EIS Volume 2 Appendix N

Socio-Economic Assessments

N-1: Updated Analysis on Electricity Prices and Assessment of Broader Economic Benefits

N-2: Project EnergyConnect (South Australian portion) Socioeconomic assessment

JBS&G

project energy connect

EIS Volume 2 Appendix N-1

Updated Analysis on Electricity Prices and Assessment of Broader Economic Benefits

JBS&G

project energy connect

ACIL ALLEN CONSULTING

REPORT TO
ELECTRANET
11 FEBRUARY 2019

SOUTH AUSTRALIA NEW SOUTH WALES INTERCONNECTOR

UPDATED ANALYSIS OF POTENTIAL IMPACT ON ELECTRICITY PRICES AND ASSESSMENT OF BROADER ECONOMIC BENEFITS

ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148

LEVEL NINE
60 COLLINS STREET
MELBOURNE VIC 3000
AUSTRALIA
T+61 3 8650 6000
F+61 3 9654 6363

LEVEL ONE
50 PITT STREET
SYDNEY NSW 2000
AUSTRALIA
T+61 2 8272 5100
F+61 2 9247 2455

LEVEL FIFTEEN
127 CREEK STREET
BRISBANE QLD 4000
AUSTRALIA
T+61 7 3009 8700
F+61 7 3009 8799

LEVEL ONE
15 LONDON CIRCUIT
CANBERRA ACT 2600
AUSTRALIA
T+61 2 6103 8200
F+61 2 6103 8233

LEVEL TWELVE, BGC CENTRE
28 THE ESPLANADE
PERTH WA 6000
AUSTRALIA
T+61 8 9449 9600
F+61 8 9322 3955

167 FLINDERS STREET
ADELAIDE SA 5000
AUSTRALIA
T +61 8 8122 4965

ACILALLEN.COM.AU

RELIANCE AND DISCLAIMER THE PROFESSIONAL ANALYSIS AND ADVICE IN THIS REPORT HAS BEEN PREPARED BY ACIL ALLEN CONSULTING FOR THE EXCLUSIVE USE OF THE PARTY OR PARTIES TO WHOM IT IS ADDRESSED (THE ADDRESSEE) AND FOR THE PURPOSES SPECIFIED IN IT. THIS REPORT IS SUPPLIED IN GOOD FAITH AND REFLECTS THE KNOWLEDGE, EXPERTISE AND EXPERIENCE OF THE CONSULTANTS INVOLVED. THE REPORT MUST NOT BE PUBLISHED, QUOTED OR DISSEMINATED TO ANY OTHER PARTY WITHOUT ACIL ALLEN CONSULTING'S PRIOR WRITTEN CONSENT. ACIL ALLEN CONSULTING ACCEPTS NO RESPONSIBILITY WHATSOEVER FOR ANY LOSS OCCASIONED BY ANY PERSON ACTING OR REFRAINING FROM ACTION AS A RESULT OF RELIANCE ON THE REPORT, OTHER THAN THE ADDRESSEE.

IN CONDUCTING THE ANALYSIS IN THIS REPORT ACIL ALLEN CONSULTING HAS ENDEAVOURED TO USE WHAT IT CONSIDERS IS THE BEST INFORMATION AVAILABLE AT THE DATE OF PUBLICATION, INCLUDING INFORMATION SUPPLIED BY THE ADDRESSEE. ACIL ALLEN CONSULTING HAS RELIED UPON THE INFORMATION PROVIDED BY THE ADDRESSEE AND HAS NOT SOUGHT TO VERIFY THE ACCURACY OF THE INFORMATION SUPPLIED. UNLESS STATED OTHERWISE, ACIL ALLEN CONSULTING DOES NOT WARRANT THE ACCURACY OF ANY FORECAST OR PROJECTION IN THE REPORT. ALTHOUGH ACIL ALLEN CONSULTING EXERCISES REASONABLE CARE WHEN MAKING FORECASTS OR PROJECTIONS, FACTORS IN THE PROCESS, SUCH AS FUTURE MARKET BEHAVIOUR, ARE INHERENTLY UNCERTAIN AND CANNOT BE FORECAST OR PROJECTED RELIABLY.

ACIL ALLEN CONSULTING SHALL NOT BE LIABLE IN RESPECT OF ANY CLAIM ARISING OUT OF THE FAILURE OF A CLIENT INVESTMENT TO PERFORM TO THE ADVANTAGE OF THE CLIENT OR TO THE ADVANTAGE OF THE CLIENT TO THE DEGREE SUGGESTED OR ASSUMED IN ANY ADVICE OR FORECAST GIVEN BY ACIL ALLEN CONSULTING.

© ACIL ALLEN CONSULTING 2019

EXECUTIVE SUMMARY

ACIL Allen Consulting was engaged by ElectraNet to update preliminary estimates prepared in July 2018 of the impact a new interconnector between New South Wales and South Australia would have on wholesale electricity prices and, therefore, on retail electricity bills:

- for residential and small business customers
- in South Australia and New South Wales.

The update differs from the preliminary analysis only in respect of the input assumptions, which were modified to:

- align more closely with the Australian Energy Market Operator's (AEMO) Integrated System Plan[1]
- include the Redcliffs to Buronga line
- reflect other updates to ACIL Allen's standard assumption set.

The modelling was conducted using *PowerMark*, ACIL Allen's proprietary model of the National Electricity Market, wholesale spot market. and was based on updated assumptions which align broadly with the Australian Energy Market Operator's Integrated System Plan.

As with the preliminary analysis, the modelling indicates that the new interconnector is projected to place downward pressure on the wholesale spot price of electricity in both South Australia and New South Wales, though the extent of that pressure has now changed due to the different input assumptions.

[1] The ISP had not been published when the preliminary analysis was done.

Impact on retail electricity bills

The projected impact of the new interconnector on customers' electricity bills is consistent with the projected change in wholesale spot prices in both states across the forecast period as a result of the new interconnector. It is summarised in Figure ES 1 and Table ES 1.

FIGURE ES 1 PROJECTED RETAIL BILL IMPACT – NSW AND SA RESIDENTIAL AND SMALL BUSINESS CUSTOMERS

SOURCE: ACIL ALLEN CONSULTING

TABLE ES 1 PROJECTED RETAIL BILL IMPACT – NSW AND SA RESIDENTIAL AND SMALL BUSINESS CUSTOMERS

	Representative residential customer		Small business customer	
	SA	NSW	SA	NSW
Transmission network cost impact ($ /annum)[2]	9	5	18	12
Average saving in wholesale component of bill ($/annum)	$(75)	$(35)	$(151)	$(84)
Net bill saving ($/annum)	$(66)	$(30)	$(132)	$(71)
Annual consumption (kWh/annum)	5,000	4,215	10,000	10,000

SOURCE: ACIL ALLEN CONSULTING

As the figure and table show:

- residential and small business customers in South Australia are projected to experience a reduction in their electricity bills with the new interconnector
- the modelling indicates that, in nominal terms over the period to 2030, annual residential customer bills would reduce on average by $66 in South Australia and by $30 in New South Wales for a representative customer
- similarly, in the period to 2030, the modelling indicates that the annual retail bill of a representative small business customer would reduce on average by $132 in South Australia and $71 in New South Wales.

In all cases the projected impact on electricity bills is net of the cost of the interconnector itself. This cost is projected to be substantially outweighed by a reduction in wholesale electricity spot prices, with

[2] This reflects solely the additional network costs arising from the new interconnector (consistent with our July report). It does not include any additional network costs that could arise from the additional Buronga to Red Cliffs line.

the modelling indicating that the saving in energy costs will be around seven or eight times the cost of the interconnector on an annual basis in the period to 2030.

It was assumed to have bi-directional transfer capacity of 800 MW between New South Wales and South Australia with an aggregate transfer limit of 1,400 MW across the new interconnector and the existing Heywood interconnector. [3]

It was also assumed that an additional line is built between Buronga in New South Wales and Red Cliffs in Victoria, which we understand will increase transfer capacity between New South Wales and Victoria by 400 MW (and is modelled as such).

Economic impacts

In this update report, we were also asked to estimate the impact the new interconnector would have on affected economies due to:

- changes in wholesale, and therefore retail, electricity prices
- benefits accruing from construction of the interconnector.

These impacts were analysed in terms of their impact on:

- real economic output, commonly referred to as either Gross Domestic Product or Gross State Product
- real incomes, which is a measure of the welfare impact that changes in economic output has on people living in a region
- employment and real wages.

The analysis shows that, the changes in real economic output are broadly in line with the projected savings in electricity prices.

Over the longer term, in the period to 2040, the project is projected to increase the real income of:

- South Australia by a cumulative total of $4.4 billion relative to the Reference Case with a net present value of $2.4 billion, using a 7 per cent real discount rate
  - $163 million of the projected benefit occurs in the SA host regions primarily during the construction phase
- New South Wales by a cumulative total of $7.5 billion relative to the Reference Case with a net present value of $4.0 billion, using a 7 per cent real discount rate
  - $209 million of the projected benefit occurs in the NSW host regions primarily during the construction phase.

Impact on real income

The discounted present values are equivalent to a *one-off* increase in the average real income of all current residents of:

- South Australia by approximately $1,300 per person
- New South Wales by approximately $500 per person.

Further, the additional construction activity associated with the project has a noticeable effect on the economies of the host regions due to a movement of economic activity into these regions.

Impact on employment

Over the period 2021 to 2040, it is projected that approximately 18,800 employee years[4] of full time equivalent (FTE) direct and indirect jobs will be created. More specifically, it is projected that the Project will increase employment in:

[3] We note that these capacity assumptions approximate ElectraNet's current expectations, which are that the Heywood Interconnector would be able to transfer up to 750 MW and that the joint capacity cannot exceed 1,300 MW. The differences were necessary to account for interdependencies between the two interconnectors that are not reflected in our model, but do not materially impact on the outcomes of the analysis.

[4] An employee year is equivalent to the employment of 1 FTE person for one year. Alternatively, it can represent employment of, say, two full-time people for half a year each, or one 0.5 FTE person for two years.

- *South Australia* by 4,947 employee years (approximately 250 FTE jobs a year on an ongoing basis)
  - with 470 employee years in the South Australian host regions during the 2-year construction phase, 400 of which will be directly employed through ElectraNet (equivalent to over 200 jobs a year during the construction phase)
- *New South Wales* by 13,841 employee years (approximately 700 FTE jobs a year on an ongoing basis)
  - with 1,650 employee years in the New South Wales host regions during the 2-year construction phase, 1,100 of which will be directly employed through TransGrid (equivalent to over 800 jobs a year during the construction phase).
- Real wages in South Australia and New South Wales are projected to increase by an average of 0.12 and 0.06 per cent respectively relative to the Reference Case. Given the size of the labour market, this is a significant increase generated by the interconnector project.

  We also note that there may be further benefits to South Australia and New South Wales accruing from construction of renewable energy projects given the opportunity to connect to the grid by the interconnector. However, we have not attempted to model those additional benefits here.

CONTENTS

FIGURES

CONTENTS

TABLES

1 INTRODUCTION

ElectraNet is the electricity Transmission Network Service Provider (TNSP) in South Australia.

ACIL Allen Consulting (ACIL Allen) was engaged by ElectraNet to provide updated modelling of the potential impact of a proposed the new interconnector between South Australia and New South Wales (new interconnector). Specifically, ACIL Allen was engaged to update preliminary modelling we conducted in July 2018 in which we project the impact the new interconnector would have on wholesale electricity spot prices in South Australia and New South Wales and, therefore, on customers' electricity bills in those states.

In undertaking this updated analysis we were also asked to estimate the broader impact the new interconnector would have on the economies of South Australia, New South Wales and the parts of those two States that will 'host' the new interconnector. Those economies would be impacted by:

- changes in wholesale, and therefore retail, electricity prices
- benefits accruing from construction of the interconnector.

They would also potentially benefit from construction of renewable energy projects given the opportunity to connect to the grid by the interconnector. However, this has not been modelled.

This report provides summary results of our analysis. The rest of this report is structured as follows:

- chapter 2 describes the methodology we used to model the potential impact of the new interconnector on electricity prices, both wholesale and retail, which centred around *PowerMark*, our proprietary model of the National Electricity Market (NEM) wholesale electricity market
- chapter 3 provides the results from our electricity market and retail modelling
- chapter 4 describes the methodology used to estimate the economic impact the interconnector would have
- chapter 5 summarises the results of the economic modelling.

2 METHODOLOGY

We have modelled the impact of the new interconnector on customers' electricity bills by considering the net impact of the new interconnector on the:

- wholesale electricity spot prices in South Australia and New South Wales
- the transmission network costs associated with the new interconnector.

The methodology for modelling the wholesale electricity market is discussed in section 2.1. The transmission network cost estimates were provided by ElectraNet.

The way these were brought together to produce estimates of bill impacts is discussed in section 2.2

2.1 Modelling the wholesale electricity market

The impact of the new interconnector on wholesale electricity spot prices was assessed using *PowerMark*, ACIL Allen's proprietary model of the NEM's wholesale electricity market.

At its core, *PowerMark* is a simulator that emulates the settlements mechanism of the NEM. *PowerMark* uses a linear program to settle the market, as does the Australian Energy Market Operator's (AEMO) NEM Dispatch Engine in its real time settlement process. *PowerMark* is part of an integrated suite of models, including models of the market for Renewable Energy Certificates and the wholesale gas market.

A distinctive feature of *PowerMark* is its iteration of generator bidding. *PowerMark* constructs an authentic set of initial offer curves for each unit of generating plant prior to matching demand and determining dispatch through the market clearing rules. Unlike many other models, *PowerMark* encompasses re-bids to allow each major thermal generation portfolio in turn to seek to improve its position — normally to maximise uncontracted revenue, given the specified demand and supply balance for the hourly period in question.

PowerMark has been developed over the past 17 years in parallel with the development of the NEM, NEMS (Singapore) and WESM (Philippines). We use the model extensively in simulations and sensitivity analyses conducted on behalf of industry and Government clients.

PowerMark routinely operates at *hourly* price resolution, unlike the NEM spot market which is settled on a half hourly basis. Half hourly modelling is possible, but our experience is that hourly modelling has very little impact on the outcomes, but simplifies the model run time and analytical task substantially.

PowerMark relies on a range of assumptions, which are set out in section 2.1.1.

The scenarios modelled are discussed in section 2.1.2.

2.1.1 Assumptions

PowerMark is based on a large number of detailed input assumptions. For the most part these are drawn from our understanding of the physical and other properties of generators in the NEM and other relevant sources. ACIL Allen's standard September 2018 reference case assumption set was adjusted for this exercise in two ways to better align with AEMO's Integrated System Plan (ISP):

- demand: aluminium smelters assumed to remain operational throughout the projection period, as per AEMO's 2018 Electricity Statement of Opportunities (ESOO) forecast
- emission abatement policy: assume the emissions trajectory from AEMO's "28% to 70% Emissions Reduction Target" scenario in the ISP.

Wholesale spot price impacts are presented to 2030. Beyond this period, modelling results become limited by the veracity of the assumptions that underpin them. The further into the future assumptions are made, the greater the risk that they are in error.

The key assumptions upon which the modelling is based are set out in Table 2.1.

TABLE 2.1 KEY ASSUMPTIONS

Item	Summary of assumption	Rationale
Macro-economic variables	– exchange rate of AUD to USD converging to 0.75 AUD/USD – inflation of 2.5% p.a.	– long term average – mid-point of RBA range
Greenhouse gas (GHG) emissions abatement policies	– assume an emissions pathway in line with AEMO's 2018 ISP "28% to 70% Emissions Reduction Target" – no emissions policy required to meet the implied carbon budget in FY2021-30 period – assume an Emissions Intensity Scheme from 1 July 2031 as a proxy for future carbon pricing in some form to achieve AEMO's ISP emissions trajectory – retention of the Large-scale Renewable Energy Target (LRET) in its current form with its current expiry date.	
	– no ongoing implementation of state based renewable energy schemes in Victoria and Queensland, beyond Victoria's reverse auction for renewable energy as announced in September 2018 and Queensland's "Renewables 400" reverse auction in 2017-18	– State-based schemes are likely to be absorbed if an effective national scheme is developed
Electricity demand	– AEMO 2018 ESOO Neutral POE50 forecast, with adjustments for ACIL Allen's projections of PV, storage uptake and electric vehicle uptake	– ACIL Allen projections used for internal consistency with assumed costs (e.g. macro-economic variables)

Item	Summary of assumption	Rationale
Supply side assumption	– named new entrant projects are included in the modelling where there is a high degree of certainty that these will go ahead (i.e. project has reached the Financial Investment Decision stage) – inclusion of third Queensland portfolio CleanCo from 1 July 2019 – does not include proposed 1,000 MW of additional capacity – 600 MW of "corporate PPA" across Queensland, New South Wales and Victoria – beyond this, only generic new entrants which we project to be commercial are introduced – committed or likely committed generator retirements included where the retirement has been announced by the participant (i.e. Liddell) – retirements of other existing generators where we project the generator to be unprofitable over an extended period of time – Snowy 2.0 not included.	– The number of announced projects far exceeds the requirements of the electricity market and hence only those that are firmly committed to go ahead are included in the modelling – Corporate PPA reflects market developments – The assessment of generator profitability under the modelled scenario provides a consistent method to assess closure decisions
Gas a fuel for electricity generation	– gas market is modelled in ACIL Allen's *GasMark Australia* model – gas prices for power generation are projected to rise from $ 9-11/GJ to $ 10-12 per GJ by 2030.	– the combined demand for gas from Australia's domestic gas users and the LNG export industry means higher cost gas resources need to be developed and possibly even imported LNG to satisfy demands.
Coal as a fuel for electricity generation	– the marginal price of coal for electricity generation is assessed considering the specific circumstances for each generator including: – short term supply issues in New South Wales – suitability of coal for export and the assumed international thermal coal price – location of power station in relation to the mine and export terminals – mining costs – existing contractual arrangements – international thermal coal prices are assumed to converge to USD 60/t in the long term	– International thermal coal prices are assumed to converge to their long term average price
Representation of bidding behaviour	– contracted capacity: – minimum generation levels are offered at negative of zero price – remaining contracted capacity offered at short run marginal cost – remaining capacity: – maximisation of dispatch for price takers – maximisation of net uncontracted revenue for price makers.	– Observations of generator bidding behaviour in the NEM

Item	Summary of assumption	Rationale
New entrant capital costs (AUD /kw, real 2018)	– wind – $ 2,000/kW in 2019 – $ 1,650/kW in 2030 – solar (Single Axis Tracking) – $ 1,470/kW in 2019 – $ 1,050/kW in 2030 – storage (with four hours) – $ 1,650/kW in 2019 – $ 950/kW in 2030	– Near-term prices based on observations in the market from actual projects – Long-term projection based on an average of long-term projections by various forecasters for new technologies

SOURCE: ACIL ALLEN

2.1.2 Scenarios analysed

The analysis presented in this report comprises two scenarios:

— a *reference case* based on assumptions described above

— a *new interconnector* scenario.

For the purposes of this analysis, the new interconnector scenario is the same as the reference case with the exceptions that the new interconnector is introduced to the model from 1 July 2023 along with a small line that would connect Buronga in New South Wales with Red Cliffs in Victoria. It is also noted that early works underwritten by the South Australian Government are being undertaken to allow for delivery earlier than this.

For the purposes of this analysis, the new interconnector was assumed to have the following properties:

— transfer capacity of 800 MW in either direction

— Heywood interconnector limited to thermal capacity of 600 MW when the new interconnector is in place

— aggregate transfer limit of 1,400 MW across the new interconnector and the existing Heywood interconnector

— The Buronga to Red Cliffs line was assumed to increase transfer capacity between New South Wales and Victoria by 400 MW.

We note that these capacity assumptions only approximate ElectraNet's current expectations, which are that the Heywood Interconnector would be able to transfer up to 750 MW but that the joint capacity cannot exceed 1,300 MW. We made these adjustments to reflect the fact that in the model these two interconnectors are independent whereas in reality there are relationships between them. Our analysis indicates that these adjustments have had little or no material impact on the final results. Importantly in the modelling, the Heywood interconnector was very rarely 'constrained' by our lower capacity assumption.

We also note that updated loss factors are not yet available for the new interconnector. The modelling is based on the assumption that electrical losses on the new interconnector will be the same as those on the Heywood interconnector, relative to the different capacity of the interconnectors.

2.2 Modelling the impact on **customers' electricity** bills

We have modelled the impact of the new interconnector on residential and small business customers in South Australia and New South Wales.

We have assumed a representative residential customer consumes 5,000 kWh per annum in South Australia and 4,215 kWh per annum in New South Wales, consistent with assumptions made by the Australian Energy Market Commission in its 2017 electricity residential price trends report.

We have assumed a representative small business customer consumes 10,000 kWh per annum in South Australia, which is consistent with the approach the Essential Services Commission of South

Australia takes in its annual Energy Retail Offers Comparison Report.[5] We made the same usage assumption in New South Wales for ease of comparison.

The impact of the new interconnector on customers' electricity bills was assessed by considering the "building blocks" of retail electricity bills, namely:

- energy costs
- network costs
- retail operating costs and margin
- costs associated with environmental schemes

We have assumed that the new interconnector will impact on the:

- energy costs building block through the impact on the wholesale electricity market
- the network cost building block through ElectraNet's and TransGrid's recovery of the costs for building and operating the new interconnector.

The new interconnector is assumed to have no impact on the other building blocks, that is, the movement in the other costs will be the same under the reference case and with the new interconnector.

We note that changes in retail tariff structures and/ or the way customers use energy are quite possible over the timeframe. The former can be expected to flow from ongoing changes to the way distribution network services charge for the service they provide. Further changes in energy use at the residential level which may flow from improvements in energy efficiency, ongoing uptake of solar technology and the use of batteries could be expected. While we acknowledge that these changes might occur, we have not sought to incorporate them into the analysis, in part to allow comparison between our analysis and other presentations of retail bills, such as those in ESCOSA's Energy Retail Offers Comparison Report. Therefore, the indicative net impact on customer bills is presented in an aggregate form to 2030 in annual average terms.

The methodology for assessing the impact of the new interconnector on the wholesale electricity market was discussed in section 2.1.

ElectraNet provided estimates to us of the transmission network costs of building and operating the new interconnector.[6] Those estimates place the cost of the new interconnector at between $ 3.24 and $ 14.40 per customer per annum depending on their consumption and whether they are in South Australia or New South Wales.

This report presents the change in the customers' electricity bills rather than the level of the customers' electricity bills.

[5] https://www.escosa.sa.gov.au/news/energy-news/aug18-news-2018-e-rocr

[6] At this stage we have assumed that there will be no change in distribution network costs.

3 RESULTS

The results from the modelling are presented in this chapter. The results from the modelling of the wholesale electricity market are presented in section 3.1 and the projected changes in customers' electricity bills are presented in section 3.2.

All financial results in this section are in nominal terms (i.e. not adjusted for inflation).

3.1 Wholesale spot price

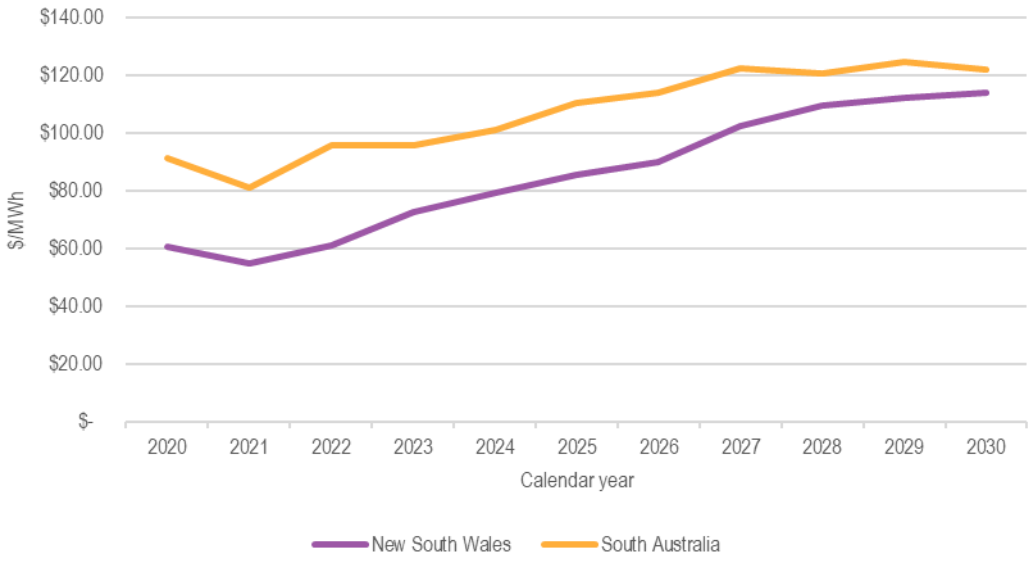
The results from the reference case are presented in section 3.1.1 and the results from the new interconnector scenario are presented in section 3.1.2.

3.1.1 Reference case

The projected annual average load weighted price of electricity[7] in South Australia and New South Wales, under the reference case, is summarised in Figure 3.1.

[7] Wholesale electricity price weighted by demand at the regional reference node

FIGURE 3.1 SUMMARY OF PROJECTED WHOLESALE SPOT PRICE OF ELECTRICITY, NOMINAL, CALENDAR YEARS – ANNUAL LOAD WEIGHTED AVERAGE, 2019 TO 2040, REFERENCE CASE – SOUTH AUSTRALIA AND NEW SOUTH WALES



NOTE: PROJECTED VALUES ARE ANNUAL TO 2035 AND FIVE YEARLY THEREAFTER.

SOURCE: ACIL ALLEN POWERMARK MODELLING

The figure illustrates our projection that wholesale electricity spot prices are likely to fall in the short term in both South Australia and New South Wales. This is due to a substantial uptake of renewable capacity. We project that they will then increase in the early to mid-part of the next decade as the supply demand balance tightens gradually. This is reflected in the growth rates, which are shown in Figure 3.2 in both year on year terms (upper pane) and as compound annual growth rates from 2020 (lower pane).

FIGURE 3.2 REFERENCE CASE – PROJECTED GROWTH IN WHOLESALE SPOT PRICE OF ELECTRICITY

SOURCE: ACIL ALLEN CONSULTING

Reference case - Comparison between preliminary and current modelling

As noted above, the modelling presented here is an update to the preliminary modelling that accompanied ElectraNet's Project Assessment Draft Report, which was presented in our report of 3 July 2018.

A number of relatively minor changes were made to the input assumptions used in this report as compared to those used in the earlier report. For the most part those changes were made to improve comparability between this report and analysis contained in AEMO's 2018 Integrated System Plan (ISP), which was published after our preliminary modelling.

The projected future electricity demand was updated using AEMO's August 2018 demand forecast. Compared to the preliminary modelling, the projected electricity demand is higher in most regions, particularly in New South Wales and Victoria. This reflects AEMO's assumption that Australia's aluminium smelters will continue to operate beyond their existing power supply contracts, which is in contrast to the assumption we made in our earlier report.

The NEM emissions budget for the 2020-21 to 2029-30 period was increased from 1,215 Mt CO2-e to 1,354 Mt CO2-e to align with the emissions trajectory used in the ISP. This assumes that the electricity sector achieves a 26 percent reduction in emissions below 2005 levels which is less than

the sector's pro-rata share of the national emissions reduction task. In contrast to this the preliminary modelling was based on a smaller budget of 1,215 Mt CO_2-e, which represents the emissions task for the NEM assuming the electricity sector does its pro-rata share. With the more generous emissions budget there is no need for an emissions policy in the NEM to achieve the budget, in contrast to the preliminary modelling in which an emissions reduction policy was assumed.

Post 2030, the emissions policy settings are almost identical to those implemented in the preliminary modelling and have the effect of reducing emissions in the NEM on a trajectory that aligns with the "28% to 70% Emissions Reduction Target" of the ISP.

Changes were also made to reflect progress with the Victorian Renewable Energy Target (VRET). In July, the full scale of the first VRET auction was not yet known. The assumed VRET capacity has been updated from 650 MW in the preliminary modelling, to include the full VRET auction in this report. In addition, to reflect the recent growth in the corporate PPA market, an additional 600 MW of additional renewable capacity underpinned by corporate PPAs is assumed to be committed across the NEM in the next 12 months.

Finally, projected gas prices in the period to 2026 have been revised upward in the Reference Case. This reflects continued poor performance of coal seam gas wells in QLD, higher Asia-Pacific LNG spot pricing and the likely reliance on imported LNG to supplement supply in the early 2020's.

Another key difference between the preliminary modelling and this update is the inclusion of the additional line from Buronga to Red Cliffs within the scope of the new interconnector to increase transfer capacity between New South Wales and Victoria, which was not included in our modelling in July.

Figure 3.3 shows the impact these changes in input assumptions had on the projection of growth in wholesale spot electricity prices in the reference case. For the most part it shows that the current projections are for slightly more rapid growth, or smaller reductions, in electricity prices than we projected in July 2018. This is mostly attributable to the increased future demand for electricity in this round of modelling arising from the assumption that the aluminium smelters will remain open for longer.

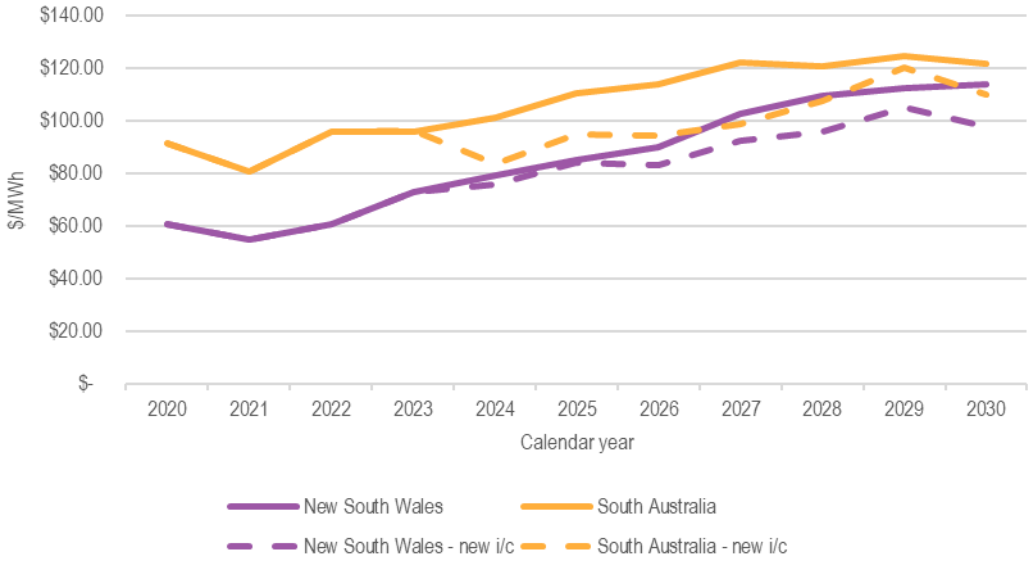
FIGURE 3.3 COMPARING WHOLESALE SPOT PRICE PROJECTIONS – REFERENCE CASE BETWEEN PRELIMINARY AND CURRENT MODELLING

SOURCE: ACIL ALLEN CONSULTING

3.1.2 New Interconnector scenario

The projected wholesale price of electricity in South Australia and New South Wales under the new interconnector scenario is shown in Figure 3.4 This also shows the projected wholesale prices of electricity under the reference case scenario to highlight the difference between the two projections.

FIGURE 3.4 SUMMARY OF PROJECTED WHOLESALE SPOT PRICE OF ELECTRICITY, NOMINAL, CALENDAR YEARS – ANNUAL LOAD WEIGHTED AVERAGE, 2019 TO 2030, REFERENCE CASE AND NEW INTERCONNECTOR SCENARIO – SOUTH AUSTRALIA AND NEW SOUTH WALES



SOURCE: ACIL ALLEN POWERMARK MODELLING

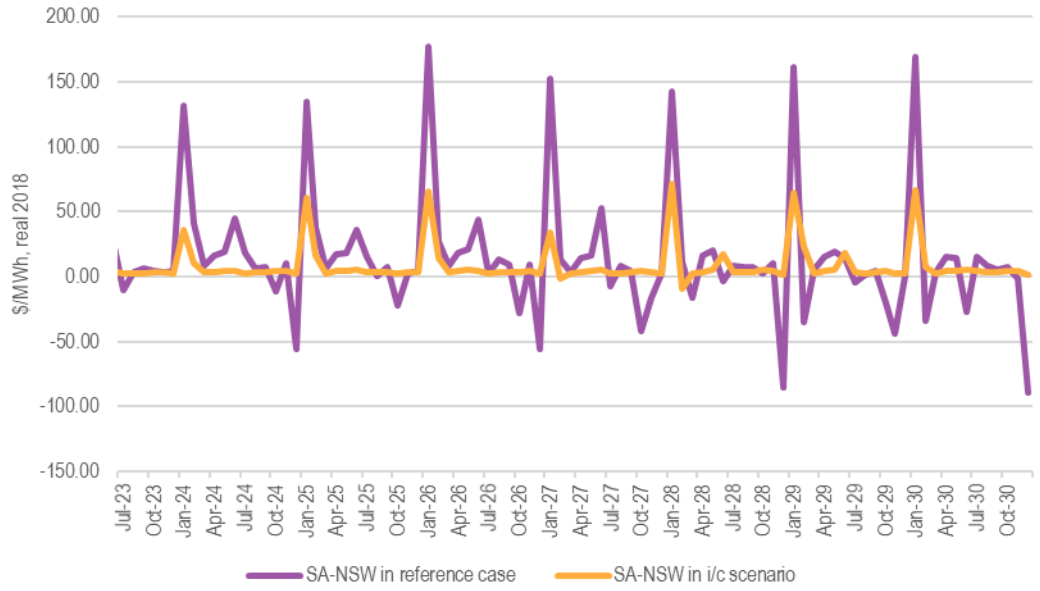
The analysis indicates that the new interconnector is projected to place downward pressure on the wholesale spot price of electricity in both South Australia and New South Wales.

In South Australia, the reduced spot price is evident from the new interconnector's first year of full operation (2024). In the first few years the reduction is projected to be quite substantial, in the order of $15 to $20 / MWh. If the early works program leads to the interconnector being introduced sooner than this, it would be reasonable to expect the results to be seen sooner as well.

Small reductions in the wholesale spot price of electricity are projected in New South Wales in the first few years of the interconnector's operation, increasing to around $13 /MWh in 2028.

The modelling shows that an interconnector between New South Wales and South Australia would tend to 'smooth' the price differential between those two regions. This is illustrated in Figure 3.5 which shows the difference in monthly average wholesale spot prices between the two regions – the New South Wales price is subtracted from the South Australian meaning that the South Australian price is higher to the extent that the curve is above the line.

FIGURE 3.5 MONTHLY LOAD WEIGHTED PRICE DIFFERENCES ($/MWH, REAL 2018) - 2022 - 2030



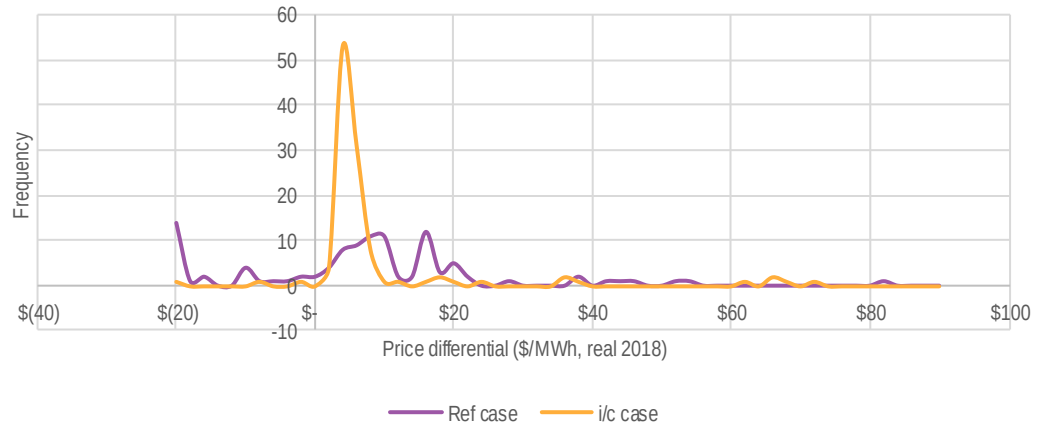
SOURCE: ACIL ALLEN POWERMARK MODELLING

The purple curve in Figure 3.5 shows that, in the reference case, the difference in the monthly average wholesale spot price between South Australia and New South Wales is projected to be volatile and often quite large. This is illustrated by the median difference, which is the value that is exceeded by half of the projected differences. In the reference case the median difference between the two regions is projected to be $7.34/MWh.

Adding an interconnector is projected to reduce the difference in price between the two regions, as illustrated by the gold curve in Figure 3.5. The difference is still present, but with the interconnector in place it is typically smaller. In this case, the median difference is projected to be $3.86/MWh, approximately half the level without the interconnector.

This 'smoothing' of the prices is shown in Figure 3.6, which shows density curves of the differences in projected monthly average prices to 2030. It shows a much higher 'peak' of price differences at near zero levels in the interconnector than the reference case.

FIGURE 3.6 DENSITY PLOT OF MONTHLY LOAD WEIGHTED PRICE DIFFERENCES IN REFERENCE AND INTERCONNECTOR CASES - ($/MWH REAL 2018) – 2022 TO 2030



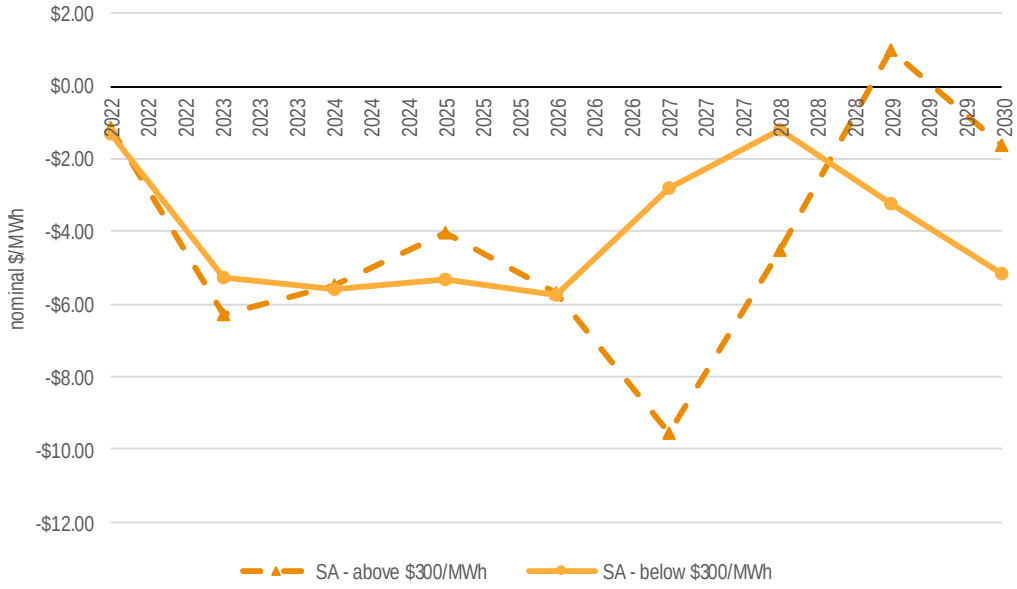
SOURCE: ACIL ALLEN POWERMARK MODELLING

It is well known that spot prices in the NEM are capable of 'spiking' to very high levels, which creates price risk for retailers and other customers buying electricity from the wholesale market. That risk can be managed in numerous ways including using exchange traded cap contracts, which can be used to limit exposure to prices greater than $300/MWh, which has come to be accepted as the line distinguishing 'high' and 'low' prices.

The modelling shows that 'high' time weighted prices, those above $300/MWh, are projected to be lower (closer to $300) in both regions with an interconnector in place. This reduction in high prices places downward pressure on price in both regions.

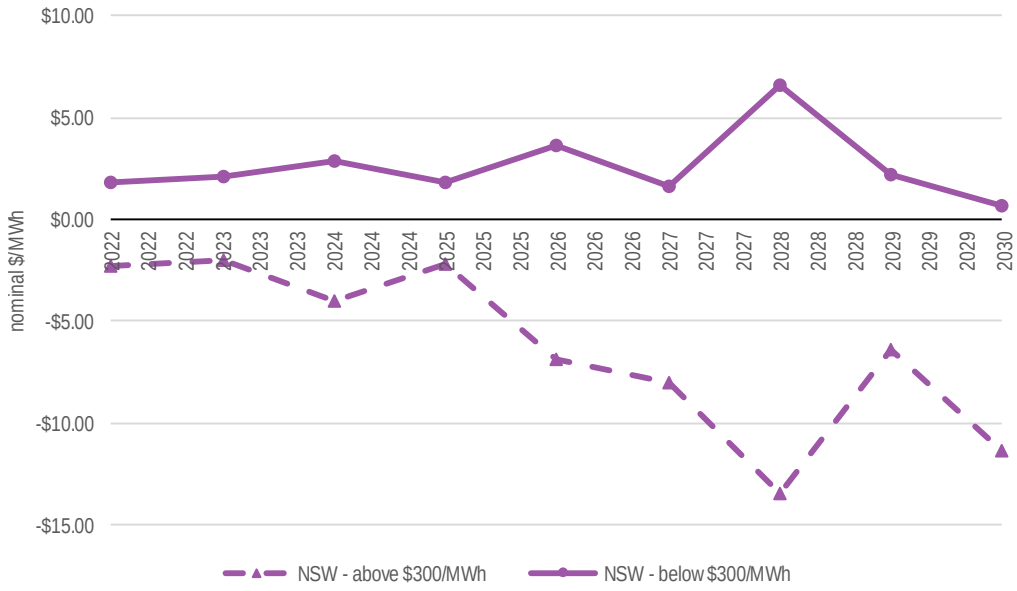
Figure 3.7 shows the projected impact on the extent of time weighted prices above, and below, $300/ MWh in South Australia. Figure 3.8 shows the corresponding information for New South Wales. In both cases the prices shown in the 'above $300/MWh' curves have had $300 subtracted – they show the amount by which prices above $300/MWh are projected to exceed $300/MWh on average each year.

FIGURE 3.7 SOUTH AUSTRALIA – IMPACT ON 'HIGH' AND 'LOW' TIME WEIGHTED PRICES



SOURCE: ACIL ALLEN POWERMARK MODELLING

FIGURE 3.8 NEW SOUTH WALES – IMPACT ON 'HIGH' AND 'LOW' TIME WEIGHTED PRICES



SOURCE: ACIL ALLEN POWERMARK MODELLING

Figure 3.7 shows that 'low' time weighted prices in South Australia are also projected to be lower with an interconnector than without. When both 'high' and 'low' prices are projected to fall, the logical conclusion is that total price must fall also, which is shown in Figure 3.5.

In New South Wales, though, the projection is different. Here, 'low' time weighted prices are projected to be higher with an interconnector in place than without. Therefore, in New South Wales, the projected impact of the interconnector is to reduce 'high' prices while increasing 'low' prices by around $2.00/MWh in most years.

Figure 3.4 shows, the 'net effect' is projected to be reductions in the price level in NSW as well as reductions in the volatility. We note that, while it is not modelled here, the decreased volatility is also likely to reduce hedging costs in both New South Wales and South Australia.

3.2 Projected customer bill impacts

The projected impact of the new interconnector on customers' electricity bills is consistent with the projected change in wholesale spot prices in both states across the forecast period as a result of the new interconnector. The projected impact on retail bills is summarised in Figure 3.9 and Table 3.1.

FIGURE 3.9 PROJECTED RETAIL BILL IMPACT – NSW AND SA RESIDENTIAL AND SMALL BUSINESS CUSTOMERS

SOURCE: ACIL ALLEN CONSULTING

TABLE 3.1 PROJECTED RETAIL BILL IMPACT – NSW AND SA RESIDENTIAL AND SMALL BUSINESS CUSTOMERS

	Representative residential customer		Small business customer	
	SA	NSW	SA	NSW
Transmission network cost impact ($ /annum)[8]	9	5	18	12
Average saving in wholesale component of bill ($/annum)	$(75)	$(35)	$(151)	$(84)
Net bill saving ($/annum)	$(66)	$(30)	$(132)	$(71)
Annual consumption (kWh/annum)	5,000	4,215	10,000	10,000

SOURCE: ACIL ALLEN CONSULTING

The figure shows two impacts on retail bills separately. The first, shown in purple, is the annual cost to each customer of the interconnector, which was provided by ElectraNet. The second component, shown in gold, is the projected impact on the wholesale energy component of each annual bill, averaged over the period from 2024 to 2030.

In nominal terms, over the period to 2030, the modelling indicates that annual residential customer bills would reduce on average by $66 in South Australia and by $30 in New South Wales for a representative residential customer. As the figure shows, the saving attributable to projected reductions in the wholesale spot electricity price outweighs the assumed impact the interconnector would have on network use of system charges. The modelling indicates that the saving in energy costs will be around seven or eight times the cost of the interconnector on an annual basis in the period to 2030.

[8] This reflects solely the additional network costs arising from the new interconnector (consistent with our July report). It does not include any additional network costs that could arise from the additional Buronga to Red Cliffs line.

4 MODELLING ECONOMIC IMPACTS

This chapter provides an overview of the approach used to model the economic impact of the new interconnector. Further detail regarding the model is provided in Appendix A. Results are provided in chapter 5.

4.1 Introduction

To provide information on the broader economic impacts potentially arising from the addition of a new interconnector between South Australia and New South Wales ACIL Allen has undertaken computable general equilibrium (CGE) modelling. For this analysis we used ACIL Allen's CGE model, *Tasman Global*. *Tasman Global* is a multi-sector dynamic model of the Australian and world economy that has been used for many similar modelling projects including for other transmission line and electricity generation projects. An overview of the model is provided in Appendix A.

Modelling was conducted for South Australia and New South Wales as well as for the areas that will 'host' the interconnector.

The capital and operating expenses underlying *PowerMark* along with the projected electricity generation and prices from the reference case and scenarios described above were used to inform the *Tasman Global* Reference Case and the Scenario Case. The differences between the economic projections with and without the interconnector provide a forecast of the total economic impacts it will have. These include the wider economic impacts associated with the construction and ongoing operation of the interconnector and the impact of changes in the availability and price of electricity in relevant areas.

CGE models produce a wide variety of economic metrics. The metrics reported in this case are:

- Real economic output (as measured by real Gross Regional Product (GRP) and real Gross State Product (GSP)): GRP/GSP is defined as the sum of value added by all producers who are within the region/state, plus any product taxes (minus subsidies) not included in output. A positive deviation (i.e. an increase) of real economic output from the Reference Case implies that the proposed investment will enable the economy to produce more real goods and services potentially available for consumption.
- Real income: The change in real income in CGE models such as *Tasman Global* is a measure of the change in economic welfare of the residents of the region, state or country. The change in real income is equal to the change in real economic output plus the change in net foreign income transfers plus the change in terms of trade. In contrast to measures such as real economic output, real income accounts for any impacts of foreign ownership and debt repayments as well as changes in the purchasing power of residents as a result of a project or policy.
- Employment and real wages: *Tasman Global* also produces the net labour market impact of the construction and operations of a major project.

4.2 Assessment methodology

The macroeconomic impacts of a policy, project or other activity can be estimated using a variety of economic analysis tools. The most common methods utilised are input-output (I-O) multiplier analysis and computable general equilibrium (CGE) modelling. The selection of the right tool is critical to the accuracy of the estimated impacts and depends upon the characteristics of the project/industry. Sometimes a range of tools are required.

By their nature, input-output multipliers and CGE models focus on 'market impacts' across the economy (that is, impacts on activities with observed market prices). Analysis of various 'non-market impacts', such as property right infringements, potential loss of biodiversity, changes in air quality, social justice implications and so forth may also be relevant in assessing the full implications of a project or policy.

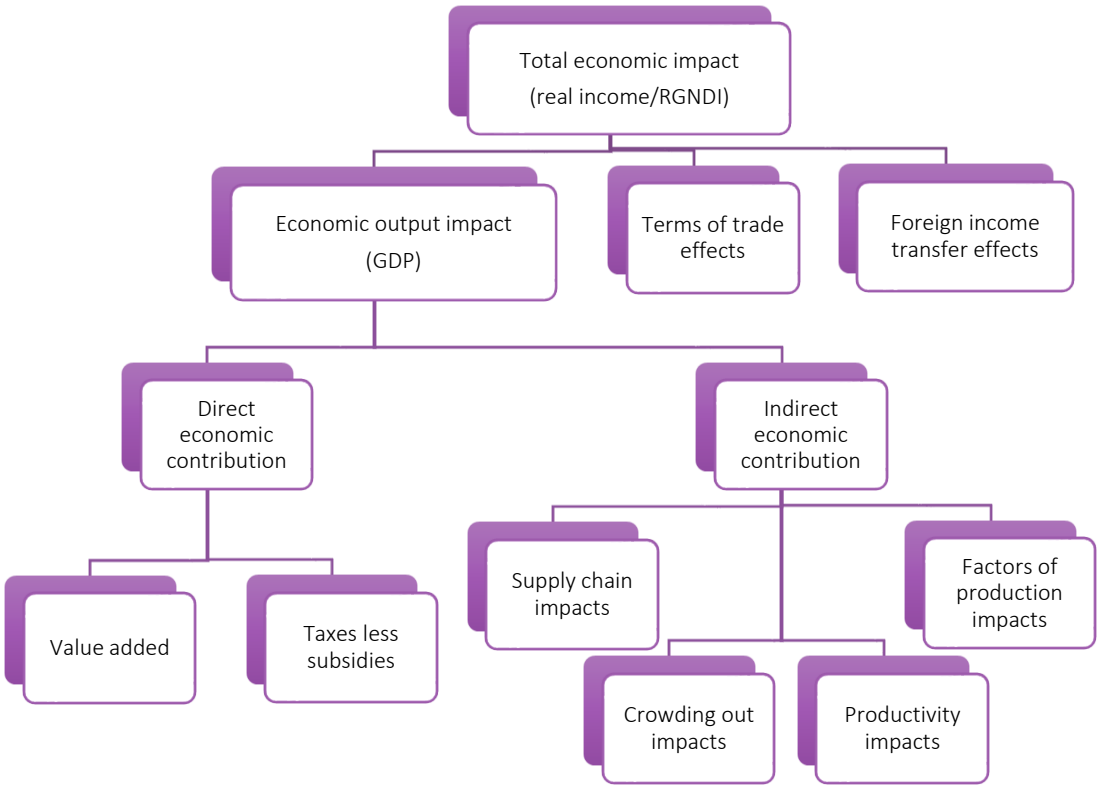
Fundamentally, although various aspects of a policy or project—such as the number of jobs or the size of the investment expenditure—are of relevance to certain stakeholders, the key aggregate measure of the macroeconomic impact of a project is the extent to which the total income of the economy changes as a result of the policy or project. Typically, this is measured by real gross national disposable income (RGNDI), although real gross domestic product (GDP) and consumer surplus (among others) can also be important aggregate measures depending on the nature of the policy or project being analysed.

The main factors that need to be considered when analysing the macroeconomic impacts of a project or policy include:

- the direct and indirect contribution to the economy as a result of the activities associated with the project
- any crowding out implications as resources are potentially diverted from other productive activities to undertake the project being analysed
- any productivity effects generated as a direct result of the policy or project activities – particularly any enduring productivity changes or productivity impacts on other activities not directly associated with the project or policy
- any changes to the factors of production in the economy
- any implications associated with changes in terms of trade or foreign income transfers
- whether there is a dynamic element to the size of any of the above effects (due to different phases of the project for example).

Figure 4.1 shows these components graphically. Some of these effects may be negligible while others may be very significant, and an understanding of the effects helps determine the most appropriate tool(s) for the analysis.

FIGURE 4.1 ESTIMATING THE MACROECONOMIC IMPACT OF A PROJECT OR POLICY



SOURCE: ACIL ALLEN CONSULTING

For many projects, static estimates of the direct economic contribution and supply chain implications can be obtained by using I-O multipliers. Estimating the size of other components using multiplier techniques is either not possible or very complex, as is estimating the economic impacts through time. In contrast, most CGE models can estimate all the components shown in Figure 4.1 with dynamic CGE models able to estimate the impacts through time.

A project of this size will have the potential for changing the cost and availability of electricity, as well as terms of trade effects. Consequently, CGE modelling has been used for this economic impact assessment.

For this analysis, ACIL Allen's CGE model, *Tasman Global*, was used to estimate the impacts of the construction activities and ongoing economic benefits associated with the new interconnector.

4.3 The *Tasman Global* CGE model

Tasman Global is a large scale, dynamic, CGE model of the world economy that has been developed in-house by ACIL Allen. *Tasman Global* is a powerful tool for undertaking economic analysis at the regional, state, national and global levels.

CGE models mimic the workings of the economy through a system of interdependent behavioural and accounting equations which are linked to an input-output database. These models provide a representation of the whole economy, set in a national and international trading context, starting with individual markets, producers and consumers and building up the system via demands and production from each component. When an economic shock or disturbance is applied to the model, each of the markets adjusts according to the set of behavioural parameters which are underpinned by economic theory. The generalised nature of CGE models enable a much broader range of analysis to be undertaken (generally in a more robust manner) compared to I-O multiplier techniques, which are also often applied in economic impact assessments

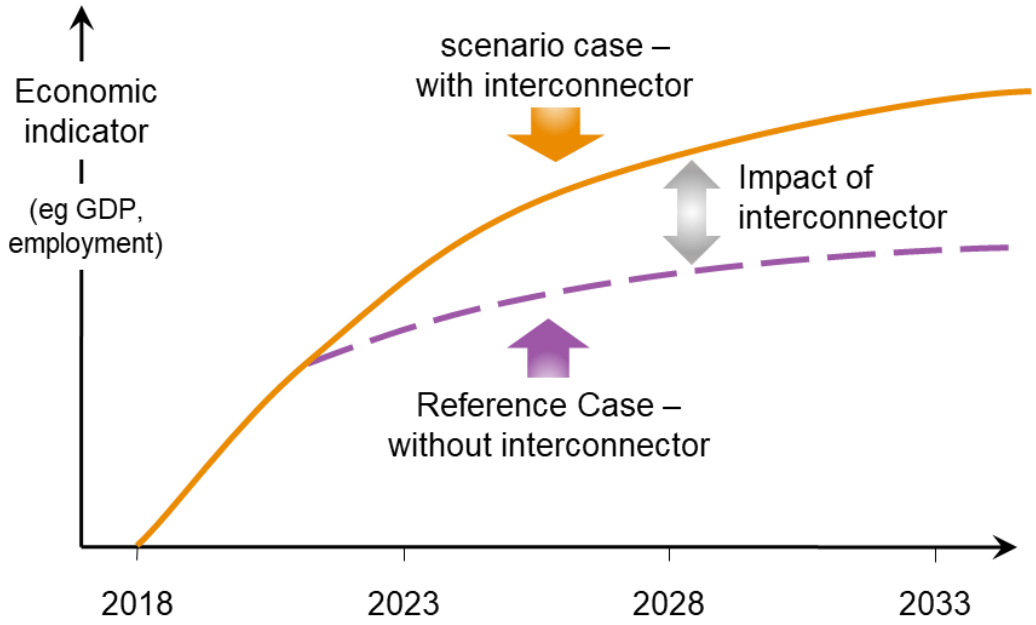
More detail on the *Tasman Global* model is provided in Appendix A of this report.

4.3.1 A dynamic model

Tasman Global is a model that estimates relationships between variables at different points in time. This is different from comparative static models, which compare two equilibriums (one before a policy change and one following). A dynamic model such as *Tasman Global* is useful when analysing issues where both the timing of economic impacts and the adjustment path that economies follow are relevant in the analysis.

In applications of the *Tasman Global* model, a Reference Case simulation forms a 'business-as-usual' basis with which to compare the results of various simulations. The Reference Case provides projections of growth in the absence of the Project (such as GDP, population, labour supply, industry output, etc.) and provides projections of endogenous variables such as productivity changes and consumer tastes. The scenario case assumes all productivity improvements, tax rates and consumer preferences change as per the Reference Case projections but also includes the proposed Project. The two scenarios give two projections of the economy and the net impact of the Project is then calculated as deviations from the Reference Case (see Figure 4.2).

FIGURE 4.2 ILLUSTRATIVE SCENARIO ANALYSIS USING TASMAN GLOBAL



Note: Indicative only. In reality the projected impacts of a project or policy can be positive, negative, neutral or mixed.

SOURCE: ACIL ALLEN CONSULTING

4.3.2 Database aggregation

The database which underpins the model contains a wealth of sectoral detail. The foundation of this information is the set of input-output tables that underpin the database. Industries in the model can be aggregated or disaggregated as required for a specific project. For this project the industries have been aggregated to 48 industries/commodities as presented in Table 4.1.

The aggregation was chosen to provide the detail relevant for this analysis.

TABLE 4.1 INDUSTRY/COMMODITY AGGREGATION USED FOR TASMAN GLOBAL MODELLING

	Industry/commodity		Industry/commodity
1	Vegetables, fruit and nuts	25	Wood and paper products; publishing and printing (excluding furniture)
2	Other crops	26	Fabricated metal products
3	Cattle	27	Motor vehicle and parts
4	Other livestock	28	Other transport equipment
5	Fishing	29	Electronic equipment
6	Forestry	30	Other machinery and equipment
7	Meat products	31	Other manufacturing
8	Other processed food and beverages	32	Water
9	Coal	33	Gas distribution
10	Oil	34	Electricity distribution
11	Gas	35	Construction
12	LNG	36	Trade services (includes all retail and wholesale trade, hotels and restaurants)
13	Iron ore	37	Road transport
14	Bauxite	38	Rail and pipeline transport
15	Other mining	39	Water transport
16	Iron & steel	40	Air transport
17	Alumina	41	Other transport services
18	Primary aluminium	42	Communications services
19	Petroleum & coal products	43	Insurance services
20	Electricity	44	Other financial services
21	Other nonferrous metals	45	Other business services
22	Non-metallic minerals (including cement, plaster, lime, gravel)	46	Recreational and other services
23	Chemicals, rubber, plastics	47	Government services (including public administration and defence)
24	Textiles, clothing and footwear	48	Dwellings

Note: Excludes micro industries developed specifically for this analysis

SOURCE: ACIL ALLEN CONSULTING

Tasman Global contains a detailed representation of the energy sector, particularly in relation to the interstate (trade in electricity and gas) and international linkages across the regions represented. To allow for more detailed electricity sector analysis, and to aid in linkages to *PowerMark*, electricity generation is separated from transmission and distribution in the model. In addition, the electricity sector in the model employs a 'technology bundle' approach that separately identifies up to twelve different electricity generation technologies:

1. brown coal (with and without carbon capture and storage)
2. black coal (with and without carbon capture and storage)
3. petroleum
4. base load gas (with and without carbon capture and storage)
5. peak load gas
6. hydro
7. geothermal

8. nuclear
9. biomass
10. wind
11. solar
12. other renewables.

To enable more accurate linking to *PowerMark* the generation cost of each technology is assumed to be equal to their long run marginal cost (LRMC) while the sales price in each region is matched to the average annual dispatch weighted prices projected by *PowerMark* – with any difference being returned as an economic rent to electricity generators. Fuel use and emissions factors by each technology are also matched to those projected in *PowerMark*. This representation enables the highly detailed market based projections from *PowerMark* to be incorporated as accurately as possible into *Tasman Global*.

4.3.3 Micro industry approach

To accurately assess the economic impacts or economic contribution of a major project such as this, the project must be accurately represented in *Tasman Global's* database. An accurate representation can be guaranteed by establishing the proposed project as a new 'micro' industry in the database.

The micro industry approach is so called because it involves the creation of one or more new, initially very small, industries in the *Tasman Global* database. The specifications of each of the micro industry's costs and sales structures are directly derived from the financial data for the project to be analysed. At the outset, the new industry is necessarily very small so that its existence in the *Tasman Global* database does not affect the database balance or the "business-as-usual" Reference Case outcomes.

Besides having a separate cost structure for the project of interest, a further challenge is to faithfully represent the time profile of the individual cost items. This is particularly important for the investment phase where there are typically large changes in demands for machinery, labour and imported components year on year. This challenge is met in *Tasman Global* through incorporating detailed year on year, input specific changes by source.

Using the micro industry approach for project evaluations is the most accurate way to capture the detailed economic linkages between the project and the other industries in the economy. This approach has been developed by ACIL Allen because each project is unique relative to the more aggregated industries in the *Tasman Global* database.

Consequently, in addition to the 47 industries identified in Table 4.1, the database also identifies the construction and operation phases of the project as separate industries with their own input cost structure, sales, employment, tax revenues and emissions based on detailed information generated as part of this analysis.

Another important aspect in the CGE modelling approach used for this analysis is to have separate identification of the capital stock created as part of the project's investment phase and isolating it until the capital is available for use, thereby preventing the economy gaining false benefits from, say, half a bridge. In the past, some CGE models potentially overstated the impact of an investment, because investment in one period was automatically added to capital stock in the next period and was made available to the rest of the economy, thereby spuriously increasing GDP.

4.4 Measures of macro-economic impacts

One of the most commonly quoted macroeconomic variables at a national level is real GDP, which is a measure of the aggregate output generated by an economy over a given period (typically a year). From the expenditure side, GDP is calculated by adding together total private and government consumption, investment and net trade. From the income side, GDP can be calculated as the sum of returns to the primary factors (labour, capital and natural resources) employed in the national economy plus indirect tax revenue. The regional level equivalent to GDP is Gross Regional Product (GRP) – at the state level it is called GSP (Gross State Product). To reduce the potential confusion

with the various acronyms, the term economic output has been used in the discussion of the results presented in this report.

These measures of the real economic output of an economy should be distinguished from measures of the economy's real income, which provide a better indication of the economic welfare of the residents of a region. It is possible for real economic output to increase (that is, for GDP to rise) while at the same time real income (economic welfare) declines. In such circumstances people and households would be worse off despite economic growth.

In *Tasman Global*, the relevant measure of real income at the national level is RGNDI as reported by the Australian Bureau of Statistics (ABS).

The change in a region's real income as a result of a new project is the change in real economic output plus the change in net external income transfers plus the change in the region's terms of trade (which measure the change in the purchasing power of the region's exports relative to its imports). As Australians have experienced first-hand in recent years, changes in the terms of trade can have a substantial impact on residents' welfare independently of changes in real economic output.

In global CGE models such as *Tasman Global*, the change in real income is equivalent to the change in consumer welfare using the equivalent variation measure of welfare change resulting from exogenous shocks. Hence, it is valid to say that the projected change in real income (from *Tasman Global*) is also the projected change in consumer welfare.

5 ECONOMIC MODELLING – RESULTS

This chapter provides the results of the economic modelling.

The results are presented for the South Australian and New South Wales economies as a whole and also for the 'host regions', which are the areas of those two states that would 'host' the interconnector.

Results are presented for the metrics defined above, namely:

- economic contribution, measured in terms of both real economic output and real income, in section 5.1
- employment, in section 5.2
- real wages, in section 5.3.

It should be noted that, in contrast to the price and bill impacts presented in chapter 3, the economic impacts presented here are in real terms (i.e. they have been adjusted for inflation).

5.1 Real economic output and real income

As discussed in section 4.1, real economic output is the sum of value added by all producers in the relevant region/state, plus any product taxes (minus subsidies) not included in output. When calculated at a national level this is referred to as Gross Domestic Product (GDP) and as Gross State Product (GSP) at the State level.

In contrast, the change in real income is:

- the change in real economic output
- plus the change in net foreign income transfers
- plus the change in terms of trade

While real output is a useful indicator, our view is that real income provides a better measure of the welfare impact that changes in these aggregates have on people living in a region.[9]

Figure 5.1 shows the change in both real economic output and real income in New South Wales and South Australia, and in the Host regions, due to the introduction of the new interconnector. A summary of the aggregate projected impacts is presented in Table 5.1.

[9] In CGE models with the same framework as *Tasman Global*, it can be shown that the change in real income is equal to the 'equivalent variation' measure of welfare change. Hence, it is valid to say that the projected change in state or national real income is the projected change in consumer welfare at the state or national level.

FIGURE 5.1 CHANGE IN REAL ECONOMIC OUTPUT AND REAL INCOME AS A RESULT OF THE PROJECT, RELATIVE TO THE REFERENCE CASE (IN 2018 TERMS)

SOURCE: ACIL ALLEN CONSULTING

In general, the changes in real economic output are broadly in line with the projected savings in electricity prices as shown by comparing Figure 5.1A with Figure 3.4 while also proportional to the size and composition of the South Australian and New South Wales economies, with New South Wales experiencing a correspondingly greater benefit.

Further, the additional construction activity associated with the project has a noticeable effect on the economies of the host regions in the initial years due to a movement of economic activity into these regions during the construction period. This is shown in Figure 5.1C. These regions also experience ongoing benefits once the interconnector is in operation due to the impact of the projected savings in electricity prices on these local economies.

Importantly, this analysis focuses on the direct economic impacts of the interconnector and excludes the additional benefits that might be expected to flow to these regions through the construction and ongoing operation of any new renewable generation projects that develop in these regions as a result of the interconnector.

TABLE 5.1 PROJECTED CUMULATIVE CHANGE IN REAL ECONOMIC OUTPUT AND REAL INCOME IN EACH REGION AS A RESULT OF THE INTERCONNECTOR PROJECT, RELATIVE TO THE BASE CASE (IN 2018 TERMS)

	Real economic output			Real income		
	Total (2021 to 2040)	NPV (4% discount rate)	NPV (7% discount rate)	Total (2021 to 2040)	NPV (4% discount rate)	NPV (7% discount rate)
	2018 A$m	2018 A$m	2018 A$m	2018 A$m	2018 A$m	2018 A$m
SA host regions	120	93	79	163	133	117
Rest of SA	3,867	2,613	2,012	4,239	2,925	2,285
Total South Australia	3,987	2,706	2,091	4,402	3,058	2,402
NSW host regions	154	129	116	209	184	170
Rest of NSW	8,998	6,171	4,766	7,250	4,950	3,809
Total New South Wales	9,153	6,301	4,882	7,459	5,134	3,978

Note: NPV = net present value.

SOURCE: ACIL ALLEN CONSULTING

Real economic output

Over the period 2021 to 2040, the interconnector project is projected to increase the real economic output of:

- *South Australia* by a cumulative total of $4.0 billion relative to the Reference Case using a real discount of seven per cent this equates to a net present value of $2.1 billion
  - $120 million of the projected benefit occurs in the SA host regions: $45 million during the construction phase and an average annual benefit of $4 million a year during the operations phase due to the significantly lower South Australian electricity prices
- *New South Wales* by a cumulative total of $9.2 billion relative to the Reference Case using a real discount of seven per cent this equates to a net present value of $4.9 billion
  - $154 million of the projected benefit occurs in the NSW host regions: $93 million during the construction phase and an average annual benefit of $3 million a year during the operations phase due to lower New South Wales electricity prices.

To place the projected changes in economic output estimates in perspective, the discounted present value (using a 7 per cent discount rate) is equivalent to 1.9 per cent of South Australia's and 0.8 per cent of New South Wales' current GSP.

Real income

Real income is a measure of the ability to purchase goods and services, adjusted for inflation. A rise in real income indicates a rise in the capacity for current consumption, but also an increased ability to accumulate wealth in the form of financial and other assets. The change in real income from a development is a measure of the change in welfare of an economy.

The extent to which local residents will benefit from the additional economic output depends on the level of ownership of the capital (including the natural resources) utilised in the business as well as any wealth transfers undertaken by Australian governments as a result of the taxation revenues generated by the Project.

Unlike analyses for other large projects where revenues flow through the books of the project owner, the economic benefits associated with the interconnector are dispersed widely throughout the community through the reduction in electricity prices. This means that the ownership situation of the project is less important than other comparable analyses.

- The South Australian and New South Wales Governments will receive some additional taxes (such as payroll taxes) because of the project, while the Australian Government will receive higher taxes through higher personal income and company tax receipts. Where this additional income will be spent

is unknown, but for this study we have assumed that it will be spent proportionately to the population in each region of Australia.

Over the period 2021 to 2040, the project is projected to increase the real income of:

- *South Australia* by a cumulative total of $4.4 billion relative to the Reference Case (with a net present value of $2.4 billion, using a 7 per cent real discount rate)
  - $163 million of the projected benefit occurs in the SA host regions: $82 million during the construction phase and an average annual benefit of $4 million a year during the operations phase
- *New South Wales* by a cumulative total of $7.5 billion relative to the Reference Case (with a net present value of $4.0 billion, using a 7 per cent real discount rate)
  - $209 million of the projected benefit occurs in the NSW host regions: $158 million during the construction phase and an average annual benefit of $3 million a year during the operations phase.

To place these projected changes in income in perspective, the discounted present values (using a 7 per cent discount rate) are equivalent to a one-off increase in the average real income of all current residents of:

- *South Australia* by approximately $1,300 per person
- *New South Wales* by approximately $500 per person.

5.2 Employment

As well as creating some ongoing employment in the New South Wales and South Australian economies, the project will generate jobs during the construction phase of the project. In addition to the direct jobs generated on-site, the construction and installation, and production phases will require a range of locally sourced goods and services. Production of these inputs will further increase the demand for labour across the New South Wales and South Australian economies.

A key issue when estimating the impact of a project is determining how the labour market will clear.[10] For this analysis, increases in the demand for labour can be met by three mechanisms: increasing migration from elsewhere in Australia; increasing participation rates and/or average hours worked; and by reducing the unemployment rate. In the model framework, the first two mechanisms are driven by changes in the real wages paid to workers in the local region while the third is a function of the additional labour demand relative to the Reference Case. Given the moderate unemployment rate assumed throughout the projection period, changes in the real wage rate account for the majority of the additional labour supply in the policy scenario relative to the Reference Case.

It should be noted that this analysis does not assume any change in net foreign migration as a result of the Project.

Compared to other industries, the operations of the interconnector are highly capital intensive rather than labour intensive.

Employment creation

Over the period 2021 to 2040, it is projected that approximately 18,800 employee years[11] of full time equivalent (FTE) direct and indirect jobs will be created across New South Wales and South Australia. More specifically, it is projected that the Project will increase employment in:

- *South Australia* by 4,947 employee years, which is approximately 250 FTE jobs on average over the modelling period
  - these jobs are mostly created during the construction phase in the host regions and in the rest of the State during the operations phase
  - we project that:

[10] As with other CGE models, the standard assumption within *Tasman Global* is that all markets clear (i.e. demand equals supply) at the start and end of each time period, including the labour market. CGE models place explicit limits on the availability of factors and the nature of the constraints can greatly change the magnitude and nature of the results. In contrast, most other tools used to assess economic impacts, including I-O multiplier analysis, do not place constraints on the availability of factors. Consequently, these tools tend to overestimate the impacts of a project or policy.

[11] An employee year is equivalent to the employment of 1 FTE person for one year. Alternatively, it can represent employment of, say, two full-time people for half a year each, or one 0.5 FTE person for two years.

  - employment in the South Australian host regions will increase by 470 employee years during the 2-year construction phase, which is equivalent to 235 FTE jobs each year during this phase
  - 400 of these employee years will be directly employed through ElectraNet

— *New South Wales* by 13,841 employee years, which is approximately 700 FTE jobs on average over the modelling period:

  – these jobs are mostly created during the construction phase in the host regions and in the rest of the State during the operations phase
  – we project that:
    - employment in the New South Wales host regions will increase by 1,650 employee years during the 2-year construction phase, which is equivalent to 825 FTE jobs each year during this phase
    - 1,100 of these employee years will be directly employed through TransGrid.

5.3 Real wages

The projected changes in real wages follow the changes in labour demand, with wages in each region acting to balance demand and supply in each year. In addition, the magnitude of the projected changes in real wages is a function of the relative size of the demand and supply imbalance with respect to the overall size of the labour market (that is, large percentage increases in labour demand relative to the Base Case will tend to result in large percentage increases in real wages relative to the Base Case). In the context of the project, average real wages are also affected by the higher average wages (including allowances) paid to direct employees compared to other industries.

Real wages in South Australia and New South Wales, respectively, are projected to increase by an average of 0.12 and 0.06 per cent relative to the Reference Case. Given the size of the labour market, this is a significant increase generated by the interconnector project.

A

OVERVIEW OF TASMAN GLOBAL

Tasman Global is a dynamic, global computable general equilibrium (CGE) model that has been developed by ACIL Allen for the purpose of undertaking economic impact analysis at the regional, state, national and global level.

A CGE model captures the interlinkages between the markets of all commodities and factors, taking into account resource constraints, to find a simultaneous equilibrium in all markets. A global CGE model extends this interdependence of the markets across world regions and finds simultaneous equilibrium globally. A dynamic model adds onto this the interconnection of equilibrium economies across time periods. For example, investments made today are going to determine the capital stocks of tomorrow and hence future equilibrium outcomes depend on today's equilibrium outcome, and so on.

A dynamic global CGE model, such as *Tasman Global*, has the capability of addressing total, sectoral, spatial and temporal efficiency of resource allocation as it connects markets globally and over time. Being a recursively dynamic model, however, its ability to address temporal issues is limited. In particular, *Tasman Global* cannot typically address issues requiring partial or perfect foresight, however, as documented in Jakeman et al (2001), it is possible to introduce partial or perfect foresight in certain markets using algorithmic approaches. Notwithstanding this, the model does have the capability to project the economic impacts over time of given changes in policies, tastes and technologies in any region of the world economy on all sectors and agents of all regions of the world economy.

Tasman Global was developed out of the 2001 version of the Global Trade and Environment Model (GTEM) developed by ABARE (Pant 2001) and has been evolving ever since. In turn, GTEM was developed out of the MEGABARE model (ABARE 1996), which contained significant advancements over the GTAP model of that time (Hertel 1997).

A.1 A dynamic model

Tasman Global is a model that estimates relationships between variables at different points in time. This is in contrast to comparative static models, which compare two equilibriums (one before a policy change and one following). A dynamic model such as *Tasman Global* is beneficial when analysing issues where both the timing of and the adjustment path that economies follow are relevant in the analysis.

A.2 The database

A key advantage of *Tasman Global* is the level of detail in the database underpinning the model. The database is derived from the Global Trade Analysis Project (GTAP) database. This database is a fully documented, publicly available global data base which contains complete bilateral trade information,

transport and protection linkages among regions for all GTAP commodities. It is the most detailed database of its type in the world.

Tasman Global builds on the GTAP database by adding the following important features:

- a detailed population and labour market database
- detailed technology representation within key industries (such as electricity generation and iron and steel production)
- disaggregation of a range of major commodities including iron ore, bauxite, alumina, primary aluminium, brown coal, black coal and LNG
- the ability to repatriate labour and capital income
- explicit representation of the states and territories of Australia
- the capacity to represent multiple regions within states and territories of Australia explicitly.

Nominally, version 9.1 of the *Tasman Global* database divides the world economy into 150 regions (142 international regions plus the 8 states and territories of Australia) although in reality the regions are frequently disaggregated further. ACIL Allen regularly models Australian or international projects or policies at the regional level including at the provincial level for Papua New Guinea and Canada.

The *Tasman Global* database also contains a wealth of sectoral detail currently identifying up to 72 industries (Table A.1). The foundation of this information is the input-output tables that underpin the database. The input-output tables account for the distribution of industry production to satisfy industry and final demands. Industry demands, so-called intermediate usage, are the demands from each industry for inputs. For example, electricity is an input into the production of communications. In other words, the communications industry uses electricity as an intermediate input. Final demands are those made by households, governments, investors and foreigners (export demand). These final demands, as the name suggests, represent the demand for finished goods and services. To continue the example, electricity is used by households – their consumption of electricity is a final demand. Each sector in the economy is typically assumed to produce one commodity, although in *Tasman Global*, the electricity, transport and iron and steel sectors are modelled using a 'technology bundle' approach. With this approach, different known production methods are used to generate a homogeneous output for the 'technology bundle' industry. For example, electricity can be generated using brown coal, black coal, petroleum, base load gas, peak load gas, nuclear, hydro, geothermal, biomass, wind, solar or other renewable based technologies – each of which have their own cost structure.

TABLE A.1 STANDARD SECTORS IN THE TASMAN GLOBAL MODEL

no	Name	no	Name
1	Paddy rice	37	Wood products
2	Wheat	38	Paper products, publishing
3	Cereal grains nec	39	Diesel (incl. nonconventional diesel)
4	Vegetables, fruit, nuts	40	Other petroleum, coal products
5	Oil seeds	41	Chemical, rubber, plastic products
6	Sugar cane, sugar beef	42	Iron ore
7	Plant- based fibres	43	Bauxite
8	Crops nec	44	Mineral products nec
9	Bovine cattle, sheep, goats, horses	45	Ferrous metals
10	Pigs	46	Alumina
11	Animal products nec	47	Primary aluminium
12	Raw milk	48	Metals nec
13	Wool, silk worm cocoons	49	Metal products
14	Forestry	50	Motor vehicle and parts
15	Fishing	51	Transport equipment nec
16	Brown coal	52	Electronic equipment
17	Black coal	53	Machinery and equipment nec
18	Oil	54	Manufactures nec
19	Liquefied natural gas (LNG)	55	Electricity generation
20	Other natural gas	56	Electricity transmission and distribution
21	Minerals nec	57	Gas manufacture, distribution
22	Bovine meat products	58	Water
23	Pig meat products	59	Construction
24	Meat products nec	60	Trade
25	Vegetables oils and fats	61	Road transport
26	Dairy products	62	Rail and pipeline transport
27	Processed rice	63	Water transport
28	Sugar	64	Air transport
29	Food products nec	65	Transport nec
30	Wine	66	Communication
31	Beer	67	Financial services nec
32	Spirits and RTDs	68	Insurance
33	Other beverages and tobacco products	69	Business services nec
34	Textiles	70	Recreational and other services
35	Wearing apparel	71	Public Administration, Defence, Education, Health
36	Leather products	72	Dwellings

Note: nec – not elsewhere classified.

SOURCE: ACIL ALLEN CONSULTING

The other key feature of the database is that the cost structure of each industry is also represented in detail. Each industry purchases intermediate inputs (from domestic and imported sources) primary factors (labour, capital, land and natural resources) as well as paying taxes or receiving subsidies.

A.3 Model structure

Given its heritage, the structure of the *Tasman Global* model closely follows that of the GTAP and GTEM models and interested readers are encouraged to refer to the documentation of these models for more detail (namely Hertel 1997 and Pant 2001, respectively). In summary:

- The model divides the world into a variety of regions and international waters.
  - Each region is fully represented with its own 'bottom-up' social accounting matrix and could be a local community, an LGA, state, country or a group of countries. The number of regions in a given simulation depends on the database aggregation. Each region consists of households, a government with a tax system, production sectors, investors, traders and finance brokers.
  - 'International waters' are a hypothetical region where global traders operate and use international shipping services to ship goods from one region to the other. It also houses an international finance 'clearing house' that pools global savings and allocates the fund to investors located in every region.
  - Each region has a 'regional household'12 that collects all factor payments, taxes, net foreign borrowings, net repatriation of factor incomes due to foreign ownership and any net income from trading of emission permits.
- The income of the regional household is allocated across private consumption, government consumption and savings according to a Cobb-Douglas utility function, which, in practice, means that the share of income going to each component is assumed to remain constant in nominal terms.
- Private consumption of each commodity is determined by maximising utility subject to a Constant Difference of Elasticities (CDE) function which includes both price and income elasticities.
- Government consumption of each commodity is determined by maximising utility subject to a Cobb-Douglas utility function.
- Each region has *n* production sectors, each producing single products using various production functions where they aim to maximise profits (or minimise costs) and take all prices as given. The nature of the production functions chosen in the model means that producers exhibit constant returns to scale.
  - In general, each producer supplies consumption goods by combining an aggregate energy-primary factor bundle with other intermediate inputs and according to a Leontief production function (which in practice means that the quantity shares remain in fixed proportions). Within the aggregate energy-primary factor bundle, the individual energy commodities and primary factors are combined using a nested-CES (Constant Elasticity of Substitution) production function, in which energy and primary factor aggregates substitute according to a CES function with the individual energy commodities and individual primary factors substituting with their respective aggregates according to further CES production functions.
  - Exceptions to the above include the electricity generation, iron and steel and road transport sectors. These sectors employ the 'technology bundle' approach developed by ABARE (1996) in which non-homogenous technologies are employed to produce a homogenous output with the choice of technology governed by minimising costs according to a modified-CRESH production function. For example, electricity may be generated from a variety of technologies (including brown coal, black coal, gas, nuclear, hydro, solar etc.), iron and steel may be produced from blast furnace or electric arc technologies while road transport services may be supplied using a range of different vehicle technologies. The 'modified-CRESH' function differs from the traditional CRESH function by also imposing the condition that the quantity units are homogenous.
- There are four primary factors (land, labour, mobile capital and fixed capital). While labour and mobile capital are used by all production sectors, land is only used by agricultural sectors while the fixed capital is typically employed in industries with natural resources (such as fishing, forestry and mining) or in selected industries built by ACIL Allen.
- Land supply in each region is typically assumed to remain fixed through time with the allocation of land between sectors occurring to maximise returns subject to a Constant Elasticity of Transformation (CET) utility function.

[12] The term "regional household" was devised for the GTAP model. In essence it is an agent that aggregates all incomes attributable to the residents of a given region before distributing the funds to the various types of regional consumption (including savings).

- Mobile capital accumulates as a result of net investment. It is implicitly assumed in *Tasman Global* that it takes one year for capital to be installed. Hence, supply of capital in the current period depends on the last year's capital stock and investments made during the previous year.
- Labour supply in each year is determined by endogenous changes in population, given participation rates and a given unemployment rate. In policy scenarios, the supply of labour is positively influenced by movements in the real wage rate governed by the elasticity of supply. For countries where sub-regions have been specified (such as Australia), migration between regions is induced by changes in relative real wages with the constraint that net interregional migration equals zero. For regions where the labour market has been disaggregated to include occupations, there is limited substitution allowed between occupations by individuals supplying labour (according to a CET utility function) and by firms demanding labour (according to a CES production function) based on movements in relative real wages.
- The supply of fixed capital is given for each sector in each region.

  The model has the option for these assumptions to be changed at the time of model application if alternative factor supply behaviours are considered more relevant.
- It is assumed that labour (by occupation) and mobile capital are fully mobile across production sectors implying that, in equilibrium, wage rates (by occupation) and rental rates on capital are equalised across all sectors within each region. To a lesser extent, labour and capital are mobile between regions through international financial investment and migration, but this sort of mobility is sluggish and does not equalise rates of return across regions.
- For most international regions, each consumer (private, government, industries and the local investment sector), consumption goods can be sourced either from domestic or imported sources. In any country which has disaggregated regions (such as Australian), consumption goods can also be sourced from other intrastate or interstate regions. In all cases, the source of non-domestically produced consumption goods is determined by minimising costs subject to a Constant Ratios of Elasticities of Substitution, Homothetic (CRESH) utility function. Like most other CGE models, a CES demand function is used to model the relative demand for domestically-produced commodities versus non-domestically produced commodities. The elasticities chosen for the CES and CRESH demand functions mean that consumers in each region have a higher preference for domestically produced commodities than non-domestic and a higher preference for intrastate or interstate produced commodities versus foreign.
- The capital account in *Tasman Global* is open. Domestic savers in each region purchase 'bonds' in the global financial market through local 'brokers' while investors in each region sell bonds to the global financial market to raise investible funds. A flexible global interest rate clears the global financial market.
- It is assumed that regions may differ in their risk characteristics and policy configurations. As a result, rates of return on money invested in physical capital may differ between regions and therefore may be different from the global cost of funds. Any difference between the local rates of return on capital and the global cost of borrowing is treated as the result of the existence of a risk premium and policy imperfections in the international capital market. It is maintained that the equilibrium allocation of investment requires the equalisation of changes in (as opposed to the absolute levels of) rates of return over the base year rates of return.
- Any excess of investment over domestic savings in a given region causes an increase in the net debt of that region. It is assumed that debtors service the debt at the interest rate that clears the global financial market. Similarly, regions that are net savers gives rise to interest receipts from the global financial market at the same interest rate.
- Investment in each region is used by the regional investor to purchase a suite of intermediate goods according to a Leontief production function to construct capital stock with the regional investor cost minimising by choosing between domestic, interstate and imported sources of each intermediate good via the CRESH production function. The regional cost of creating new capital stock versus the local rates of return on mobile capital is what determines the regional rate of return on new investment.
- In equilibrium, exports of a good from one region to the rest of world are equal to the import demand for that good in the remaining regions. Together with the merchandise trade balance, the net payments on foreign debt add up to the current account balance. *Tasman Global* does not require that

the current account be in balance every year. It allows the capital account to move in a compensatory direction to maintain the balance of payments. The exchange rate provides the flexibility to keep the balance of payments in balance.

— Emissions of six anthropogenic greenhouse gases (namely, carbon dioxide, methane, nitrous oxide, HFCs, PFCs and SF_6) associated with economic activity are tracked in the model. Almost all sources and sectors are represented; emissions from agricultural residues and land-use change and forestry activities are not explicitly modelled but can be accounted for externally. Prices can be applied to emissions which are converted to industry-specific production taxes or commodity-specific sales taxes that impact on demand. Abatement technologies similar to those adopted in Australian Government (2008) are available and emission quotas can be set globally or by region along with allocation schemes that enable emissions to be traded between regions.

More detail regarding specific elements of the model structure are discussed in the following sections.

A.4 Population growth and labour supply

Population growth is an important determinant of economic growth through the supply of labour and the demand for final goods and services. Population growth for each region represented in the *Tasman Global* database is projected using ACIL Allen's in-house demographic model. The demographic model projects how the population in each region grows and how age and gender composition changes over time and is an important tool for determining the changes in regional labour supply and total population over the projection period.

For each of region, the model projects the changes in age-specific birth, mortality and net migration rates by gender for 101 age cohorts (0-99 and 100+). The demographic model also projects changes in participation rates by gender by age for each region, and, when combined with the age and gender composition of the population, endogenously projects the future supply of labour in each region. Changes in life expectancy are a function of income per person as well as assumed technical progress on lowering mortality rates for a given income (for example, reducing malaria-related mortality through better medicines, education, governance etc.). Participation rates are a function of life expectancy as well as expected changes in higher education rates, fertility rates and changes in the work force as a share of the total population.

Labour supply is derived from the combination of the projected regional population by age by gender and the projected regional participation rates by age by gender. Over the projection period labour supply in most developed economies is projected to grow slower than total population as a result of ageing population effects.

For the Australian states and territories, the projected aggregate labour supply from ACIL Allen's demographics module is used as the base level potential workforce for the detailed Australian labour market module, which is described in the next section.

A.4.1 The Australian labour market

Tasman Global has a detailed representation of the Australian labour market which has been designed to capture:

— different occupations

— changes to participation rates (or average hours worked) due to changes in real wages

— changes to unemployment rates due to changes in labour demand

— limited substitution between occupations by the firms demanding labour and by the individuals supplying labour, and

— limited labour mobility between states and regions within each state.

Tasman Global recognises 97 different occupations within Australia – although the exact number of occupations depends on the aggregation. The firms who hire labour are provided with some limited scope to change between these 97 labour types as the relative real wage between them changes. Similarly, the individuals supplying labour have a limited ability to change occupations in response to the changing relative real wage between occupations. Finally, as the real wage for a given occupation

rises in one state relative to other states, workers are given some ability to respond by shifting their location. The model produces results at the 97 3-digit ANZSCO (Australian New Zealand Standard Classification of Occupations) level which are presented in Table A.2.

The labour market structure of *Tasman Global* is thus designed to capture the reality of labour markets in Australia, where supply and demand at the occupational level do adjust, but within limits.

Labour supply in *Tasman Global* is presented as a three-stage process:

13. labour makes itself available to the workforce based on movements in the real wage and the unemployment rate;
14. labour chooses between occupations in a state based on relative real wages within the state; and
15. labour of a given occupation chooses in which state to locate based on movements in the relative real wage for that occupation between states.

By default, *Tasman Global*, like all CGE models, assumes that markets clear. Therefore, overall, supply and demand for different occupations will equate (as is the case in other markets in the model).

TABLE A.2 OCCUPATIONS IN THE *TASMAN GLOBAL* DATABASE, ANZSCO 3-DIGIT LEVEL (MINOR GROUPS)

ANZSCO code, Description	ANZSCO code, Description	ANZSCO code, Description
1. MANAGERS	3. TECHNICIANS & TRADES WORKERS	5. CLERICAL & ADMINISTRATIVE
111 Chief Executives, General Managers and Legislators	311 Agricultural, Medical and Science Technicians	511 Contract, Program and Project Administrators
121 Farmers and Farm Managers	312 Building and Engineering Technicians	512 Office and Practice Managers
131 Advertising and Sales Managers	313 ICT and Telecommunications Technicians	521 Personal Assistants and Secretaries
132 Business Administration Managers	321 Automotive Electricians and Mechanics	531 General Clerks
133 Construction, Distribution and Production Managers	322 Fabrication Engineering Trades Workers	532 Keyboard Operators
134 Education, Health and Welfare Services Managers	323 Mechanical Engineering Trades Workers	541 Call or Contact Centre Information Clerks
135 ICT Managers	324 Panel beaters, and Vehicle Body Builders, Trimmers and Painters	542 Receptionists
139 Miscellaneous Specialist Managers	331 Bricklayers, and Carpenters and Joiners	551 Accounting Clerks and Bookkeepers
141 Accommodation and Hospitality Managers	332 Floor Finishers and Painting Trades Workers	552 Financial and Insurance Clerks
142 Retail Managers	333 Glaziers, Plasterers and Tilers	561 Clerical and Office Support Workers
149 Miscellaneous Hospitality, Retail and Service Managers	334 Plumbers	591 Logistics Clerks
	341 Electricians	599 Miscellaneous Clerical and Administrative Workers
2. PROFESSIONALS	342 Electronics and Telecommunications Trades Workers	
211 Arts Professionals	351 Food Trades Workers	6. SALES WORKERS
212 Media Professionals	361 Animal Attendants and Trainers, and Shearers	611 Insurance Agents and Sales Representatives
221 Accountants, Auditors and Company Secretaries	362 Horticultural Trades Workers	612 Real Estate Sales Agents
222 Financial Brokers and Dealers, and Investment Advisers	391 Hairdressers	621 Sales Assistants and Salespersons
223 Human Resource and Training Professionals	392 Printing Trades Workers	631 Checkout Operators and Office Cashiers
224 Information and Organisation Professionals	393 Textile, Clothing and Footwear Trades Workers	639 Miscellaneous Sales Support Workers
225 Sales, Marketing and Public Relations Professionals	394 Wood Trades Workers	
231 Air and Marine Transport Professionals	399 Miscellaneous Technicians and Trades Workers	7. MACHINERY OPERATORS & DRIVERS
232 Architects, Designers, Planners and Surveyors		711 Machine Operators
233 Engineering Professionals	4. COMMUNITY & PERSONAL SERVICE	712 Stationary Plant Operators
234 Natural and Physical Science Professionals	411 Health and Welfare Support Workers	721 Mobile Plant Operators
241 School Teachers	421 Child Carers	731 Automobile, Bus and Rail Drivers
242 Tertiary Education Teachers	422 Education Aides	732 Delivery Drivers
249 Miscellaneous Education Professionals	423 Personal Carers and Assistants	733 Truck Drivers
251 Health Diagnostic and Promotion Professionals	431 Hospitality Workers	741 Storepersons
252 Health Therapy Professionals	441 Defence Force Members, Fire Fighters and Police	
253 Medical Practitioners	442 Prison and Security Officers	8. LABOURERS
254 Midwifery and Nursing Professionals	451 Personal Service and Travel Workers	811 Cleaners and Laundry Workers
261 Business and Systems Analysts, and Programmers	452 Sports and Fitness Workers	821 Construction and Mining Labourers
262 Database and Systems Administrators, and ICT Security Specialists		831 Food Process Workers
263 ICT Network and Support Professionals		832 Packers and Product Assemblers
271 Legal Professionals		839 Miscellaneous Factory Process Workers
272 Social and Welfare Professionals		841 Farm, Forestry and Garden Workers
		851 Food Preparation Assistants
		891 Freight Handlers and Shelf Fillers
		899 Miscellaneous Labourers

SOURCE: ABS (2009), ANZSCO – AUSTRALIAN AND NEW ZEALAND STANDARD CLASSIFICATIONS OF OCCUPATIONS, FIRST EDITION, REVISION 1, ABS CATALOGUE NO. 1220.0.

Labour market database

The *Tasman Global* database includes a detailed representation of the Australian labour market which has been designed to capture the supply and demand for different skills and occupations by industry. To achieve this, the Australian workforce is characterised by detailed supply and demand matrices.

On the supply side, the Australian population is characterised by a five-dimensional matrix consisting of:

- 7 post-school qualification levels
- 12 main qualification fields of highest educational attainment
- 97 occupations
- 101 age groups (namely 0 to 99 and 100+)
- 2 genders.

The data for this matrix is measured in persons and was sourced from the ABS 2011 Census. As the skills elements of the database and model structure have not been used for this project, it will be ignored in this discussion.

The 97 occupations are those specified at the 3-digit level (or Minor Groups) under the Australian New Zealand Standard Classification of Occupations (ANZSCO) (see Table A.2).

On the demand side, each industry demands a particular mix of occupations. This matrix is specified in units of full-time equivalent (FTE) jobs where an FTE employee works an average of 37.5 hours per week. Consistent with the labour supply matrix, the data for FTE jobs by occupation by industry was also sourced from the ABS 2011 Census and updated using the latest labour force statistics.

Matching the demand and supply side matrices means that there is the implicit assumption that the average hours per worker are constant, but it is noted that mathematically changes in participation rates have the same effect as changes in average hours worked.

A.4.2 Labour market model structure

In the model, the underlying growth of each industry in the Australian economy results in a growth in demand for a particular set of skills and occupations. In contrast, the supply of each set of skills and occupations in a given year is primarily driven by the underlying demographics of the resident population. This creates a market for each skill by occupation that (unless specified otherwise) needs to clear at the start and end of each time period.[13] The labour markets clear by a combination of different prices (i.e. wages) for each labour type and by allowing a range of demand and supply substitution possibilities, including:

- changes in firms demand for labour driven by changes in the underlying production technology:
  - for technology bundle industries (electricity, iron and steel and road transportation) this occurs due to changes between explicitly identified alternative technologies
  - for non-technology bundle industries this includes substitution between factors (such as labour for capital) or energy for factors
- changes to participation rates (or average hours worked) due to changes in real wages
- changes in the occupations of a person due to changes in relative real wages
- substitution between occupations by the firms demanding labour due to changes in the relative costs
- changes to unemployment rates due to changes in labour demand, and
- limited labour mobility between states due to changes in relative real wages.

All of the labour supply substitution functions are modified-CET functions in which people supply their skills, occupation and rates of participation as a positive function of relative wages. However, unlike a standard CET (or CES) function, the functions are 'modified' to enforce an additional constraint that the number of people is maintained before and after substitution.[14]

[13] For example, at the start and end of each week for this analysis. *Tasman Global* can be run with different steps in time, such as quarterly or bi-annually in which case the markets would clear at the start and end of these time points.

[14] As discussed in Dixon et al (1997), a standard CES/CET function is defined in terms of *effective units*. Quantitatively this means that, when substituting between, say, X_1 and X_2 to form a total quantity X using a CET function a simple summation generally does not actually

Although technically solved simultaneously, the labour market in *Tasman Global* can be thought of as a five-stage process:

1. labour makes itself available to the workforce based on movements in the real wage (that is, it actively participates with a certain number of average hours worked per week)
2. the age, gender and occupations of the underlying population combined with the participation rate by gender by age implies a given supply of labour (the potentially available workforce)
3. a portion of the potentially available workforce is unemployed implying a given available labour force
4. labour chooses to move between occupations based on relative real wages
5. industries alter their demands for labour as a whole and for specific occupations based on the relative cost of labour to other inputs and the relative cost of each occupation.

By default, *Tasman Global*, like all CGE models, assumes that markets clear at the start and end of each period. Therefore, overall, supply and demand for different occupations will equate (as is the case in other markets in the model). In principle, (subject to zero starting values) people of any age and gender can move between any of the 97 occupations while industries can produce their output with any mix of occupations. However, in practice the combination of the initial database, the functional forms, low elasticities and moderate changes in relative prices for skills, occupations etc. means that there is only low to moderate change induced by these functions. The changes are sufficient to clear the markets, but not enough to radically change the structure of the workforce in the timeframe of this analysis.

Factor-factor substitution elasticities in non-technology bundle industries are industry specific and are the same as those specified in the GTAP database[15], while the fuel-factor and technology bundle elasticities are the same as those specified in GTEM.[16] The detailed labour market elasticities are ACIL Allen assumptions, previously calibrated in the context of the model framework to replicate the historical change in the observed Australian labour market over a five year period[17]. The unemployment rate function in the policy scenarios is a non-linear function of the change in the labour demand relative to the reference case with the elasticity being a function of the unemployment rate (that is, the lower the unemployment rate the lower the elasticity and the higher the unemployment rate the higher the elasticity).

A.5 Detailed energy sector and linkage to *PowerMark* and *GasMark*

Tasman Global contains a detailed representation of the energy sector, particularly in relation to the interstate (trade in electricity and gas) and international linkages across the regions represented. To allow for more detailed electricity sector analysis, and to aid in linkages to bottom-up models such as ACIL Allen's *GasMark* and *PowerMark* models electricity generation is separated from transmission and distribution in the model. In addition, the electricity sector in the model employs a 'technology bundle' approach that separately identifies up to twelve different electricity generation technologies:

1. brown coal (with and without carbon capture and storage)
2. black coal (with and without carbon capture and storage)
3. petroleum
4. base load gas (with and without carbon capture and storage)
5. peak load gas
6. hydro
7. geothermal
8. nuclear

equal X. Use of these functions is common practice in CGE models when substituting between substantially different units (such as labour versus capital or imported versus domestic services) but was not deemed appropriate when tracking the physical number of people. Such 'modified' functions have long been employed in the technology bundles of *Tasman Global* and GTEM. The Productivity Commission have proposed alternatives to the standard CES to overcome similar and other weaknesses when applied to internationally traded commodities.

[15] Narayanan et al. (2012).

[16] Pant (2007).

[17] This method is a common way of calibrating the economic relationships assumed in CGE models to those observed in the economy. See for example Dixon and Rimmer (2002).

9. biomass
10. wind
11. solar
12. other renewables.

To enable more accurate linking to *PowerMark* the generation cost of each technology is assumed to be equal to their long run marginal cost (LRMC) while the sales price in each region is matched to the average annual dispatch weighted prices projected by *PowerMark* – with any difference being returned as an economic rent to electricity generators. Fuel use and emissions factors by each technology are also matched to those projected in *PowerMark*. This representation enables the highly detailed market based projections from *PowerMark* to be incorporated as accurately as possible into *Tasman Global*.

A.6 References

Australian Government (2008), Australia's Low Pollution Future: the economics of climate change mitigation, Australian Government, Canberra.

Dixon, Parmenter, Sutton, & Vincent (1997), ORANI: A Multisectoral Model of the Australian Economy.

Dixon, P.B. and Rimmer, M.T. (2002), *Dynamic general equilibrium modelling for forecasting and policy*. Contributions to Economic Analysis 256, North Holland, Amsterdam

Hertel, T. (1997), *Global Trade Analysis: modelling and applications*, Cambridge University Press, Cambridge.

Jakeman, G., Heyhoe, E., Pant, H., Woffenden, K. and Fisher, B.S. (2001), The Kyoto Protocol: economic impacts under the terms of the Bonn agreement. ABARE paper presented to the International Petroleum Industry Environmental Conservation Association conference, 'Long Term Carbon and Energy Management - Issues and Approaches', Cambridge, Massachusetts, 15-16 October.

Narayanan, G., Badri, Angel Aguiar and Robert McDougall, Eds. (2012). *Global Trade, Assistance, and Production: The GTAP 8 Data Base*, Center for Global Trade Analysis, Purdue University.

Pant, H.M. (2007), *GTEM: Global Trade and Environment Model*, ABARE Technical Report, Canberra, June

ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148

ACILALLEN.COM.AU

ABOUT ACIL ALLEN CONSULTING

ACIL ALLEN CONSULTING IS ONE OF THE LARGEST INDEPENDENT, ECONOMIC, PUBLIC POLICY, AND PUBLIC AFFAIRS MANAGEMENT CONSULTING FIRMS IN AUSTRALIA.

WE ADVISE COMPANIES, INSTITUTIONS AND GOVERNMENTS ON ECONOMICS, POLICY AND CORPORATE PUBLIC AFFAIRS MANAGEMENT.

WE PROVIDE SENIOR ADVISORY SERVICES THAT BRING UNPARALLELED STRATEGIC THINKING AND REAL WORLD EXPERIENCE TO BEAR ON PROBLEM SOLVING AND STRATEGY FORMULATION.

EIS Volume 2 Appendix N-2

Project EnergyConnect (South Australian portion) Socioeconomic Assessment

JBS&G

project energy connect

PROJECT ENERGYCONNECT (SOUTH AUSTRALIAN PORTION) SOCIOECONOMIC ASSESSMENT

A Report to JBS&G

22 December 2020

Prepared by

BDO EconSearch

Level 7, BDO Centre, 420 King William Street
Adelaide SA 5000
Tel: +61 (8) 7324 6190
https://www.bdo.com.au/en-au/econsearch

TABLE OF CONTENTS

TABLES

FIGURES

ABBREVIATIONS

DCLW	District Council of Loxton Waikerie
EIS	environmental impact statement
GRP	gross regional product
GSP	gross state product
LGA	local government area
NEM	National Energy Market
NSW	New South Wales
PV	photo voltaic
RISE	Regional Industry Structure and Employment
RIT-T	Regulatory Investment Test for Transmission
SA	South Australia
UCL	Urban Centre and Locality

DOCUMENT HISTORY AND STATUS

Doc Version	Doc Status	Issued To	Qty elec	Qty hard	Date	Reviewed	Approved
1	Draft	Erinn Carter	1 Word 1 PDF	-	11/12/20	JBM	JBM
2	Final	Erinn Carter	1 Word 1 PDF		22/12/20	JBM	JBM

Printed:	22/12/2020 11:13:00 AM
Last Saved:	22/12/2020 11:13:00 AM
File Name:	I:\CLIENTS\JBS&G\ES2051_EnergyConnect Update\Report\PEC_Socioec_Final_201222.docx
Project Manager:	Julian Morison
Principal Author/s:	Heather Bailey, Anders Magnusson and Nick Angelakis
Name of Client:	JBS&G
Name of Project:	Project EnergyConnect Update
Document Version:	2
Job Number:	2051

EXECUTIVE SUMMARY

ElectraNet and Transgrid are collectively exploring options to develop a high capacity interconnector between Robertstown in SA and Wagga Wagga in NSW (Project EnergyConnect) which will form a key infrastructure component of the National Electricity Market. The SA portion of Project EnergyConnect involves the construction of a 330 kV transmission line between Robertstown and the SA-NSW border as well as construction of a new substation approximately 14km north-east of Robertstown.

This document forms a part of the Development Application submission, under the sponsorship of the Department of the Premier and Cabinet, for lodgement with the State Commission Assessment Panel (SCAP) under Section 49 of the *Development Act 1993*.

The main objective of the specialist socioeconomic impact assessment report is to describe the socioeconomic environment in which the Project is set, identify and assess potential impacts, and propose mitigation measures. The information is presented in a manner suitable for the purposes of conducting impact significance assessment and risk assessment required for the EIS.

The assessment approach followed the Impact Assessment Methodology developed for the Project. The Study Area includes key population centres and local towns in proximity to the alignment, and is defined by the following Local Government Areas (LGAs):

- Regional Council of Goyder
- Mid Murray Council
- District Council of Loxton Waikerie
- Berri Barmera Council
- Renmark Paringa Council.

This study focussed on local and regional socioeconomic impacts. The key findings of the Regulatory Investment Test for Transmission completed for the Project have been reported for completeness. These findings describe the broader economic benefits of the Project.

Findings of the Regulatory Investment Test for Transmission

A new interconnector between South Australia and New South Wales is expected to provide a range of benefits:

SA benefits:

- Reduces reliance on high cost gas plants in SA for dispatchable capacity
- Deconcentrates SA wholesale market and adds hedging liquidity
- Reduces SA vulnerability to extreme weather events and system disturbances
- Decrease SA price volatility, through sharing resources across regions

NEM benefits:

- Allows greater exports of embedded generation at times of minimum SA system demand

- Unlocks renewable generation development en-route and allows greater market access[1]
- Reduces electricity prices and affordability concerns through greater supply, diversity and competition

NSW benefits:

- Greater sharing of reserves, providing NSW with access to renewable generation as coal retires.

The new interconnector is expected to place downward pressure on wholesale electricity prices with flow on benefits to customer pricing. Modelling by ACIL Allen estimated an annual average reduction in the representative South Australian customer bills for residential, small business and large customers of $100/yr, $201/yr and $18/MWh respectively.

The flow on effect of the construction of the Project and the reductions in wholesale electricity prices on the wider economy is expected to be substantial, with an expected increase in total gross state product (GSP) over the 21-year period of $2.4 billion in South Australia and $4.0 billion in New South Wales in present value terms. These increases in GSP are the equivalent to a one-off increase in the average real income of all current residents of South Australia by approximately $1,300 per person and of New South Wales by approximately $500 per person.

During construction, the Project is expected to generate approximately 235 regional jobs in total in South Australia (of which approximately 200 fte jobs will be created directly by the Project) and over 800 regional fte jobs in total in New South Wales. Based on the overall economic impact, the Project is expected to create 250 ongoing fte jobs in total in South Australia and 700 ongoing fte jobs in total in New South Wales.

Existing socioeconomic conditions in the Study Area

The following describe the baseline (i.e. existing) demographic and economic conditions that occur in the Study Area.

Demographic profile

Across the Study Area the population has changed very little between 2006 (44,214 persons) and 2016 (44,285 persons), with an increase of 0.2 per cent over that period. All regions in the Study Area have older populations with lower numbers of people in the 20-39 year age bracket relative to South Australia as a whole.

Within the Study Area, the proportion of the population speaking English as a main language has decreased by 0.5 per cent from 93.1 per cent 2006 to 92.6 per cent in 2016.

The proportion of the population with at least secondary education has increased between 2006 and 2016 from 20.1 per cent to 26.1 per cent across the Study Area, an increase of 0.6 per cent. Across the LGAs in the Study Area and the Study Area as a whole, the proportion of the population earning over $104,000 per year has increased from around 1.0 per cent to 2.4 per cent between 2006 and 2016.

[1] For example, the Project could enable the RDA Murraylands and Riverland strategic priority *to support solar and wind power regional investments* (RDAMR 2018).

Economic profile

Within the Study Area, agriculture is the largest employer of people with 21 per cent of employees in the Agriculture, Forestry and Fishing sector (3,527 employed persons from a total of 16,531 employed persons in the Study Area). Overall, employee numbers have increased by 3 per cent in the Study Area between 2006 and 2016. The trends in employee numbers by sector in the Study Area have seen growth in Health Care and Social Assistance, Education and Training and Accommodation and Food Services between 2006 and 2016. Decreases in employee numbers have been observed for Agriculture, Retail Trade and Manufacturing over the same period. Agriculture dominates the contribution to GRP in the Study Area (contributing 31 per cent or approximately $753 million of a regional total of $2,457 million).

The unemployment rate has increased in the Study Area between 2006 and 2018 from 4.9 per cent to 5.6 per cent. The unemployment rate peaked within this period in 2016 when the unemployment rate was 6.2 per cent. The unemployment rate was 5.9 per cent in 2011. The unemployment rate has generally been lower in the Study Area relative to the State, with the exception of 2011 when the agriculture-dominated economy in the Study Area was recovering from the millennium drought and subsequent drought-breaking weather events.

Tourism profile

An estimated 204,400 to 490,700 visitors travel to each LGA in the Study Area each year, totalling almost 1,130,800 visitors. On average, visitors stay half the time in the Study Area (1 night) than in South Australia (2 nights). They also spend less per trip ($180 in the Study Area and $319 in South Australia) and less per night on average ($133 per night in the Study Area and $195 per night in South Australia).

Visitors to the Study Area spend around $8.1 million each year, around $6.0 million of which remains in the region. That expenditure is estimated to generate around 55 fte jobs (including 16 from flow-on effects) and $5.3 million in GRP (including $1.9 million from flow-on effects).

Residential property

Across the Study Area, the number of residential vacancies has declined by 6 per cent between 2014 and 2019 from 88 to 83 vacancies. Across the Study Area, the median weekly rent paid by households has increased by 60 per cent from $115 per week to $184 per week between 2006 and 2016.

House prices in the majority of the LGAs in the Study Area have increased. These LGAs are Loxton Waikerie, Berri Barmera and Renmark Paringa with increases in median house prices of 6 per cent, 27 per cent and 25 per cent respectively between 2014 and 2019. In comparison, median house prices have increased by 4 per cent between 2014 and 2018 in rural South Australia. Median house prices have decreased between 2014 and 2018 in Goyder and Mid Murray by 2 per cent and 1 per cent respectively.

Summary of potential Impacts

Based on the outcomes of the assessment, the Project is expected to have the following potential impacts:

- Major, positive economic and employment impacts are expected on regional and SA economies.
- Major, positive impacts in terms of reduced cost of electricity for households, small business and large electricity consumers, with spill over positive impacts on regional and South Australian economies.
- Negligible impact is expected on labour market competition in the Study Area during construction and no impact is expected during operation. Almost all of the construction labour requirement is highly specialised and will be sourced from outside the Study Area. The small number of workers

sourced from within the Study Area are expected to have negligible and temporary impact on the labour market.

- No impact is expected on social disruption from relocation to residential centres during construction, as there will be none. Negligible impact is expected from workers accommodated at construction camps during construction as any contact will be brief and effectively controlled by the ElectraNet Health, Safety, Environment & Sustainability Policy. No impact is expected during operation.
- Negligible impact is expected on local services during construction as consumption of services by Project workers is expected to be only on a minimal and ad hoc basis. No impact is expected during operation.
- Negligible impact is expected on local businesses during construction as demand for goods and services from local businesses by Project workers is expected to be minimal. No impact is expected during operation.
- New consumption expenditure in the Study Area associated with the Project is expected to provide a positive, minor impact on the regional economy on the scale of around 4 to 13 fte jobs at peak construction activity. No impact is expected during operation.
- No impact on local housing availability or affordability is expected during construction as no use of private accommodation by workers is expected.
- Negligible impact on local price inflation is expected in the Study Area under the worst-case assumptions as the change in proportion of high income earners is expected to be marginal and temporary.
- ElectraNet's Health, Safety, Environment & Sustainability Policy is expected to prevent social disruption by construction workers whilst accommodated in construction camps and when accessing construction sites on rural properties. No impact is expected during operation.
- During construction, sections of rural properties may also become temporarily inaccessible, if access through construction areas or alternate routes are not available. The effect from loss of access is expected to be minor, given the limited extent of works to be performed at a given location. The number, duration and specific location of road restricted construction areas is unknown.
- The construction of the Project could affect the condition of unsealed property access tracks through road wear from additional Project traffic (particularly heavy loads) during the construction phase and through unplanned events (e.g. Project vehicle accidents or bogging) leading to damage to the tracks. These effects, if they occur, are likely to result in nuisance to landholders. Likewise, if these effects occur they could incur costs to pastoralists from having to undertake additional track repair and maintenance. It is expected that the Project will undertake measures to mitigate these effects. Therefore, these impacts are expected to be negligible.
- A negligible to minor loss of amenity is expected by landholders along the transmission line route as a result of changes to the visual aesthetic of the landscape and temporary changes to lifestyle of landholders. During construction, lifestyle and aesthetic effects are expected to come from temporary clearance of vegetation, light spill from the construction camp and exposure to construction activities and workforce. During operation, aesthetic effects are expected to come from permanently cleared vegetation and from the towers and cables of the Project transmission line itself.

- No impact on social cohesion and identity is expected in the Project Area during construction and operation as no Project workers are expected to be accommodated in residential centres during construction and no significant employment is expected during the operation phase.
- Negligible economic impact is expected in the Study Area as a result of visitor activity being affected by construction and operation of the Project.
- Planned investments in the Study Area can be expected to have a minor, positive impact on population in the Study Area during their construction and operation. The size of the impact cannot be verified as the scale and detail of these projects is unknown.
- Planned investments in the Study Area can be expected to have a positive impact on standard of living for the workers and contractors involved in their construction and operation. The size of the impact cannot be verified as the scale and detail of these projects is unknown.
- The presence of the Project transmission line is expected to have minor impact on landholder operations, i.e. potentially affect some aspects of operations for a small number of landholders along the Project transmission line route, as a result of vehicle height and aerial operations restrictions near transmission lines.
- The permanent exclusion of areas along the proposed transmission line is expected to have negligible impact on property value. This quantum of reduction in area is unlikely to require a reduction in stocking rates.
- The permanent exclusion of land for the new substation is expected to require an area of 0.09km^2. ElectraNet has signed an option to purchase agreement with the landholder for the substation site. Appropriate market value will be paid, hence this impact has not been assessed.
- The Project may bisect paddocks or other structures relevant to agricultural enterprise activities, which may restrict access and constrain landholder activities. This may in turn influence the value of the properties. Changes in existing levels of fragmentation as a result of the Project are unlikely for the majority of the properties along the Transmission Line route and the Project is expected to have negligible impact. The transmission line has potential to change the existing levels of fragmentation east of White Dam Conservation Park (approximately 17.5km) and on Hawks Nest Station (approximately 16km) where the transmission line does not follow existing tracks. In these situations the Project has the potential to cause minor impact.
- The Project may lead to restriction of some landholder activities for properties within the Project Transmission line corridor. This may, in turn, lead to an actual or perceived constraint on future developments by enterprises. As the Project is at the preliminary design stage and consultation with affected properties is incomplete, it is not possible to quantify expected effects. The majority of potential development restrictions would apply to less than 0.6 per cent per property within the Project Transmission Line corridor and the Project is expected to have negligible impact.
- A minor impact on loss of land for primary production (or constrained activities) is expected due to investment in renewable energy in the Study Area. The exact location, size and nature of the loss is unknown so the size of the impact cannot be verified.

1. INTRODUCTION

1.1. Background

ElectraNet and TransGrid are collectively exploring options to develop a high capacity interconnector between Robertstown in SA and Wagga Wagga in NSW (Project EnergyConnect) which will form a key infrastructure component of the National Electricity Market. The SA portion of Project EnergyConnect involves the construction of a 330 kV transmission line between Robertstown and the SA-NSW border as well as construction of a new substation approximately 14km north-east of Robertstown.

This document forms a part of the impact assessment documentation prepared for the environmental impact statement (EIS) being prepared for the Project under the major development provisions of the *Development Act 1993* (Section 46).

1.2. Purpose of the Assessment

The main objective of the specialist socioeconomic impact assessment report is to describe the socioeconomic environment in which the Project is set, identify and assess potential socioeconomic impacts, and propose mitigation measures. The information is presented in a manner suitable for the purposes of conducting impact significance assessment and risk assessment required for the EIS and informs the relevant EIS chapters.

The socioeconomic assessment is guided by the State Planning Commission's Guidelines for preparing the EIS for the Project. The assessment report assists with:

- Understanding the existing socio-economic context and provide a benchmark of pre-Project conditions to help predict possible Project induced changes (positive and negative).
- Providing comparative data (i.e. South Australia vs local council) and context to the Project
- Understanding potential impacts and risks to inform suitable mitigation measures
- Providing context for understanding stakeholder feedback.
- Understanding vulnerabilities of stakeholders
- Informing Project design.

The main focus of the assessment is local effects on individuals, communities and economies. The broader impacts of the Project on regional, state and national economies have been addressed in ElectraNet's *SA Energy Transformation RIT-T, Project Assessment Conclusions Report*, and this report summarises the key findings of the regulatory investment test for transmission[2] (RIT-T). A summary of the findings of the RIT-T is provided in this report (Section 3).

1.3. Assessment Area

The area of influence of this Project in terms of socioeconomic values occurs at a number of scales. As highlighted in Section 1.2, the main focus of the assessment is local effects on individuals, communities and

[2] The RIT-T is the economic cost benefit test that is overseen by the Australian Energy Regulator and applies to all major network investments in the national electricity market.

economies. Broader effects occur at the regional, state and national level and have been covered in other studies (the findings of which are summarised in Sections 3, 5.1 and 5.2). At the local level, effects on socioeconomic values occurs to local communities, mainly concentrated within key population centres within local government areas (LGAs), local economies (described at the LGA level) and individual properties that will intersect the Project. For the purposes of this assessment, two scales are defined namely, the Study Area and the Project area, and are described in more detail following.

The Study Area (Figure 1-1 overleaf) includes the key population centres and local towns in proximity to the alignment, and is defined by the following Local Government Areas (LGAs) to describe the regional setting:

- Regional Council of Goyder
- Mid Murray Council
- District Council of Loxton Waikerie
- Berri Barmera Council
- Renmark Paringa Council.

The Project also intersects the unincorporated area of South Australia managed by the Outback Communities Authority. It should be noted that the unincorporated area covers some 63 per cent of the landmass of SA with an estimated resident population of 3,380 persons (Outback Communities Authority, 2019). It does not have any major population centres within 100km proximity of the Project and relevant baseline information for the socioeconomic assessment is limited. As such, the Unincorporated Area has not been included in this assessment.

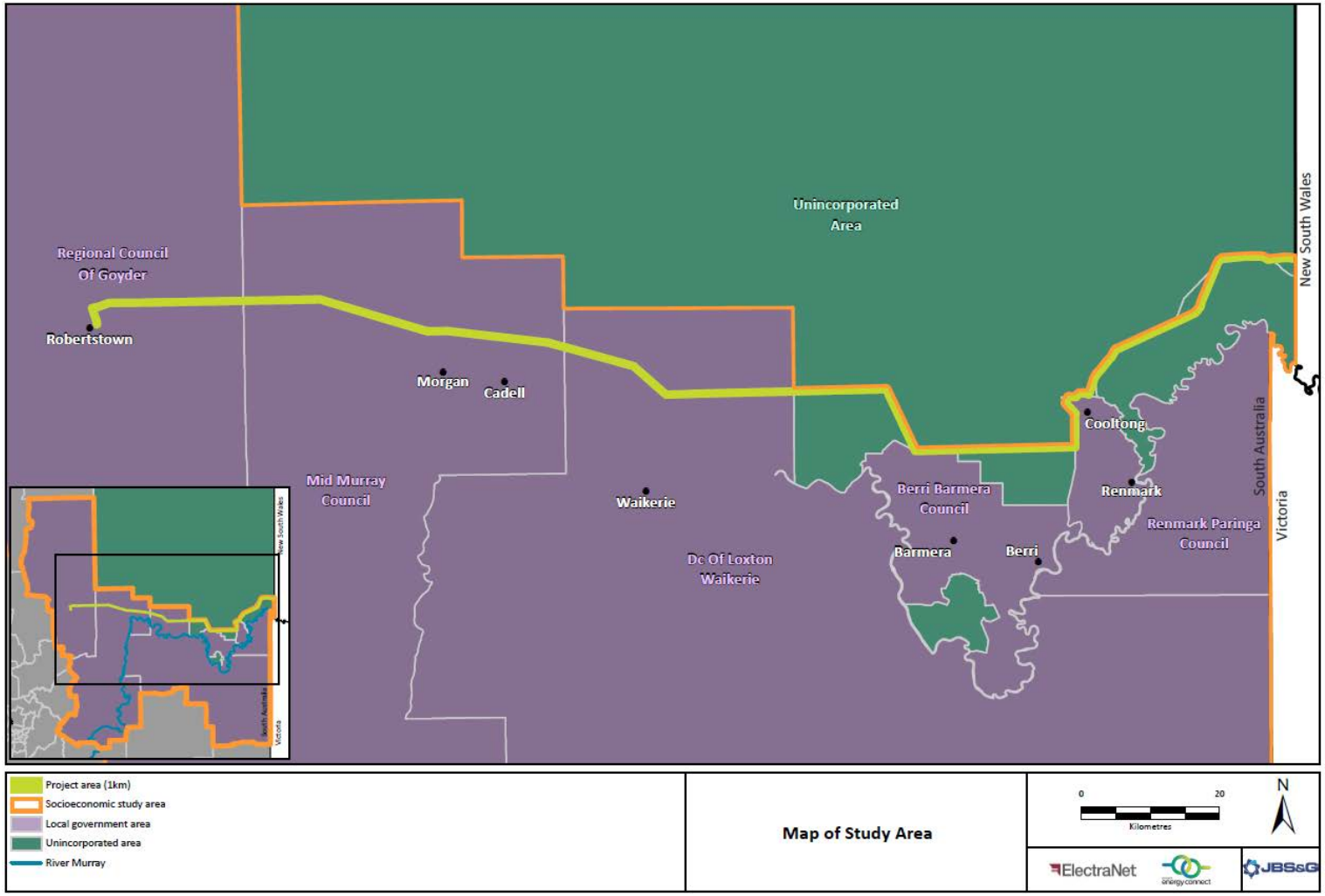
The main population centres considered in the study include the towns of Morgan, Waikerie, Barmera, Berri, and Renmark. There are also several smaller centres primarily located along the banks of the River Murray, along with rural residential properties and private holiday accommodation. The four closest centres to the alignment are Robertstown, Morgan, Cadell and Cooltong. The transmission line corridor is situated in a rural setting, with these population centres located to the south at varying distances (between 1.5km and 6km). The closest location of Cooltong is an irrigated horticulture area with rural residential properties. Local community level and local economy effects were assessed at the Study Area scale.

The transmission line corridor, for the purposes of the EIS, is defined as a 1km corridor (centreline with 500m buffer) and is referred to as the Project Area. The Project Area and all associated Project activities is situated north of all local population centres which surround the Murray river, as shown in Figure 1-1. There are no population centres within or in close proximity to the Project Area. Effects on individual properties that will/may intersect with the Project were assessed at the Project Area level.

1.4. Structure of This Report

An outline of the assessment approach employed in this study is provided in Section 2, a summary of the economic findings of the Regulatory Investment Test for Transmission Study is provided in Section 3, a description of the baseline (existing) conditions is given in Section 4, the pathway modelling and assessment of potential impacts is described in detail in Section 5, and a summary of the socio-economic impacts provided in Section 6.

Figure 1-1 Map of the Study Area



Source: ElectraNet and JBS&G

2. ASSESSMENT APPROACH

The assessment approach is consistent with the Impact Assessment Methodology developed for the Project Environmental Impact Statement (EIS). It involved the following steps:

1. Identify the socioeconomic values that occur in the area of influence[3] of the Project.
2. Identify the potential events that could be caused directly or indirectly by the Project and result in an impact on a socioeconomic value.
3. Consider control measures that could be used to prevent or minimise impacts on a socioeconomic value for each potential impact event.
4. Determine the expected impact on each socioeconomic value and whether this will result in an acceptable socioeconomic outcome.
5. Determine the credible risks to each socioeconomic value and whether these risks will be acceptable.
6. Consider changes needed to the Project design and/or control measures if impacts and/or risks are not acceptable.

2.1. Data Sources and Methods of Analysis

The main data and information sources for this assessment were the demographic, economic, tourism and property profiles presented in the baseline/existing conditions chapter of this report (as referenced within this report), the Project Description prepared for the EIS, other specialist reports and outcomes and feedback from stakeholder and community consultation undertaken for the Project. The pathway effects presented within this report were identified through the Impact Assessment Methodology, as well as additional pathway changes identified by BDO EconSearch during the course of this assessment.

These sources were supplemented by published data as referenced within this report. This information was used to quantify changes in pathways and resulting potential impacts, to provide input to the socioeconomic Impact Assessment chapter of the EIS.

The methods and information sources used, and models developed to assess the pathway effects are described in detail for each pathway change.

BDO EconSearch constructed a Regional Industry Structure and Employment (RISE) economic model of the Study Area to use in a number of analyses in this assessment. Further details of this model are provided in Appendix 2.

2.2. Assessing Expected Impacts

In the context of this assessment, an impact is any change, positive or negative, to social and economic values expected as part of planned activities associated with the construction and operation of the Project. The impact assessment considered the scale, intensity, duration and frequency of impacts and the sensitivity

[3] The area of influence of this Project in terms of socioeconomic values occurs at a number of scales. As highlighted in Section 1.2, the main focus of the assessment is local effects on individuals, communities and economies. Broader effects occur at the regional, state and national level and have been analysed in other studies (the findings of which are summarised in Section 3).

of the receptor. Impacts were assessed with reference to the descriptors in Table 2-1. Assessment categories for land use impacts were also included due to the overlap of issues with socioeconomic issues.

Table 2-1 Categorisation of impact consequence

Category	Socioeconomic	Land use
Negligible	No impact or minor reparable socio-economic impacts on local population	No measurable impact to current or future land uses
Minor	Short-term impacts on local businesses and/or wellbeing of local communities	Minor repairable damage to land or disruption to land use with no compromise to ongoing or future land use
Moderate	Ongoing impacts on the wellbeing of local communities that results in a significant proportion of the community leaving the area and/or significant mental health issues across the community. Ongoing impacts on local businesses that result in closures and (direct and indirect) loss of employment for up to 20 people. Suspension of important community services (e.g. transport, telecommunications, energy) for up to one week.	Damage to land and infrastructure that results in remediation costs and/or loss of income of up to $1 million.
Major	Ongoing impacts on the wellbeing of regional communities that results in a significant proportion of the community leaving the area and/or serious mental health issues across the affected communities. Ongoing impacts to regional businesses that result in closures and (direct and indirect) loss of employment for up to 100 people. Suspension of important community services (e.g. transport, telecommunications, energy) for more than one week.	Damage to land and infrastructure that results in remediation costs and/or loss of income of up to $10 million.
Catastrophic	Complete breakdown of social order. Ongoing impacts to regional businesses that result in closures and (direct and indirect) loss of employment for more than 100 employees and/or towns in the region becoming unviable. Suspension of important community services (e.g. transport, telecommunications, energy) for several weeks or more.	Extensive damage to land or disruption to land use that results in remediation costs and/or loss of income of over $10 million

2.3. Level of Certainty Analysis

Level of certainty analysis of the potential impact estimates was undertaken to determine the relative reliability of the results described in this report, and to justify the acceptance of uncertainty and assumptions. The level of certainty analysis considered four aspects (described in Table 2-2), which were applied as described in the Impact Assessment Methodology chapter of the EIS.

Table 2-2 Rating level of certainty

Level of certainty	Quality of data	Extent to which modelling has been validated	Effectiveness of design measures	Effectiveness of management measures
High	Comprehensive data. Further studies are unlikely to generate additional information that would change the conclusions reached in the impact assessment.	Excellent baseline data available. Model has been run and provides accurate predictions over different seasons. Model has been extensively used and is regarded by discipline experts as leading practice and/or the impact assessment does not rely to any significant extent on the use of a model.	Widely used and demonstrated to be effective at a range of infrastructure sites including sites with similar topographical/climatic conditions. Requires minimal checking and failure risk has been shown to be low.	Management measures are considered routine and used effectively throughout industry. Reduction in the level of impact from an unmitigated level does not rely primarily on the management measures.
Medium	Some site-specific information available to provide ground-truthing of regional desktop information. Further studies could change some of the conclusions reached in the impact assessment.	Some baseline data available. Model shows a reasonable approximation of real conditions but relies on a number of assumptions and sufficient data not available to demonstrate the model accurately portrays seasonal conditions.	Has been used at sites with similar conditions but requires regular checking or maintenance to ensure performance. Has only been used at limited sites. OR Effectiveness has not been established in the long term or at sites similar to the Project site.	Management measures have been effectively used at a limited number of sites and have not been demonstrated at similar sites or in the long term and/or reduction in the level of impact from an unmitigated level relies primarily on the management measures.
Low	Minimal site-specific data available. Reliance on regional desktop studies that may not accurately reflect site conditions. Low level of confidence in the impact assessment.	Minimal baseline data. Model is unable to be validated with current data.	Measures are novel and have not been demonstrated in the field.	Management measures are novel and/or heavily reliant on specialised technical expertise.

3. FINDINGS OF THE REGULATORY INVESTMENT TEST FOR TRANSMISSION

As discussed in Section 1.2, the main focus of the assessment is local effects on individuals, communities and economies. The broader impacts of the Project on regional, state and national economies have been addressed in ElectraNet's *SA Energy Transformation RIT-T, Project Assessment Conclusions Report* (2019), ACIL Allen's *South Australia New South Wales Interconnector, updated analysis of potential impact on electricity prices and assessment of broader economic benefits* (2019) and *Project EnergyConnect, updated analysis of potential impact on electricity prices in South Australia* (2020). A summary of the findings of these reports is provided in this section.

ElectraNet investigated interconnector and network support options aimed at reducing the cost of providing secure and reliable electricity to South Australia in the near term, while facilitating the longer-term transition of the energy sector across the National Energy Market (NEM) to low emission energy sources. As part of this process they were required to complete a RIT-T. The RIT-T is the economic cost benefit test that is overseen by the Australian Energy Regulator and applies to all major network investments in the NEM. As part of this investigation, ElectraNet engaged ACIL Allen to provide estimates of the impact a new interconnector between New South Wales and South Australia would have on wholesale electricity prices and, therefore, on retail electricity bills, for residential and small business customers in South Australia and New South Wales. They were also engaged to estimate the economic impact of the Project on the regional and State economies in SA and NSW as a result of the construction of the Project and the change in retail electricity prices. ElectraNet reengaged ACIL Allen to update earlier estimates of the impact that the Project would have on wholesale electricity prices and on retail electricity bills for residential and business customers in South Australia (2020 report).

Australia's energy markets are undergoing rapid change as the sector transitions to a situation with lower carbon emissions and greater uptake of renewable generation and emerging technologies. These changes have brought with them a number of challenges, including:

- a current reliance on high cost gas plant in South Australia to provide dispatchable capacity; and
- increased variability of demand and supply due to a dominance of intermittent renewable generation (both grid-scale and household PV).

This in turn has led to high wholesale prices in South Australia and a reduction in contract market liquidity, fuelling affordability concerns for customers. In addition, the South Australian region is seen as continuingly vulnerable to extreme weather events and system disturbances.

Going forward, the progressive retirement of around half of the New South Wales coal fleet by 2035 (or sooner) means that alternative low emission supply sources will be required to fill this gap whilst meeting Australia's carbon emissions policy commitments.

A new interconnector between South Australia and New South Wales is expected to provide a range of benefits that help meet these challenges and support this energy transition, namely:

SA benefits:

- Reduces reliance on high cost gas plants in SA for dispatchable capacity
- Deconcentrates SA wholesale market and adds hedging liquidity
- Reduces SA vulnerability to extreme weather events and system disturbances

- Decrease SA price volatility, through sharing resources across regions

NEM benefits:

- Allows greater exports of embedded generation at times of minimum SA system demand
- Unlocks renewable generation development en-route and allows greater market access[4]
- Reduces electricity prices and affordability concerns through greater supply, diversity and competition

NSW benefits:

- Greater sharing of reserves, providing NSW with access to renewable generation as coal retires.

The RIT-T assessment identified the preferred option to be a new 330 kV interconnector between Robertstown in mid-north South Australia and Wagga Wagga in New South Wales, via Buronga and with an augmentation between Buronga and Red Cliffs (the broader Project).

The broader Project was estimated to deliver net market benefits of around $900 million over 21 years (in present value terms)[5], including wholesale market fuel cost savings in excess of $100 million per annum as soon as the interconnector is energised. These fuel cost savings are primarily driven by avoided high-cost South Australian gas generation (ElectraNet 2019a).

The new interconnector is expected to place downward pressure on wholesale electricity prices with flow on benefits to customer pricing. Modelling by ACIL Allen estimated an annual average reduction in the representative South Australian customer bills for residential, small business and large customers of $100/yr, $201/yr and $18/MWh respectively (ACIL Allen 2020, see Table 5-2 for more details).

The flow on effect of the construction of the Project and the reductions in wholesale electricity prices on the wider economy is expected to be substantial, with an expected increase in total gross state product (GSP) over the 21-year period of $2.4 billion in South Australia and $4.0 billion in New South Wales in present value terms (ACIL Allen 2019). These increases in GSP are the equivalent to a *one-off* increase in the average real income of all current residents of South Australia by approximately $1,300 per person and of New South Wales by approximately $500 per person (ACIL Allen 2019).

During construction, the Project is expected to generate approximately 235 regional jobs in total in South Australia (of which approximately 200 fte jobs will be created directly by the Project) and over 800 regional fte jobs in total in New South Wales. Based on the overall economic impact, the Project is expected to create 250 ongoing fte jobs in total[6] in South Australia and 700 ongoing fte jobs in total[5] in New South Wales.

---

4 For example, the Project could enable the RDA Murraylands and Riverland strategic priority *to support solar and wind power regional investments* (RDAMR 2018).

5 The 'business-as-usual' case (i.e. the non-interconnector option), over the same time period, was estimated to deliver a net market *cost* of $80 million (ElectraNet 2019a). This means that the estimated NPV of the new interconnector (the Project) over business as usual is estimated to be approximately $980 million over 21 years.

6 Total fte jobs include both direct employment (i.e. employment created directly as a result of the Project) and indirect employment (i.e. employment stimulated by re-spending by firms (e.g. plant and equipment suppliers, contractors) that receive payments from the sale of goods and services to the Project and additional employment, resulting from re-spending by households that receive income from employment in direct and indirect activities.

4. BASELINE/EXISTING CONDITIONS

The following subsections describe the baseline (i.e. existing) demographic and economic conditions that occur in the Study Area. These profile data inform the socioeconomic impact assessment (Section 5). These profile data are based on more detailed demographic and economic information provided in Appendix 1. The focus of this section is on local government areas (LGAs) and key localities within the Study Area for which Census data are available.

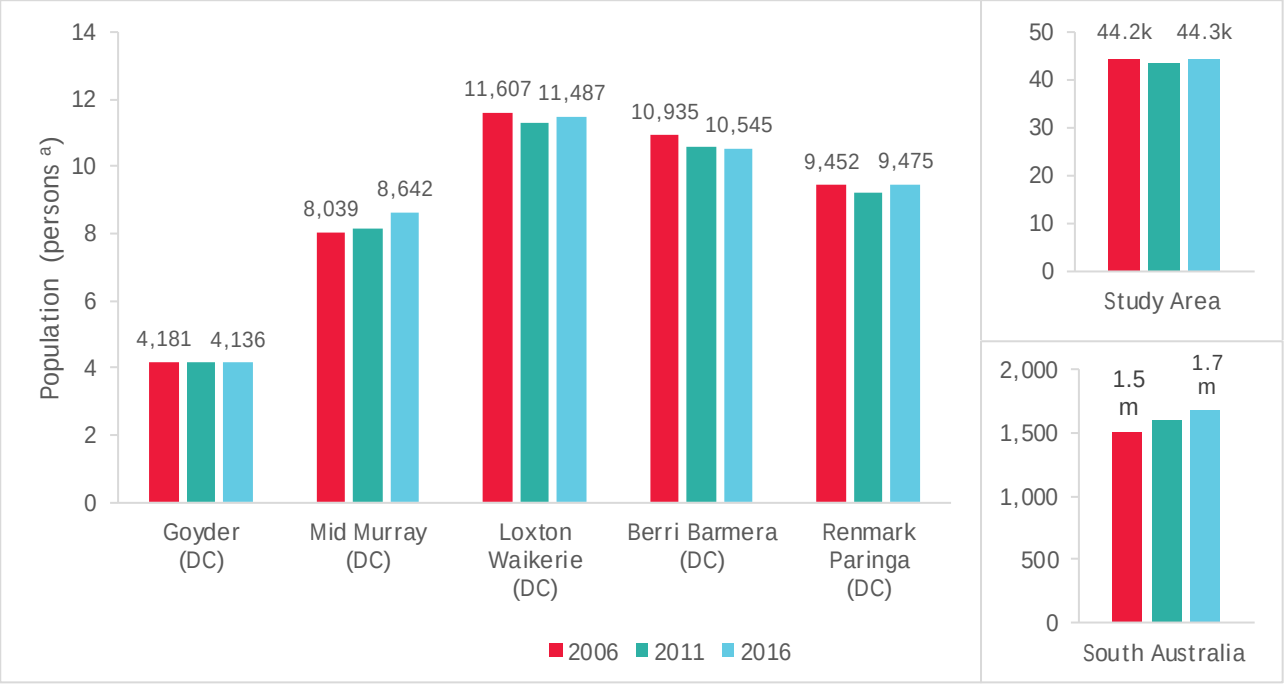
4.1. Regional Demographic Profile

Six demographic indicators inform the socioeconomic impact assessment, namely population, age, gender, language spoken at home, education and proportion of the population earning a high income in the Study Area.

Population trends

The population trend from 2006 to 2016 by LGA in the Study Area is presented in Figure 4-1. These trends are compared with the Study area as whole and with South Australia over the same period.

Figure 4-1 Population trend by region (2006 to 2016)



[a] Persons for LGA; thousand persons for Study Area and million persons for South Australia

Source: ABS 2017

Across the Study Area the population has changed very little between 2006 (44,214 persons) and 2016 (44,285 persons), with an increase of 0.2 per cent over that period. In comparison, South Australia's population has increased by 11 per cent over the same period from approximately 1.51 million persons to approximately 1.68 million persons. Within the Study Area, populations have decreased in Goyder (-1 per cent), Loxton Waikerie (-1 per cent) and Berri Barmera (-4 per cent), remained stable in Renmark Paringa (0.2 per cent increase), and grown in Mid Murray (8 per cent increase). Loxton Waikerie, Berri Barmera and

Renmark Paringa all experienced population decreases between 2006 and 2011 but recovered slightly by 2016 (Figure 4-1).

Similarly mixed trends are apparent at the local level between 2011 and 2016 with small increases in the townships (classified as Urban Centre and Locality (UCL) for Census purposes) Renmark (5.7 per cent), Morgan (3.4 per cent) and Barmera (1.4 per cent) a small decrease in Berri (0.4 per cent) and no change in Waikerie (Table 4-1).

Table 4-1 Population of each UCL within the Study Area

	Urban Centre and Locality (UCL)				
Census Year	Barmera	Berri	Renmark	Waikerie	Morgan
2011	1,913	4,101	4,389	1,635	325
2016	1,939	4,086	4,638	1,635	336

Source: ABS 2017

There is limited information available to explain these population trends at the local scale, however slow growth and population decline in the Riverland has been attributed to the outward migration of residents due to limited opportunities and a decline in irrigation (SA Centre for Economic Studies 2012). Moreover, across the Murray Mallee LGA, smaller towns and more rural areas are losing population at a faster rate than the region as a whole (URS and URPS 2013).

The District Council of Loxton Waikerie (DCLW) has identified the lack of regional development and economic diversification as key drivers for the decrease in population that occurred between 2006 and 2011. Particularly, a significant decrease in the 20-35 year old age group has been noted and the DCLW is attempting to create employment opportunities to encourage this age group to stay in the area (DCLW 2017).

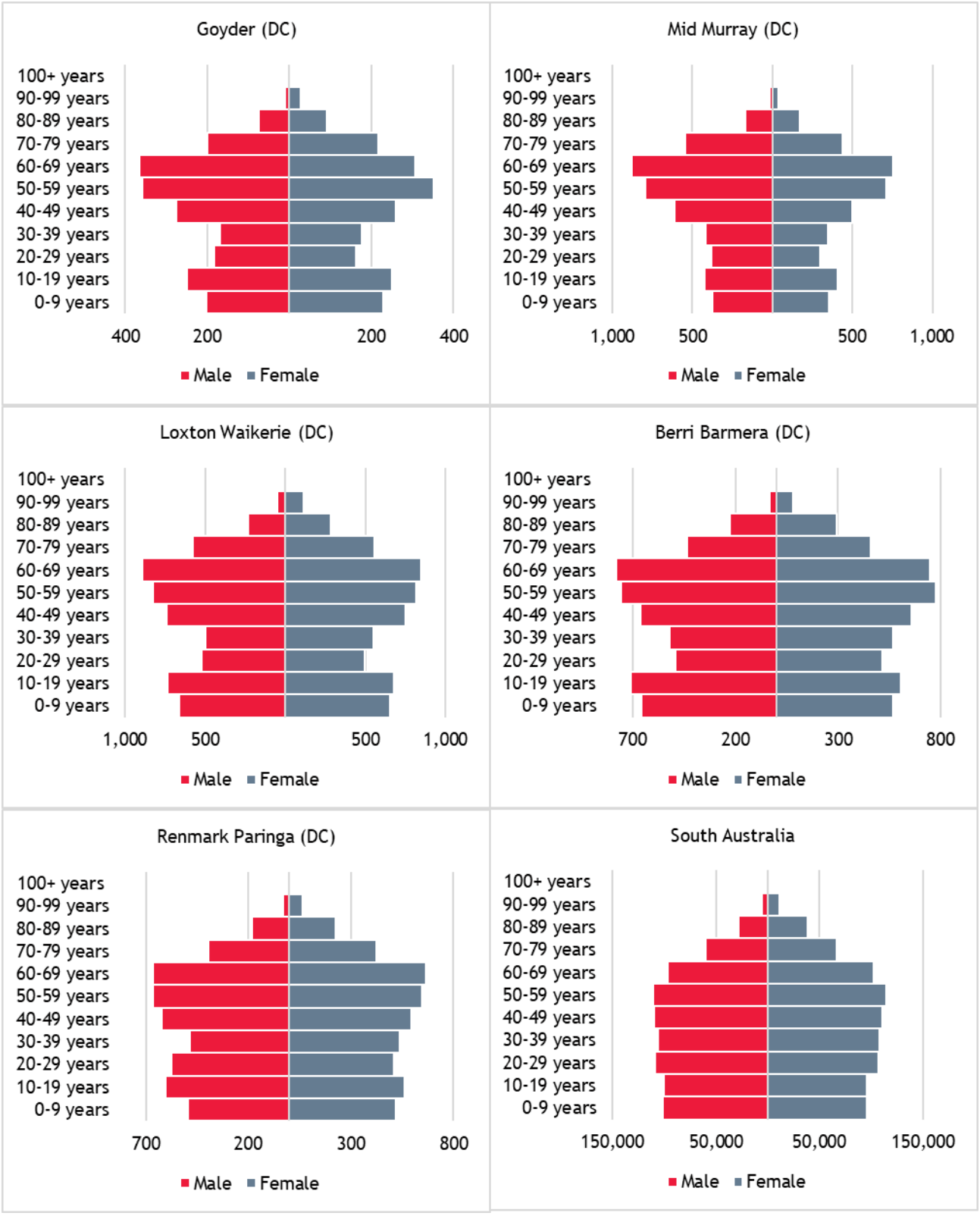
Age and gender trends

Population pyramids that illustrate the age sex distribution for each region in 2016 are shown in Figure 4-2. These distributions are compared with the distribution for South Australia in the lower-right pane.

Figure 4-2 shows that all regions in the Study Area have older populations with lower numbers of people in the 20-39 year age bracket relative to South Australia as a whole. The Mid Murray shows the oldest population with the lowest numbers of young people and children. Loxton Waikerie and Berri Barmera show some evidence of small baby booms with a larger number of children aged 19 and under. Renmark Paringa more closely matches the South Australian distribution which shows a barrel shaped population that indicates a falling birth rate and a rising life expectancy.

The likely explanation for the relatively lower number of people in the 20-39 year age bracket in each LGA in the Study Area is a reflection of wider trends identified across regional Australia as young people seek educational and employment opportunities in regional and metropolitan centres (Luck *et al*. 2010). However, opportunities to encourage counter-urbanisation, where older, urban populations migrate into rural landscapes with high amenity values are also being identified by small regional towns (Luck *et al*. 2010). For example, smaller, dryland and riverside communities in the Murraylands that are attractive to 'tree-changers' are capitalising on those amenity values to attract them to move into the region (URS and URPS 2013). This also contributes to the ageing profile of the population as older people migrate into them.

Figure 4-2 Population pyramid by LGA and South Australia (persons), 2016

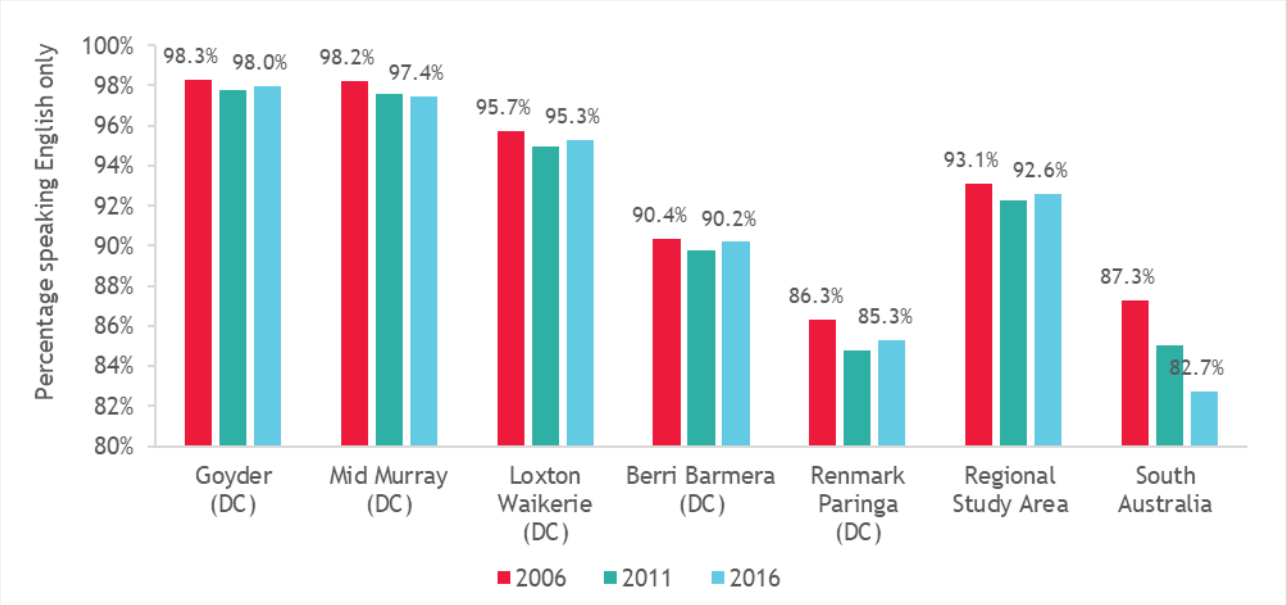


Source: ABS 2017

Trend in language spoken

The English as a main language spoken trend from 2006 to 2016 by LGA in the Study Area is presented in Figure 4-3. These trends are compared with the Study area as whole and with South Australia over the same period.

Figure 4-3 Language spoken trend by region (2006 to 2016)



Source: ABS 2017

Across the Study Area, the proportion of the population speaking English as a main language has decreased by 0.5 per cent from 93.1 per cent 2006 to 92.6 per cent in 2016. At the local scale the percentage of people who speak English at home in Barmera remained unchanged, while a decrease of 1 per cent occurred in Renmark, 3 per cent in Morgan and 4 per cent in Berri and Waikerie, as shown in Table 4-2. In comparison, across South Australia the proportion of the population speaking English as a main language has decreased by 4.6 per cent from 87.3 per cent in 2006 to 82.7 per cent in 2016, a substantially larger decrease than the Study Area. This indicates that the Study Area is diversifying at a slower rate than the rest of South Australia.

Table 4-2 Proportion of population in each UCL in the Study Area who speak English at home

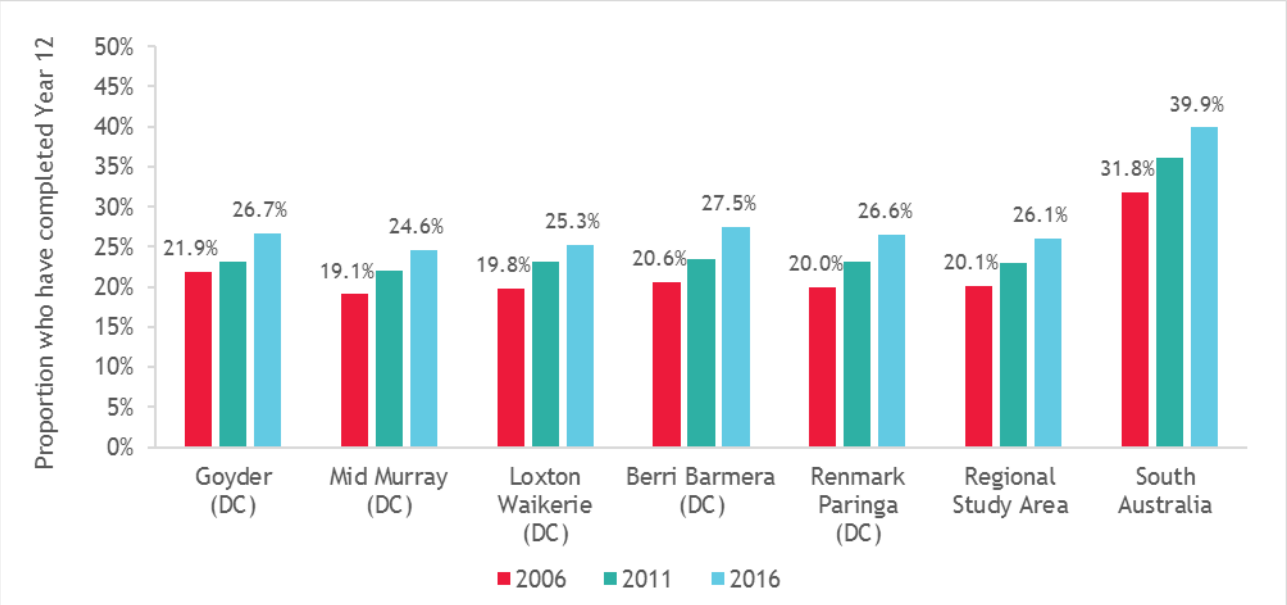
	Urban Centre and Locality (UCL)				
Census Year	Barmera	Berri	Renmark	Waikerie	Morgan
2011	86%	87%	78%	90%	95%
2016	86%	83%	77%	86%	92%

Source: ABS 2017

Trend in education

The proportion of the population with at least year 12 or equivalent education trend from 2006 to 2016 by LGA in the Study Area is presented in Figure 4-4. These trends are compared with the Study Area as whole and with South Australia over the same period.

Figure 4-4 Education trend by LGA (2006 to 2016)



Source: ABS 2017

Across the Study Area, the proportion of the population with at least year 12 or equivalent education has increased between 2006 and 2016 from 20.1 per cent to 26.1 per cent, an increase of 6 per cent. This trend is comparable to the broader increase in the proportion of the population with at least secondary education across South Australia which has increased by 8.1 per cent over the same period from 31.8 per cent to 39.9 per cent.

At the local level, similar upward trends in the proportion of the population completing year 12 schooling are evidenced in Barmera and Berri with a 5 per cent increase, Renmark with a 3 per cent increase and Waikerie and Morgan showing a smaller, 2 per cent increase, as shown in Table 4-3.

Table 4-3 Proportion of population in each UCL in the Study Area who have completed year 12 schooling

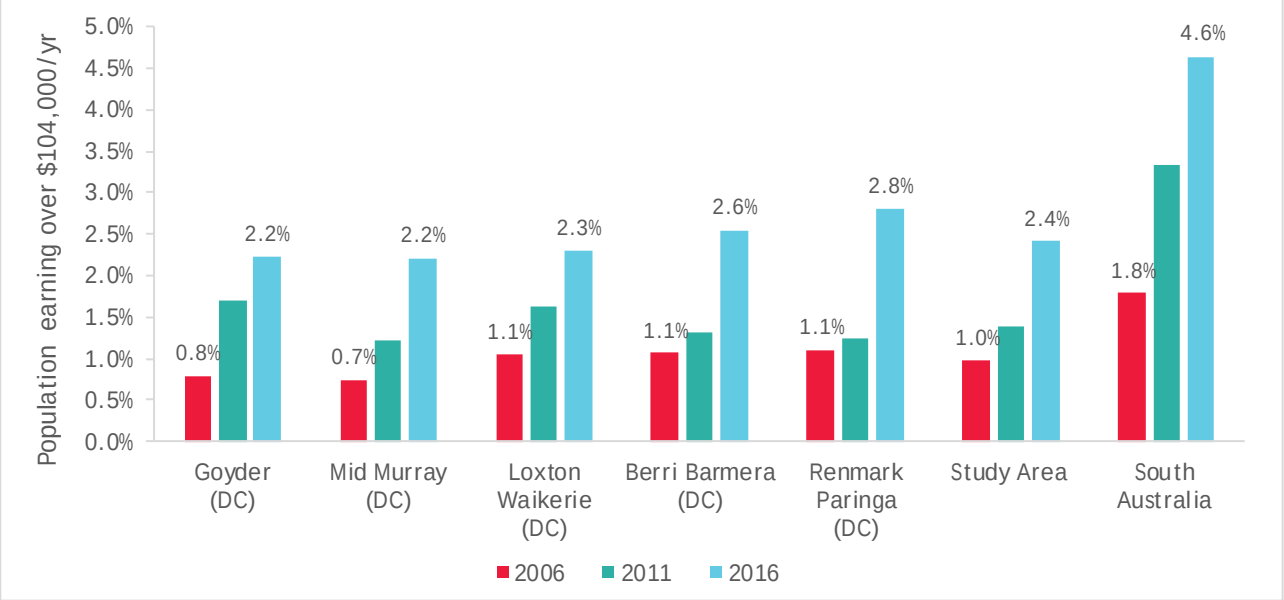
	Urban Centre and Locality (UCL)				
Census Year	Barmera	Berri	Renmark	Waikerie	Morgan
2011	19%	23%	22%	21%	18%
2016	24%	28%	25%	23%	20%

Source: ABS 2017

Trends in proportion of population earning high income

The trends in the proportion of the population earning a high income (over $104,000 per year) from 2006 to 2016 by LGA in the Study Area are presented in Figure 4-5. These trends are compared with the Study area as a whole and with South Australia over the same period.

Figure 4-5 Trend in proportion of population earning high income by region (2006 to 2016)



Source: ABS 2017

Across the LGAs in the Study Area and the Study Area as a whole, the proportion of the population earning over $104,000 per year has increased from around 1.0 per cent to 2.4 per cent between 2006 and 2016. In comparison, in South Australia as a whole the proportion of the population earning a high income has increased from 1.8 per cent to 4.6 per cent, a substantially larger increase than the Study Area.

At the local level, the largest increase of 2.7 per cent occurred in the town of Morgan, where in 2011 none of the population were high income earners. Small increases were also seen in Renmark (1.3 per cent), Barmera (1.2 per cent), Berri (1 per cent) and Waikerie (0.6 per cent), as shown in Table 4-4.

Table 4-4 Proportion of population in each UCL in the Study Area who earn high personal income ($104,000/year or more)

	Urban Centre and Locality (UCL)				
Census Year	Barmera	Berri	Renmark	Waikerie	Morgan
2011	1.0%	1.5%	1.2%	1.1%	0.0%
2016	2.2%	2.5%	2.5%	1.7%	2.7%

Source: ABS 2017

Summary

The population of the Study Area is older, has a lower average weekly income and lower levels of educational attainment than the South Australian average. Moreover, population growth in the Study Area has been flat between 2006 and 2016 at just 0.2 per cent, despite an overall population growth of 11 per cent across South Australia over the same period. There is, however, some regional variation with Mid Murray the only LGA experiencing population growth at 8 per cent.

The population within the Study Area is diversifying more slowly than the rest of South Australia. While the proportion of the population in the Study Area that speaks English as a main language followed the South Australian downward trend, it was a smaller decrease.

Educational attainment in the Study Area is lower than the rest of South Australia. Across the Study Area, the proportion of the population with at least year 12 or equivalent education increased between 2006 and 2016 by 6 per cent. This trend is comparable to the broader increase in the proportion of the population with at least secondary education across South Australia.

There was an increase in the proportion of high income earners across all LGAs in the Study Area, mirroring the wider South Australian trend but at a reduced rate. Renmark Paringa experienced the largest increase in high income earners between 2006 and 2016 at 2.8 per cent.

4.2. Regional Economic Profile

Three economic indicators inform the socioeconomic impact assessment, namely industry of employment, gross regional production (GRP) and unemployment rate in the Study Area. Note that tourism is not a single industry sector rather that it is an activity that draws upon a number of industries such as Accommodation and Food Services, Retail Trade, Transport, etc., and is not described further in this Section. A detailed regional tourism profile is provided in Section 4.3.

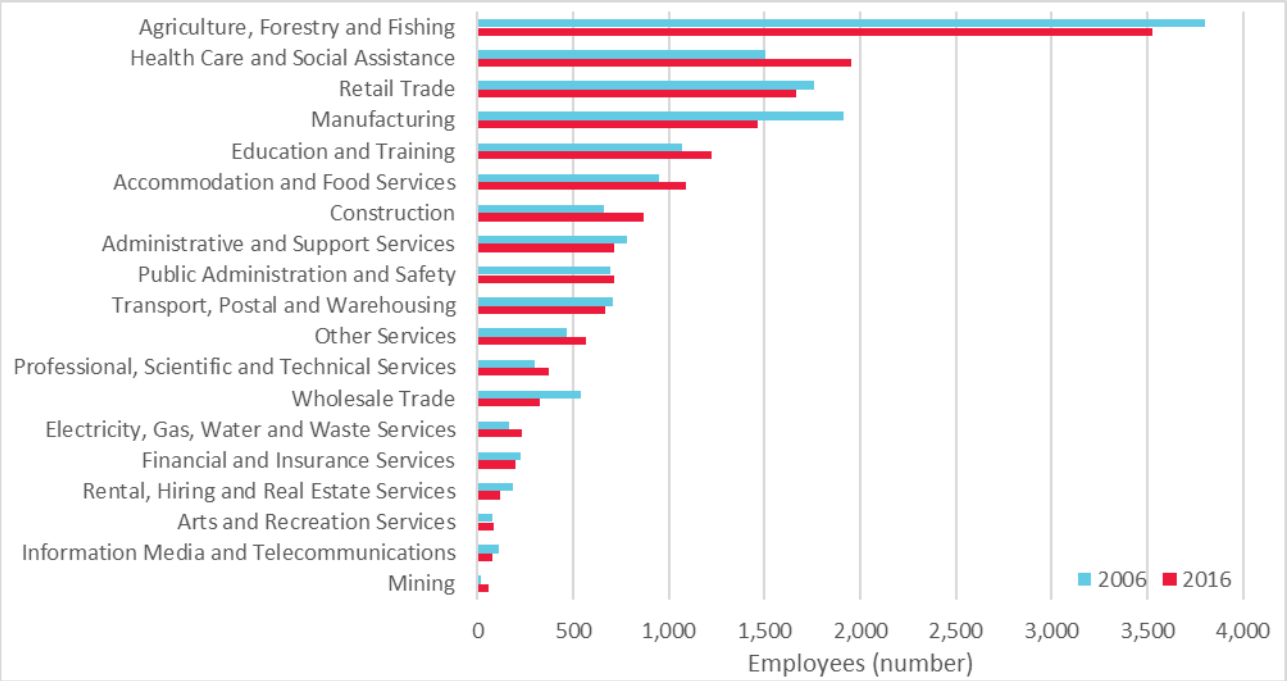
Trends in Industry of Employment

The trends in employee numbers by industry sector between 2006 and 2016 for the Study Area are presented in Figure 4-6. A break down by LGA is provided in Appendix Table 1-3 in Appendix 1. These data are not available/unreliable for UCLs and are not presented.

Within the Study Area, agriculture is the largest employer of people with 21 per cent of employees in the Agriculture, Forestry and Fishing sector (3,527 employed persons from a total of 16,531 employed persons in the Study Area). This is followed by Health Care and Social Assistance (12 per cent of employed persons), Retail Trade (10 per cent of employed persons), Manufacturing (9 per cent of employed persons), Education and Training and Accommodation and Food Services (both 7 per cent of employed persons). These six sectors account for 66 per cent of the employed persons in the Study Area. Overall, employee numbers have increased by 3 per cent in the Study Area between 2006 and 2016.

The trends in employee numbers by sector in the Study Area have seen growth in Health Care and Social Assistance, Education and Training and Accommodation and Food Services between 2006 and 2016. Decreases in employee numbers have been observed for Agriculture, Retail Trade and Manufacturing over the same period.

Figure 4-6 Industry of employment, Study Area (2006 and 2016)



Source: ABS 2017

Gross Regional Product

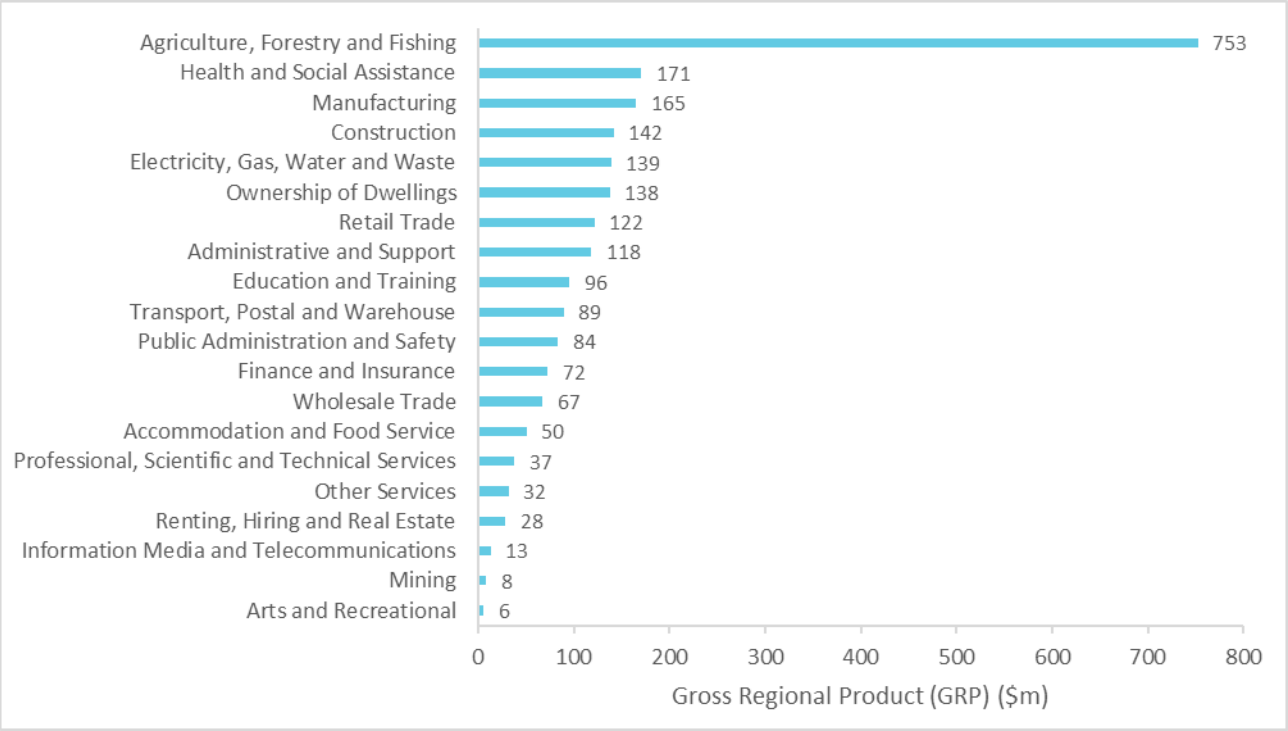
Gross regional product (GRP) is a measure of the net contribution of an activity to the regional economy[7]. Gross regional product is measured as value of output less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as household income plus other value added (gross operating surplus and all taxes, less subsidies). It represents payments to the primary inputs of production (labour, capital and land). GRP estimates are derived from the RISE model developed for the Study Area and are not available for smaller geographies, e.g. LGAs and towns in the Study Area. GRP by industry sector in 2017-18 for the Study Area are presented in Figure 4-7.

From the profile, it can be seen that agriculture dominates the contribution to GRP in the Study Area (contributing 31 per cent or approximately $753 million of a regional total of $2,457 million). This is followed by Health and Social Assistance ($171 million, 7 per cent of GRP), Manufacturing ($165 million, 7 per cent) of GRP), Construction ($142 million, 6 per cent of GRP) and Electricity, Gas, Water and Waste[8] ($139 million, 6 per cent). In aggregate, these sectors contribute $1,370 million to GRP in the Study Area (56 per cent).

7 Similarly, contribution to gross state product (GSP) is a measure of the net contribution of an activity to the state economy.

8 The Electricity, Gas, Water and Waste sector includes generation and supply of electricity to the grid from renewable energy plants.

Figure 4-7 Gross regional product by industry, Study Area ($m), 2017-18



Source: BDO EconSearch analysis

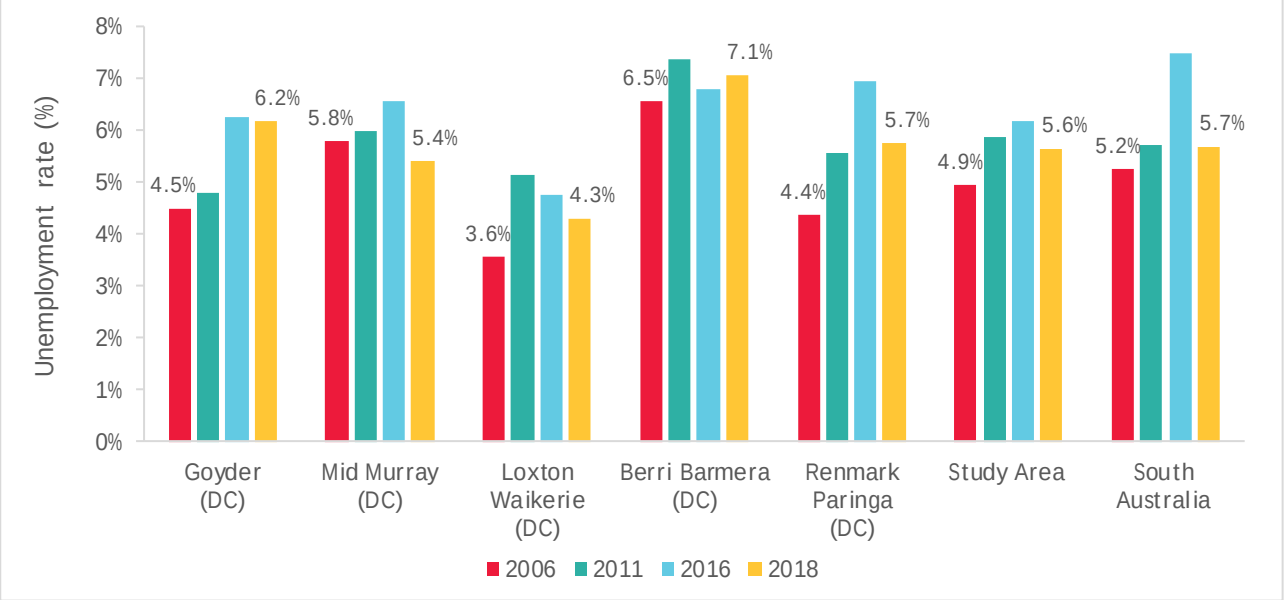
Trends in unemployment rates

The trends in unemployment rates by LGA between 2006 and 2018 for the Study Area are presented in Figure 4-8. These trends are compared with the Study Area as whole and with South Australia over the same period. These data are not available/unreliable for UCLs and are not presented.

The unemployment rate has increased in the Study Area between 2006 and 2018 from 4.9 per cent to 5.6 per cent. The unemployment rate peaked within this period in 2016 when the unemployment rate was 6.2 per cent. The unemployment rate was 5.9 per cent in 2011. In comparison, the unemployment rates in South Australia as a whole were 5.2 per cent, 5.7 per cent, 7.5 per cent and 5.7 per cent respectively. The unemployment rate has generally been lower in the Study Area relative to the State, with the exception of 2011 when the agriculture-dominated economy in the Study Area was recovering from the millennium drought and subsequent drought-breaking weather events.

Between 2006 and 2018, the unemployment rate has been increasing in all of the LGAs in the Study Area with the exception of Mid Murray where the unemployment rate has decreased from 5.8 per cent in 2006 to 5.4 per cent in 2018.

Figure 4-8 Trend in unemployment rate by region (2006 to 2018)



Source: ABS 2017 and DOJSB 2019

Agriculture

The Agriculture, Forestry and Fishing sector is the largest employer and the largest contributor to GRP in the Study Area. It employs the largest proportion of the labour force in the Study Area with 3,527 employees or 21 per cent of the labour force (Figure 4-7). For comparison, these industries employ only 4 per cent of the total South Australian work force (ABS 2017). It also contributes 31 per cent of GRP in the Study Area (Figure 4-8).

Although the wider Riverland region is known for producing high quality fruit and nuts, vegetables, and wine grapes, the proposed alignment does not include any land used for these purposes. Agricultural land use in the Project Area is comprised of sheep and cattle grazing, cropping and feral goat hunting. The primary crops in the area are wheat and barley. There are public roads that many of the landholders use for water, stock patrol and movement of livestock. Aerial activities such as mustering only occurs on one property in the Project Area.

Renewable Energy

There are a number of renewable energy projects in construction or due to start soon near the Study Area (see Table 4-5). The Solar River Project Phase 1 and 2 is located 30km from Robertstown, Stage 1 is expected to commence in 2021 while Stage 2 will commence beyond 2022. The Robertstown Solar project, located 5km north-east of Robertstown, is expected to commence beyond 2022. The start date of a number of other renewable energy projects remains unclear, this includes the Riverland Solar Farm and Storage project (scheduled) located east of Morgan, Berri Barmera Council Solar Project (approved) located on the outskirts of Berri, the Monash REWARD Project (approved) on the outskirts of Monash, and Loxton Solar (proposed) on the outskirts of Loxton.

Table 4-5 Proposed and scheduled renewable energy projects in the Study Area

Tech	Owner	Project	Status	Expected Commencement
Solar	Alt Energy	Solar River Project - Stage 1	Scheduled	Q1 2021
Solar	Alt Energy	Solar River Project - Stage 2	Scheduled	Beyond 2022
Solar	Lyon Group	Riverland Solar Farm and Storage	Scheduled	Unclear
Battery	Lyon Group	Riverland Solar Farm and Storage	Scheduled	Unclear
Solar	Berri Barmera Council	Berri Barmera Council Solar Project	Approved	Unclear
Solar/Hybrid	Gallard Group	Monash REWARD Project	Approved	Unclear
Solar	CleanGen	Loxton Solar	Proposed	Unclear
Solar	EPS	Robertstown Solar	Scheduled	Beyond 2022
Battery	EPS	Robertstown Solar	Scheduled	Beyond 2022

Economic Profile of Local Townships

Barmera

Barmera is located on Lake Bonney on the Murray River. It has a population of 1,939 in 2016 (ABS 2017). The town was gazetted in 1921 in when irrigation was established for vineyards and fruit orchards[9]. It is a dormitory town for the Central Irrigation Trust district. Lake Bonney is an integral part of the offering of the local tourism industry[10].

Berri

Berri is located on the north bank of the Murray River. With a population of 4,086 persons in 2016 (ABS 2017), it is a regional service centre for surrounding horticultural irrigation districts. The town was proclaimed in 1911 when irrigation was established for vineyards and fruit orchards[9].

Renmark

Renmark is located on the banks of the Murray River. With a population of 4,638 persons in 2016 (ABS 2017) it is the largest town in the Study Area. It is also a regional service centre for surrounding horticultural irrigation districts. The settlement was established in 1887 when the Renmark Irrigation Settlement was established by George and William Chaffey. The area is known for the cultivation of grapes, citrus fruits, nut crops (almonds and pistachios), tomatoes, vegetables, wheat and wool.

9 State Library, n.d. *The Manning Index of South Australian History*, Government of South Australia.

10 http://www.murrayriver.com.au/barmera/

Waikerie

Waikerie is located on the south bank of the Murray River. It has a population of 1,635 persons in 2016 (ABS 2017). It is a dormitory town for the surrounding horticultural irrigation district, where citrus, stonefruit and grapes are mainly grown.

Summary

While the Agriculture, Forestry and Fishing sector dominates the Study Area economy, between 2006 and 2016 Agriculture, Retail Trade and Manufacturing have all seen decreases in employee numbers while the Health Care and Social Assistance, Education and Training and Accommodation and Food Services have all seen trends of growth. This suggests that other industries are increasing in importance in the Study Area. Between 2006 and 2018 the unemployment rate in the Study Area has increased from 4.9 per cent to 5.6 percent, with a peak in 2016 at 6.2 per cent. Relative to South Australia the unemployment rate in the Study Area has generally been lower except in 2011 when the dominant agricultural sector was coping with the effects of adverse weather events.

Townships in the Study Area are located near or on the Murray River. Key economic activities for these towns are irrigated agriculture, mainly fruit and winegrapes, wineries and tourism (see Section 4.3). Berri and Renmark are regional service centres.

4.3. Regional Tourism Profile

Tourism in the Study Area can be characterised by the number of visitors, how long they stay and how much they spend. The economic contribution of tourism in the Study Area is driven by expenditure and can be quantified in terms of gross regional product and employment generated by tourism activity.

The Study Area encompasses parts of two South Australian tourism regions, the Murraylands and the Riverland. Many of the tourism activities in these regions centre on the river. For example, activities such as houseboating, kayaking or canoeing and fishing are popular drawcards. Ecotourism is also popular in this region. Stargazing, birdwatching, camping, the Murray River walk and viewing sunrise or sunset at Headings cliffs (Paringa) are key ecotourism activities. The Riverland produce, beverages and events such as the Riverland's dinghy derby also bring visitors to the region.

Many of the towns in the Study Area market these assets and activities to attract tourists. Townships which are not situated directly on the River such as Robertstown draw on local community activities such as events at the Robertstown Oval, which may bring visitors into the town. There is only one accommodation option, the Robertstown Hotel, so many visitors may not stay overnight. Cadell draws visitors to the Cadell Wetlands, a riverfront reserve and scenic walk and a variety of historical monuments. Morgan is a historic town and popular holiday destination on the Murray. Its main tourist attractions are its riverfront reserve, historic wharf, houseboating, water sports, museums and a conservation park. Waikerie also draws tourists with river-related activities and scenery, bird watching, scenic loops, food and wine and houseboating being its main attractions.

Barmera is situated next to Lake Bonney and water sports on the lake are the primary tourist attraction for the town. However, similar to the riverside towns, ecotourism is popular with eco cruises, Chambers creek canoe trail and the Banrock Station wine and wetlands being the town's main ecotourism offerings. Other attractions include the Monash adventure park, historical attractions, a lavender farm and regional food and wine. Berri offers the Murray River National Park - Katarapko, a variety of historical attractions and, as it is a short distance from the Murray River, offers similar attractions to other riverside towns such as canoeing. Although Cooltong does not market itself as a tourist destination, nearby Renmark is a major Riverland

destination. Renmark is known for food and wine, water sports, national parks, eco-tourism such as the golden limestone cliffs, canoeing, camping and fishing, a wildlife park, houseboating, walking trails, tourist drives and historical attractions.

At a local level, Calperum Station and Taylorville Station are pastoral leases situated along the central and eastern section of the Project Area. The properties are important locally, nationally and internationally because of their intact mallee vegetation, populations of threatened bird species, and their wetlands and related species. Both stations provide opportunities for educational (including schools) and training programs and recreational activities including camping, picnicking, bush walking, canoeing and bird watching (DAWE, 2020).

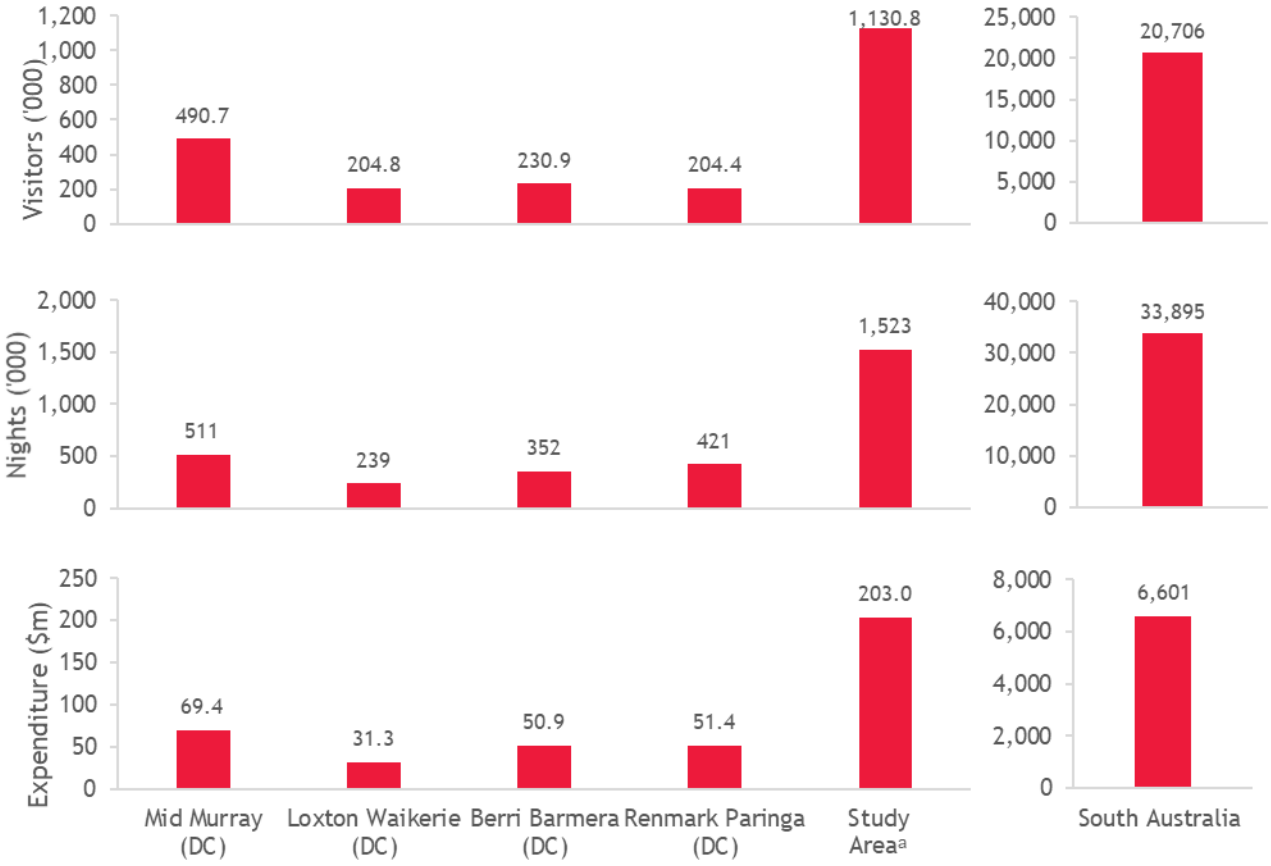
The Project Area also passes through Chowilla game reserve and regional reserve, which is situated 50 km north of Renmark. It comprises floodplain and wetland regions along the River Murray, and forms part of the Bookmark Biosphere Reserve. Activities offered include camping, bush walking trails, canoeing and fishing (SATC, 2020).

Visitors, nights and expenditure

Tourism profiles for most LGAs in Australia are published by Tourism Research Australia. Profiles are available for all LGAs in the Study Area except Goyder that present the average of the four years to 2017. Total visitors, nights and expenditures in each LGA, the Study Area and South Australia, based on these profiles, are presented in Figure 4-9. An estimated 204,400 to 490,700 visitors travel to each LGA in the Study Area each year, totalling almost 1,130,800 visitors.

Mid Murray is the most popular of these (490,700 visitors). Mid Murray also accommodates the greatest number of nights stayed each year (511,000 nights) and greatest amount of visitor expenditure ($69.4 million) out of the total 1,523,000 nights and $203 million expenditure for the Study Area.

Figure 4-9 Total visitors, nights and expenditure by tourists



[a] Study Area excludes Goyder for this chart.

Source: TRA 2018a-e

Figure 4-10 presents intensities calculated from the totals in Figure 4-9 to highlight relative differences within the Study Area and between the Study Area and rest of South Australia. On average, visitors stay half the time in the Study Area (1 night) than in South Australia (2 nights). They also spend less per trip ($180 in the Study Area and $319 in South Australia) and less per night on average ($133 per night in the Study Area and $195 per night in South Australia). This describes the average visit to the Study Area as shorter and relatively low spend.

International visitors to Renmark Paringa stay, on average, almost twice as long as visitors to the Study Region as a whole. They also spend more per trip but less per night when averaged out across the whole trip. This is likely to be related to the demand for backpacker labour for fruit picking in the Riverland.

Figure 4-10 Average stay and spend per visitor

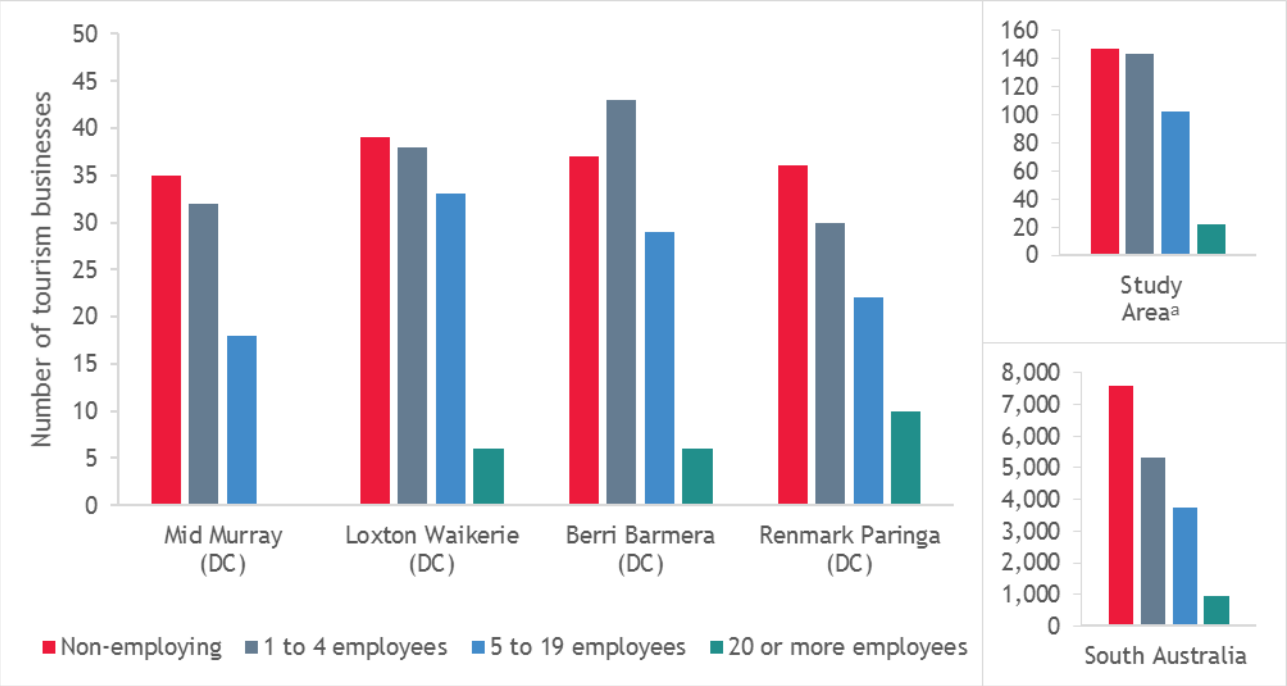
[a] Study Area excludes Goyder for this chart.

Source: TRA 2018a-e

Tourism businesses

The distribution of tourism businesses in terms of number of employees is presented in Figure 4-11. The distribution is similar between the LGAs, Study Area and South Australia except that Mid Murray has no tourism businesses employing over 20 people.

Figure 4-11 Tourism businesses by region in the Study Area



[a] Study Area excludes Goyder for this chart.

Source: TRA 2018a-e

Economic contribution

Economic contribution of tourism in the Study Area is driven by expenditures in the region by visitors. Economic contribution is conceptualised as additional gross regional product (GRP) and employment occurring directly due to visitor activity and from the associated flow-on effects:

- Direct - when visitors spend at local businesses, generating value and employment.
- Flow-on - when those businesses spend at their suppliers in order to meet the demand by visitors and when employees of all affected businesses spend their wages within the region.

Total economic contribution is the sum of direct and flow-on effects. A RISE economic model of the Study Area was developed to model the economic contribution of tourism. The model is based on an input-output table that describes the interlinkages between industries in the Study Area using 78 sectors. Given expenditure by visitors, the model can estimate the likely economic contribution to the whole region in terms of gross regional product (the regional equivalent to GDP or gross domestic product) and employment (measured in fte or full-time equivalents).

Visitors to the Study Area spend around $8.1 million each year (Figure 4-9). After removing expenditure that leaks outside of the region as imports, around $6.0 million in expenditure remains. That expenditure is estimated to generate around 55 fte jobs (including 16 from flow-on effects) and $5.3 million in GRP (including $1.9 million from flow-on effects). The five sectors that receive the highest contribution are identified in Table 4-6, retail trade receives the highest contribution (16 fte jobs and $1.1 million GRP), followed by accommodation (11 fte jobs and $0.8 million GRP) and food and beverage services (8 fte jobs and $0.4 million GRP).

Table 4-6 Economic contribution of Tourism to the Study Area

Sector (top 5 employment)	Local Expenditure ($)	Employment (fte)			Gross Regional Product ($m)		
		Direct	Flow-on	Total	Direct	Flow-on	Total
Retail Trade	1.3	14	3	16	0.9	0.2	1.1
Accommodation	1.6	11	0	11	0.8	0.0	0.8
Food & Beverage Services	0.9	7	1	8	0.4	0.1	0.4
Road Transport	0.2	1	1	2	0.1	0.1	0.2
Cultural & Recreational Serv	0.2	2	0	2	0.1	0.0	0.1
All other sectors	1.8	4	11	15	1.0	1.6	2.6
Total	6.0	39	16	55	3.3	1.9	5.3

Source: BDO EconSearch analysis

Summary

The Study Area encompasses parts of both the Murraylands and Riverland tourism regions in South Australia. The Mid Murray LGA accommodates the greatest number of visitors, nights stayed and visitor expenditure in the Study Area. This may be a result of its proximity to Adelaide. Visitors usually stay between 1-2 nights in the Study Area and spend around $180 per trip. This is similar to the average stay across South Australia with an average of 2 night stays, however the average trip spend is somewhat lower in the Study Area as the South Australian average is $319. Tourism businesses are similar across the Study Area and in comparison to South Australia. Visitors to the Study Area spend around $8.1 million each year which generates around 55 fte jobs (including 16 from flow-on effects) and $5.3 million in GRP (including $1.9 million from flow-on effects). The three sectors that receive the highest contribution are retail trade (16 fte jobs and $1.1 million GRP), accommodation (11 fte jobs and $0.8 million GRP) and food and beverage services (8 fte jobs and $0.4 million GRP). Although important locally, tourism does not play a big role across the Study Area in terms of contribution to GRP (i.e. tourism activities contribute $5.3 million in GRP compared with Agriculture, which contributes approximately $753 million to GRP in the Study Area).

4.4. Residential Property

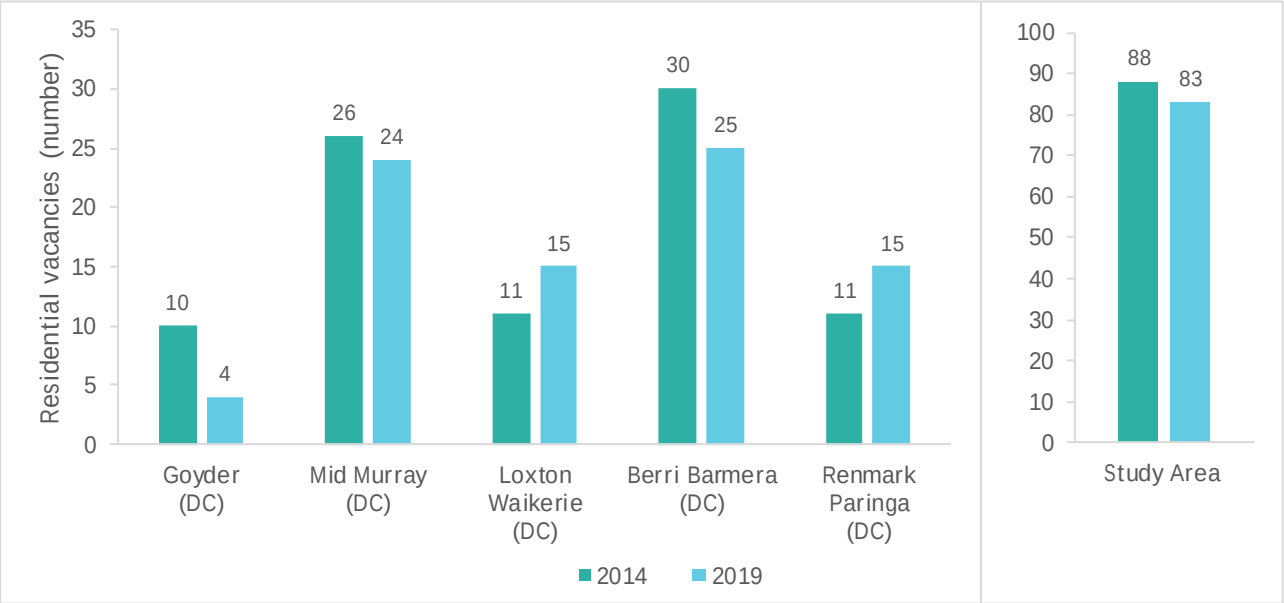
Three residential property indicators inform the socioeconomic impact assessment, namely residential vacancies, house prices and median weekly rent in the Study Area.

Residential vacancies

The trends in residential vacancies by LGA between 2014 and 2019 are presented in Figure 4-12. These trends are compared with the Study Area over the same period.

Across the Study Area, the number of residential vacancies has declined by 6 per cent between 2014 and 2019 from 88 to 83 vacancies. This masks a mixed picture at the LGA level, with Loxton Waikerie and Renmark Paringa experiencing a 36 per cent increase, albeit off a low base of 11 vacancies each in 2014. Goyder, Mid Murray and Berri Barmera experienced declines of 60 per cent, 8 per cent and 17 per cent respectively. Goyder has the lowest number of vacancies with 10 vacancies in 2014 and 4 vacancies in 2019.

Figure 4-12 Trend in residential vacancies by region (2014 and 2019)

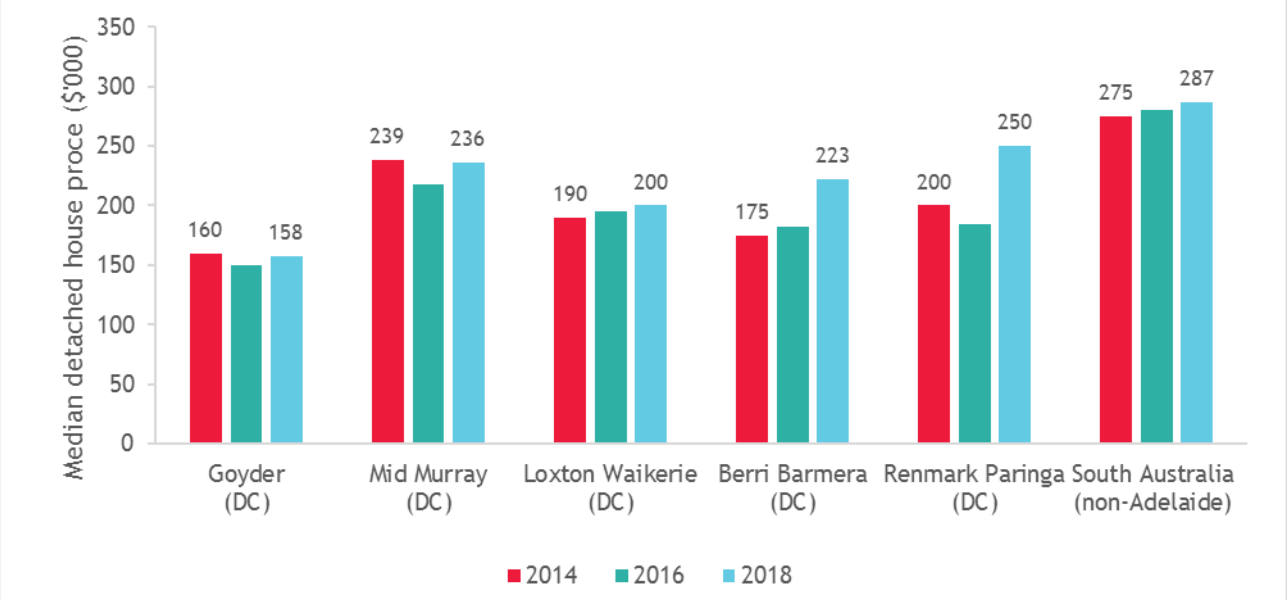


Source: SQM Research 2019

House prices

The trends in detached house prices by LGA between 2014 and 2018 are presented in Figure 4-13. These trends are compared with the non-Adelaide area of South Australia over the same period.

Figure 4-13 Trend in median detached house price by region (2014 to 2018)



Source: CoreLogic 2019

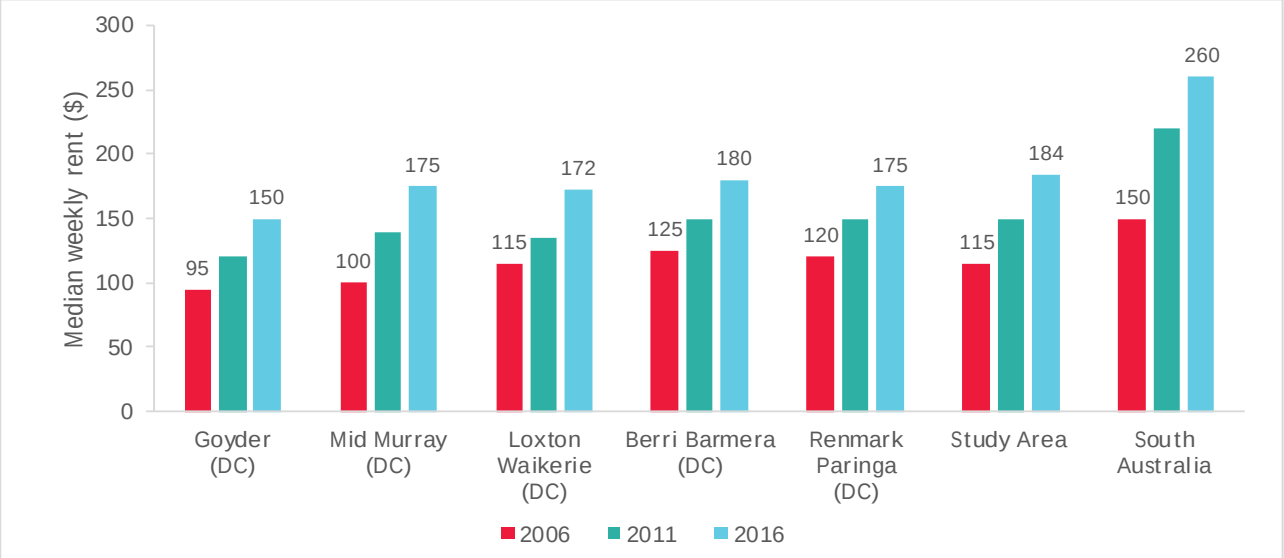
Similar to rural South Australia, house prices in the majority of the LGAs in the Study Area have increased. These LGAs are Loxton Waikerie, Berri Barmera and Renmark Paringa with increases in median house prices of 6 per cent, 27 per cent and 25 per cent respectively between 2014 and 2019. In comparison, median

house prices have increased by 4 per cent between 2014 and 2018 in rural South Australia. Median house prices have decreased between 2014 and 2018 in Goyder and Mid Murray by 2 per cent and 1 per cent respectively.

Weekly rent

The trends in median weekly rent by LGA between 2006 and 2016 are presented in Figure 4-14. These trends are compared with the Study Area[11] and South Australia over the same period.

Figure 4-14 Trend in median weekly rent by region (20106 to 2016)



Source: ABS 2017

Across the Study Area, the median weekly rent paid by households has increased by 60 per cent from $115 per week to $184 per week between 2006 and 2016. By comparison, in South Australia as a whole the median weekly rent has increased by 73 per cent from $150 per week to $260 per week over the same period.

At the LGA level increases in median weekly rent from 2006 to 2016 range from 44 per cent in Berri Barmera to 75 per cent in Mid Murray. The lowest median weekly rents are paid in Goyder ($150 per week in 2016) and the highest median weekly rents are paid in Berri Barmera ($180 per week in 2016).

Summary

Across the Study Area residential property has become more expensive to rent and buy, mirroring trends across rural South Australia. There were however, regional differences in the number of residential vacancies across the Study Area. Berri Barmera and Renmark Paringa had substantial increases in median house prices of 27 per cent and 25 per cent respectively between 2014 and 2019. In comparison, median house prices have increased by 4 per cent between 2014 and 2018 in rural South Australia. Median weekly rent has increased by 60 per cent across the Study Area between 2006 and 2016, this is comparable to average increases across South Australia of 73 per cent.

[11] Study Area statistical geography: Murray Lands Statistical Division (2006) and Murray and Mallee Statistical Area Level 3 (2011 and 2016). These are the nearest equivalent statistical geography areas to the Study Area.

5. POTENTIAL IMPACTS

Potential positive and negative impacts, i.e. events associated with the Project that may impact directly or indirectly on regional socioeconomic values, were identified and are summarised in Table 5-1. Detailed analysis and results for each of these potential impacts is described in the sub-sections following.

Table 5-1 Potential impacts of the Project on socioeconomic values

Report Section	Source	Receptor	Potential Impact	Guidelines Reference
5.1	Project construction activities and Project Infrastructure	State and Regional economy	Capital expenditures to build the Project will result in direct and indirect positive impact to regional and state economies, including employment	2.8
5.2	Project operation	Electricity consumers in SA	Greater interconnection between electricity suppliers as a result of the Project increases reliability of electricity supply and increases supply competition leading to greater reliability and lower electricity wholesale prices	2.9, 2.13
5.3	Project job creation	Local employers	Job creation in the Study Area during construction reduces the availability of labour for existing businesses, which could lead to a short-term increase in wage costs, or shortage of specific skills.	2.10, 9.4
5.4	Project construction workers and contractors	Local towns residents	Relocation of construction workers to residential centres and construction camps in the Study Area has the potential to cause social disruption and conflict.	2.10
5.5	Project construction workers and contractors	Local town services	Relocation of construction workers to residential centres in the Study Area has the potential to put strain on local services (such as social and medical services), reducing their availability to existing residents.	2.10
5.6	Project construction workers and contractors	Local town businesses	Relocation of construction workers to residential centres in the Study Area has the potential to put strain on local business, which may cause shortages of basic services to these communities (for example retail and recreation).	2.10, 9.4
5.7	Project construction workers and contractors	Local town businesses	Relocation of workers and establishment of a relatively highly paid workforce brings opportunities for expansion of local business/services.	2.10, 9.4
5.8	Project construction workers and contractors	Local housing	Relocation of labour sourced outside of the region may put pressure on local rental accommodation markets, making housing less available and affordable to existing residents during construction.	2.10, 9.4
5.9	Project construction workers and contractors	Local prices of goods and services	The establishment of a relatively highly paid workforce within regional townships influences inflation of prices for goods and services.	2.10, 9.4
5.10	Project construction activities and Project Infrastructure	Local communities	Changes to primary industries/demographics may cause loss of social cohesion and community identity.	9.1

Report Section	Source	Receptor	Potential Impact	Guidelines Reference
5.11	Project construction activities and Project Infrastructure	Local tourism operators	Project may cause loss of income / lower standard of living via reduced tourism from changes in amenity.	2.11
5.12	New investment in region	Local communities	Investment in the Project and potential renewable energy generation projects (enabled by the Project) may reverse population decline amongst the local communities.	2.12
5.13	New investment in region	Local communities	More money coming into the area may increase standard of living amongst the local communities.	2.12
5.14	Project construction workers and contractors	Rural enterprises on transmission line	Increased access by construction personnel to Project construction sites and camp located within rural properties during construction has the potential to cause social disruption.	2.3
5.15	Project construction activities	Rural enterprises on transmission line	Project construction activities could lead to temporary disruption of landholder activities.	2.3
5.16	Project construction activities and Project Infrastructure	Rural enterprises on transmission line	Project may cause a loss of amenity for landholders through changes to the visual aesthetic of the landscape and restricting lifestyle activities.	2.3
5.17	Project infrastructure	Rural enterprises on transmission line	Transmission line clearance requirements disrupts landholder operations by limiting vehicle access below the transmission line. Presence of transmission line disrupts landholder operations by affecting aerial mustering (or other aerial activities) near the transmission line.	2.3
5.18	Project infrastructure	Rural enterprises on transmission line	Permanent loss of land as a result of Project infrastructure may be perceived to, or may actually, constrain landholders' activities in conducting their agricultural businesses.	2.5, 2.6
5.19	Project easements	Rural enterprises on transmission line	Restriction of certain activities on Project easements may be perceived to, or may actually, constrain landholders' activities in conducting their agricultural businesses.	2.4, 2.5, 2.6
5.20	Project easements	Rural enterprises on transmission line	Project activities may be perceived to, or may actually constrain landholders' activities in conducting their agricultural businesses with respect to future developments.	2.4, 2.5, 2.6
5.21	New investment in region	Rural enterprises on transmission line	Cumulative impact of other infrastructure projects proposed for the region (such as the increase in renewable energy generation anticipated) may cause a loss of land for primary production purposes.	2.7

5.1. Project Capital Expenditure Effects on Regional/SA Economies

5.1.1. Description of potential impact

Capital expenditures to build the Project will result in direct and indirect positive impact to regional and South Australian economies, including employment.

5.1.2. Control measures

None.

5.1.3. Impact analysis

Results of impact assessment

The capital expenditures made to construct the Project in South Australia are expected to have major direct and indirect positive impact to the regional economy[12] and the SA economy. It is estimated that the Project construction activities would have the following impacts:

Host region

- Contribution to total[13] GRP of approximately $45m
- Contribution to total real regional income of approximately $82m
- Contribution to total employment of 235 full-time equivalent (fte) jobs (200 fte jobs employed directly by the Project)

South Australia

- Contribution to total GSP of approximately $113m
- Contribution to total real state income of approximately $186m
- Employment impacts similar to the regional economy employment impacts.

Supporting information and analysis

The supporting information and analysis is taken from ACIL Allen's assessment of the Project's potential impact on electricity prices and broader economic effects (ACIL Allen 2019).

To provide information on the broader economic impacts potentially arising from the addition of a new interconnector between South Australia and New South Wales (the Project) ACIL Allen undertook computable general equilibrium (CGE) modelling[14]. Modelling was conducted for South Australia and the region within SA that will 'host' the interconnector. The capital expenditures with and without the Project were analysed using CGE modelling. The differences between the economic projections with and without the interconnector provided a forecast of the total economic impacts the Project will have.

---

[12] Described by ACIL Allen (2019) as regions that host the proposed transmission line. The definition of the region was not provided.

[13] Total impacts are the sum of direct and indirect economic contributions. Direct economic contributions arise from value added and taxes less subsidies. Indirect economic contributions take account of supply chain, factors of production, crowding out and productivity impacts (see Figure 4.1 in ACIL Allen 2019).

[14] The analysis used ACIL Allen's CGE model, Tasman Global. Tasman Global is a multi-sector dynamic model of the Australian and world economy. For an overview of the model see Appendix A of ACIL Allen (2019).

The metrics reported from the CGE analysis were:

- *Real economic output (as measured by real Gross Regional Product (GRP) and real Gross State Product (GSP))*: GRP/GSP is defined as the sum of value added by all producers who are within the region/state, plus any product taxes (minus subsidies) not included in output. A positive deviation (i.e. an increase) of real economic output by the Project from the Reference Case (i.e. without Project scenario) implies that the proposed investment will enable the economy to produce more real goods and services potentially available for consumption.
- *Real income*: The change in real income is a measure of the change in economic welfare of the residents of the region, state or country. The change in real income is equal to the change in real economic output plus the change in net foreign income transfers plus the change in terms of trade. In contrast to measures such as real economic output, real income accounts for any impacts of foreign ownership and debt repayments as well as changes in the purchasing power of residents as a result of a project or policy.
- Employment.

The results of their analysis indicated that during the first 2 years of their analysis, the Project construction activities would have the following impacts:

Host region

- Contribution to total[15] GRP of approximately $45m
- Contribution to total real regional income of approximately $82m
- Contribution to total employment of 235 full-time equivalent (fte) jobs (200 fte jobs employed directly by the Project)

South Australia

- Contribution to total GSP of approximately $113m
- Contribution to total real state income of approximately $186m
- Not provided, but stated that "these jobs are mostly created during the construction phase in the host region".

5.1.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Project specific primary data used (High). Quality and industry standard secondary data used (High).
Extent to which modelling has been validated	High	Industry Standard method (High)

[15] Total impacts are the sum of direct and indirect economic contributions. Direct economic contributions arise from value added and taxes less subsidies. Indirect economic contributions take account of supply chain, factors of production, crowding out and productivity impacts (see Figure 4.1 in ACIL Allen 2019).

Component	Ranking	Notes
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.2. Electricity Price Effects on Consumers and /Economies

5.2.1. Description of potential impact

Greater interconnection between electricity suppliers as a result of the Project increases reliability of electricity supply and increases supply competition leading to greater reliability and lower electricity wholesale prices.

5.2.2. Control measures

None.

5.2.3. Impact analysis

Results of impact assessment

It is expected that the Project will have major, positive impacts for electricity consumers within South Australia; and the spill over effects of electricity prices on regional and SA economies is expected to have major, positive impacts.

Greater interconnection between electricity suppliers as a result of the Project will increase reliability of electricity supply and supply competition leading to greater reliability and lower electricity wholesale prices. It is estimated that the operation Project will enable the following impacts:

Electricity price effects for electricity consumers

In nominal terms, over the period to 2030, it is expected that the annual representative residential customer bill would reduce on average by $100 in South Australia, with a corresponding reduction of $201 for small businesses. Larger customers are projected to save approximately $18 per MWh over the time period in net terms, with their total bill impacts varying depending on their usage.

Spill over effects of electricity prices on regional and SA economies

Based on modelling undertaken by ACIL Allen in 2018 (ACIL Allen 2019), the effects of the downward pressure on wholesale electricity prices on the broader economy is expected to have the following impacts:

Host region

- Contribution to GRP of approximately $36m in total[16] in present value at 7 per cent discount rate and $48m in present vale at 4 per cent discount rate
- Contribution to real regional income of approximately $39m to $52m in total in present value (7 and 4 per cent discount rate respectively)
- Not provided, but estimated to be approximately 15 fte jobs.

South Australia

- Contribution to total GSP of approximately $1,9b to $2,6b in present value (7 and 4 per cent discount rate respectively)
- Contribution to total real state income of approximately $2,3b to $3.0b (7 and 4 per cent discount rate respectively)

Contribution of approximately 250 fte jobs on average over the modelling period. These jobs are mostly created during the construction phase in the host regions (see Section 5.1.3) and in the rest of the State during the operations phase.

Economic implications for the State and the region if the Project does not proceed

The expected implications to the State and the region if the Project does not go ahead, include:

South Australia:

- Continued reliance on high cost gas plants in SA for dispatchable capacity
- Concentration of SA wholesale market and reduced hedging liquidity
- Increased vulnerability to extreme weather events and system disturbances
- Increased price volatility, through on-going constraints to sharing resources across regions

NEM:

- Continuing constraints to exports of embedded generation at times of minimum SA system demand
- Constrains renewable generation development en-route and due to limited market access
- Increases electricity prices and affordability concerns through constrained supply, diversity and competition

NSW:

- Continuing constraints to sharing of reserves, limiting NSW access to SA renewable generation as coal retires.

[16] Total impacts are the sum of direct and indirect economic contributions. Direct economic contributions arise from value added and taxes less subsidies. Indirect economic contributions take account of supply chain, factors of production, crowding out and productivity impacts (see Figure 4.1 in ACIL Allen 2019).

Supporting information and analysis

The supporting information and analysis is taken from ACIL Allen's assessment of the Project's potential impact on electricity prices (ACIL Allen 2020) and broader economic effects (ACIL Allen 2019). The implications for SA and the region if the Project does not go ahead is taken from the ElectraNet's *SA Energy Transformation Regulatory Investment Test for Transmission (RIT-T), Project Assessment Conclusions* Report (2019).

Electricity price effects for electricity consumers

To estimate the electricity price effects ACIL Allen used their proprietary model of the National Electricity Market's wholesale spot market. The Project was assumed to have bi-directional transfer capacity of 800 MW between New South Wales and South Australia with an aggregate transfer limit of 1,400 MW across the Project and the existing Heywood interconnector. The Project was assumed to be physically in place from January 2024, although it is expected to operate at reduced capacity for the first six months to allow for network testing. Therefore the additional transfer capacity was introduced in stages from 1 January and 1 July 2024. The results of their analysis are provided in Table 5-2.

Table 5-2 Projected retail electricity bill impact[a], South Australia

	Residential customer	Small business customer	Large customer
Transmission network cost impact	$10/yr	$20/yr	$4/MWh
Less average saving in wholesale component of bill	$110/yr	$221/yr	$22/MWh
Net bill saving	$100/yr	$201/yr	$18/MWh
Annual consumption (kWh/yr)	5,000	10,000	varied

[a] in nominal dollars averaged over the period 2024 to 2030.

Source: ACIL Allen 2020

Spill over effects of electricity prices on regional and SA economies

To estimate the effects of the downward pressure on wholesale electricity prices on the broader economy, ACIL Allen used the CGE modelling approach and metrics as described in Section 5.1.3. It should be noted that this analysis is based on modelling undertaken by ACIL Allen in 2018 (ACIL Allen 2019) and has not been updated since and therefore does not reflect the updated effects of lower electricity wholesale prices on economic activity in the broader economy. It is expected that the lower the electricity input costs are, the more economic activity will be stimulated in electricity consuming sectors of the economy. Therefore, the ongoing effects of the Project described following are expected to be conservative (i.e. the impacts on the economy is expected to be greater than that described).

The results of their analysis indicated that during the operational phase of the Project (then 2023-2040), the modelled price effects would have the following impacts:

Host region

- Contribution to GRP of approximately $36m in total[17] in present value at 7 per cent discount rate and $48m in present vale at 4 per cent discount rate
- Contribution to real regional income of approximately $39m to $52m in total in present value (7 and 4 per cent discount rate respectively)
- Not provided, but estimated to be approximately 15 fte jobs.

South Australia

- Contribution to total GSP of approximately $1,9b to $2,6b in present value (7 and 4 per cent discount rate respectively)
- Contribution to total real state income of approximately $2,3b to $3.0b (7 and 4 per cent discount rate respectively)
- Contribution of approximately 250 fte jobs on average over the modelling period. These jobs are mostly created during the construction phase in the host regions (see Section 5.1.3) and in the rest of the State during the operations phase.

Economic implications for the State and the region if the proposal does not proceed

As discussed in the RIT-T (ElectraNet 2019a, see also Section 3), Australia's energy markets are undergoing rapid change as the sector transitions to a situation with lower carbon emissions and greater uptake of renewable generation and emerging technologies. These changes have brought with them a number of challenges, including:

- a current reliance on high cost gas plant in South Australia to provide dispatchable capacity; and
- increased variability of demand and supply due to a dominance of intermittent renewable generation (both grid-scale and household PV).

This in turn has led to high wholesale prices in South Australia and a reduction in contract market liquidity, fuelling affordability concerns for customers. In addition, the South Australian region is seen as continuing to be vulnerable to extreme weather events and system disturbances.

Going forward, the progressive retirement of around half of the New South Wales coal fleet by 2035 (or sooner) means that alternative low emission supply sources In NSW will be required to fill this gap whilst meeting Australia's carbon emissions policy commitments.

The expected implications to the energy market if the Project does not go ahead, include:

South Australia:

- Continued reliance on high cost gas plants in SA for dispatchable capacity

[17] Total impacts are the sum of direct and indirect economic contributions. Direct economic contributions arise from value added and taxes less subsidies. Indirect economic contributions take account of supply chain, factors of production, crowding out and productivity impacts (see Figure 4.1 in ACIL Allen 2019).

- Concentration of SA wholesale market and reduced hedging liquidity
- Increased vulnerability to extreme weather events and system disturbances
- Increased price volatility, through on-going constraints to sharing resources across regions
- As a consequence, failure to gain the major, positive impacts on regional and SA economies from construction of the Project and flow-on effects from reduced wholesale prices, as described in Section 5.1.3 and 5.2.3, respectively.

NEM:

- Continuing constraints to exports of embedded generation at times of minimum SA system demand
- Constrains renewable generation development en-route due to limited market access
- Increases electricity prices and affordability concerns through constrained supply, diversity and competition

NSW benefits:

- Continuing constraints to sharing of reserves, limiting NSW access to SA renewable generation as coal retires.

5.2.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Project specific primary data used (High). Quality and industry standard secondary data used (High).
Extent to which modelling has been validated	High	Industry Standard method (High)
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.3. Increased Competition for Labour

5.3.1. Description of potential impact

Job creation in the Study Area during construction reduces the availability of labour for existing businesses that could lead to a short-term increase in wage costs or shortage of specific skills.

5.3.2. Control measures

None.

5.3.3. Impact analysis

Results of impact assessment

Negligible impact is expected on labour market competition in the Study Area during construction and no impact is expected during operation. Almost all of the construction labour requirement is highly specialised

and will be sourced from outside the Study Area. The small number of workers sourced from within the Study Area are expected to have negligible and temporary effect on the labour market.

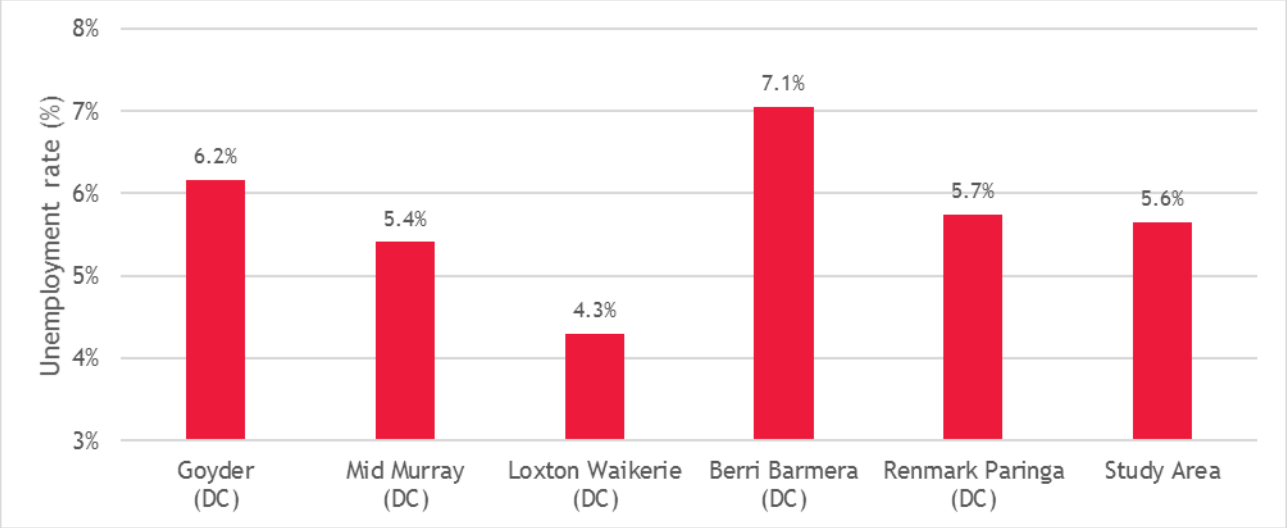
Supporting information and analysis

Estimating the change in the availability of labour for each LGA in the Study Area due to the Project requires estimates of current availability of labour, as well as job creation and relocation due to the Project. The proportion of workers to be hired from the Study Area is uncertain but around 90 per cent of the labour requirement is in highly specialised skill areas. A 'low migration' and a 'high migration' case has been modelled by varying the assumed local hires between 5 and 15 per cent. Both cases assume accommodation of all workers from outside of the region in construction camps. The total labour requirement is also uncertain so the peak expected labour requirement (200 workers) has been modelled to evaluate the maximum-impact scenario.

Existing availability of labour

A common measure of the availability of labour is the unemployment rate. It is generally accepted that a long-term average unemployment rate of around 5 per cent is normal, a lower rate can increase labour costs as competition for workers pushes up wages and a higher rate can decrease labour costs as competition for employment means workers are willing to accept a lower wage. Existing unemployment by LGA in the Study Area is presented in Figure 5-1.

Figure 5-1 Existing unemployment by LGA, 2019



Source: DOSBJ 2019

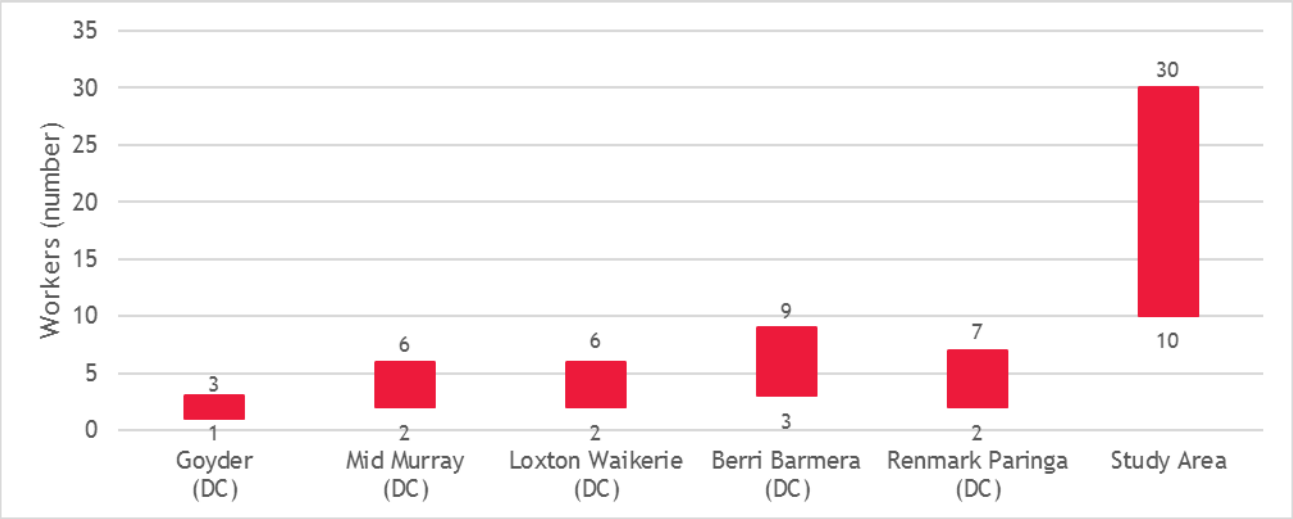
Figure 5-1 shows that the existing unemployment rate is over 5 per cent in each LGA except Loxton Waikerie (4.3 per cent) and is 5.6 per cent for the combined Study Area. It is particularly high in Berri Barmera (7.1 per cent). The low unemployment rate in Loxton Waikerie means there may be some upward pressure on wages due to a shortage of labour. The high unemployment rate in Berri Barmera means that there may be some downward pressure on wages.

Job creation and relocation

Though unemployment rates differ across LGAs, it was assumed that the Study Area is a single labour market for the type of labour required for the Project and an equal amount of work is required in the vicinity of

each LGA along the alignment. This implies that workers can be hired from any LGA in the Study Area to work in any other LGA in the Study Area. It was also implies that available labour in each LGA depends on the number of unemployed persons multiplied by the proportion of employed persons in trade, machinery operator or labourer occupations in each. These assumptions combined mean that more workers will be hired from LGAs in the Study Area with higher appropriately skilled unemployed people, even if some of those people must travel to other LGAs in the Study Area to work on the Project. The resulting range of workers (low and high migration cases) expected to be employed from each LGA and the Study Area is presented in Figure 5-2. A higher proportion of workers is expected to be sourced from Berri Barmera and Renmark Paringa than the other LGAs and some of these workers are expected to travel to other LGAs to work, the smallest expected source of workers is Goyder.

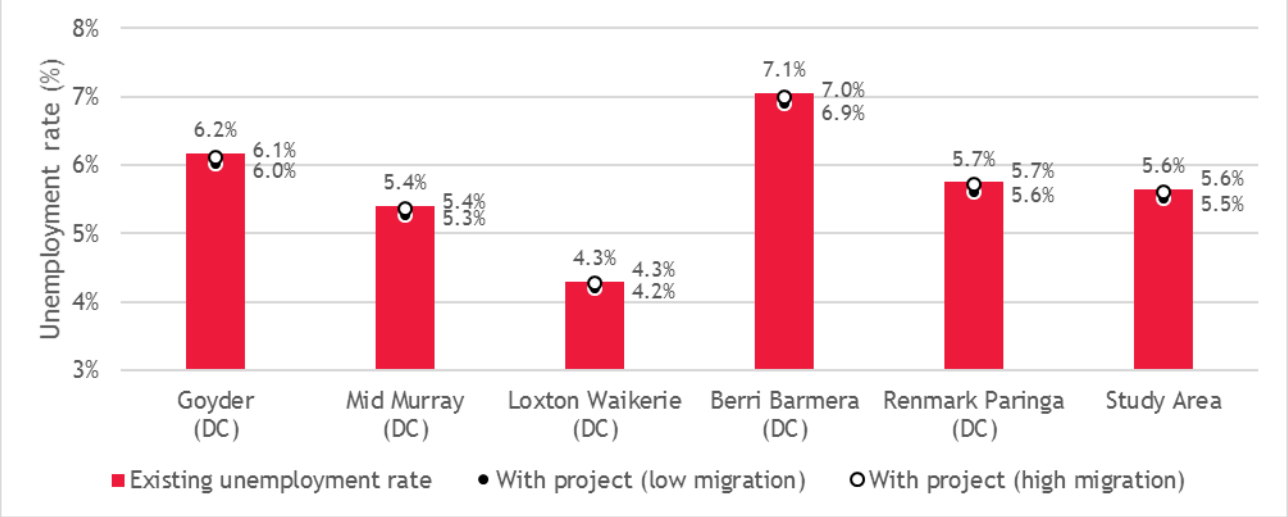
Figure 5-2 Range of workers (low and high migration cases) expected to be sourced by LGA



Source: BDO EconSearch analysis

Given the current unemployment rates and expected ranges of Project employees sourced from each LGA, an expected range for the unemployment rate can be calculated for each LGA with the Project. The range is represented by the black (low migration case) and white (high migration case) dots in Figure 5-3. The red bar shows the existing (without Project) unemployment rate for comparison. The low labour requirement compared to the existing pool of unemployed results is only marginal changes across the LGAs.

Figure 5-3 Range for expected unemployment rates (low and high migration cases) with Project



Source: BDO EconSearch analysis and DOJSB 2019

5.3.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Australian Bureau of Statistics and Department of Jobs and Small Business data are used for labour force, household and population characteristics (High). Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	High	LGA level activity was modelled separately to Study Area activity and reconciled to validate the model (High). It was validated that the latest data available were used for the analysis (High).
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.4. Relocation - Social Disruption

5.4.1. Description of potential impact

Relocation of construction workers to residential centres and construction camps in the Study Area has the potential to cause social disruption and conflict.

5.4.2. Control measures

ElectraNet employees, contractors and visitors at ElectraNet workplaces and any other locations where activities are undertaken by ElectraNet representatives or on behalf of ElectraNet are subject to the *ElectraNet Health, Safety, Environment & Sustainability Policy*. An aim of this internal policy is to 'protect and respect the natural and cultural environment in the communities in which [ElectraNet operates]' (ElectraNet 2019b).

5.4.3. Impact analysis

Results of impact assessment

No impact is expected on social disruption from relocation to residential centres during construction, as there will be none. Negligible impact is expected from workers accommodated at construction camps during construction as any contact will be brief and effectively controlled by the *ElectraNet Health, Safety, Environment & Sustainability Policy*. No impact is expected during operation.

Supporting information and analysis

Estimating the likely social disruption caused by workers during construction requires an understanding of the expected number of workers accommodated in construction camps and relocating to residential centres, demographics of the workers, and any control measures in place to minimise social disruption by these workers. Relocation to residential centres is expected to be zero (see Section 5.3).

Some workers will likely be sourced from the local region so any social disruption caused by them is included in the existing condition of the Study Area. Other workers will relocate to construction camps, around 170 in the low migration case and 190 in the high migration case. These workers will likely come into contact with residents of the Study Area while travelling to and from the construction camps. The duration of each contact can be expected to be brief as the workers will be travelling and the period of time when contact can be expected will be short, as the focus of construction activity will move along the length of the alignment over time.

5.4.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	N/A	
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.5. Relocation - Pressure on Local Services

5.5.1. Description of potential impact

Relocation of construction workers to residential centres in the Study Area has the potential to put strain on local services (such as social and medical services), reducing their availability to existing residents.

5.5.2. Control measures

Construction camps will be used to accommodate workers from outside the Study Area.

5.5.3. Impact analysis

Results of impact assessment

Negligible impact is expected on pressure on local services during construction as consumption of services by relocating workers is expected to be only on a minimal and ad hoc basis. No impact is expected during operation.

Supporting information and analysis

Estimating the increase in pressure on local services requires an understanding of the existing population being serviced, the trend in population growth/decline, and how the Project is likely to affect that trend. If the population is growing and the Project increases the growth rate then services may become strained. If the population is declining then the Project may moderate that trend without placing additional strain on services.

As all relocating workers (peak of 200) are expected to be accommodated in construction camps, strain on local services is only expected on an ad hoc basis, such as requirement for emergency services. Relocating workers can be expected to consume regular services at their place of usual residence and services for minor incidents and first aid will be supplied by the construction camps. This means the potential impact of the Project is not influenced by the current level of pressure on services in residential centres in the Study Area.

5.5.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	N/A	
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.6. Relocation - Pressure on Local Businesses

5.6.1. Description of potential impact

Relocation of construction workers to residential centres in the Study Area has the potential to put strain on local business, which may cause shortages of basic business services to these communities (for example retail and recreation).

5.6.2. Control measures

Construction camps will be used to accommodate workers from outside the Study Area.

5.6.3. Impact analysis

Results of impact assessment

Negligible (negative) impact is expected on local businesses during construction as local demand for business services by Project workers is expected to be minimal. No impact is expected during operation. Expected positive impacts on businesses within the Study Area are quantified in Section 5.7.

Supporting information and analysis

Estimating the increase in pressure on local businesses requires an understanding of the existing population being serviced, the trend in population growth/decline, and how the Project is likely to affect that trend. If the population is growing and the Project increases the growth rate then services may become strained. If the population is declining then the Project may moderate that trend without placing additional strain on businesses.

As all workers (peak headcount of 200) are expected to be accommodated in construction camps, strain on local businesses is only expected on a minimal basis while workers travel to and from construction camps. Workers can be expected to consume primarily at their place of usual residence. This means the potential impact of the Project is not influenced by the current level of pressure on businesses in residential centres in the Study Area.

5.6.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	N/A	
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.7. Relocation - Expansion of Local Businesses

5.7.1. Description of potential impact

Relocation of workers and establishment of a relatively highly paid workforce brings opportunities for expansion of local business/services.

5.7.2. Control measures

None.

5.7.3. Impact analysis

Results of impact assessment

New consumption expenditure in the Study Area associated with locally employed Project workers is expected to provide a minor, positive impact on the Study Area economy of around 4 to 13 fte jobs at peak construction activity. No impact is expected during operation.

Supporting information and analysis

Estimating the opportunities for expansion of local business due to presence of a relatively highly paid workforce requires an understanding of the industrial structure of the region as well as the likely new consumption expenditure resulting from creating high income jobs.

Industrial structure

A RISE economic model of the Study Area in 2017/18 was constructed for this assessment. The model is based on an input-output table that describes the interlinkages between industries in the region using 78 sectors. Given an increase in household income, the model can estimate the likely consumption expenditure and impact on the region in terms of gross regional product (the regional equivalent to GDP or gross domestic product) and employment (measured in fte or full-time equivalents).

Relocation and associated increase in household income

It is estimated that 200 workers will temporarily be based in the Study Area at peak construction activity (Section 5.4). These workers will be accommodated in construction camps and can be expected to consume minimally from local towns so have been excluded from this analysis. Between 10 and 30 jobs are expected to be filled by local workers. Assuming these are all high income jobs ($134,000 from similar studies carried out by BDO EconSearch) that are new to the region, the range for new household income in the Study Area can be estimated as between $1.3 million and $4.0 million.

Economic impact results

Construction of the RISE economic model for the Study Area produced a final demand profile for household expenditure that estimates around 44 per cent of household income is spent on consumption goods and services within the Study Area by local residents employed/contracted by the Project during construction. It is, therefore, estimated that around $0.6 million and $1.8 million of new consumption expenditure can be expected to occur as a result of the Project. This expenditure creates economic activity directly, and indirectly, through flow-on effects.

The economic impact of this consumption expenditure is presented in Table 5-3. The new consumption expenditure associated with employing 10 to 30 local workers at peak construction is expected to generate between 4 and 13 jobs in the region, primarily in the retail trade (1 to 4), personal and other services, food and beverage services and health and community services sectors (1 to 2 in each). Gross regional product generated by this activity is expected to be between $0.5 million and $1.6 million. The sectors with the largest expected impact on GRP are retail trade ($0.1 million to $0.3 million), health and community services, food and beverage services and personal and other services (up to $0.1 million).

Table 5-3 Economic impact of new consumption expenditure in the Study Area with the Project

Sector (top 5 employment)	Employment (fte)		Gross Regional Product ($m)	
	Low-migration	High-migration	Low-migration	High-migration
Retail Trade	4	1	0.3	0.1
Personal & Other Serv	2	1	0.1	0.0
Food & Beverage Services	2	1	0.1	0.0
Health & Community Serv	2	1	0.1	0.0
Road Transport	0	0	0.0	0.0
All other sectors	3	0	1.0	0.4
Total	13	4	1.6	0.5

Source: BDO EconSearch analysis

5.7.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Australian Bureau of Statistics data are used for population trends (High). Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	High	LGA level activity was modelled separately to Study Area activity and reconciled to validate the model (High). It was validated that the latest data available were used for the analysis (High). A RISE economic model was used for the analysis, this modelling method has been applied to various projects in South Australia including electricity transmission application and projects in the Study Area (High).
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.8. Local Housing Pressures

5.8.1. Description of potential impact

Relocation of labour sourced outside of the region may put pressure on local rental accommodation markets, making housing less available and affordable to existing residents during construction.

5.8.2. Control measures

Construction camps will be used to accommodate workers from outside the Study Area.

5.8.3. Impact analysis

Results of impact assessment

No impact on local housing availability or affordability is expected during construction or operation as no use of private accommodation by workers is expected.

Supporting information and analysis

Estimating the effect of the Project on the residential housing market within each LGA requires estimates of the number of workers required to be accommodated in private residential accommodation and the existing number of vacancies in each. No use of private accommodation by workers is anticipated so the impact of the Project on local housing is not influenced by the existing number of vacancies in each LGA. No impact on housing can be expected.

5.8.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	N/A	
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.9. Local Price Inflation

5.9.1. Description of potential impact

The establishment of a relatively highly paid workforce within regional townships influences inflation of prices for goods and services.

5.9.2. Control measures

Construction camps will be used to accommodate workers from outside the Study Area.

5.9.3. Impact analysis

Results of impact assessment

Negligible impact on local price inflation is expected in the Study Area under the worst-case assumptions as the change in proportion of high income earners is expected to be marginal.

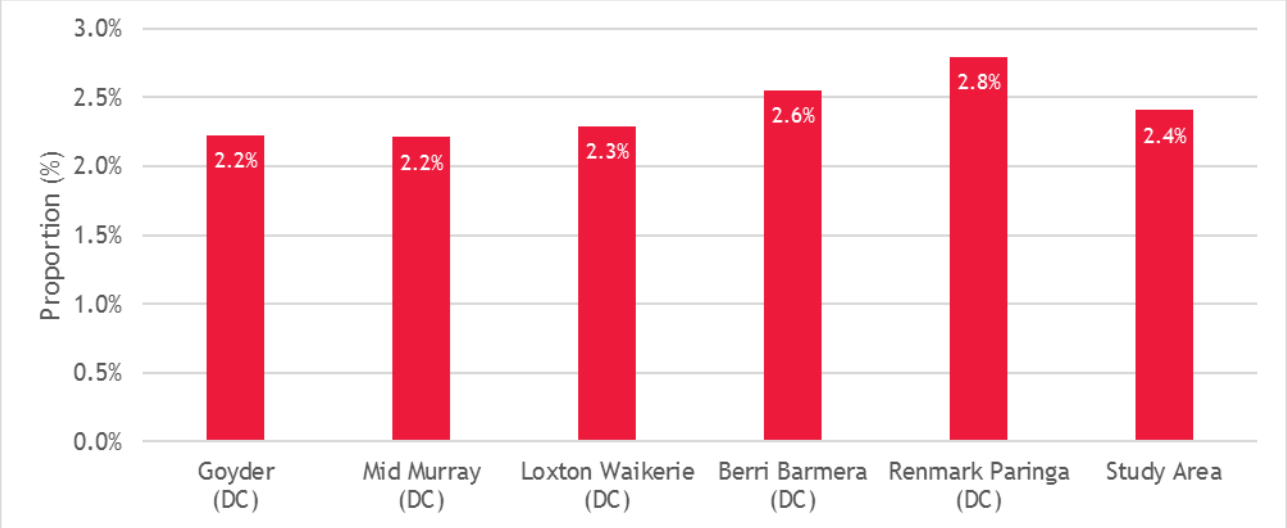
Supporting information and analysis

Estimating the effect of the Project on the general level of prices requires estimates of the proportion of population in each LGA who are high-income earners and the number of new high-income jobs created by the Project. As with Section 5.3, a 'low migration' and a 'high migration' case has been modelled.

Existing high-income workers

The existing proportion of the local population who earn a high income was sourced from ABS Census data (2017). The proportion for each LGA and the Study Area is presented in Figure 5-4. The proportion is between 2.2 per cent and 2.8 per cent for each LGA and the average for the Study Area is 2.4 per cent. For context, the average for South Australia is 4.6 per cent and it is 21 per cent in Roxby Downs. Mining towns such as Roxby Downs are more likely to experience local price inflation due to the high proportion of the population who earn a high income.

Figure 5-4 Existing proportion of population who earn a high income ($104,000/year or more)



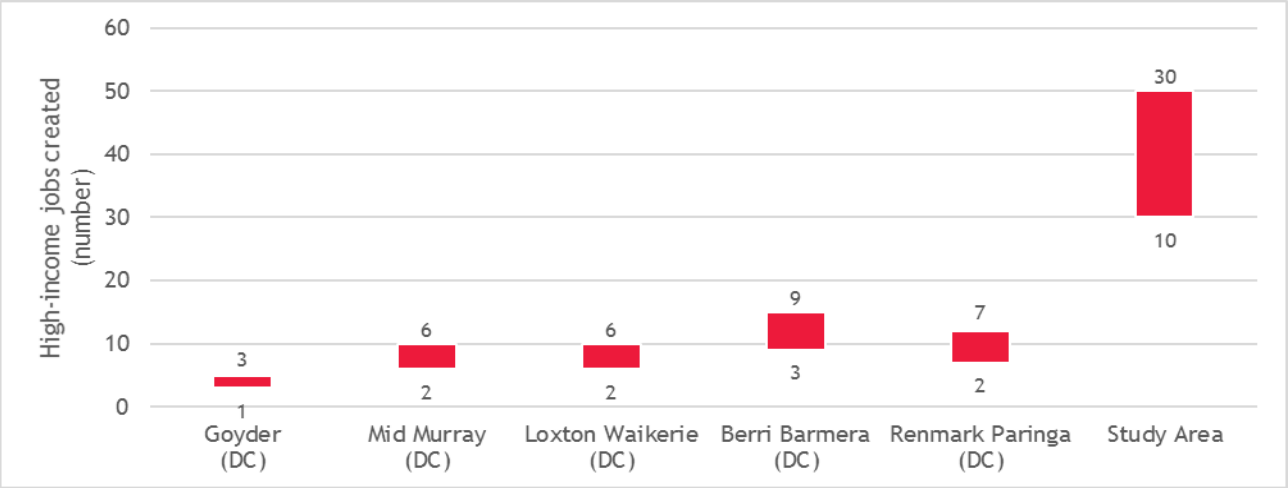
Source: ABS 2017

High-income job creation

To estimate the maximum likely impact on local prices (worst-case) it is assumed that all local hires will be paid an income over $104,000/year and that none did so before being hired on the Project. High-income workers accommodated in construction camps are assumed to primarily consume at their usual residence so have been excluded from this analysis. As the low and high migration cases include a different number of local hires, they each imply a different number of high income earners living in the Study Area, potentially affecting local prices.

The resulting range for number of high-income jobs created in each LGA and the Study Area is presented in Figure 5-5. Between 10 and 30 high income jobs are expected to be filled by existing residents of towns in the Study Area during peak construction activity. As the number of local hires is small, the impact on individual towns cannot be easily predicted.

Figure 5-5 Range for number of high income jobs created at the Project that could affect prices

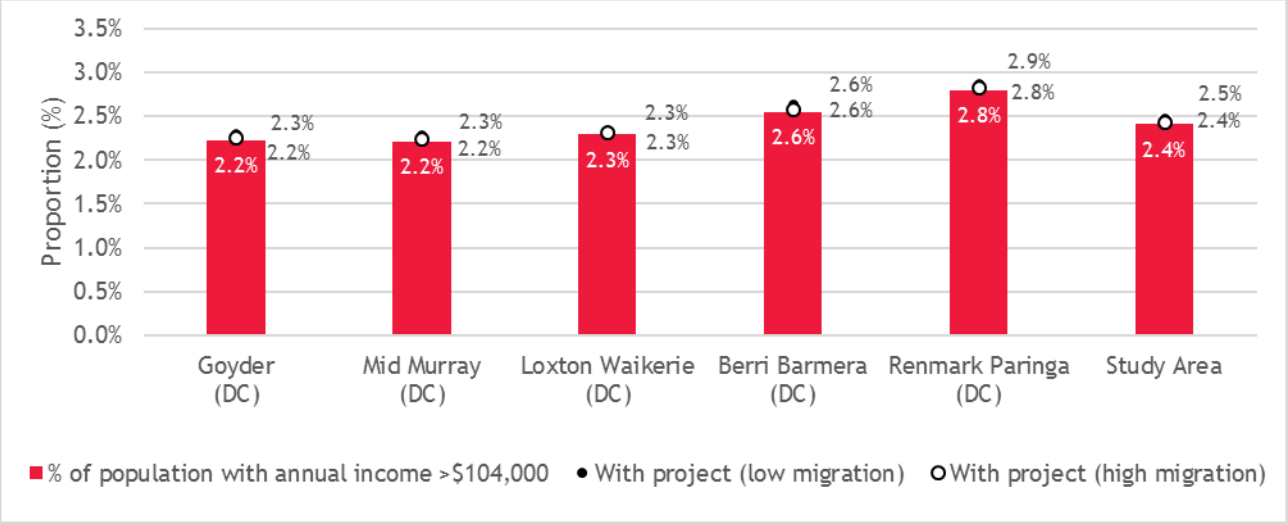


Source: BDO EconSearch analysis

Given the existing population, the proportion who earn a high income and the number of new high-income jobs created by the Project, an expected range of proportions can be calculated for each LGA with the Project. The range is represented by the black (low migration case) and white (high migration case) dots in Figure 5-6. The red bar shows the existing (without Project) proportion for comparison.

The proportion of population earning a high income is expected to increase marginally in each LGA as some Project workers are assumed to be residents of each. The marginal change in proportion of high-income earners is not expected to influence local price inflation in the Study Area.

Figure 5-6 Range of expected proportion of population earning a high income (low and high migration cases) with Project



Source: BDO EconSearch analysis and ABS 2017

5.9.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Australian Bureau of Statistics data are used for population and income estimates (High). Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	High	LGA level activity was modelled separately to Study Area activity and reconciled to validate the model (High). It was validated that the latest data available were used for the analysis (High).
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.10. Pressures on Social Cohesion and Community Identity

5.10.1. Description of potential impact

Changes to primary industries/demographics may cause loss of social cohesion and community identity.

5.10.2. Control measures

Construction camps will be used to accommodate workers from outside the Study Area.

5.10.3. Impact analysis

Results of impact assessment

No impact on social cohesion and identity is expected in the Project Area during construction and operation as no Project workers are expected to be accommodated in residential centres during construction and no significant employment is expected during the operation phase.

Supporting information and analysis

Estimating the potential for loss of social cohesion and community identity requires an understanding of the existing population and identity as well as the expected temporary relocation of Project workers and how their identity differs from the existing population.

As all workers (peak of 200) are expected to be accommodated in construction camps. Project workers can be expected to travel through local towns and consume some goods and services on an ad hoc basis, but not to reside in and change the identity of the towns. The duration of visits to each town can be expected to be brief as the workers will be travelling and the period of time when visits can be expected to be short as the focus of construction activity will move along the length of the alignment over time.

Positive attitudes of the community to the Project (evidenced through feedback from community consultation and support of local Councils) may also mitigate any potential impacts to social cohesion.

5.10.4. Level of certainty

Component	Ranking	Notes
Quality of data	High	Australian Bureau of Statistics data are used for population and industry of employment (High). Project description is used to inform assumptions about Project requirements (High).
Extent to which modelling has been validated	N/A	
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.11. Local Tourism Amenity Effects

5.11.1. Description of potential impact

Project may cause loss of income / lower standard of living via reduced tourism from changes in amenity.

5.11.2. Control measures

The transmission line alignment and transmission structure placement are the principal design controls that seek to reduce impacts as a result of Project activities. The alignment has been selected to follow existing infrastructure corridors; avoid areas of high cultural significance, high value conservation areas and wetlands, and important habitat for threatened species; and to minimise the potential for disturbance. Further investigation through technical studies and landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access. This uncertainty has been addressed by nominating a 500m wide buffer on a nominal transmission line alignment (1km corridor) for the purposes of the impact assessment.

5.11.3. Impact analysis

Results of impact assessment

Negligible economic impact is expected in the Study Area as a result of visitor activity being affected by construction and operation of the Project.

Supporting information and analysis

Estimating the economic impact of a change to tourism in the Study Area requires an understanding of the existing level of tourism activity and associated economic contribution and the expected change to tourism activity and associated expenditure as a result of the Project.

Existing tourism and associated economic contribution

The existing tourism activity in the Study Area is described in Section 4.3. Each year, almost 10,000 visitors travel to the Study Area[18], staying a total of 219,000 nights and spending around $8.1 million. This supports around 55 fte jobs and generates $5.3 million in GRP.

Expected change to tourism activity and associated expenditure

For most of the alignment, the Project will be constructed alongside an existing transmission line so will have negligible effect on the wilderness and visual amenity values that draw some visitors to the area. Consultation with land holders revealed locations where impacts may occur: Taylorville Station, Calperum Station and Chowilla Game Reserve.

Calperum is a private station with area designated for conservation. The Commonwealth Heritage listing for the station states '*Calperum Station is valued by the community for its wilderness qualities and remoteness. It is used for a range of recreational activities, including camping and picnicking*' (DAWE, 2020). Some tourism activities take place on the conservation area including:

- School groups on outdoor education field trips camp by the river and stay in tents or dorm accommodation. These events occur around 10-15 times per year with around 10-30 people each time (around 100 to 450 visitors per year in total).
- Community use for camping, recreation and picnicking.
- An outstation that is very rarely used.
- Small numbers of visitors use the site for research, visiting the Calperum Mallee SuperSite and an ANU bird study site.

Expected impacts on these activities were identified during consultation:

- School groups are not expected to be impacted by the Project as, while it will be visible from the road on approach, it will not be visible from the dorm accommodation or river.
- Researchers visiting the SuperSite are not expected to be impacted by the Project as, while it will be visible from the SuperSite, it is not expected to affect the environmental values that attract researchers to the site (not affected by visual amenity).
- Researchers visiting the Australian National University bird Study Area may be affected by the Project as the 500m corridor crosses the Study Area. However, the Project can run along the existing track in the area to prevent any impact on the researchers (as discussed in Control Measures above). The number of researchers visiting the site is very small and negligible in comparison to the estimated 10,000 visitors to the townships within the Study Area each year.

Visitation to Chowilla Game Reserve focuses primarily on camping next to the river and duck hunting. The transmission line is proposed to follow roads that run inside the boundary of the reserve, away from the camping sites and river so is not expected to affect the visual amenity value that attracts visitors to the reserve. The limited number of tourists to Calperum and Taylorville Stations are likely to be sensitive to

[18] Expected to be focussed in the towns near the Murray River outside the Project Area, but within the Study Area.

changes to the landscape, however the low frequency of views to the transmission line reduces the magnitude of impact.

There is no significant impact expected on visitor activity in the Study Area resulting from construction and operation of the Project. It follows that there is no significant economic impact expected associated with a change to visitor activity.

5.12. New Regional Investment - Population Effects

5.12.1. Description of potential impact

Investment in the Project and potential renewable energy generation projects (enabled by the Project) may reverse population decline amongst the local communities.

5.12.2. Control measures

None.

5.12.3. Impact analysis

Results of impact assessment

Planned investments in the Study Area can be expected to have a minor, positive impact on population in the Study Area during their construction and operation. The size of the impact cannot be verified as the scale and detail of these projects is unknown.

Supporting information and analysis

Estimating the effect on population resulting from regional investment enabled by the Project requires an understanding of the type, scale and location of likely investments as well as their likely operating employment and expenditure requirements. These factors would affect population decline by stimulating economic activity in the area, influencing people to remain in the region or more to the region.

The RIT-T for the Project identified a potential benefit to be greater market access to renewable energy generation en-route and identifies a strategic priority of RDA Murraylands and Riverland to support solar and wind power regional investments. Renewable energy generation projects are proposed in the vicinity of Robertstown, Morgan, Berri, Monash and Loxton in the Study Area (see Section 4.2). These investments can be expected to provide employment opportunities to local workers and contractors during construction and operation, increasing economic activity and retaining population in the Study Area.

While high-level descriptions of potential projects en-route have been identified, the scale and operating employment and expenditures of these investments is unknown. It follows that the impact of new regional investments on population cannot be established at this time.

5.12.4. Level of certainty

Component	Ranking	Notes
Quality of data	Low	Specific data about potential investments are not available (Low)
Extent to which modelling has been validated	Low	Modelling cannot be carried out without data on the potential investments (Low)

Component	Ranking	Notes
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.13. New Regional Investment - Local Standard of Living

5.13.1. Description of potential impact

More money from new regional investment coming into the area may increase standard of living amongst the local communities.

5.13.2. Control measures

None.

5.13.3. Impact analysis

Results of impact assessment

Planned investments in the Study Area can be expected to have a positive impact on standard of living for the workers and contractors involved in their construction and operation. The scale of the impact cannot be verified as the scale and detail of these projects is unknown.

Supporting information and analysis

Estimating the effect on local standard of living resulting from regional investment enabled by the Project requires an understanding of the type, scale and location of likely investments as well as their likely operating employment and expenditure requirements. These factors would affect local standard of living by stimulating economic activity in the area, generating jobs and income.

The RIT-T for the Project identified a potential benefit to be greater market access to renewable energy generation en-route and identifies a strategic priority of RDA Murraylands and Riverland to support solar and wind power regional investments. Renewable energy generation projects are operating or proposed in the vicinity of Robertstown, Morgan, Berri, Monash, Waterloo and Loxton in the Study Area (see Section 4.2). These investments can be expected to provide employment opportunities to local workers and contractors during construction and operation, increasing economic activity and raising the standard of living for those involved.

While high-level descriptions of potential projects en-route have been identified, the scale and operating employment and expenditures of these investments is unknown. It follows that the impact of new regional investments on local standard of living cannot be established at this time.

5.13.4. Level of certainty

Component	Ranking	Notes
Quality of data	Low	Specific data about potential investments are not available (Low)

Component	Ranking	Notes
Extent to which modelling has been validated	Low	Modelling cannot be carried out without data on the potential investments (Low)
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.14. Increased Access to Rural Properties

5.14.1. Description of the potential impact

Increased access by construction personnel to Project construction sites and camps located within rural properties during construction has the potential to cause social disruption.

5.14.2. Control measures

ElectraNet employees, contractors and visitors at ElectraNet workplaces and any other locations where activities are undertaken by ElectraNet representatives or on behalf of ElectraNet are subject to the ElectraNet Health, Safety, Environment and Sustainability Policy. An aim of this internal policy is to 'protect and respect the natural and cultural environment in the communities in which [ElectraNet operates]' (ElectraNet 2019b).

5.14.3. Impact analysis

Results of impact assessment

The policy described under control measures (above) is expected to prevent social disruption by construction workers whilst accommodated in construction camps and when accessing construction sites on rural properties and negligible impact is expected during construction. No impact is expected during operation.

Supporting information and analysis

The Project will require construction camps with capacity of around up to 150 workers (see Section 5.6.3).

A review of rural mining developments carried out for a development application by Iron Road for a major mine on the Eyre Peninsula (Bowey 2015) identified concerns about social disruption from worker camps. Similar concerns were raised and assessed for temporary workers' camps for a railway line construction in an EIS for the Carmichael Coal Mine and Rail Project (GHD 2013). The social disruption concern is focused on 'safety and security, including the misuse of alcohol and drugs, crime and anti-social behaviour and perceptions of safety'. While these concerns related to a permanent camp for a major mine and temporary camps for a railway line construction, the same concerns could be expected to transfer to the temporary construction camps for the Project. Furthermore, landholders may have concerns relating to their privacy and running their business without interruption/interference (Department of Regional Development and Lands 2011).

Consultation with landholders along the alignment have identified a willingness to host construction camps on properties.

5.14.4. Level of certainty

Component	Ranking	Notes
Quality of data	Medium	Based on literature review only.
Extent to which modelling has been validated	Medium	Transfer of issues from a project with a similar type of workforce in a similar area. Addressing issues through company policy (B).
Effectiveness of design measures	N/A	
Effectiveness of management measures	High	

5.15. Disruption of Landholder Operations - Construction Phase

5.15.1. Description of the potential impact

Project construction activities lead to temporary disruption of landholder activities.

5.15.2. Control measures

Design measures

The transmission line alignment and transmission structure placement are the principal design controls that seek to reduce impacts as a result of Project activities. The alignment has been selected to follow existing infrastructure corridors; avoid areas of high cultural significance, high value conservation areas and wetlands, and important habitat for threatened species; and to minimise the potential for disturbance. Further investigation through technical studies and landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access. This uncertainty has been addressed by nominating a 500m wide buffer on a nominal transmission line alignment (1km corridor) for the purposes of the impact assessment.

Management measures

The Proponent is consulting with directly affected landowners throughout the planning of the Project to discuss the effect the transmission line will have on their properties, design alternatives and options, management issues, continuity of current operations, access arrangement and compensation. It is expected that, through this process, the Project will identify property access tracks that are at risk of deterioration due to Project transport activities and will undertake measures to mitigate the effect (for example, but not limited to, identifying alternative routes, upgrading access tracks prior to Project use, repairing access tracks during and after Project use, managing driver behaviour of Project contractors).

5.15.3. Impact analysis

Results of impact assessment

Overall, the expected disruption to landholder activities is expected to have minor to negligible impacts.

Disruption to landholder activities

Access during construction phase will use existing tracks wherever possible, and therefore may result in disruptions to landholder activities. The expected delay for these travellers would be negligible (estimated to be less than five minutes) per one-kilometre construction zone. Longer delays may also be required depending on requirements for traffic stoppages during construction works, which could cause minor impact.

If full closures of the tracks are required, the Proponent would communicate this with potentially affected landholders to allow access through construction areas. If access cannot be provided, landholders may have to use alternate routes and accordingly experience increased travel times for the duration of construction. Sections of properties may also become temporarily inaccessible if access through construction areas or alternate routes are not available. The effect from loss of access to properties is expected to be negligible, given the limited extent of works to be performed at a given location.

Damage to access roads

The Project could affect the condition of unsealed access tracks through road wear from additional Project traffic (particularly heavy loads) during the construction phase and through unplanned events (e.g. Project vehicle accidents or bogging) leading to damage to the roads.

These effects, if they occur, are likely to result in nuisance to landholders (e.g. discomfort from using tracks in poor condition, time delays or the need to use alternative routes if access tracks become unusable/impassable). Likewise, if these effects occur they could incur costs to landholders from having to undertake additional track repair and maintenance.

It is expected that through consultation with landholders, the Project will identify access tracks that are at risk of deterioration due to Project transport activities and will undertake measures to mitigate the effect. Therefore, the effect is expected to be negligible.

Supporting information and analysis

Disruption to landholder activities

Potential time delays for travellers moving along unsealed tracks were based on the time travelled through a temporary speed restriction regime, in contrast to the current speed limit (60km/h). The temporary speed restrictions were based on two 500m buffer zones of 60 and 40km/h around a one-kilometre-long 25km/h construction zone (DPTI 2014). Based on vehicles traveling at an average of these limits suggests the following travel times:

- 4.9-minute travel time through temporary speed restrictions
- 3.0-minute travel time under usual conditions.

Although the above figures suggest a shorter delay, the pathway effect of five minutes was conservatively used. This was considered to be in line with travel time delays modelled at various travel speeds. Specifically, these were

- 30km/h average travel speed: 6.4-minute travel time through temporary speed restrictions and 6.0-minute travel time under usual conditions
- 45km/h average travel speed: 5.2-minute travel time through temporary speed restrictions and 4.0-minute travel time under usual conditions

- 60km/h average travel speed: 4.9-minute travel time through temporary speed restrictions and 3.0-minute travel time under usual conditions
- 75km/h average travel speed: 4.9-minute travel time through temporary speed restrictions and 2.4-minute travel time under usual conditions
- 90km/h average travel speed: 4.9-minute travel time through temporary speed restrictions and 2.0-minute travel time under usual conditions.

Damage to access roads

A number of factors influence the condition of unsealed roads and the rate at which they deteriorate and these factors include:

- Climatic conditions
- Road base material characteristics
- Quality of construction and maintenance
- Terrain
- Traffic conditions
- Driver behaviours (Mwaipungu and Allopi 2015, Hart 2016).

The Project could affect the condition of unsealed access tracks through road wear from additional traffic and through unplanned events leading to damage to the roads.

Road wear could be brought about by increased Project traffic during the construction period. The factors influenced by the Project are the number of heavy loads moved on these roads and the driver behaviour of those heavy loads. Hart (2016) identified the trend towards heavier vehicles, from 17 tonne trucks to B-Doubles, travelling at relatively high speeds as having a significant effect on road deterioration and damage on unsealed roads in the Flinders Ranges. The level of wear will be an interaction between these Project-influenced factors and the characteristics of the track (i.e. quality of materials, construction and maintenance, weather conditions and terrain).

Damage to property access tracks could also occur from unplanned events resulting from the Project activities, for example road accidents and bogging of Project vehicles.

These effects, if they occur, are likely to result in nuisance to landholders (e.g. discomfort from using tracks in poor condition, time delays or the need to use alternative routes if access tracks become unusable/impassable). Likewise, if these effects occur they could incur costs to landholders from having to undertake additional track repair and maintenance.

The Proponent is consulting with directly affected landowners throughout the planning of the Project to discuss the effect the transmission line will have on their properties, design alternatives and options, management issues, continuity of current operations, access arrangement and compensation. It is expected that, through this process, the Project will identify property access tracks that are at risk of deterioration due to Project transport activities and will undertake measures to mitigate the effect (for example, but not limited to, identifying alternative routes, upgrading access tracks prior to Project use, repairing access tracks during and after Project use, managing driver behaviour of Project contractors).

5.15.4. Level of certainty

Disruption to pastoral activities

Component	Ranking	Notes
Quality of data	Medium	Data unavailable in relation to construction schedule and effect due to restrictions/temporary closures (low). Current and restricted travel speeds are modelled on hypothetical values (medium).
Extent to which modelling has been validated	Medium	Industry standard approach for speed restrictions (high). Informal methodology used for full track closure effects (low).
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access.
Effectiveness of management measures	N/A	

Damage to access roads

Component	Ranking	Notes
Quality of data	Low	Data unavailable in relation to access track conditions, construction schedules (low).
Extent to which modelling has been validated	Low	Informal, qualitative methodology used for assessing effects (low).
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access.
Effectiveness of management measures	High	Project will undertake measures to mitigate the effect (for example, but not limited to, identifying alternative routes, upgrading access tracks prior to Project use, repairing access tracks during and after Project use, managing driver behaviour of Project contractors).

5.16. Landholder Amenity Effects

5.16.1. Description of potential impact

Project may cause a loss of amenity for landholders through changes to the visual aesthetic of the landscape and restricting lifestyle activities.

5.16.2. Control measures

Design measures

The transmission line alignment and transmission structure placement are the principal design controls that seek to reduce impacts as a result of Project activities. The alignment has been selected to follow existing infrastructure corridors; avoid areas of high cultural significance, high value conservation areas and wetlands, and important habitat for threatened species; and to minimise the potential for disturbance. Further investigation through technical studies and landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access. This uncertainty has been

addressed by nominating a 500 m wide buffer on a nominal transmission line alignment (1km corridor) for the purposes of the impact assessment.

Management measures

The Proponent is consulting with directly affected landowners throughout the planning of the Project to discuss the effect the transmission line will have on their properties, design alternatives and options, management issues, continuity of current operations, access arrangement and compensation.

5.16.3. Impact analysis

Results of impact assessment

Some temporary loss of amenity is expected by landholders in the Project Area as a result of temporary changes to the visual aesthetic of the landscape and the lifestyle of landholders. During construction, lifestyle and aesthetic effects are expected to come from temporary clearance of vegetation, light spill from the construction camp and exposure to construction activities and workforce. During operation, aesthetic effects are expected to come from permanently cleared vegetation and from the towers and cables of the Project transmission line itself.

In summary, the Project is expected to have negligible to minor impact for individual landholder amenity along the proposed transmission line route.

Supporting information and analysis

Detailed visual impact assessment is addressed separately in a visual impact assessment commissioned for this EIS. Consultation with landholders for a development application by Iron Road for a major mine on the Eyre Peninsula identified concerns about a loss of amenity from dust, noise, light and changes to the visual landscape associated with the mine and related infrastructure corridor (Bowey 2015). While these concerns relate to a major mine and a new infrastructure corridor, they indicate the types of issues that might arise for landholders in the Project Area for the Project transmission line. The possible effects from the Project are described and their magnitudes estimated below.

During construction

- Exposure to construction activities including light, heavy vehicles and helicopters is expected along the length of the transmission line. Construction is expected to proceed linearly from multiple locations over an 18 to 22 month period. Exposure to construction activities by individual landholders will be for a short period within the Project construction period and will be in proportion to the number of structures associated with the transmission line in each property.
- Exposure to construction workforce in or around the Project Area. The inconvenience and disruption on property access roads is discussed in Section 5.9. This point relates to the lifestyle and aesthetic impact of having people residing on and travelling around a, usually private, property. The magnitude for each landholder is expected to be the same as for exposure to construction activities.
- Temporary clearance of vegetation for access tracks, pole construction areas and structure laydown areas will be carried out along the length of the Project transmission line causing a change to the landscape aesthetic. Use of existing access tracks where possible will minimise the area cleared. These areas will be evenly spaced along the Project transmission line so the magnitude for each landholder is expected to be the same as for exposure to construction activities.

- Temporary clearance of vegetation for construction camps is expected to cause a change to the visual aesthetic of the landscape for the property on which it is located. The location of the construction camp is not available for this assessment.
- Light spill at night from the construction camp is expected to cause a change to the visual aesthetic of the night time landscape. The incidence of the effect is the same as for temporary vegetation clearance for the construction camp.

During operation

- Changed visual aesthetic of the landscape is expected due to permanent vegetation clearance for access tracks. While most cleared areas will be rehabilitated, some will remain cleared and gravel will be used to supress dust and prevent erosion. This will cause a permanent change to the visual aesthetic of the landscape but at a lesser magnitude than the temporary clearances discussed above.
- Changed visual aesthetic of the landscape is expected due to the towers and cables of the Project transmission line itself. Where the Project transmission line runs alongside an existing transmission line (approximately 90.5km of the 201km length of the Project transmission line), the visual change will be smaller than the effect where the transmission line will traverse undeveloped land (approximately 110.5km of the Project transmission line). Detailed visual impact assessment is addressed separately in a visual impact assessment commissioned for this EIS.

5.16.4. Level of certainty

Vehicle height restrictions

Component	Ranking	Notes
Quality of data	Medium	Land area requirements per structure/track based on ElectraNet industry standard (High). Numbers of structures and length of access track based on high-level assumptions (Medium).
Extent to which modelling has been validated	Medium	Approach based on literature from a comparable project and region rather than on consultations.
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate visual aesthetic impacts. The residual effects are expected to be marginal.
Effectiveness of management measures	High	Project will undertake measures to mitigate the effect (for example, but not limited to, placement of infrastructure, minimising construction footprint, rehabilitation temporarily cleared areas).

Aerial mustering/other aerial operations restrictions

Component	Ranking	Notes
Quality of data	High	Landholder consultation was used to source data on existing visitation and how it may change with the Project (High).
Extent to which modelling has been validated	Med	Conclusions were validated by checking satellite imagery to confirm the Project could be constructed along existing tracks where this would prevent impacts (Med).

Component	Ranking	Notes
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

5.17. Disruption of landholder operations - Project Operating Phase

5.17.1. Description of potential impact

Transmission line clearance requirements disrupts landholder operations by limiting vehicle access below the transmission line.

Presence of transmission line disrupts landholder operations by affecting aerial mustering (or other aerial activities) near the transmission line.

5.17.2. Control measures

The transmission line alignment and transmission structure placement are the principal design controls that seek to reduce impacts as a result of Project activities. The alignment has been selected to follow existing infrastructure corridors; avoid areas of high cultural significance, high value conservation areas and wetlands, and important habitat for threatened species; and to minimise the potential for disturbance. Further investigation through technical studies and landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access. This uncertainty has been addressed by nominating a 500m wide buffer on a nominal transmission line alignment (1km corridor) for the purposes of the impact assessment.

The transmission line and the GPS coordinates of the line and associated structures will be registered with the Energy Network Association, who maintains a register of transmission lines for use by pilots of light aircraft (CASA 2015, 2014).

5.17.3. Impact analysis

Results of impact assessment

The presence of the proposed transmission line is expected to have minor impact on landholder operations, i.e. potentially affect some aspects of operations for a small number of landholders, as a result of vehicle height and aerial operations restrictions near transmission lines.

Vehicle height restrictions

Where the Project transmission line route does not run adjacent to existing transmission lines (i.e. when it traverses the first two properties at the western end of the transmission line corridor, on properties after White Dam Conservation Park for the next 17.5km of the Project transmission line, Taylorville Station, Hawks Nest Station, Calperum Station and Chowilla Regional Reserve), there is potential for landholder operations to be affected when oversize vehicles (greater than 4.3m in height) are required to move across these properties. Landholder consultation did not identify any specific concerns relating use of oversize transport vehicles. One landholder did raise concerns about use of cropping machinery.

For the remaining properties along the Project transmission line route, the Project transmission line runs adjacent to existing transmission lines and the Project is unlikely to change existing limitations on landholder operations in this regard.

Aerial mustering/other aerial operations restrictions

Where the Project transmission line route does not run adjacent to existing transmission lines (for approximately 17.5km), there is potential for aerial mustering (or other aerial) operations to be affected when they occur in the vicinity of the Project transmission line route. Project landholder consultations identified one property where they use aerial mustering of stock, however they did not raise any concerns regarding farm operations.

For the remaining properties along the Project transmission line route, the Project transmission line runs adjacent to existing transmission lines and the Project is unlikely to change existing limitations on aerial mustering (or other aerial) operations.

Supporting information and analysis

Vehicle height restrictions

Vehicle heights of 4.3m and less are not subject to any restrictions when travelling on roads under transmission lines (DTEI 2008). Vehicles between 4.3m and 4.9m high (maximum permitted height of vehicles in South Australia) are required to confirm their route with SA Power Networks, because of potential transmission line clearance restrictions (DTEI 2008). The minimum clearance between the ground or road and the transmission line is 9m and the minimum clearance distance between a vehicle and load to be transported and transmission lines is 4.6m for a 330kV line (*Electricity (General) Regulations 2012* under the *Electricity Act 1996* (SA)). Vehicles transporting large rectangular baled hay are often 4.6m in height as are double deck cattle transporters, and would be subject to these restrictions (DTEI 2010, NHVR 2016).

For approximately 90.5km of the transmission line corridor, the Project transmission line runs adjacent to existing transmission lines and the Project is unlikely to change existing limitations on landholder operations resulting from vehicle height restrictions.

The Project transmission line route does not run adjacent to existing transmission lines in the following locations:

- First two properties at the western end of the transmission line corridor
- Properties after White Dam Conservation Park for the next 17.5km of the Project transmission line
- Taylorville Station
- Hawks Nest Station
- Calperum Station
- Chowilla Regional Reserve.

On these properties there is potential for landholder operations to be affected when oversize vehicles (greater than 4.3m in height) are required to move across these properties. Landholder consultations did not identify any specific concerns relating use of oversize transport vehicles. One landholder did raise concerns about use of cropping machinery.

Aerial mustering//other aerial operations restrictions

Aerial mustering and crop spraying are recognised as a "hazard rich activities" which involves low-level flying (CASA 2015, 2014). Analysis of reported aerial mustering accidents (66 in total) over a 10-year period (2003-2012) identified wire strike as the cause in 10 per cent of incidents (6 in number), the majority of which occurred during manoeuvring (CASA 2015). Analysis of reported aerial application (i.e. crop dusting) accidents over a 10-year period (2005-2016) identified wire-strike as the cause in 57 per cent of incidents (ATSB 2016).

It is generally recommended that aerial mustering aircraft fly with a minimum of 100ft (31m) clearance from other objects (FSF 2016). On-going marking of transmission lines, both physically and on aviation maps (CASA 2015, 2014) and wire strike avoidance seminars with aerial mustering/crop dusting operators will assist to reduce the hazard (CASA 2015). Aerial mustering/other aerial operations which occur in the vicinity of transmission lines will need to modify their operations (e.g. be limited to stock spotting, adjust spraying pattern) to minimise the risk of wire strike (ATSB 2016).

For approximately 90.5km of the transmission line corridor, the Project transmission line runs adjacent to existing transmission lines and the Project is unlikely to change existing limitations on aerial mustering/other aerial operations.

On properties where the transmission line does not run adjacent to the existing transmission line, there is potential for landholder aerial mustering/other aerial operations to be affected when they occur near the Project transmission line route. As discussed, one property was identified as using aerial mustering of stock, however the landholder did not raise any concerns regarding farm operations.

5.17.4. Level of certainty

Vehicle height restrictions

Component	Ranking	Notes
Quality of data	Medium	Vehicle heights and vehicle height restrictions based on industry standard (high); on-property vehicle routes unknown (low).
Extent to which modelling has been validated	Medium	Approach based on literature rather than on consultations.
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access.
Effectiveness of management measures	N/A	

Aerial mustering/other aerial operations restrictions

Component	Ranking	Notes
Quality of data	Medium	Aerial mustering/other aerial operations hazards and safety of operation standards based on industry standard (High); on-property aerial mustering/other aerial operations activity unknown (Low).
Extent to which modelling has been validated	Medium	Approach based on literature rather than on consultations.

Component	Ranking	Notes
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access.
Effectiveness of management measures	N/A	

5.18. Loss of Property Value from Permanent Loss of Land

5.18.1. Description of potential impact

Permanent loss of land as a result of Project activities may be perceived to, or may actually, constrain landholders' activities in conducting their agricultural businesses and decrease property values.

5.18.2. Control measures

The transmission line alignment and transmission structure placement are the principal design controls that seek to reduce impacts as a result of Project activities. The alignment has been selected to follow existing infrastructure corridors; avoid areas of high cultural significance, high value conservation areas and wetlands, and important habitat for threatened species; and to minimise the potential for disturbance. Further investigation through technical studies and landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access. This uncertainty has been addressed by nominating a 500m wide buffer on a nominal transmission line alignment (1km corridor) for the purposes of the impact assessment.

ElectraNet operates from the position that compensation is awarded on the basis that no directly affected property owners are financially disadvantaged as a result of having the transmission line on their property.

5.18.3. Impact analysis

Results of impact assessment

Clearance will be required for both tower locations and access, and will need to be maintained during operation of the transmission line, as described in the EIS Chapter 7 Project Description. An approximately 80m-wide easement will be required for the full length of the proposed alignment, however, the easement will not be cleared and ongoing existing land uses, such as grazing, may continue. It is not anticipated that the Project will cause a reduction in stocking rates. Land disturbance and vegetation clearance has been addressed in the EIS in Chapter 9 Land Use, and Chapter 11 Flora and Fauna.

ElectraNet has signed an option to purchase agreement with the landholder for the Bundey substation site. Appropriate market value will be paid, hence this impact has not been assessed. ElectraNet has also signed option deeds for an easement over multiple properties. All landholders will be compensated in accordance with an independent valuation and appropriate market value.

All landholders whose properties will be accessed by the transmission line easement have been extensively engaged with as part of easement and compensation negotiations. There will be ongoing consultation to determine micro-siting of the towers, easement access and location, and management of temporary workers camps and laydown/staging areas (where this has been agreed). Location of the easement, towers and associated access, and management of land uses within the easement will take into consideration potential

long-term impacts on landholder activities. The loss of land to the easement is considered during the valuation process and reflected in the offer of compensation made to landholders during easement acquisition negotiations.

The permanent exclusion of areas along the proposed transmission line is expected to have negligible impact on property value.

Supporting information and analysis

Permanent clearance of areas will be required for the transmission line structures (towers) and for access to the transmission line structures.

Permanently excluded land - transmission line structures

Lattice and/or guyed towers will be used for the 330kV line and will require permanent clearance as described in the EIS Project Description. Towers are expected to be required every 400-600m and a transmission line easement 80m wide between towers will be required. A substation will be located approximately 15km north-east of Robertstown with a permanent disturbance footprint of 9ha. Based on these assumptions, high level estimates of areas permanently excluded from the land holdings for transmission line structures were calculated by a licensed valuer. Information on the valuation process, including compensation, can be found in EIS Chapter 'Land Use and Tenure'.

Permanently excluded land - transmission line structure access

Access tracks will be required for both line construction and maintenance. A track to the base of each tower of approximately 5m wide will typically be required.

Existing roads and tracks will be used for access wherever possible (e.g. with short sections of new track constructed to access each tower). In areas where there is no existing access track or where use of nearby tracks is not permitted by the owner, a new track generally paralleling the transmission line route would be constructed.

Access to Project Transmission Line for the first 107.5km from the western end of the transmission line will be able to use the existing ElectraNet access track along the 132 kV Monash to North West Bend line, except for approximately 17.5km of the Project Transmission line east of White Dam Conservation Park. Access to the remainder of the Project Transmission Line could potentially use existing access tracks where they are near the proposed line, subject to landholder approval, or will use purpose-built access tracks.

5.18.4. Level of certainty

Component	Ranking	Notes
Quality of data	Medium	Land area requirements per structure/track based on ElectraNet industry standard (high); numbers of structures and length of access track based on high-level assumptions (low).
Extent to which modelling has been validated	High	Industry standard approach.
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access.
Effectiveness of management measures	N/A	

5.19. Loss of Property Value from Land Fragmentation

5.19.1. Description of the potential impact

Project activities may be perceived to, or may actually constrain landholders' activities (as a result of land fragmentation) in conducting their agricultural businesses.

5.19.2. Control measures

The transmission line alignment and transmission structure placement are the principal design controls that seek to reduce impacts as a result of Project activities. The alignment has been selected to follow existing infrastructure corridors; avoid areas of high cultural significance, high value conservation areas and wetlands, and important habitat for threatened species; and to minimise the potential for disturbance. Further investigation through technical studies and landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access. This uncertainty has been addressed by nominating a 500m wide buffer on a nominal transmission line alignment (1km corridor) for the purposes of the impact assessment.

5.19.3. Impact analysis

Results of impact assessment

The Project may bisect paddocks or other structures relevant to landholder activities, which may restrict access and constrain pastoralists' activities. This may in turn influence the value of the properties.

The level of detail of Project transmission line route and on-ground assessments limits assessment of this potential impact. However, based on the following assumptions:

- Visual assessment of aerial photography supplied by the Project is sufficient to identify relevant structures
- Land use guidelines for electricity transmission corridors (ElectraNet 2013) provide sufficient guidance to identify landholder activities that could be restricted
- Where Project transmission lines run parallel to existing infrastructure (transmission lines, roads), existing levels of fragmentation will not change.

All landholders whose properties will be accessed by the transmission line easement have been extensively engaged with as part of easement and compensation negotiations, and there will be ongoing consultation to determine micro-siting of the towers, easement access and location, and management of temporary workers camps and laydown/staging areas (where this has been agreed). Other factors considered when assessing compensation include injurious affection, which is described as those losses suffered as a consequence of what is constructed on the acquired land. This includes consideration of the potential long-term impacts on landholder activities.

Changes in existing levels of fragmentation as a result of the Project are unlikely for the majority of the properties along the Transmission Line route and is expected to have negligible impact. The transmission line has potential to change the existing levels of fragmentation on properties where the transmission line does not follow existing tracks. In these situations the Project has the potential to cause minor impact.

Supporting information and analysis

Easements

Easements for the Project transmission line route will be obtained. An easement is a property right that will allow the Project to build, own and maintain the transmission line. Easements are permanent and will be registered on the relevant Certificate of Title and will remain part of the land and title regardless of changes in ownership. For this Project, easements will be approximately 80m wide.

An easement or Right of Way (ROW) provides a safety clearance margin between the high-voltage power lines and surrounding structures and vegetation, and provides a path for ground-based inspections and access to transmission towers for repairs and maintenance. Generally, the ROW will consist of native vegetation or other low level vegetation, and, in some instances, access tracks which constitute a portion of the ROW.

Restriction of landholder activities in easements

The following assessment is based on ElectraNet (2013) and Safework Australia (2014).

- *Grazing* - permitted activity.
- *Fences* - constructing or maintaining fences across transmission line easements, provided fences are not greater than 2m in height, is a permitted activity.
- *Gates* - constructing or maintaining gates across transmission line easements, provided gates are not greater than 2m in height and do not prevent access for transmission line inspection/maintenance, is a permitted activity.
- *Access tracks* - is a permitted activity. Note that transport loads up to 4.6m in height are unrestricted on public roads (Safework Australia 2014).
- *Vegetation* - needs to be cleared to a height of 3m within 12.5m of the centreline and cleared to a height of 6m between 12.5 and 25m of the centreline of the transmission line. The vegetation in the Project Area is unlikely to reach these heights, and therefore maintaining pastoral or native vegetation areas in their natural state is unlikely to be affected by the Project activities.
- *Permanent and annual plantings* - orchards, vineyards and vegetable growing are permitted provided they meet the above mentioned clearance restrictions. Irrigation and chemical spraying activities are required to be controlled through management guidelines to avoid exposure of transmission lines to water or chemicals.
- *Buildings/structures* - e.g. sheds, yards, pump houses, housing are permitted outside minimum clearance distances of the transmission lines (i.e. the easements) and must not prevent access to infrastructure for maintenance or inspection.
- *Storage of materials* -not permitted within easement.
- *Excavation/filling of land* - excavation which impacts on the footings of transmission lines is not permitted.

Assessment of potential for enterprise activity fragmentation

Table 5-4 summarises the assessment of potential for enterprise activity fragmentation.

Table 5-4 Assessment of potential for landholder activity fragmentation

Property	Assessment	Notes
Properties along first 108km of transmission line from western end *with exception*	A	Project transmission line runs adjacent to existing transmission line with exception (see next row)
Exception	B	Approximately 17.5km of the Project Transmission line east of White Dam Conservation Park where line does not run adjacent to existing tracks/transmission line.
Taylorville Station	A	Project transmission line runs adjacent to existing transmission line (approximately 1km) and existing track (13km) on southern boundary of property.
Hawks Nest Station	B	Project transmission line crosses the property diagonally between the SW corner of Taylorville Station and the southern boundary of Hawks Nest Station. There are few if any existing tracks running along this section (approx. 10km). Project transmission line then runs along the southern boundary of Hawks Nest Station to the SW corner of Calperum Station. Approximately 50% of this section has some existing track/fire break running parallel, but likely to be on a southern property boundary. This section is approx. 12km
Calperum Station	A	Project transmission line runs along the southern and eastern boundary of Calperum Station, adjacent to existing tracks (approx. 20km). Project transmission line then runs approx. 7km through Calperum Station parallel to some existing tracks. Project transmission line then runs parallel to Wentworth Road corridor (likely to be inside the Calperum Station boundary) for approx. 35km to the border of SA and NSW.
Chowilla Regional Reserve	A	Project transmission line runs adjacent to existing tracks (approx. 11.1km)

A unlikely to change existing levels of fragmentation i.e. there is an existing transmission line/road which could constrain certain landholder activities.

B potential to change existing levels of fragmentation.

Sources: Project GIS, ElectraNet (2013), BDO EconSearch analysis.

5.19.4. Level of certainty

Component	Ranking	Notes
Quality of data	Medium	Limited data; use of industry recognized or benchmarked data (ElectraNet 2013); some assumptions (medium).
Extent to which modelling has been validated	Medium	Not industry recognised (medium).
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access.

Component	Ranking	Notes
Effectiveness of management measures	N/A	

5.20. Loss of Property Value from Future Development Constraints

5.20.1. Description of the potential impact

Project activities may be perceived to, or may actually constrain landholders' activities in conducting their agricultural businesses with respect to future developments.

5.20.2. Control measures

The transmission line alignment and transmission structure placement are the principal design controls that seek to reduce impacts as a result of Project activities. The alignment has been selected to follow existing infrastructure corridors; avoid areas of high cultural significance, high value conservation areas and wetlands, and important habitat for threatened species; and to minimise the potential for disturbance. Further investigation through technical studies and landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access. This uncertainty has been addressed by nominating a 500m wide buffer on a nominal transmission line alignment (1km corridor) for the purposes of the impact assessment.

5.20.3. Impact analysis

Results of impact assessment

The Project may lead to restriction of some landholder activities for properties within the Project Transmission line corridor, as described in Section 5.19.3. This may, in turn, lead to an actual or perceived constraint on future developments by landholder enterprises. However, the Project has a relatively small footprint within each property and this reduces the likelihood of actual development constraints occurring. As the Project is at the preliminary design stage and consultation with affected landholders is incomplete, it is not possible to quantify expected effects. The majority of potential development restrictions would apply to less than 0.6 per cent per property within the Project Transmission Line corridor. In these situations the Project is expected to have negligible impact.

A hypothetical 'worst case' development constraint scenario for each pastoral lease within the Project Transmission Line corridor has been used to quantify the maximum potential effect. Changes in existing levels of fragmentation as a result of the Project are unlikely for the majority of the properties along the Transmission Line route and in this situation it is unlikely that future developments will be constrained by the Project. The transmission line has potential to change the existing levels of fragmentation on properties along approximately 17.5km of the Project Transmission line east of White Dam Conservation Park, Hawks Nest Station (approximately 16.7km) and Calperum Station (approximately 14.4km) where the transmission line does not follow existing transmission lines, and in these situations there is potential to have future developments constrained by the Project. In these situations the Project is could have a minor impact.

Supporting information and analysis

The properties along the Project transmission line alignment are a mixture of freehold and pastoral leases, with the freehold titles mainly occurring on the smaller parcels along the western end of the Project.

A pastoral lease is a title issued for the lease of an area of Crown Land use for the limited purpose of grazing of stock and associated activities. It is a limited property right and does not provide the leaseholder with all the rights that attach to freehold land. Specific conditions are often attached to pastoral leases, including a time period and the type of activity that may be permitted.

The further limitation of a leaseholder's rights would generally be expected to reduce the value of a lease. However, the Project has a relatively small footprint within each property and this reduces the likelihood of actual development constraints occurring, because any development constraint resulting from the Project is limited to a relatively small section of the property.

The majority of potential landholder activity restrictions apply to the Project easement (80m, see Section 5.19.3). These potential development restrictions would apply to buildings/structures (e.g. sheds, yards, pump houses, housing), storage of materials (e.g. haystacks) and excavations/filling of land (e.g. bunds, swales).

5.20.4. Level of certainty

Component	Ranking	Notes
Quality of data	Medium	Limited data; use of industry recognized or benchmarked data (; some assumptions (medium).
Extent to which modelling has been validated	Medium	Not industry recognised (medium).
Effectiveness of design measures	High	Landholder discussions will confirm the exact placement of infrastructure to mitigate impacts and risks associated with land access.
Effectiveness of management measures	N/A	

5.21. New Regional Investment - Loss of Land for Primary Production

5.21.1. Description of potential impact

Cumulative impact of other infrastructure projects proposed for the region (such as the increase in renewable energy generation anticipated) may cause a loss of land for primary production purposes.

5.21.2. Control measures

None.

5.21.3. Impact analysis

Results of impact assessment

A minor impact on loss of land for primary production (or constrained activities) is expected due to investment in renewable energy in the Study Area. The exact location, size and nature of the loss is unknown so the size of the impact cannot be verified.

Supporting information and analysis

Estimating the effect of infrastructure projects on loss of land for primary production requires an understanding of the amount of primary production land that will likely be affected by infrastructure projects and the effect of the land use change on that land.

Section 4.2 lists known renewable energy infrastructure projects proposed for the Study Area. The total land area for these projects is unknown but some details are available on the nature of the effect on land use. For example:

- Robertstown Solar is expected to convert around 1,800 hectares of agricultural land (dry cropping and grazing) for solar energy generation. Project materials (Robertstown Solar 2019) suggest that grazing may still be possible once the project is operational so the land may still be used for primary production, with additional constraints on the possible uses.
- Riverland Solar Farm and Storage is expected to convert 600 hectares of agricultural land for solar energy generation and storage (Lyon Group 2019). The development application indicated that grazing would not be possible during operation.

Infrastructure of this kind will cause a loss of land for primary production or constrain primary production activities in the Study Area. This kind of infrastructure project tends to take place on grazing properties (rather than irrigated agriculture) where the cost of lost agricultural production is minimal.

5.21.4. Level of certainty

Component	Ranking	Notes
Quality of data	Low	Specific data about potential investments are not available (Low)
Extent to which modelling has been validated	Low	Quantification cannot be carried out without data on the potential investments (Low)
Effectiveness of design measures	N/A	
Effectiveness of management measures	N/A	

6. IMPACT ASSESSMENT SUMMARY

Potential Impact	Controls	Impact Consequence	Certainty
5.1 Capital expenditures to build the Project will result in direct and indirect positive impact to regional and South Australian economies, including employment.	None	Major, positive	High
5.2 Greater interconnection between electricity suppliers as a result of the Project increases reliability of electricity supply and increases supply competition leading to greater reliability and lower electricity wholesale prices.	None	Major, positive	High
5.3 Job creation by the Project in the Study Area during construction reduces the availability of labour for existing local businesses which could lead to a short-term increase in wage costs or shortage of specific skills.	None	Negligible	High
5.4 Relocation of construction workers to residential centres and construction camps in the Study Area has the potential to cause social disruption and conflict.	ElectraNet Health, Safety, Environment & Sustainability Policy to 'protect and respect the natural and cultural environment in the communities in which [ElectraNet operates]'.	Negligible	High
5.5 Relocation of construction workers to residential centres in the Study Area has the potential to put strain on local services (such as social and medical services), reducing their availability to existing residents.	Construction camps will be used to accommodate workers from outside the Study Area.	Negligible	High
5.6 Relocation of construction workers to residential centres in the Study Area has the potential to put strain on local business, which may cause shortages of basic services to these communities (for example retail and recreation).	Construction camps will be used to accommodate workers from outside the Study Area.	Negligible	High
5.7 Relocation of workers and establishment of a relatively highly paid workforce brings opportunities for expansion of local business/services.	None	Minor, positive	High
5.8 Relocation of Project labour sourced outside of the region may put pressure on local rental accommodation markets, making housing less available and affordable to existing residents during construction.	Construction camps will be used to accommodate workers from outside the Study Area.	None	High

Potential Impact	Controls	Impact Consequence	Certainty
5.9 The establishment of a relatively highly paid workforce within regional townships influences inflation of prices for goods and services.	Construction camps will be used to accommodate workers from outside the Study Area.	Negligible	High
5.10 Changes to primary industries/demographics may cause loss of social cohesion and community identity.	Construction camps will be used to accommodate workers from outside the Study Area.	None	High
5.11 Project may cause loss of income / lower standard of living via reduced tourism from changes in amenity.	500m buffer for transmission line alignment to avoid areas of high amenity.	Negligible	Medium
5.12 Investment in the Project and potential renewable energy generation projects (enabled by the Project) may reverse population decline amongst the local communities.	None	Minor, positive	Low
5.13 More money coming into the area may increase standard of living amongst the local communities.	None	Unquantified, positive	Low
5. 14 Increased access by construction personnel to Project construction sites and camp located within rural properties during construction has the potential to cause social disruption.	ElectraNet Health, Safety, Environment & Sustainability Policy to 'protect and respect the natural and cultural environment in the communities in which [ElectraNet operates]'.	Negligible	High
5.15 Project construction activities lead to temporary disruption of landholder activities and financial impact for rural enterprises on the transmission line.	Detailed consultation with individual landholders regarding transmission line alignment and transmission structure placement; and regarding continuity of current operations, access arrangement and compensation.	Negligible to minor	Medium
5.16 Project may cause a loss of amenity for landholders through changes to the visual aesthetic of the landscape and restricting lifestyle activities.	Detailed consultation with individual landholders regarding transmission line alignment and transmission structure placement; and regarding continuity of current operations, access arrangement and compensation.	Negligible to minor	High
5.17 Transmission line clearance requirements disrupts pastoral operations by limiting vehicle access below the transmission line. Presence of transmission line disrupts pastoral operations by affecting aerial	Detailed consultation with individual landholders regarding transmission line alignment and transmission structure placement.	Minor	Medium

Potential Impact	Controls	Impact Consequence	Certainty
mustering (or other aerial activities) near the transmission line.	Registration of transmission line and GPS coordinates with Energy Network Association.		
5.18 Permanent loss of land as a result of Project infrastructure may be perceived to, or may actually, constrain landholders' activities in conducting their agricultural businesses.	Detailed consultation with individual landholders regarding transmission line alignment and transmission structure placement. Compensation or acquisition of land.	Transmission line (negligible), new substation (minor)	High
5.19 Restriction of certain activities on Project easements may be perceived to, or may actually, constrain landholders' activities in conducting their agricultural businesses.	Detailed consultation with individual landholders regarding transmission line alignment and transmission structure placement.	Negligible to minor	Medium
5.20 Project activities may be perceived to, or may actually constrain, landholders' activities in conducting their agricultural businesses with respect to future developments.	Detailed consultation with individual landholders regarding transmission line alignment and transmission structure placement.	Negligible to minor	Medium
5.21 Cumulative impact of other infrastructure projects proposed for the region (such as the increase in renewable energy generation anticipated) may cause a loss of land for primary production purposes.	None	Minor	Low

REFERENCES

ACIL Allen 2019, *South Australia New South Wales Interconnector, updated analysis of potential impact on electricity prices and assessment of broader economic benefits*, February.

ACIL Allen 2020, *Project EnergyConnect, updated analysis of potential impact on electricity prices in South Australia*, September.

Australian Bureau of Statistics (ABS) 2017, *Census TableBuilder*. http://www.abs.gov.au/websitedbs/D3310114.nsf/home/About+TableBuilder, accessed 3/4/19.

Australian Transport Safety Bureau (ATSB) 2016, *Aerial Application Safety - 2015-2016 year in review*, Canberra, September.

Bowey, R. 2015, *Central Eyre Iron Project Social Baseline and Social Impact Assessment Technical Report*, report prepared by Rose Bowey and Associates for Iron Road, Adelaide, April.

Civil Aviation Safety Authority (CASA) 2014, *Sector Risk Profile for the Aerial Application Sector*, Canberra.

Civil Aviation Safety Authority (CASA) 2015, *Sector Risk Profile for the Aerial Mustering Sector*, Canberra.

CoreLogic 2019, *RP Data Professional*. https://rpp.rpdata.com, accessed 2/4/19.

Department of Agriculture, Water and the Environment (DAWE), 2020a. *Murray Mallee - Calperum Station and Taylorville Station*, Australian Heritage Database, Commonwealth Heritage List, Department of Agriculture, Water and the Environment, Australian Government, Canberra.

DAWE 2020b, ***Australia's Biosphere Reserves: Calperum and Taylorville Stations***, accessed 17 December 2020, available online at https://www.environment.gov.au/topics/national-parks/associated-programs/australias-biosphere-reserves/calperum-tayorville-stations

Department of Jobs and Small Business (DOJSB) 2019, *LGA Data tables — Small Area Labour Markets — December quarter 2018*. https://docs.jobs.gov.au/documents/lga-data-tables-small-area-labour-markets-december-quarter-2018, accessed 3/4/19.

Department of Planning, Transport and Infrastructure (DPTI) 2014, *SA Standards for Work-zone Traffic Management*, SA Government.

Department of Regional Development and Lands 2011, *Travelling in Outback Western Australia*, WA Government.

Department of Transport, Energy and Infrastructure (DTEI) 2008, *Code of Practice for Oversize or Overmass Agricultural Vehicles*, May.

Department of Transport, Energy and Infrastructure (DTEI) 2010, *Code of Practice for the Transport of Large Rectangular Baled Hay*, April.

District Council of Loxton Waikerie (DCLW) 2017, *Population, Demographic & Economic Activity Profile*, November.

ElectraNet 2013, *Land use guidelines for electricity transmission corridors*, Adelaide.

ElectraNet 2019a, *SA Energy Transformation RIT-T, Project Assessment Conclusions Report*, February.

ElectraNet 2019b, *Health, Safety, Environment & Sustainability Policy*, January.

Electricity (General) Regulations 2012 (SA).

GHD 2013, *Carmichael Coal Mine and Rail Project SEIS*, report prepared on behalf of Adani Mining Ltd, October.

Hart, W. 2016, *Unsealed Roads and Patrol Grading Methodology*, District Council of Mount Remarkable publication, February.

Luck, GW, Black, R & Race, D 2010, 'Demographic Change in Rural Australia: Future Opportunities and Challenges', in Demographic Change in *Australia's Rural Landscapes: Implications for Society and the Environment*, vol. 12, Springer Netherlands, Dordrecht, pp. 375-384.

Lyon Group 2019, *Riverland Battery Power Plant*, https://www.lyonasia.com.au/projects/riverland-battery-power-plant/, accessed 18/12/2019.

Mwaipungu, R. and Allopi, D. 2015, The lessons learned from conducting a condition survey on unsealed roads surfaced with marginal materials in the Iringa region, Tanzania, *WIT Transactions on Ecology and the Environment*, Vol. 193, pp 287-298.

National Heavy Vehicle Regulator (NHVR) 2016, *National Heavy Vehicle Mass and Dimension Limits*, July.

Regional Development Australia Murraylands and Riverland (RDAMR) 2018, *2020 Strategic Plan*, December.

Outback Community Authority 2019, *State of the Outback Report*, https://oca.sa.gov.au/sites/default/files/media/reports/2018-19/StateoftheOutback2019.html

Robertstown Solar 2019, *Project Information*, https://www.robertstownsolar.com.au/, accessed 18/12/2019.

South Australian Centre for Economic Studies 2012, *Regional Development Australia Murraylands and Riverland,* The University of Adelaide and Flinders University, May.

South Australian Tourism Commission (SATC) 2020, Chowilla Game reserve and Regional Reserve, accessed 17 December 2020, available online at https://southaustralia.com/products/riverland/attraction/chowilla-game-reserve-and-regional-reserve

Safework Australia 2014, *Guide for Transporting High Loads Near Overhead Electric Lines*, July.

SQM Research 2019, *Vacancy Rates*. https://sqmresearch.com.au/vacancy.php?t=1, accessed 2/4/19.

Tourism Research Australia (TRA) 2018a, *Local Government Area Profiles 2017, Berri and Barmera (DC),* August.

Tourism Research Australia (TRA) 2018b, *Local Government Area Profiles 2017, Loxton Waikerie (DC),* August.

Tourism Research Australia (TRA) 2018c, *Local Government Area Profiles 2017, Mid Murray (DC),* August.

Tourism Research Australia (TRA) 2018d, *Local Government Area Profiles 2017, Renmark Paringa (DC),* August.

Tourism Research Australia (TRA) 2018e, *Tourism Businesses in Australia*.

URS and URPS 2013, *Murray and Mallee LDA Regional Public Health Plan 2013-2018*.

West, G.R. and Jackson R.W. 2005, *Simulating Impacts on Regional Economies: A Modelling Alternative*, Faculty of Business, University of the Sunshine Coast.

Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.

APPENDIX 1 Socioeconomic Indicators

Appendix Table 1-1 Person characteristics, age, family characteristics, 2016

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area[a]	South Australia
Person characteristics							
Population (total number)	4,136	8,642	11,487	10,545	9,475	44,285	1,676,653
Male %	50.2%	53.5%	50.0%	50.0%	49.8%	50.6%	49.3%
Female %	49.8%	46.5%	50.0%	50.0%	50.2%	49.4%	50.7%
Age							
0-14 years %	17.3%	13.1%	17.6%	18.0%	17.2%	16.7%	17.5%
65 years and over %	22.5%	25.5%	23.1%	21.7%	21.0%	22.7%	18.3%
Median age	48	51	46	45	44	234	40
Family Characteristics							
Number of families	1,063	2,258	3,115	2,780	2,468	11,684	436,817
Couple families with children %	36.4%	30.0%	36.7%	35.6%	36.7%	35.1%	42.1%
Couple families without children %	51.1%	54.7%	48.5%	45.0%	46.2%	48.6%	40.0%
One parent families %	11.4%	14.2%	13.8%	18.1%	15.7%	15.1%	16.3%
Other families %	1.1%	1.1%	1.0%	1.2%	1.4%	1.2%	1.7%
Education							
Completed Year 12 (%)	26.4%	24.3%	24.9%	26.7%	25.3%	25.4%	39.2%
Did not go to school (%)	0.2%	0.3%	0.3%	0.8%	1.3%	0.6%	0.7%

[a] Study Area statistical geography: Murray and Mallee Statistical Area Level 3.

Source: ABS 2017.

Appendix Table 1-2 Main language spoken at home, 2016

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area[a]	South Australia
Main language spoken at home							
Speaks English only	98.0%	97.4%	95.3%	90.2%	85.3%	92.6%	82.7%
Afrikaans	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
Arabic	0.0%	0.1%	0.1%	0.2%	0.0%	0.1%	0.6%
Australian Indigenous Languages	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%	0.2%
Cantonese	0.1%	0.0%	0.1%	0.0%	0.2%	0.1%	0.6%
Mandarin	0.0%	0.2%	0.2%	0.2%	1.0%	0.3%	1.8%
Other Chinese	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Croatian	0.0%	0.0%	0.0%	0.4%	0.2%	0.2%	0.2%
Dutch	0.4%	0.3%	0.1%	0.1%	0.0%	0.1%	0.2%
French	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%
German	0.4%	0.3%	0.2%	0.2%	0.3%	0.2%	0.4%
Greek	0.0%	0.0%	1.0%	4.0%	4.2%	2.1%	1.5%
Bengali	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.2%
Hindi	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.5%
Punjabi	0.0%	0.1%	0.9%	1.5%	2.6%	1.2%	0.6%
Sinhalese	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Urdu	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%

Appendix Table 1 2 Main language spoken at home, 2016 - continued

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area[a]	South Australia
Main language spoken at home							
Italian	0.3%	0.1%	0.6%	0.7%	1.5%	0.7%	1.8%
Japanese	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%
Korean	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%
Macedonian	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Persian (excluding Dari)	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.3%
Polish	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%	0.4%
Russian	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.2%
Samoan	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Serbian	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
Filipino	0.2%	0.1%	0.1%	0.3%	0.1%	0.2%	0.2%
Indonesian	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Tagalog	0.1%	0.1%	0.0%	0.2%	0.1%	0.1%	0.3%
Spanish	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.4%
Tamil	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.2%
Thai	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
Turkish	0.0%	0.0%	0.0%	0.0%	0.7%	0.2%	0.0%
Vietnamese	0.0%	0.0%	0.1%	0.0%	0.9%	0.2%	1.2%
Other(f)	0.6%	0.7%	0.6%	0.9%	2.1%	1.0%	3.9%

[a] Study Area statistical geography: Murray and Mallee Statistical Area Level 3.

Source: ABS 2017.

Appendix Table 1-3 Person characteristics, income and household type, 2016

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area	South Australia
Person characteristics							
Population (total number)	4,136	8,642	11,487	10,545	9,475	44,285	1,676,653
Income							
Median weekly individual income ($[a])	481	473	552	533	550	523	600
Median weekly household income ($[a])	891	842	1,005	971	1,016	965	1,204
Median weekly family income ($[a])	1,184	1,096	1,286	1,252	1,256	1,222	1,510
Median rent ($/weekly[a])	150	175	172	180	175	184	260
Rent payments more than 30% household income[a]	4.7%	5.7%	6.0%	8.8%	7.2%	7.9%	10.2%
Median mortgage repayment ($/monthly[a])	867	1,000	1,040	1,083	1,083	1,083	1,491
Mortgage repayments more than 30% household income[a]	4.3%	7.0%	4.1%	4.7%	5.5%	5.3%	6.6%
Population with annual personal income over $104,000 %	2.2%	2.2%	2.3%	2.6%	2.8%	2.4%	4.6%
Household type – occupied private dwellings							
Family households %	59.3%	58.6%	65.0%	60.9%	62.2%	61.6%	64.9%
Lone person households %	30.1%	29.9%	26.7%	28.3%	26.7%	28.1%	26.6%
Group households %	2.0%	2.5%	2.1%	2.5%	2.3%	2.3%	3.4%
Other households	8.6%	8.9%	6.2%	8.3%	8.8%	8.0%	5.2%
Occupied private dwellings	1,645	3,506	4,497	4,179	3,627	17,454	638,792
Unoccupied private dwellings	405	2,904	805	545	534	5,193	92,242

[a] Study Area statistical geography: Murray and Mallee Statistical Area Level 3.

Source: ABS 2017.

Appendix Table 1-4 Employment and occupation, 2016

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area	South Australia
Employment (population aged 15 years and over)							
In the labour force (total number)	1,815	3,516	5,236	4,630	4,370	19,567	806,596
Employed full-time %	52.8%	52.7%	55.8%	55.6%	54.9%	54.7%	53.9%
Employed part-time %	34.2%	35.1%	33.5%	32.5%	32.4%	33.4%	33.5%
Employed but away from work %	6.8%	5.7%	5.9%	5.1%	5.7%	5.7%	5.0%
Unemployed % - 2016 Census	6.3%	6.5%	4.7%	6.8%	6.9%	6.2%	7.5%
Unemployed % - 2018 DOJSB	6.2%	5.4%	4.3%	7.1%	5.7%	5.6%	5.7%
Occupation (population aged 15 years and over) (%)							
Managers	28.4%	19.6%	20.3%	14.4%	16.9%	18.8%	12.8%
Professionals	9.3%	8.5%	11.9%	14.1%	11.5%	11.5%	20.6%
Technicians and Trades Workers	13.1%	15.8%	12.5%	13.4%	12.5%	13.3%	13.6%
Community and Personal Service Workers	8.2%	10.4%	10.9%	12.1%	9.5%	10.5%	12.2%
Clerical and Administrative Workers	8.8%	9.0%	10.7%	10.7%	10.4%	10.2%	13.6%
Sales Workers	5.9%	8.0%	8.1%	9.4%	9.1%	8.4%	9.8%
Machinery Operators and Drivers	8.7%	9.4%	7.2%	7.6%	7.9%	8.0%	6.2%
Labourers	17.7%	19.3%	18.4%	18.4%	22.4%	19.4%	11.3%

Source: ABS 2017 and DOJSB 2019.

Appendix Table 1-5 Industry of employment, 2016

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area	South Australia
Industry of employment (population aged 15 years and over)							
Agriculture, Forestry and Fishing	509	617	1,211	411	779	3,527	30,022
Mining	18	10	17	3	8	56	8,698
Manufacturing	109	166	404	456	327	1,462	59,528
Electricity, Gas, Water and Waste Services	17	23	27	125	39	231	9,081
Construction	60	118	248	214	229	869	56,095
Wholesale Trade	19	19	93	87	105	323	21,056
Retail Trade	94	201	409	531	431	1,666	79,614
Accommodation and Food Services	80	196	190	262	364	1,092	49,555
Transport, Postal and Warehousing	35	131	197	100	203	666	30,806
Information Media and Telecommunications	3	0	9	18	48	78	9,597
Financial and Insurance Services	3	6	54	87	50	200	20,236
Rental, Hiring and Real Estate Services	0	27	22	33	36	118	9,953
Professional, Scientific and Technical Services	26	45	88	141	69	369	41,104
Administrative and Support Services	10	112	198	135	262	717	26,614
Public Administration and Safety	36	175	100	322	82	715	52,676
Education and Training	109	171	322	391	227	1,220	64,429
Health Care and Social Assistance	111	158	549	844	289	1,951	110,283
Arts and Recreation Services	5	20	22	16	20	83	10,126
Other Services	38	56	170	200	104	568	29,057
Inadequately described	32	53	108	110	96	399	17,299
Industry of Employment not stated	26	37	47	51	56	217	6,990
Total	1,339	2,351	4,486	4,530	3,825	16,531	742,822

Source: ABS 2017.

Appendix Table 1-6 Gross Regional Product by sector ($m), 2017-18

Sector	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area	South Australia
Agriculture, Forestry and Fishing	83	132	273	75	189	753	5,195
Mining	1	7	0	0	0	8	4,432
Manufacturing	11	14	39	53	49	165	5,869
Electricity, Gas, Water and Waste	6	11	13	83	25	139	4,025
Construction	12	18	37	34	40	142	7,481
Wholesale Trade	6	2	17	20	21	67	4,438
Retail Trade	8	12	27	42	32	122	5,758
Accommodation and Food Service	4	8	9	12	18	50	2,357
Transport, Postal and Warehouse	5	11	28	13	31	89	5,440
Information Media and Telecommunications	0	0	0	4	9	13	2,526
Finance and Insurance	4	1	11	36	20	72	8,578
Renting, Hiring and Real Estate	1	5	6	8	9	28	2,314
Ownership of Dwellings	11	27	36	33	30	138	8,751
Professional, Scientific and Technical Services	4	2	9	16	5	37	5,963
Administrative and Support	6	17	30	19	47	118	3,556
Public Administration and Safety	5	20	13	35	11	84	6,268
Education and Training	6	12	25	33	19	96	5,363
Health and Social Assistance	9	11	44	79	27	171	10,037
Arts and Recreational	0	0	2	2	2	6	742
Other Services	3	2	9	13	5	32	1,846
Net Taxes in Final Demand	12	22	32	31	31	127	6,448
Gross Regional Product (GRP)	197	334	662	643	620	2,457	107,386

Source: BDO EconSearch analysis.

Appendix Table 1-7 Tourism businesses, visitor numbers and visitor expenditure, 4-year average (2014-2017)

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area[a]	South Australia
Tourism businesses							
Non-employing	np	35	39	37	36	147	7,608
1 to 4 employees	np	32	38	43	30	143	5,323
5 to 19 employees	np	18	33	29	22	102	3,752
20 or more employees	np	0	6	6	10	22	963
Total	**np**	**88**	**115**	**106**	**103**	**412**	**17,646**
Visitor metrics							
Visitors ('000)	np	2.4	1.9	2.4	3.0	9.7	20,706
Nights ('000)	np	15	43	40	120	219	33,895
Average stay (nights)	np	6	23	17	40	23	2
Total spend ($m)	np	1.6	1.3	1.6	3.6	8.1	6,601
Average spend per trip ($)	np	668	711	664	1,178	834	319
Average spend per night ($)	np	106	31	39	30	37	195

[a] Study Area excludes Goyder for this chart.

Source: TRA 2018a-e

Appendix Table 1-8 Residential housing vacancies and property prices, 2014 to 2018

	Goyder (DC)	Mid Murray (DC)	Loxton Waikerie (DC)	Berri Barmera (DC)	Renmark Paringa (DC)	Study Area	South Australia (ex Adelaide)
Residential housing vacancies							
Residential Vacancy 2019 (no.)	4	24	15	25	15	83	-
Residential Vacancy 2014 (no.)	10	26	11	30	11	88	-
Δ in housing vacancy 2014 to 2019 (%)	-60%	-8%	36%	-17%	36%	-6%	-
Residential property prices							
Median house price 2018 ($)	157,500	236,000	200,100	222,500	250,000	-	287,000
Median house price 2016 ($)	150,000	217,500	195,000	182,250	183,750	-	280,000
Median house price 2014 ($)	160,000	238,600	189,500	175,000	200,000	-	275,000
Δ in house price 2014 to 2018 (%)	-2%	-1%	6%	27%	25%	-	4%
Median unit price 2018 ($)	np (<5)	np (<5)	180,000	154,000	182,500	-	195,000
Median unit price 2016 ($)	np (<5)	np (<5)	np (<5)	167,500	np (<5)	-	205,000
Median unit price 2014 ($)	np (<5)	np (<5)	np (<5)	120,000	np (<5)	-	180,100
Δ in unit property price 2014 to 2018 (%)	-	-	-	28%	-	-	8%

Sources: SQM Research 2019 and CoreLogic 2019.

APPENDIX 2 RISE Model

The RISE Model Version 6.04 is a Microsoft Excel ® spreadsheet model designed to assist a regional analyst understand the structure of a regional economy and estimate the economic impact of change in the region.

The model has three functions:

- Describe industry structure
- Measure economic impact
- Provide an input-output table and multipliers for the region.

The model can be used to estimate the impact on the regional economy over a ten-year period of a change in the final demand for the output of one or many sectors. It can also be used to illustrate the impact of establishing a new industry/business in the region, as well as the effects due to change in tourist expenditure. Impacts are measured in terms of gross regional product, employment, household income and value of output. The RISE model extends the standard input-output (I-O) model to enable measurement of population impacts.

Further extensions have been incorporated to improve the functional scope of the RISE model. In particular, an option to include price sensitivity as part of an economic impact analysis has been added to the model following the West and Jackson (2005) approach.

The RISE model has I-O analysis as its core. I-O models, such as RISE, provide a detailed picture of the structure of an economy at a particular point in time. The model provides a basis for analysis of inter-sectoral relationships within the economy. Accordingly, this makes the I-O model suitable for regional impact analysis.

Based on the assumption that no single firm, industry or sector exists in isolation, I-O analysis provides a framework analysing the dependencies that exist between firms. Each firm, industry or sector depends to some extent on others as sources of inputs or as markets for outputs. An understanding of these dependencies is essential in measuring the impact of a change in a particular sector.