated projects in the vicinity of this Project. Notably, whilst incoming labour will increase the local resident population and drive increased economic activity, it may also result in:

- Tension within the currently tight housing market. Goulbourn Mulwaree LGA has a 0.66% rental vacancy rate. With a sudden influx of labour for this and other projects, housing demand is expected to outstrip supply. This can lead to higher rents and potential crowding out of current residents as housing markets are typically slow to respond to large changes;
- pressure on services, entertainment, transport and retail where there is scarcity. Unlike the housing market, many of these pressures are likely to be temporary as markets can adjust quickly. An exception to this is health services and public transport which can take longer to adjust; and
- Wage pressure and labour shortages across the regional economy as renewable projects compete with local businesses across multiple industries for skills. This could have inflationary impacts as higher operating costs are passed through to end users in the local communities.

These impacts are sensitive to the balance between drive-in drive-out (DIDO) and localised labour adopted by this Project and other renewable energy projects in the region. The Project proposes to collaborate closely with local councils and communities to mitigate the above risks associated with an increase in economic activity. This may include:

- Creating commutable routes to the Project from a wider region to alleviate housing pressure;
- Prioritising employment opportunities for current resident;
- Sourcing local inputs for production where possible;
- Establishing benefit sharing schemes within the local community; and
- Working with neighbours to minimise agricultural disruption during the construction and operation phases.

# 1. INTRODUCTION

## 1.1 PROJECT OVERVIEW

X-Elio Willavale Park Pty Ltd (the Applicant) proposes to construct and operate the Willavale Park Battery Energy Storage System (BESS) (the Project), a renewable energy development situated at 20541 Hume Highway, Wollongorang, NSW.

The Project is a State Significant Development (SSD) pursuant to Part 2.2, clause 2.6 and Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP). This report supports an Environmental Impact Statement (EIS) for the Project being prepared under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Project is proposed to commence construction in early-2026, and commissioning and operation is anticipated from 2027.

The Project is located approximately 22 km southwest of Goulburn and 86 km southwest of Canberra in the South East and Tablelands region. The Project is located entirely within the Goulburn Mulwaree Local Government Area (LGA), and borders the Upper Lachlan Shire LGA. The land is predominantly agricultural, primarily used for irrigated cropping and grazing. The Project will involve the construction, operation, maintenance and, where relevant, decommissioning of a BESS and associated infrastructure, including:

- Large-scale BESS with a storage capacity of up to 300 megawatts (MW) / 1,200 megawatt hours (MWh);
- Electrical reticulation infrastructure, including an onsite substation, switching station, and internal transmission and feeder lines;
- Permanent associated and ancillary infrastructure; and
- Temporary construction facilities.

The Project proposes to connect to the national grid via the existing TransGrid 330 kilovolt (kV) Yass – Marulan overhead transmission line, which runs east to west along the southern boundary of the Project.

A summary of the Project component is presented in **Table 1-1**, and the Project locality is shown in **Figure 1-1**.

**TABLE 1-1 PROJECT SUMMARY**

Project Element	Summary
BESS	<ul style="list-style-type: none"> <li>• Single BESS with 300 MW / 1,200 MWh storage capacity</li> </ul>
Electrical Reticulation Infrastructure	<ul style="list-style-type: none"> <li>• High voltage substation (330 kV);</li> <li>• Switching Station, owned and operated by TransGrid;</li> <li>• 130 kV underground transmission line connecting the substation to the switching station; and</li> <li>• 330 kV overhead cut-in connecting the Project to the existing 330 kV Yass-Marulan transmission line.</li> </ul>
Access	<ul style="list-style-type: none"> <li>• The Project will be accessed via two site access points, both located on Wollongorang Road</li> </ul>

Project Element	Summary
On-site Supporting Infrastructure	<ul style="list-style-type: none"> <li>• Temporary construction and laydown area;</li> <li>• Permanent Operations &amp; Maintenance (O&amp;M) facility including: <ul style="list-style-type: none"> <li>○ A control room;</li> <li>○ Storage facilities;</li> <li>○ Supervisory Control and Data Acquisition (SCADA) facilities;</li> <li>○ Car parking;</li> <li>○ Basic office and associated amenities; and</li> <li>○ Utilities and waste facilities.</li> </ul> </li> <li>• New and/or upgraded internal access roads;</li> <li>• New and/or upgraded drainage system; and</li> <li>• Security fencing and lighting.</li> </ul>
Off-site Supporting Infrastructure	<ul style="list-style-type: none"> <li>• Waste and wastewater disposal facilities;</li> <li>• Existing communications network;</li> <li>• Existing transport network and associated roadworks within the road reserve: <ul style="list-style-type: none"> <li>○ Localised widening of Wollogorang Road to 7 m between the southern site access point and the Hume Highway intersection;</li> <li>○ At the intersection of Wollogorang Road / Hume Highway (Parkesbourne, NSW) to relocate two traffic signs;</li> <li>○ Hume Highway (Parkesbourne, NSW) to relocate bollards;</li> <li>○ Intersection of Botany Road / Bunnerong Road (Matrville, NSW) for temporary hardstand and mountable kerb; and</li> </ul> </li> <li>• Quarries for construction material (if required).</li> </ul>

## 1.2 PURPOSE OF THIS REPORT

This report has been prepared to evaluate the direct and indirect economic impacts of the Project and inform the Environmental Impact Statement (EIS) submitted in support of a State Significant Development (SSD) Development Consent application under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act (EP&A Act) 1979*. The SEARS were issued on 12/12/2024 under the application number SSD-78100252.

## 1.3 ASSESMENT GUIDELINES AND REQUIREMENTS

This report has been prepared in accordance with the requirements of the NSW Department of Planning and Environment which are set out in the Large-scale solar energy Secretary's Environmental Assessment Requirements (SEARs) (DPE, 2022a). The SEARs outline matters which must be addressed in the EIS, with the following requirements pertinent to this economic assessment:

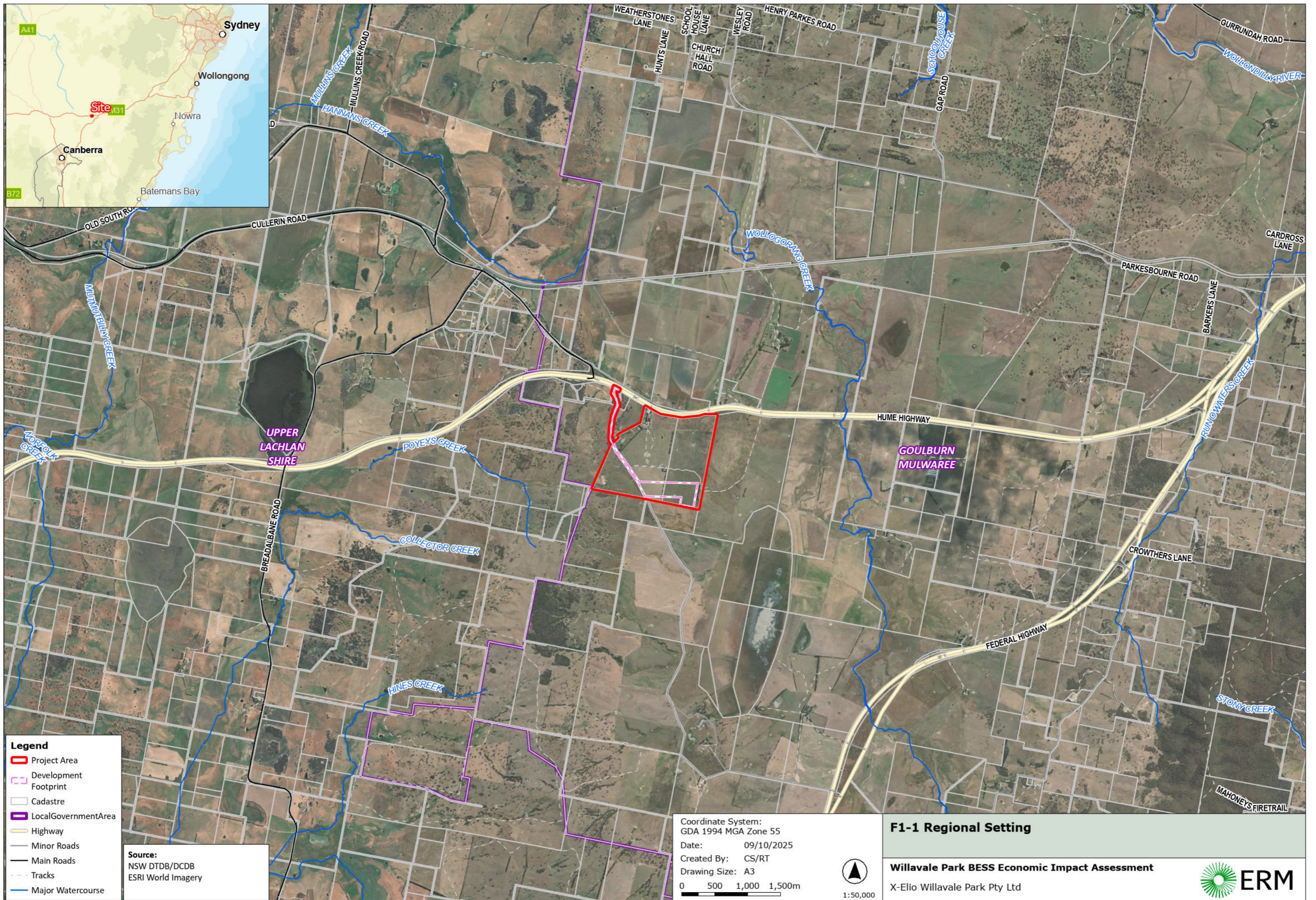
- **Economic** – including an assessment of the economic impacts or benefits of the project for the region and the State as a whole and provide details of any proposed voluntary benefit sharing, having regard for the *Benefit-Sharing Guideline 2024* and *Private Agreement Guideline 2024*.

## 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 background context about the regional economy;
- **Section 4** assesses the economic impacts of the construction phase of the Project on the regional and NSW economy.

- **Section 5** assesses the economic impacts of the operational phase of the Project on the regional and NSW economy.;
- **Section 6** considers potential cumulative impacts on the region and NSW given other projects in the region;
- **Section 7** provides details of the proposed benefit sharing scheme; and
- **Section 8** provides conclusions of the assessment.



**Legend**

- Project Area
- Development Footprint
- Cadastre
- Local Government Area
- Highway
- Minor Roads
- Main Roads
- Tracks
- Major Watercourse

**Source:**  
NSW DTDB/DCDB  
ESRI World Imagery

Coordinate System:  
GDA 1994 MGA Zone 55  
Date: 09/10/2025  
Created By: CS/RT  
Drawing Size: A3  
0 500 1,000 1,500m  
1:50,000

**F1-1 Regional Setting**

**Willavale Park BESS Economic Impact Assessment**  
X-Elio Willavale Park Pty Ltd



## 2. METHODOLOGY

### 2.1 OVERVIEW

An input-output (IO) analysis has been undertaken to evaluate the potential economic impacts of the Project on the regional and NSW economy. The IO analysis provides a quantitative assessment of the direct and indirect economic effects during the construction and operational phases of the Project. In addition, other potential economic considerations are addressed qualitatively to determine the broader economic influence of the Project.

### 2.2 STUDY AREA

The study area for the regional economic impact assessment encompasses the Goulburn Mulwaree LGA. The neighbouring LGA of Yass and Canberra LGA (Estimated Residential Populations of 17,240 and 473,855, respectively) will provide a base for some of the labour force during the construction phase (Australian Bureau of Statistics, July 2021-June 2026). It is anticipated that there will be some economic impact distributed across these LGAs, and provisions made for income leakage beyond the Goulburn Mulwaree.

The Goulburn Mulwaree LGA have been selected as the focus due to the direct association with the Project's location and anticipated economic influence. This LGA represents the primary geographical area where the economic effects from the construction and operation of the Project are most likely to be concentrated. Analysis of this region captures the economic interactions, workforce movements, and supply chain activities associated with the Project, and reflects the most significant benefits or impacts, such as employment opportunities, infrastructure development, and changes in local economic activity. Impacts on the broader statewide economy are also assessed.

**TABLE 2-1 STUDY AREA FOR ECONOMIC ASSESSMENT**

<b>Economic boundary assessed</b>	<b>ABS statistical area</b>
Regional economy	Goulburn Mulwaree LGA
State economy	New South Wales

### 2.3 INPUT-OUTPUT ANALYSIS

An input-output framework is an established methodology to assess economic impacts from changes to the economy including large projects that result in an increase in production in an industry sector. We use a proprietary input-output model to assess the direct and indirect economic impacts of the construction and operational phases of the Project on the regional and state economy.

Our input-output model is based on the latest ABS data to underpin the relationships and structure of the economy. The first step of our analysis is to develop an input-output model that reflects the regional and state economy. We use regional employment and state production to calibrate the input-output models to reflect the regional and state economic structure.

The second step of our analysis is to calculate the direct impacts of the Project. Direct impacts are estimated based on data received from the Applicant on employment, energy generation and storage and annual revenue generation.

The third step of our analysis is to calculate the indirect impacts of the Project. This includes the flow-on effects from an increase in household income (through wages), expenditure on intermediate products and production.

Our analysis determines which industries in the economy benefit most from the Project and determines the overall change in gross output, value added, household income and employment.

Our methodology is based on assumptions listed in Appendix A. Some key assumptions that will affect the interpretation of results include fixed production ratios, fixed prices and no supply side constraints. These assumptions lead to results reflecting average economic impacts rather than marginal impacts and results are an upper bound of potential economic impacts.

A limitation of fixed prices and production ratios is that any structural changes to the relationship between industries and price impacts are not captured in the analysis. This limitation can be overcome with computable general equilibrium (CGE) modelling. However, this approach would likely lead to opaqueness in a regional analysis and has historically overestimated an economy's ability to adapt to large changes.

A limitation of no supply side constraints is that crowding out effects are not captured in the analysis. Crowding out is when productive resources in the economy are shifted away from their current use due to the introduction of new expenditure. Crowding out is assumed to be outside of the model. Without crowding out effects incorporated in the model, the analysis creates an upper bound on potential economic impacts. We therefore provide a qualitative assessment of crowding out effects in other impacts.

## 2.4 DIRECT AND INDIRECT IMPACTS

The economic impacts of the Project are categorised into direct and indirect impacts for analysis. Direct impacts are those that result from project expenditure. The direct impact is the summation of economic impact across all sectors of the economy. For example, a direct impact of the Project is the wages provided to households as employment compensation. In the tables described in this report, this is referred to as household income.

Indirect impacts are those that result from the flow-on effects of expenditure in an industry. For example, an increase in construction output will necessitate inputs from other industries, such as manufacturing. To meet this additional demand, manufacturing will increase its output. This rise in manufacturing output will, in turn, require inputs from various industries, stimulating further increase in production from downstream sectors. This cascading effect, in total, constitutes the indirect impact of the project.

The key economic indicators that have been used to calculate the direct and indirect economic impacts include:

- **Gross Output** – The total amount of expenditure across all industries in the economy annually.
- **Gross Value added** – The annual value of employee compensation, gross operation surplus, and other taxes on production, less subsidies. This reflects the gross revenue minus input costs (excluding employee-related expenses).
- **Gross Household Income** – The total amount of wage expenditure by the Project annually.
- **Employment** – The total number of FTE employees employed annually.

### 3. DESCRIPTION OF REGIONAL ECONOMY

Characteristics of the regional economy have been explored to provide context for the information provided by the IO analysis. This analysis provides a deeper understanding of the economic structure, workforce distribution, industry composition, and key drivers of economic activity within the area. Information is sourced from the ABS and extracted data is provided at different levels of aggregation (i.e., one-digit and four-digit Australian and New Zealand Standard Industrial Classification (ANZSIC)) to deliver an overview of the region and its economic trends.

#### 3.1 RESIDENTS OF THE REGION

**Table 3-1** provides various characteristics of the usual residents of the regional economy based on the ABS's Regional Summary and 2021 Population and Housing Census Information (ABS, 2024).<sup>1</sup> The Goulburn Mulwaree LGA is located within the Capital Region Statistical Area Level 4 (SA4).

In 2021, this geographical area had an estimated residential population (ERP) of 238,618 and a labour force of 144,781. The Capital Region is an extensive geographical area bordering the Greater Sydney area, Canberra and the state of Victoria. The Goulburn Mulwaree LGA is generally considered part of the Southern Tablelands<sup>1</sup>, a distinct set of LGAs, within the Capital Region. Further comparisons will be made against the Southern Tablelands area.

The LGAs comprising the Southern Tablelands area, have an ERP of 140,511 and a labour force of 88,933. Of which the Upper Lachlan Shire LGA constituted an ERP of 31,250 (approximately 22.2% of the Southern Tablelands population), with a median age of 41.4 years, and a labour force of 14,998 (approximately 16.8% of the Southern Tablelands labour force).

As illustrated in **Table 3-1** below, the top occupations of usual residents<sup>2</sup> in the Goulburn Mulwaree LGA in 2021 were Community and Personal Service Workers (14.9%), Technicians and Trade Workers (14.8%), Professionals (14.7%), Managers (12.2%), Labourers (12.2%), Clerical and Administrative works (11.6%), Sales Workers (8.9%), and Machinery Operators and Drivers (8.6%).

**TABLE 3-1 CHARACTERISTICS OF USUAL RESIDENTS OF THE REGIONAL ECONOMY**

Goulburn Mulwaree LGA		
Demographics	No.	
Population	32,150 people	
Median Age	41.4 years	
In labour force (no.)	14,988 individuals	
Unemployed (no.)	641 (4.3%) individuals	
Median household weekly income	\$950	
Unoccupied private dwellings (%)	12.99%	
Median weekly rent	\$320	
Occupations	No.	%
Managers	1,751	12.2%
Labourers	1,751	12.2%
Technicians and Trades Workers	2,124	14.8%
Machinery Operators and Drivers	1,234	8.6%

<sup>1</sup> The Southern Highlands and Shoalhaven area includes following LGAs: Goulburn Mulwaree, Hilltops, Yass Valley, Upper Lachlan Shire and Queanbeyan-Palerang.

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

<b>Goulburn Mulwaree LGA</b>		
Community and Personal Service Workers	2,138	14.9%
Clerical and Administrative Workers	1,665	11.6%
Professionals	2,109	14.7%
Sales Workers	1,277	8.9%

The main industries and occupations of usual residents are presented in **Figure 3-1**.

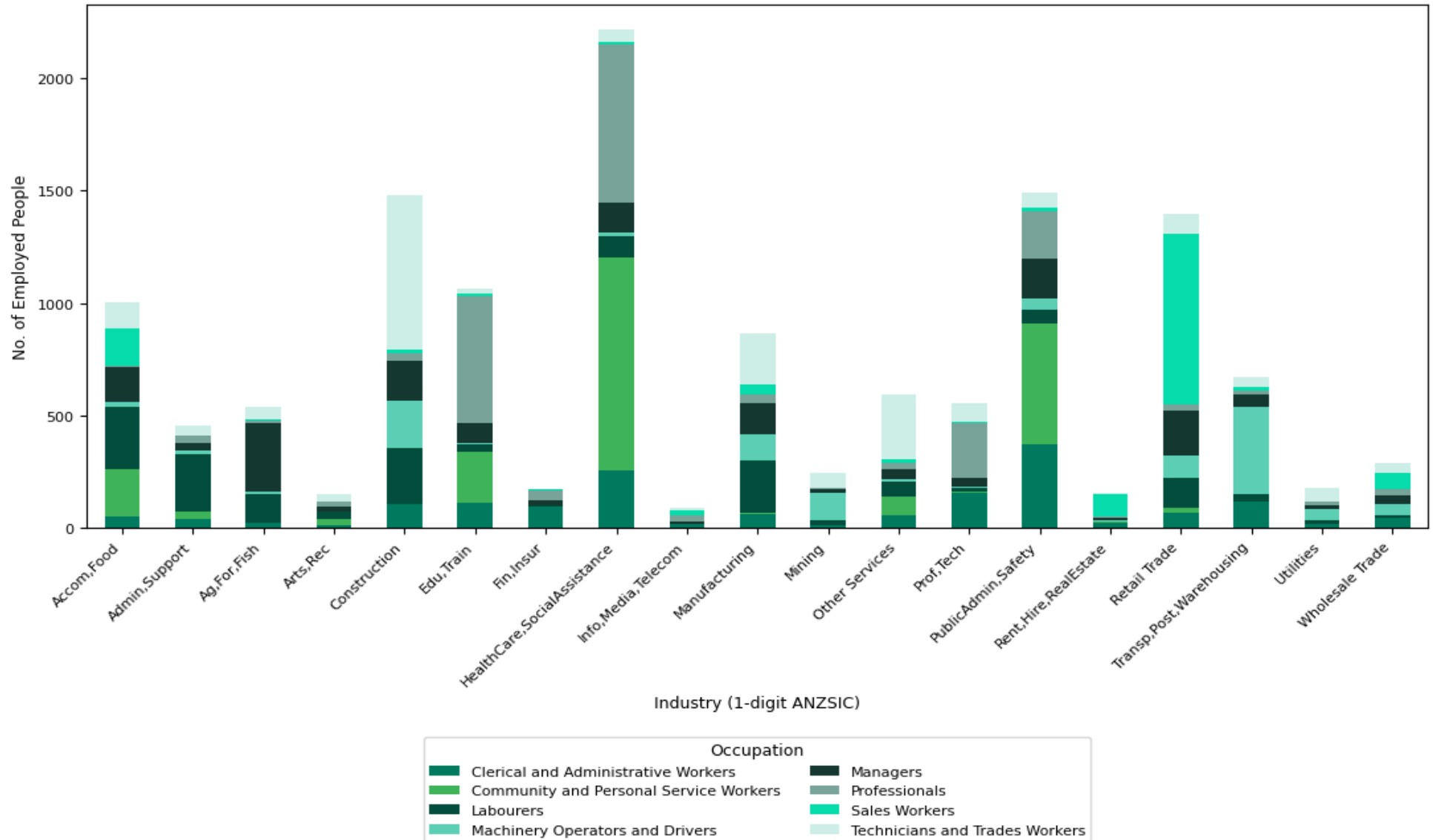


FIGURE 3-1 REGIONAL ECONOMY EMPLOYMENT BY INDUSTRY (ONE-DIGIT ANZSIC) AND OCCUPATIONS FOR GOULBURN MULWAREE

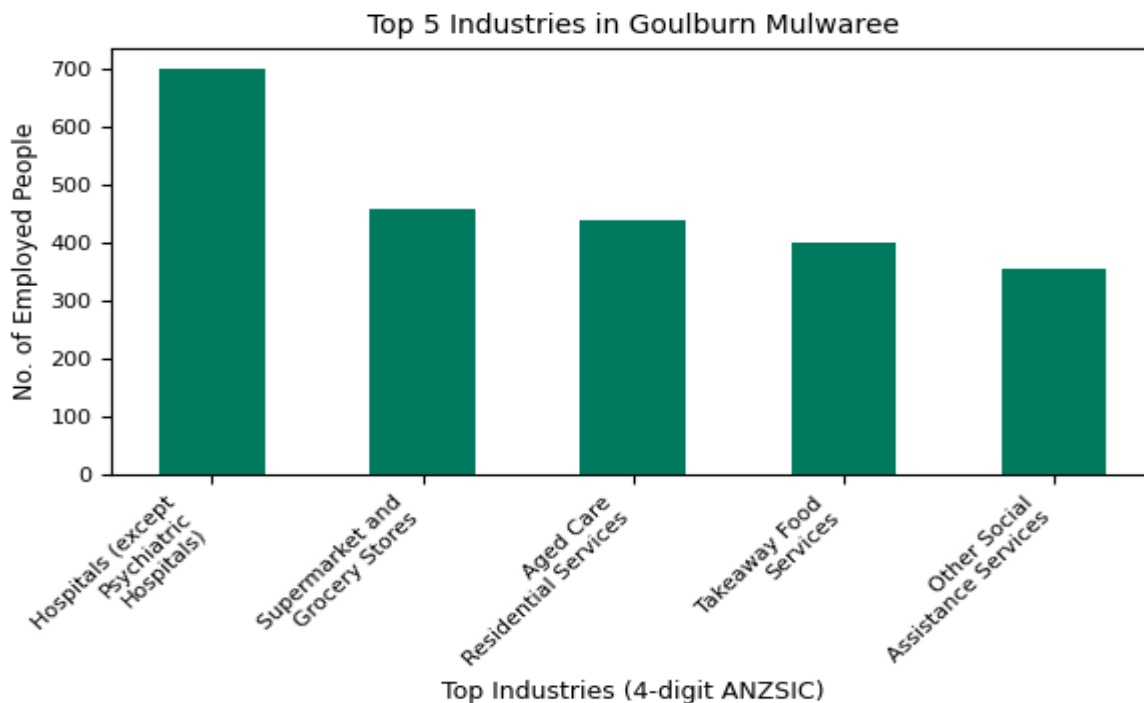
At a finer level, **Table 3-2** indicates the main four-digit ANZSIC industry sectors in which usual residents<sup>3</sup> were employed in 2021 in the Goulburn Mulwaree LGA compared to the total Southern Highlands and Shoalhaven geographical area.

In the Goulburn Mulwaree LGA, *Hospitals (except Psychiatric Hospitals)* was the most significant industry of employment (5.6%), followed by *Supermarket and Grocery Stores*, *Aged Care Residential Services*, *Takeaway Food Services*, and *Other Social Assistance Services* (3.7%, 3.5%, 3.2%, and 2.8%, respectively).

**TABLE 3-2 TOP 5 INDUSTRY SECTORS OF EMPLOYMENT FOR USUAL RESIDENTS (FOUR DIGIT ANZSIC)**

Goulburn Mulwaree LGA	%	Southern Highlands and Shoalhaven geographical area <sup>4</sup>	%
Hospitals (except Psychiatric Hospitals)	5.6	Hospitals (except Psychiatric Hospitals)	3.4
Supermarket and Grocery Stores	3.7	Supermarket and Grocery Stores	3.2
Aged Care Residential Services	3.5	Primary Education	2.9
Takeaway Food Services	3.2	Aged Care Residential Services	2.7
Other Social Assistance Services	2.8	Takeaway Food Services	2.6

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



**FIGURE 3-2 TOP INDUSTRIES OF EMPLOYMENT FOR GOULBURN MULWAREE LGA**

<sup>3</sup> Employed people aged 15 years and over.

<sup>4</sup> The Southern Highlands and Shoalhaven area includes following LGAs: Goulburn Mulwaree, Hilltops, Yass Valley, Upper Lachlan Shire and Queanbeyan-Palerang.

## 3.2 HOUSING

Based off the ABS 2021 census data of the Goulburn Mulwaree LGA, 4,256 people fully owned their homes, 3,896 people were homeowners with a mortgage, and 3,476 people rented their residences. The median weekly household income was \$950, the median monthly mortgage repayment was \$1,733, and the median weekly rent was \$320. The vacancy rate for the Goulburn Mulwaree region is 0.66% with a slightly higher vacancy rate in the Goulburn suburb of 0.79% (Real Estate Investar, 2025).

## 3.3 POPULATION GROWTH

The population in Goulburn Mulwaree LGA has been growing steadily, but at a slower pace than in NSW. The Goulburn Mulwaree LGA is expected to grow at +0.9% p.a. out to 2041 whilst the aggregate NSW population is expected to grow at +1.2% p.a. (NSW Government, 2024). The median age in Goulburn Mulwaree is 41.4 (in 2021) slightly above the Australian average of 38 (in 2021) and the NSW median of 39 (in 2021).

TABLE 3-3 POPULATION GROWTH

Local Government Area	Population				Average Annual Growth Rate		
	2020	2021	2022	2023	2020-2021	2021-2022	2022-2023
Goulburn Mulwaree	31,934	32,150	32,428	32,710	0.68%	0.86%	0.87%

Source: Region Summary (ABS, 2024)

TABLE 3-4 PROJECTED POPULATION GROWTH

Local Government Area	2021	2041	Change	Annual %
Goulburn Mulwaree	32,150	37,819	+4,796	+0.9%
<b>New South Wales</b>	8,097,062	10,070,467	+1,973,405	+1.2%

Source: LGA Population projections 2022 to 2032 (ABS, 2024)

## 3.4 ECONOMIC STRUCTURE

The economic structure of Goulburn Mulwaree LGA is derived from our input output model for the regional economy. **Table 3-5** outlines the industries with the highest economic output in the regional economy, indicating 46.5% of the total output is derived from five key industries. Construction represents the largest industry in the regional economy in terms of gross output. In terms of value added, the Health Care and Social Assistance industry is the largest contributor to the regional economy and the largest industry of employment in the regional economy (15.7%).

**TABLE 3-5 GROSS REGIONAL OUTPUT FOR THE 5 LARGEST INDUSTRIES IN THE REGIONAL ECONOMY (ANZSIC ONE DIGIT) (\$2024)**

Industry	Gross Regional Output (\$m)	Proportion of Regional Economy (%)
Construction	\$286M	11.75%
Public administration and safety	\$248M	10.19%
Health care and social assistance	\$248M	10.17%
Manufacturing	\$195M	8.01%
Retail trade	\$155M	6.37%
<b>Total</b>	<b>\$1,132M</b>	<b>46.5%</b>

**TABLE 3-6 GROSS VALUE ADDED FOR THE 5 LARGEST INDUSTRIES IN THE REGIONAL ECONOMY (ANZSIC ONE DIGIT) (\$2024)**

Industry	Gross Value Added (\$m)	Proportion of Regional Employment (%)
Health care and social assistance	\$170M	15.7%
Public administration and safety	\$140M	10.7%
Mining	\$102M	1.7%
Education and training	\$94M	7.5%
Retail trade	\$89M	9.8%
<b>Total</b>	<b>\$595M</b>	<b>45%</b>

### 3.5 SUMMARY

The Goulburn Mulwaree LGA economy (the regional economy) represents a significant proportion of the Southern Highlands and Shoalhaven geographical area. Goulburn City within the local economy is an important urban centre for regional communities and represents a large proportion of the resident population. It is expected that many employees of the Project will come from Goulburn or choose to reside there if moving from another region given its services and proximity to the Project.

A main driver of the regional economy is the Health Care and Social Assistance sector which is the primary employer and primary source of gross value added. Construction is also a significant driver of economic activity and the primary source of gross regional output.

The regional economy has low unemployment of 4.3%, indicating that some of the employment for the Project will come from outside the region. This will bring additional economic activity and temporary population growth. Long term, some of the incoming residential population may choose to remain increasing the overall population growth rate.

As with much of regional NSW, housing pressure is high in the regional economy. The vacancy rate in the region is 0.66% with approximately a third of the local population currently renting

their homes. Any increase in local population is likely to increase housing demand and lead to increased housing pressure.

## 4. CONSTRUCTION PHASE

### 4.1 THE PROJECT

The construction phase of the Project will drive economic activity, benefiting both the local, regional and broader NSW economy. This phase is expected to last 18 months, directly employing approximately 70 workers, with a peak workforce of 100 full time equivalent (FTE) employees.

### 4.2 DIRECT AND INDIRECT IMPACTS

The economic impacts described in this report are calculated across one-digit ANZSIC industry sectors. During the construction phase, direct impacts will primarily flow through to the construction industry, which includes heavy and civil engineering construction, construction services and non-residential building.

The ABS defines the construction division as:

- *Units mainly engaged in the construction of buildings and other structures, additions, alterations, reconstruction, installation, and maintenance and repairs of buildings and other structures;*
- *Units engaged in demolition or wrecking of buildings and other structures and clearing of building sites; and*
- *Units engaged in blasting, test drilling, landfill, levelling, earthmoving, excavating, land drainage and other land preparation (Australian Bureau of Statistics, 2006-revision-2.0).*

#### 4.2.1 REGIONAL IMPACTS

On a regional level, most direct impacts generated by the Project are within the construction industry. In total, the direct output from the Project is estimated at \$46.2 million per annum. The annual total impact of the indirect output from the Project on the regional economy is estimated at \$119 million. During the construction phase, this brings the modelled annual impact of the total output from the Project to \$165 million. The IO analysis indicates that the industries with the highest indirect output from the Project (based on a one-digit ANZSIC classification) include Construction, Manufacturing, Transport, Professional and Scientific Services and Administration and Support Services.

The annual value added by the Project to the regional economy is estimated at \$80 million. This is split into \$24 million from direct impacts and \$56 million from indirect annually.

Household direct income is calculated based on the number of full-time employees on average during the construction phase. Peak employment is not used as the economic impacts assessed are average impacts. The average direct impact on household income is estimated \$11 million annually. The indirect impact on household income is expected to be \$4 million per annum, leading to a modelled total impact of \$15 million per annum on the regional economy during the construction.

The indirect impacts of household income are calculated with an expected leakage rate of 50% from the regional economy. This is because the regional economy is limited in size compared to the wider region. It is likely household income will be spent beyond the regional economy and thus the multiplier effect of household income has been adjusted. This assumption is also reasonable because a proportion of income earners will not reside in the region and hence spend their income outside of the regional economy.

The direct impacts on employment are measured by the expected annual average employment during the construction phase, 70 FTEs. This will flow through the economy and create an estimated additional 36 jobs leading to an overall expected increase of 106 jobs.

**TABLE 4-1 AVERAGE ANNUAL ECONOMIC IMPACTS OF THE CONSTRUCTION ON THE REGIONAL ECONOMY (\$2024)**

	<b>Direct Impact</b>	<b>Indirect Impact</b>	<b>Total Impact</b>
<b>Output (\$m)</b>	\$46.17M	\$118.95M	\$165.12M
<b>Value Added (\$m)</b>	\$23.69M	\$56.24M	\$79.93M
<b>Income (\$m)</b>	\$10.86M	\$3.94M	\$14.80M
<b>Employment (FTE No.)</b>	70	36	106

*Note: Total impact may differ from the sum of the direct and indirect impact due to rounding in the tables*

#### 4.2.2 STATE IMPACTS

The main industries that benefit from indirect Project impacts are Construction, Manufacturing, Professional and Scientific Services, Transport and Financial and Insurance Services.

Value added by the Project to the state economy is estimated at \$95 million per annum. This is split into \$28 million from direct and \$67 million from indirect impacts.

The total impact on household income is \$17 million per annum on the NSW economy during the construction phase. Of which, direct household income is estimated at \$11 million annually.

The indirect impacts of household income are calculated with an expected leakage rate of 15% from the NSW economy. This is to account for expenditure outside of the state that will not create cascading flow-on effects within the NSW economy.

The direct impacts on employment are measured by the expected annual average employment during the construction phase, 70 FTEs. This will flow through the economy and create an estimated additional 55 jobs leading to an overall expected increase of 125 jobs.

The indirect impacts on the NSW economy are larger than those in the regional economy because of the larger multiplier effect in the NSW economy and the reduction in leakage.

The regional and state economic impacts are sensitive to the amount of local expenditure. In this project we have assumed the non-local expenditure for BESS construction is 77% of the total construction costs. This assumption is in line with the locally sourced minimum requirements (DCCEEW, 2022) and reflects the predominately international supply chain for BESS components and limited scope for introducing domestically sourced materials. This

results in lower economic benefits as compared to other more locally sourced renewable projects for both the state and regional economy.

**TABLE 4-2 AVERAGE ANNUAL ECONOMIC IMPACTS OF THE CONSTRUCTION ON THE STATE ECONOMY (\$2024)**

	<b>Direct Impact</b>	<b>Indirect Impact</b>	<b>Total Impact</b>
<b>Output (\$m)</b>	\$51.13M	\$132.82M	\$183.95M
<b>Value Added (\$m)</b>	\$27.80M	\$67.08M	\$94.88M
<b>Income (\$m)</b>	\$10.86M	\$5.99M	\$16.85M
<b>Employment (FTE No.)</b>	70	55	125

*Note: Total impact may differ from the sum of the direct and indirect impact due to rounding in the tables*

### 4.3 OTHER IMPACTS

In this section we described the impact of the construction phase of the Project on agriculture and housing. Impacts on transport and social community are considered in detail in the respective chapters of the Environmental Impact Assessment.

#### 4.3.1 AGRICULTURAL IMPACTS

The construction phase of the Project is expected to be 18 months. During this time, it is likely that there will be disruption to previous agricultural practices.

The disturbance area in the Project area for the construction of the BESS is 20.68 ha on cleared agricultural land used for grazing with minimal vegetation<sup>5</sup>. The loss of agricultural production from the Project area is expected to be \$7,978 per annum based on average agricultural production per hectare of agricultural holding in the Goulburn Mulwaree LGA (Australian Bureau of Statistics, 1990-2023). The direct impact on the regional economy due to this loss of agricultural production is \$3,894. The total economic impact of this loss of production is estimated to be \$16,969 annually for the region and \$20,052 annually for the state.

<sup>5</sup> The external road work study area (5.47 ha) is not included in the agricultural impact assessment

**TABLE 4-3 ANNUAL ECONOMIC IMPACTS OF FORGONE AGRICULTURE ON THE REGIONAL ECONOMY (\$2024)**

	<b>Direct Impact</b>	<b>Indirect Impact</b>	<b>Total Impact</b>
<b>Output (\$)</b>	\$3,894	\$13,074	\$16,969
<b>Value added (\$)</b>	\$1,829	\$6,141	\$7,970
<b>Income (\$)</b>	\$628	\$1,244	\$1,872
<b>Employment (FTE No.)</b>	0.01	0.02	0.04

*Note: Total impact may differ from the sum of the direct and indirect impact due to rounding in the tables*

**TABLE 4-4 ANNUAL ECONOMIC IMPACTS OF FORGONE AGRICULTURE ON THE STATE ECONOMY (\$2024)**

	<b>Direct Impact</b>	<b>Indirect Impact</b>	<b>Total Impact</b>
<b>Output (\$)</b>	\$4,434	\$15,617	\$20,052
<b>Value added (\$)</b>	\$2,083	\$7,335	\$9,418
<b>Income (\$)</b>	\$628	\$1,517	\$2,145
<b>Employment (FTE No.)</b>	0.01	0.03	0.04

*Note: Total impact may differ from the sum of the direct and indirect impact due to rounding in the tables*

### 4.3.2 HOUSING IMPACTS

The construction phase, the Project is expected to employ 70 individuals on average and 100 individuals at its peak. The Project does not anticipate providing any temporary housing for these employees. Employees will be based in Goulburn (50%) Yass (35%) and Canberra (15%).

**TABLE 4-5 LIST OF POTENTIAL TOWNS/CITIES WHERE PERSONNEL WOULD BE BASED AND EXPECTED PROPORTIONS**

<b>Town/City</b>	<b>% Workforce</b>	<b>Number of workers local (Peak)</b>	<b>Number of workers non-local (Peak)<sup>6</sup></b>
Goulburn	50%	25	25
Yass	35%	10	25
Canberra	15%	15	0
<b>Total</b>	<b>100%</b>	<b>50</b>	<b>50</b>

The vacancy rate for private dwellings in the Goulburn Mulwaree region is 0.66% with a slightly higher vacancy rate in the Goulburn suburb of 0.79% (Real Estate Investar, 2025). Similarly, the vacancy rate for the Yass region is 0.52%.

<sup>6</sup> This is a distribution for non-local workers for the purpose of economic assessment.

This is significantly below the industry benchmark of 3.0% set by the Real Estate Institute of Australia (Real Estate Institute of Australia (REIA), 2024). A vacancy rate at the benchmark is considered a stable market with supply and housing demand roughly in equilibrium. A vacancy rate below this, as in the Goulburn Mulwaree and Yass LGA, indicates strong rental demand.

This indicates substantial housing pressures in the Goulburn Mulwaree and Yass LGA that can be further impacted with a change in the size of the resident population. With the existing low rental vacancy, an influx of workers from outside the region can result in further housing pressures and crowding out of lower income tenants. Some housing pressure and congestion will likely be mitigated by proposed shuttle buses for non-local employees residing in Goulbourn and Yass.

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## 5. OPERATION PHASE

### 5.1 THE PROJECT

The operation phase of the Project will drive economic activity, benefiting both the local region and the broader NSW economy. The operational phase is scheduled to commence in 2027 for 20 to 30 years.

Throughout the operational life of the Project, no workforce is permanently required on site, as the BESS is designed to function remotely without any intervention. The workforce required periodically for maintenance activities of the project during operations will be equivalent to five FTE employees.

### 5.2 DIRECT AND INDIRECT IMPACTS

Within the operation phase of the Project direct impacts will be focused predominantly in: Electricity supply, and Electricity transmission, distribution, on selling and electricity market operations sectors.

#### 5.2.1 REGIONAL IMPACTS

During the operation phase, the annual direct output to the region from the Project will be \$55 million. The indirect output in the regional economy is smaller than that of the state economy because of benefits leakage from the region to the broader economy and decreased multiplier effects from consumption within the regional boundary. Annual indirect outputs total \$37 million for the region. In total the economic output of the Project is an estimated \$92 million annually during the operation phase.

The main industries that receive indirect impacts from the Project are Electricity, Gas and Water Supply, Construction, Manufacturing, Professional and Scientific services and Financial and Insurance services.

Value added to the region is estimated at \$31 million per annum over the operation phase. This is split into \$19 million from direct impacts and \$12 million from indirect impacts.

The average direct impact on household income is estimated at \$880,000 annually. The indirect impact of household income is expected to be \$320,000 per annum, leading to a total impact of \$1.2 million per annum on the regional economy during the operation phase.

The direct impacts on employment are measured by the expected annual average employment during the operation phase, i.e. five FTE. This will flow through the economy and create an estimated additional two jobs leading to an overall expected increase of seven jobs.

**TABLE 5-1 AVERAGE ANNUAL ECONOMIC IMPACTS OF THE PROJECT ON THE REGIONAL ECONOMY (\$2024)**

	Direct Impact	Indirect Impact	Total Impact
<b>Output (\$m)</b>	\$55.00M	\$36.78M	\$91.78M
<b>Value added (\$m)</b>	\$18.63M	\$12.46M	\$31.08M
<b>Income (\$m)</b>	\$0.88M	\$0.32M	\$1.20M
<b>Employment (FTE No.)</b>	5	2	7

*Note: Total impact may differ from the sum of the direct and indirect impact due to rounding in the tables*

### 5.2.2 STATE IMPACTS

During the operation phase, the annual direct output from the Project is estimated at \$55 million. The indirect impact on the state economy is larger than that of the regional economy because of a reduction due to both leakage and the lower multiplier effects from consumption. The indirect output totals for the state are estimated at \$57 million per annum. In total the output of the Project is an estimated \$112 million annually during the operation phase.

The main industries that receive indirect impacts from the Project are Electricity, Gas and Water Supply, Financial and Insurance services, Professional and Scientific services, Construction and Manufacturing.

The estimated value added by the Project to the NSW economy is \$38 million per annum, split evenly at \$19 million for both direct and indirect impacts after rounding.

The average direct impact on household income is estimated at \$880,000 annually. The indirect impact of household income is expected to be \$490,000 per annum, leading to a total impact of \$1.4 million per annum on the state economy during the operation phase.

The indirect impacts of household income are calculated with an expected leakage rate of 15% from the NSW economy. This is to account for expenditure outside of the state that will not create cascading flow-on effects within the NSW economy.

The direct impacts on employment are measured based on the expected annual average employment during the operation phase, i.e. five FTE. This will flow through the economy and create an additional three jobs leading to an overall expected increase of eight jobs.

The indirect impacts on the NSW economy are larger than those in the regional economy because of the larger multiplier effect in the NSW economy and the reduction in leakage to areas outside the state boundary.

**TABLE 5-2 AVERAGE ANNUAL ECONOMIC IMPACTS OF THE PROJECT ON THE STATE ECONOMY (\$2024)**

	<b>Direct Impact</b>	<b>Indirect Impact</b>	<b>Total Impact</b>
<b>Output (\$m)</b>	\$55.00M	\$56.62M	\$111.62M
<b>Value added (\$m)</b>	\$18.63M	\$19.18M	\$37.80M
<b>Income (\$m)</b>	\$0.88M	\$0.49M	\$1.37M
<b>Employment (FTE No.)</b>	5	3	8

*Note: Total impact may differ from the sum of the direct and indirect impact due to rounding in the tables*

## 5.3 OTHER IMPACTS

### 5.3.1 AGRICULTURAL IMPACTS

The disturbance area of the BESS in the Project Area is approximately 20.68 ha on cleared agricultural land used for grazing with minimal vegetation. The operation phase of the Project will result in a permanent development footprint that will be incompatible with previous agricultural practices.

### 5.3.2 HOUSING IMPACTS

Given the small number of employees during the operational phase of the Project, there is unlikely to be any crowd out of housing or adverse impacts on the rental market attributable to this Project.

## 6. CUMULATIVE IMPACTS

### 6.1 INTRODUCTION

The cumulative impacts of the Project refer to the combined effects when considered alongside other existing, planned, or reasonably foreseeable activities in the area. In the context of the Project, it is important to assess how the construction and operational impacts, when combined with other local developments or factors, could result in a broader economic effect.

### 6.2 POTENTIAL CUMULATIVE IMPACTS

#### 6.2.1 NEARBY RENEWABLE ENERGY AND RELATED PROJECTS

As indicated in the Willavale Park BESS Scoping Report, there are several existing or proposed renewable energy projects located near the Project Area (Environmental Resources Management (ERM), 2024). These are detailed in **Table 6-1** below. The combined impacts of these projects are likely to lead to cumulative impacts on labour force, resident population, housing and prices.

**TABLE 6-1 PROJECT CONSTRUCTION TIMELINES OF NEARBY RELEVANT PROJECTS**

<b>Status of Indicative Timing</b>	<b>Colour Key</b>
Confirmed (EIS or Developer Web Site)	
Non Confirmed (incomplete information, Inferred based on existing reporting)	

Project	2025				2026				2027				2028				FTE	Workforce Source	Notes and SSD/SSI
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
Willavale Park BESS (The Project)																	70-100	Goulburn, Yass and Canberra	SSD-78100252
Marulan GT																	380 - 500	Priority in sourcing locally, Goulburn and Moss Vale	Projected commissioning in 2032
Wattle Creek Solar Farm																	96-147	Marulan, Goulburn, Moss Vale, Bowral	In response to submissions phase. SSD-63344210
Wattle Creek BESS																	71	Marulan, Goulburn, Moss Vale, Bowral	As Above (SSD-63345458)
Gunlake Quarry																	70	Local (Marulan)	(SSD-7090)
Cleary Bros Marulan Quarry																	30	Not stated	
Marulan South Limestone mine Operations																	100	Local (Marulan)	(SSD-7009)
Holcim Lynwood Quarry																	Not known	Local and FIFO/DIDO	

Project	2025				2026				2027				2028				FTE	Workforce Source	Notes and SSD/SSI
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
Marulan Solar Farm																	300	Marulan and Goulburn	(SSD-13137914)
Hanworth BESS																	150	Not Stated	SSD-78179499
Bannaby BESS																	150	Not Stated	SSD-78810458
Swallow Tail BESS																	150	Upper Lachlan Shire LGA, Goulburn	SSD-78039972
WSC Marulan Quarry																	Not known	Not detailed	SSD-65146459
Merino Solar Farm																	220-330	Unknown	SSD-59155459
Gundry Solar Farm																	400 (250 on site during peak const.)	Goulburn, Canberra	SSD-48225958
HumeLink																	1600+*	Yass Purpose built worker accommodation	*Across whole project. SSI-36656827
Kangaroo Valley BESS																	60	Short-term local accommodation being prioritised	SSD-78593964
Blind Creek Solar Farm																	300	Temporary workers accommodation, Bungendore, Canberra	Pre-Construction appears to be underway SSD-13166280
Canyonleigh BESS																	70-100	Goulburn, Moss vale, Bowral, Sydney, potentially Yass and Canberra	SSD-78247462

### 6.2.2 LABOUR FORCE

The labour force in the region is expected to be insufficient to meet the demand from the projects in the region. The projects with overlapping timelines include Marulan GT, Hanworth BESS, Bannaby BESS, Swallowtail BESS, Gundry Solar Farm, Humelink, Kangaroo Valley BESS and Canyonleigh BESS. The required FTE for these projects is more than 2000. As a result, it is likely that some labour will shift industries, individuals outside of the labour force may rejoin, and there may be inward movement of labour from other regions. Given the demand for labour, wage increases may occur depending on whether the shortage can be met at the current wage rate.

Developers may also adopt a combination of localised labour hiring and training approaches, combined with drive-in drive-out (DIDO) approaches as may be appropriate for their Project specific locations. The balance between these approaches may alleviate some of the negative impacts on the local community.

### 6.2.3 RESIDENT POPULATION

As a result of an increase in the labour force in the region, the resident population will grow. Given the current population dynamics in the region, this increase in the resident population is likely to be higher than the current underlying rate (+0.9%).

An increase in the resident population will lead to economic growth through increased economic activity driven by expenditure on goods, services, accommodation and entertainment. These flow-on effects will boost the regional economy, so long as there is excess capacity to meet demand. In the event of scarcity, there could be an erosion in the quality of services and an increase in the cost of living for existing residents.

### 6.2.4 HOUSING IMPACTS

The influx of new residents to the region will increase the need for accommodation. The South East NSW region has a vacancy rate below 3% in 2022 (NSW Government, 2022) revealing a rental market already under pressure. Beyond the formal rental market, availability of short-term rentals (e.g. Airbnb) may alleviate some of the housing pressures. In the absence of building temporary housing, it is likely that there will be an increase in housing pressure when new residents enter the region. This could lead to increased rents and the crowding out of lower income tenants.

### 6.2.5 PRICES

An increase in the resident population and reduction in unemployment, coupled with housing pressure can lead to an increase in prices as demand for goods and services increases. The interconnectedness of the broader region will mitigate this to an extent, allowing for price pressures to ease across a wider geographic footprint. Further, the increase in new residents is foreseeable and will likely lead to increases in the supply of goods and services to meet demand. Prices in these situations tend to adjust quickly and any price increases are likely to be temporary.

## 7. BENEFIT SHARING SCHEMES

The Project has proposed a model of community benefit sharing in line with the Benefit-Sharing Guideline (NSW Department of Planning, Housing and Infrastructure, 2024). The proposed scheme is guided by the six policy principles for benefit sharing schemes for large-scale renewable projects. These are: benefit-sharing is standard practice, cooperative, transparent, community focused, proportionate and delivers a positive outcome.

The proposed scheme has been collaboratively designed through preliminary discussions with the local community, council meetings and DPFI meetings.

The proposed scheme is set out below (\$2026):

- **Neighbourhood benefits:** None
- **Local community benefits:**
  - During construction phase: \$570,462 over the phase;
  - During the operation phase: \$37,204 over the phase

**TABLE 7-1 LOCAL BENEFITS DETAILS (\$2026)**

Name	Details	Scale	Total benefit (\$ lump sum)	Phase
Rural Fire Service	Training and Equipment	Willavale RFS Brigade serves region (pop 41,622)	\$35,000	Construction
Pejar Aboriginal Land Council	Occupational training	Land Council serves region (Aboriginal pop 1,579)	\$35,000	Construction
Breadalbane town	Community group support	Breadalbane town (pop 275)	\$50,000	Construction
Goulburn Mulwaree Shire	Social Housing Fund	Entire LGA (pop 33,112)	\$300,308	Construction
Upper Lachlan Shire	Support council community works	Entire LGA (pop 8,510)	\$150,154	Construction
TBD	TBD	TBD	\$37,204	Operation

**Table 7-2** indicates the maximum total financial value of the benefit sharing scheme is \$180,000p.a. (\$2024) for the life of this Project (20-30 years). The estimated total of the proposed scheme is below this threshold when considered over the life of the project and therefore assessed to comply with the Benefit Sharing Guideline. The proposed scheme intends to provide financial benefits lump sum at the start of the construction phase and at the start of the operation phase. The benefit sharing guideline provides an annual maximum financial value. The proposed scheme would breach the annual threshold because of the nature of the lump sum payments however when annualised across the project would not be close to the threshold. It is suggested that the benefit scheme could be smoothed across the life of the Project to distribute the benefits equitably across the life of the Project.

**TABLE 7-2 MAXIMUM VALUE OF BENEFIT SHARING (PER ANNUM \$2024)**

Development	\$/MW	MWh	Financial Value
Battery	\$150	1,200	\$180,000

\$/MW is stipulated in the Benefit Sharing Guideline NSW (Nov 2024)

**Table 7-3** provides documentation listing the private agreements that have been entered into by the Applicant as required by the Private Agreement Guideline.

**TABLE 7-3 PRIVATE AGREEMENTS (PER ANNUM \$2024)**

Landholder Number	Type (landholder or neighbour)	Exclusions	Impact duration
1	Landholder	n/a	1-3 year option period, 25 year lease period if exercised, with 5 year extension available

## 8. CONCLUSION

The Project will have a positive economic impact on the regional economy during both its construction and operation phases. This positive impact will outweigh the temporary disruption to agricultural activity within the region, with significant flow-on effects to the regional, as well as the state economy more broadly.

Managing the impacts of the growing labour force in the construction industry may present some challenges that need to be carefully managed, particularly when considering the current size of the construction industry within the region. The Project proposes shuttle busses to commutable nearby towns Goulburn and Yass to disperse the impacts of a centralised large workforce on the local economy. The dispersion of the workforce is likely to create positive economic impacts to nearby towns and limit the negative impacts on price increases due to limited demand of services and housing.

Economic gains from the Project could be maximised by working closely with local councils and communities to ensure benefits from the Project are realised and negative impacts reduced. The Project has proposed a benefit sharing scheme involving Breadalbane town, Upper Lachlan Shire council and Goulburn Mulwaree Shire council during the construction phase. The Project intends to support the local community through contributions to the rural fire service, occupational training and social housing. The Project intends to develop a benefit sharing scheme for the operation phase of the project once construction has commenced through a needs assessment. This will ensure the longevity of benefits for the local community across a diverse set of stakeholders.

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## APPENDIX A THE INPUT-OUTPUT FRAMEWORK

## OVERVIEW

The input-output framework is an equilibrium framework with four general uses. Firstly, it can be used to understand how industries in an economy are inter-related by accounting for relationships among industries in the economy over a given period of time. Secondly, it is useful to assess economic impact of changes in final demand and evaluate how impacts flow through various sectors of the economy. Thirdly, it can be used to calculate the inputs required from each sector due to demands from other sectors of the economy and final demand. Fourthly, it can be used to assist with economic development planning (Jackson, R.W., 2020)

Within the input-output framework there are different styles and types of input-output models (Miller, R. E., & Blair, P. D., 2009). Consistent among all input-output models is a mapping of how goods are used in production across the economy. This mapping allows an understanding of how outputs feed through the economy and their intermediate use in production.

The ERM Energetics' input-output model (IO model) underpinning this economic assessment is used to analyse how a change in production in one sector affects other sectors in the economy and the indirect effects of this change.

## METHODOLOGY

For consistency, our proprietary IO model is based on the 2024 release of Australian Bureau of Statistics (ABS) data. This represents the most comprehensive update and is used for all ABS input data.<sup>7</sup>

We use this data to build an input-output table with four quadrants (McLennan, W, 1995).

1. Quadrant 1: The top left quadrant is a matrix that shows the intermediate usage of goods across each sector. The rows represent the inputs required by each sector, while the columns represent the outputs produced by each sector. Each cell indicates the value of inputs used by one sector from another.
2. Quadrant 2: The top right quadrant shows final demand for outputs in each sector, for example household expenditure, capital expenditures.
3. Quadrant 3: The bottom left quadrant is a matrix of primary inputs into production, for instance compensation of employees, taxes and imports.
4. Quadrant 4: The bottom right quadrant shows the contribution of primary inputs into final demand.

The direct coefficients table is derived from the input-output table and shows the amount of extra output required from each industry to produce an extra dollar of output in the column industry. These are called the direct impacts.

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<sup>7</sup> There have been subsequent ABS data releases since 2024, however the updates do not represent a comprehensive refresh to all data categories or changes to the underlying data collection methodology. Primarily, the subsequent releases include additional categories that are not relevant for the IO model.

There is a cascading effect from the direct impacts which is called the indirect impacts. This is because for the extra output in the column industry the row industries must contribute extra production. In turn, this means inputs into the row's industry production need to increase and so on. The indirect and direct effects are captured by the Leontief inverse matrix also known as the total requirements coefficients.

### STATE AND REGIONAL ADJUSTMENTS

Industry production level data is provided by the ABS only at the national level. Therefore, adjustments need to be made to translate this data into state and regional input-output models.

The national model uses four-digit Australian and New Zealand Standard Industrial Classification (ANZSIC) categories. To match this with State and Regional data, we aggregate the ANZSIC groupings to one-digit classifications.

Following the aggregation we use location quotients (LQ) to adjust the national input-output table to a state table and a regional table (Miller, R. E., & Blair, P. D., 2009). The state LQ is determined on each one-digit classification as the proportional share of each industry's output in the state as compared to the national. The regional LQ is determined on each one-digit classification as the proportional share of each industry's employment in the region as compared to the state. The location quotients scale the industries in the economy to match that of the state and the region to ensure that the input-output table reflects the localised economy.

### PROJECT EXPENDITURE

Project expenditure is a key variable in the input-output framework. It represents the additional economic activity in the economy that triggers the direct and indirect impacts.

We measure project expenditure from the construction phase using an estimate of capital expenditure based on the size of the project. The CSIRO GenCost 2024 report provides the estimated costs for renewable projects in Australia based upon energy generation and storage (Graham, 2024). To remove imports from the capital expenditure we use the minimum requirements from the NSW Renewable Energy Sector Board's Plan (NSW Office of Energy and Climate Change, 2022).

### TABLE A 1 - SUPPLY CHAIN INPUTS: LOCALLY SOURCED MINIMUM REQUIREMENTS

	<b>Solar</b>	<b>Battery Storage</b>	<b>Wind</b>	<b>Pumped Hydro</b>
Development Phase	49%	23%	40%	66%

Source: (NSW Office of Energy and Climate Change, 2022)

Project expenditure in the operation phase is estimated using annual revenue generation from the Applicant.

### ASSUMPTIONS AND LIMITATIONS

Although versatile, input-output frameworks are based on assumptions that limit the interpretation of results. The main assumptions and associated limitations are listed below (Australian Bureau of Statistics, 2021).

- Fixed ratios for intermediate inputs and production. An input-output model is based on an economic structure as at a given point in time. This necessarily fixes the ratios of inputs and production within the economy based on that point in time. Analysis that extends from the model uses these fixed ratios and therefore results in average effects rather than marginal effects.
- Fixed prices. Similar to fixed ratios, prices in an input-output model are fixed at a point in time. This means that changes in the prices of inputs are not considered in the model. Any response to a change in prices cannot be modelled in an input-output model.
- No supply side constraints. It is assumed in an input-output model that production inputs can be sourced if required. This can lead to an overstating of impacts.
- Fixed employment proportions. Input-output models assume employment is perfectly proportional to output over all scales of production. This is related to the assumption of fixed ratios and results in the trade-off between capital and labour being fixed.
- Constant proportions of income for consumption. Input-output models assume that constant proportions of income are used for consumption. This means that the household budget is spent in the exact proportion to the initial budget even if household income increases. This is a limitation that does not account for income effects on the household budget. E.g. leisure goods may increase in the household budget share when income goes up.

### DATA USED

Our input-output model uses the following data sources.

Data set	Input-output model
Australian Bureau of Statistics (2021-2022) 5209.0.55.001 Australian National Accounts: Input-Output Tables <a href="https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/latest-release#data-downloads">[https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/latest-release#data-downloads]</a> , accessed 11 November 2024	National, state, regional
Australian Bureau of Statistics (1990-2023) 5220.0 Australian National Accounts: State Accounts <a href="https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-state-accounts/latest-release#data-downloads">[https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-state-accounts/latest-release#data-downloads]</a> , accessed 11 November 2024	State

<b>Data set</b>	<b>Input-output model</b>
Australian Bureau of Statistics (2011-2023) Data by Region [ <a href="https://www.abs.gov.au/methodologies/data-region-methodology/2011-23#data-downloads">https://www.abs.gov.au/methodologies/data-region-methodology/2011-23#data-downloads</a> ], accessed 11 November 2024	Regional

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