FINAL TECHNICAL REPORT

Moree Special Activation Precinct

Responding to the Final Enquiry by Design

Prepared for
Department of Regional NSW

12 February 2021

THE CENTRE FOR INTERNATIONAL ECONOMICS
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Contents

BOXES, CHARTS AND TABLES

Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ARTC	Australian Rail Track Corporation
CIE	Centre for International Economics
COVID-19	Coronavirus pandemic of 2020
DPIE	Department of Planning, Industry and Environment
DRNSW	Department of Regional NSW
ERP	Estimated resident population
FEbD	Final Enquiry by Design
FTE	Full time equivalents
GAB	Great Artesian Basin
GRDC	Grains Research and Development Corporation
GRP	Gross Regional Production
HGP	Hunter Gas Pipeline
LALC	Local Aboriginal Land Council
LDC	Louis Dreyfuss Commodities
LGA	Local Government Area
MIP	Moree Intermodal Park
MPSC	Moree Plains Shore Council
NAT	Newcastle Agri-Terminal
ORED	NSW Office of Regional Development
RJCF	NSW Regional Job Creation Fund
RGDC	Regional Growth Development Corporation
SAP	Special Activation Precincts
TfNSW	Transport for NSW
UAN	Liquid urea ammonium nitrate
USP	Unique selling proposition

Summary

Special Activation Precincts (SAP) are a new way of planning and delivering industrial and commercial infrastructure projects in region NSW, delivered as part of the $4.2 billion Snowy Hydro Legacy Fund. The objective of each SAP is job creation and economic development, within designated areas of regional NSW. This is created through infrastructure investment and fast-tracked, streamlined planning, government-led development, and business concierge.

In December 2019, Moree was declared a suitable location for a SAP because of its access to both Brisbane and Sydney markets, supply of water, and location along the Inland Rail Route and the Newell Highway.[1] By further leveraging these advantages, the SAP intends to capitalise on Moree's high-value agricultural industry and create a business hub that specialises in agribusiness, logistics and food processing.

The vision of the Moree SAP is to diversify Moree's agricultural economy by building on its strong connection to Country and sustainable water and energy, and to unlock world class opportunities to value-add, embrace new technologies and develop innovative energy solutions.[2]

The Moree region

Moree Plains Shire is located at the junction of the Newell Highway and Gwydir Highway, 640km northwest of Sydney and 473km southwest of Brisbane. The area has a population of 13,159 residents, with Approximately 60 per cent of the population resides in the Moree township, with the remainder located in the Moree Region.[3] Discussions with local stakeholders have clarified that population growth was strong in terms of births versus deaths at a regional and Moree township level. However, the overall net migration has been extensive enough to drive downward pressure on the population over the past two decades.

The population includes one of the largest Indigenous nations in Australia, Kamilaroi Country, with 21.6 per cent of the Moree Plains Shire LGA population identifying as an Indigenous Australian.

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1 NSW Department of Planning, Industry and Environment, '*Moree Special Activation Precinct frequently asked questions*', NSW Government

2 NSW Department of Planning, Industry and Environment 2020, '*Moree Special Activation Precinct: Integrated Analysis Report*', NSW Government

3 Australian Bureau of Statistics, 2016, '*Census 2016*', Australian Government

The Shire has key strategic advantages, particularly for the agriculture industry, which has made one of the most productive agriculture regions across Australia. These key advantages include;

- reliable access to both groundwater and surface water
- the region benefits from rich, alluvial black soils that are highly productive for agricultural purposes
- strong transport links across rail, road and air freight, providing producers with reliable and efficient links to local and international markets, and
- relatively cheap land compared to other regional locations.

Economic context

The number of businesses in the Moree Plains LGA have been increasing on average since 2015, from 1 913 in 2015 to 1 926 in 2019, representing a 0.7 per cent increase.

It has been stated though the SAP investigation process that agriculture is the first, second and third largest industry in the Moree Plains Shire. For instance:

- over 40 per cent of the number of business are agricultural businesses[4]
- the agricultural, fishing and forestry industry contributed 33 per cent ($225.1 million) of Moree's Gross Regional Product in 2019,[5] and
- agricultural production within the Moree Plains Shire alone is estimated to account for 17.5 per cent of the NSW's gross agricultural value.[6]

Many of the other businesses with the Moree Plains LGA are highly linked to the agricultural sector. For example, the rental, hiring and real estate services industry grouping has the second highest number of businesses with 11.6 per cent of the total number of businesses.[7] This industry has also experienced a 15.8 per cent increase in the number of businesses since 2015.

Labour movements, production and various other elements of the local economic are highly integrated with the surrounding region. This includes other regions across NSW, south east Queensland, and import and export points through the Port of Newcastle, Port Botany and Port of Brisbane.

SAP land use scenarios

Through the SAP investigation process, our investigation has considered the potential land uses and the number of jobs created against the SAP vision. This analysis considered the suitability and likelihood of business investment across a wide range of industries. The analysis considered current business demand and potential future

4 8165.0 Counts of Australian Businesses, including Entries and Exits, June 2015 to June 2019.

5 REMPLAN

6 Moree Plains Shire Council, '*Local Strategic Planning Statement*'

7 This industry includes transport equipment and vehicle rental and other goods and equipment rental (such as heavy machinery)

business demand that would enable the SAP to achieve its objective of diversifying the local agricultural economy, building on Moree's strong connection to Country and sustainable water and energy, unlocking opportunities to value-add, embrace new technologies and develop innovative energy solutions. The outcome of this analysis is provided in table 1 below.

1 Estimated land uptake and jobs forecasted to be created in the Moree SAP

	New businesses	Total allotment size		Total employment
	No.	Ha.	persons	FTE's
Building on water and land availability				
Aquaculture	1	5	400	300
Outdoor horticulture	3	150	180	81
Undercover horticulture	12	365	2 861	1 993
Building on grain/cotton advantage				
Increasing value from the supply chain	5	25	50	50
Early-stage processing	4	25	90	78
Grain ethanol	1	30	30	24
Reducing reliance on imported inputs				
Diesel replacement (methanol) — Gas to liquids	0	0	0	0
Chemicals manufacture/mixing	1	15	15	15
Fertiliser mixing— Urea Ammonium Nitrate	1	10	10	10
Building on location				
Intermodal terminal (public access)	1	30	15	15
Freight and logistics	2	20	10	10
Abattoir	0	0	0	0
Circular economy				
Resource recovery (tyres and plastics)	2	60	20	20
Waste to energy — Biogas	1	30	10	10
Solar electricity	1-3	700-2 100	4-12	4-12
Hydrogen production	1	10	4	4
Supporting/service industries				
Light industry/commercial	5	10	25	25

Source: Market Sounding and CIE analysis.

This report further discusses the suitability and likelihood of each of these business groupings. Linked to each business is a probability assessment, those activities assessed as being high probability are either underway or likely to be underway in the next 5 years, and for activities with lower probabilities, the timing is less certain.

1 Introduction

On 3 December 2019, the NSW Government declared Moree a Special Activation Precinct (SAP) investigation area, to be funded by the $4.2 billion Snowy Hydro Legacy Fund. SAPs are a place-based models for economic development designed to attract and grow businesses in regional NSW, and enabling jobs growth and private sector investment. SAPs are areas of State or regional significance and are selected based on an assessment of economic enablers, market failures and catalyst opportunities.

The Department of Regional NSW (DRNSW) leads the SAP program, with the Department of Planning, Industry and Environment (DPIE) in NSW leading the master planning process of the SAP that will be informed by the Structure Plan and a number of technical studies conducted by engaging consultants across a range of disciplines.

The DRNSW is responsible for the development of a Strategic Business Case (SBC) for each of the SAPs, including Moree.

DRNSW has engaged Centre for International Economics (CIE) to prepare a series of economic studies, working in collaboration with technical leads and the NSW Office of Regional Development (ORED), including a:

- economics and demographic analysis — that provides the key context and baseline economic activity for the Moree region to inform the economic rationale for the SAP and identify strategic economic opportunities
- market sounding analysis — involving consultation with existing businesses, potential investors and other stakeholder in governments,
- scenario analysis that compares the strengths, weaknesses, opportunities and constraints of three scenarios from an economic development perspective, identifying potential industry sectors relevant to the SAP
  - This information was used as an input to the Final Enquiry by Design (FEbD) workshop and where insights from that process and the technical reports were used along with information from the market sounding, to further refine land use and employment scenarios.
- final technical report (this report) that summarises the key learnings and insights from the preceding studies— that provide evidenced-based recommendations in relation to the:
  - types of land uses and industry categories envisaged for the Moree SAP.
  - indicative amount of land, employment and water required and preferred locational characteristics for each land use and industry category
  - The sequencing, timing and take up of land uses and industries across the full development potential of the SAP.

2 *The Moree region and its strategic context*

When identifying the Moree SAP investigation area, the following has been considered:

- **rural towns such as Moree are highly integrated with the surrounding region and global supply chains — economic activity is not contained to statistical boundaries**
- **the Moree Plains LGA comprises of two smaller regions, Moree (SA2) and Moree Region (SA2). The different economic structures and activities within these two sub-regions also need to be considered.**

There are strategic documents directing government investments and activities across regional NSW and the Moree region:

- **at the regional level, the NSW Economic Blueprint 2040 outlines the overarching strategic aspiration that 'Our regions should be productive and growing, serviced by world-class infrastructure and transport links'. Additionally, there are a range of government planning documents whose objectives align with that of the stated objectives of the Moree SAP**
- **within the Moree region, there are more specific strategies and goals. These prioritise building a dynamic economy, preserving and leveraging the natural environment, investing in infrastructure and transport networks, and building community infrastructure.**

Defining the Moree region relevant to the SAP

Moree, like any other rural town, is highly integrated with the surrounding region and economic activity is not contained to statistical boundaries, such as those used by the Australian Bureau of Statistics (ABS), and even state boundaries. This includes labour movements within the region, production and various other elements of the production supply chain.

However, for the purposes of the SAP investigation area, the Moree Shire LGA has been identified as the Moree SAP region.

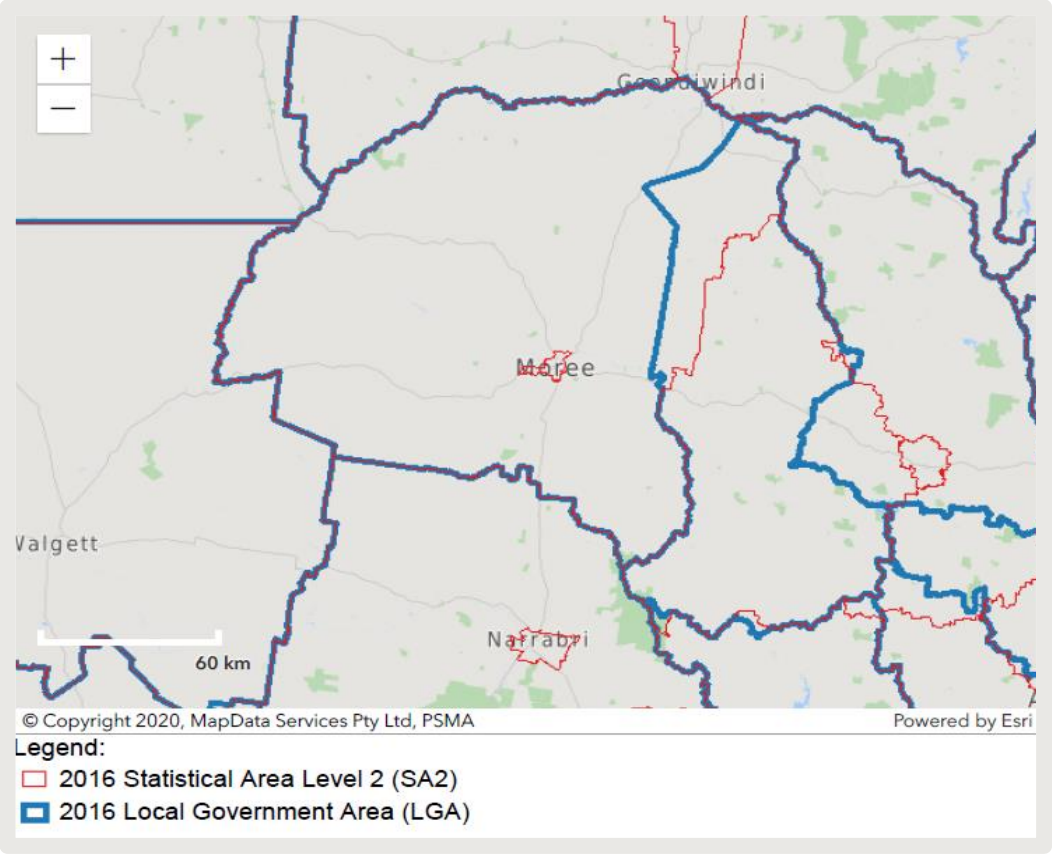
The primary analysis being undertaken focuses on the Moree Shire LGA such that the majority of the economic drivers of the SAP are captured and the analysis is aligned to the demographic modelling. Other indirect linkages have also been identified outside of the LGA with;

- other regions across NSW, specifically Narrabri, Wee Waa and Inverell
- south east Queensland including Goondiwindi and Toowoomba

- export points in the supply chain such as the Port of Newcastle (the Newcastle Agri Terminal), Port Botany, and the Port of Brisbane, and
- Brisbane, Newcastle and Sydney for purchased inputs such as fuel, fertiliser and machinery and parts.

Throughout this report, the SAP investigation area has been aligned to the geographies used within the ABS statistical reports; the Moree Shire LGA, Moree (SA2) and Moree Region (SA2) — as shown in Chart 2.1. The LGA region is mapped by the blue line where as the SA2 region uses red. The SA2 region for Moree includes the town but includes the area west along the Gwydir highway.

2.1 Comparing the Moree Plains LGA with SA2 regions



Source: ABS Maps, see https://itt.abs.gov.au/itt/r.jsp?ABSMaps

Strategic context

Overview of the region's strategy

The NSW Government has a range of strategic documents that detail the aspirations for the state as a whole and for key areas, including the New England North West region and Moree. Table 2.2 summarises the planned objectives for the broader NSW state and regional NSW that aligns with the stated objectives of Moree SAP.

2.2 Key objectives of strategic documents for NSW state and regional NSW

Strategic document	Objective
NSW Economic Blueprint 2040	The NSW Economic Blueprint 2040 has an aspiration that 'Our regions should be productive and growing, serviced by world-class infrastructure and transport links'. One of the recommendations for achieving this is to support regions to be productive and growing and to improve freight networks
NSW Global	Global NSW is a government wide plan to support "a strong and resilient NSW economy" through growing and diversifying trade, stimulating new business investment, fostering innovation and boosting industry competitiveness in cities and across regions. The key objectives identified by Global NSW are: ▪ Accelerate the growth of world-leading industries and businesses. ▪ Build an export culture amongst domestic businesses and support business to go global. ▪ Foster an environment conducive to investment that allows innovation to prosper. ▪ Put Lighthouse Precincts on the map as magnets for international investment in priority sectors. ▪ Develop the workforce of tomorrow. ▪ Deliver productive jobs in great places to live.
NSW State Infrastructure Strategy 2018-2038	The NSW State Infrastructure Strategy sets out government priorities for the next 20 years for infrastructure investment and is underpinned by Future Transport Strategy 2056, Greater Sydney Region Plan, and Regional Development Framework. Its vision for the Regional NSW states 'Communities will grow around a hub-and-spoke network of economic regions, linked by key freight and service routes to markets and suppliers in major cities. They will focus on their competitive advantage in agriculture, mining, primary resource manufacturing and the visitor economy. '
NSW Freight and Port Plans 2018-2033	This report sets out a plan of action for the freight and port sector over the five-year period. It supports the Future Transport 2056 strategy and aligns with the NSW Government's state-wide land use and infrastructure Plans such as the NSW Regions Plans, Greater Sydney Commission District Plans and the State Infrastructure Strategy. The key objectives of this projects are: ▪ Increased economic growth – by providing confidence and certainty that encourages continued investment in the freight industry ▪ Increased efficiency, connectivity and access – by improving the efficiency of existing infrastructure and ensuring greater connectivity and access along key freight routes ▪ Greater freight capacity – by maximising infrastructure investment and increasing land use capacity to accommodate growth ▪ Improved safety – by creating a safer freight supply chain involving safe networks, safe transport, safe speeds and safe people ▪ Enhanced sustainability – by developing a sustainable supply chain that delivers benefits to our environment and continued operations into the future
Snowy Hydro Legacy Fund Priorities	The objective of the Snowy Hydro Legacy Fund was created to invest in critical infrastructure and priority initiatives as identified in the 20-year Economic Vision for Reginal NSW. The areas of immediate focus include improved water security, rail and road transport connections, freight linkages, digital connectivity and Special Activation Precincts (SAP). Moree SAP falls within the investment area focusing on the development of SAP where the key objective is to create jobs, attract businesses and investors, support local industries and fuel economic development.

Strategic document	Objective
20-year Economic Vision for Regional NSW	The 20-year economic vision for Regional NSW presents a pathway to ensure the economic growth of Regional NSW by identifying key principles and priorities for government investment in the infrastructure, skills, advocacy and promotion, and business environment. Some of the identified priorities in the infrastructure and business development that reflects the stated objectives of the Moree SAP is to: ▪ Improve freight networks from regional NSW to global gateways to increase exports. ▪ Provide an attractive environment for businesses to establish and invest in regional NSW locations, consistent with regions' economic endowments. ▪ Grow vibrant places to live and work to encourage business and population growth.
Regional Development Framework	This report provides a framework for investment to support better coordination, decision making and effort on the ground. This will be achieved through the following programs: ▪ Providing quality services and infrastructure in regional NSW – ensuring a baseline set of services across regional NSW ▪ Aligning efforts to support growing regional centres, acknowledging the needs of areas with strong growth in population, jobs or both, and ▪ identifying and activating economic potential by looking across regional NSW for opportunities to change the economic outlook and activate local economies.

Source: Regional NSW, Transport for NSW, NSW Global, Infrastructure NSW, NSW Treasury.

At a more specific level, there are five key strategies driving the Moree SAP:

- Upper North West Regional Economic Development
- New England North West Regional Plan 2036
- Moree Plains Shire — Economic Development Strategy 2020-2030
- Moree Plains Shire Council Local Strategic Planning Statement 2040, and the
- Moree Community Strategic Plan.

These strategic documents highlight four core goals to drive the region moving forward. In short, the goals focus on building a dynamic economy, preserving and leveraging the natural environment, investing in infrastructure and transport networks, and building community infrastructure.

All these strategic goals are relevant to the Moree SAP.

3 *Moree's economic context*

Population projections have been undertaken for the Moree region. This analysis found that:

- **existing government investment in the Moree region (or the baseline) is unlikely to reverse the downward trend in population**
- **over the next 40 years, the estimated regional population for the Moree Plains LGA is expected to decline at an average annual rate of 1 per cent each year.**

There are strong strategic advantages within the Moree region, in particular for agricultural industries. Because of this strategic advantage, agriculture plays a dominant role in the local economy. For instance, over 40 per cent of the local businesses are within this industry.

The Gross Regional Product for the Moree region shows that:

- **agriculture plays a dominant role in the local economy, directly comprising a third of the economy's production value**
- **there are a wide range of other industries within the Moree LGA, with most of these located within the Moree township.**

When considering businesses in the Moree region:

- **the number of businesses has been increasing. The largest growth has been experienced in the following industries:**
  - **Rental, Hiring and Real Estate Services**
  - **Professional, Scientific and Technical Services, and**
  - **Manufacturing.**
- **business confidence is mostly positive. Businesses believe that trading conditions, profitability, and business expansion will be positive in the future. However, there are some businesses that are less confident, and believe their conditions are deteriorating — it is to be noted that this could be flow-on effects of drought.**

When considering jobs within the Moree region:

- **agricultural jobs are vital, and account for over 20 per cent of the total number of jobs (this is ten times the state average for the agricultural sector). The key competitive advantage of the Moree region is to leverage the comparative advantage of the region and further process the agriculture and associated supporting industries**

- **the number of jobs fluctuates year to year. This is partly driven by variations in agricultural production as a result of climate but also changes in productivity in the farm sector and its supporting industries**
- **the majority of the jobs are provided through 'non-employing businesses'. This shows the high level of ownership of small local businesses. Consistent with the current business structure, the Moree SAP could be expected to drive growth in owner-operated businesses or small businesses with less than 20 staff.**

Demographic trends

The objective of the demographic analysis was to develop a better understanding of baseline demographic trends — starting from the DPIE regional projections to 2041 for:

- Moree Plains Shire Council (LGA level) linked to the Moree SAP; and
- the New England and North West (SA4 level) for context.

DPIE projections reflect a declining population at an LGA level driven by net migration out of the region. While the gradual decline in the estimated resident population (ERP) identified in the analysis, is consistent with observations across much of regional NSW, a more detailed analysis was required to identify not only what are the drivers of net migration but also the levers available to change baseline trends.

Key observations from local stakeholders was that population growth was strong in terms of births versus deaths at a regional, and particularly Moree township level, but it is net migration that has driven the downward pressure on ERP:

- young people who have completed high school or go onto tertiary education are most likely to leave the Moree district as there is usually a lack of skilled jobs in their preferred field available in rural locations
  - We note that it is common for farming families to send children to boarding school in Toowoomba, Armidale, Tamworth, Brisbane and Sydney. This is especially the case where these people are likely to go onto further tertiary education.
  - Many stakeholders observed that having quality secondary education and TAFE facilities in Moree could contribute to arresting these losses
- retirees off farms also tend leave the region, rather than moving into Moree, to areas such as Toowoomba and the North Coast of NSW [8]
- ongoing labour productivity across broadacre agriculture and the increased prevalence of seasonal workers (prior to COVID-19) were also contributing factors to the downward pressure on population in the Moree region.

The baseline or business-as-usual scenario are a set of plausible outcomes based on the continuation of existing trends and accounting for developments that can be reasonably expected.

One of these developments is Inland Rail. In line with the narrative developed across the component reports, we have assessed that the investment in and operation of Inland Rail

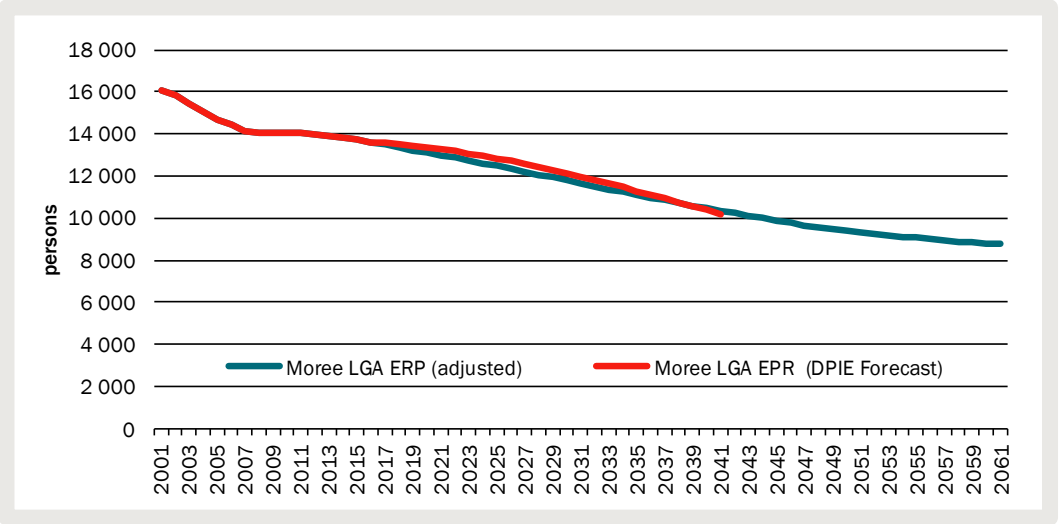
8 It is to be noted that many agribusiness/agronomists come home and stay rural as there is a demand for their skills, albeit not at a scale to offset net outflow of residents.

is unlikely to materially impact on the baseline population of Moree or the Moree Region without complementary investments in economic and social infrastructure.

Baseline results

Over the next 40 years, the ERP for the Moree Plains LGA is projected to decline at an average annual rate of 1 per cent each year. The estimates for the report as shown in chart, largely replicate the trajectory of the DPIE analysis (chart 3.1).

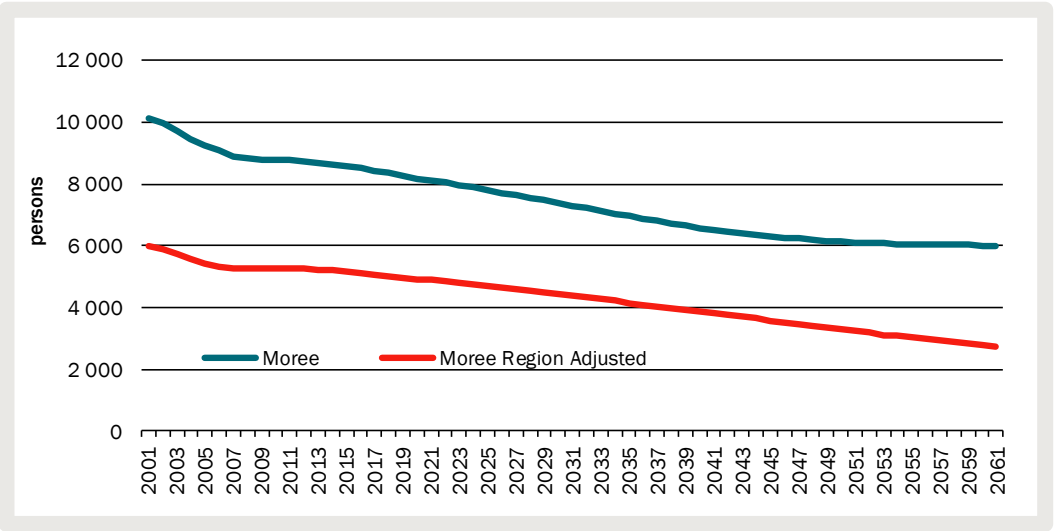
3.1 Population projections of Moree Plains LGA



Data source: DPIE and CIE estimates.

Chart 3.2 disaggregates the Moree Plains LGA outcome into its component parts. The ERP of Moree is expected to decline at an average annual rate of 0.8 per cent over the next 40 years in the baseline compared to an average decline of 1.3 per cent for the Moree Region.

3.2 Population projections of Moree and Moree region

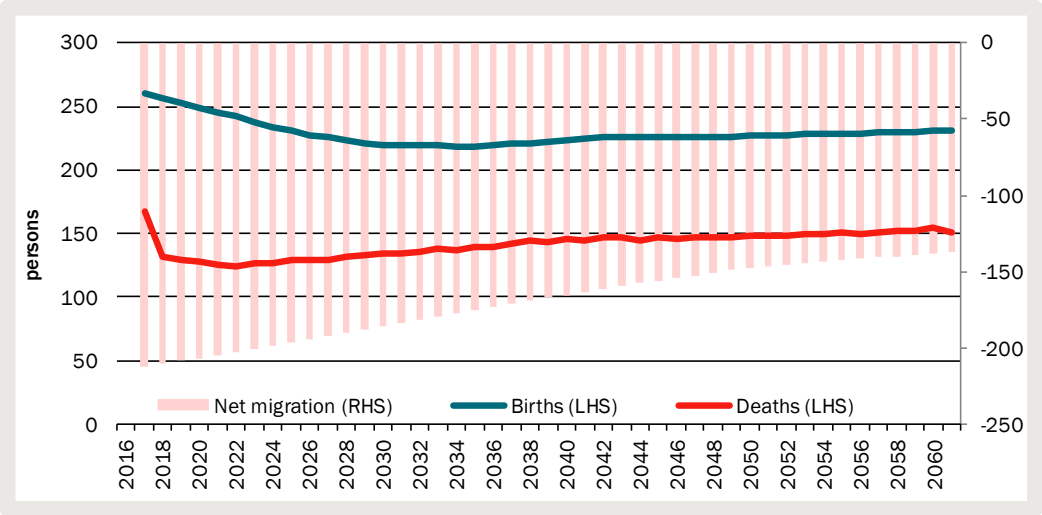


Data source: DPIE and CIE estimates.

By 2050, the Moree ERP is expected to stabilise to around 6 000 persons whereas for the Moree Region, the population is expected to halve compared to 2020 levels. It is important to note that the Moree LGA was expected to have shrunk to this figure already, however the population has stabilised more than the ERP predicted.

Chart 3.3 shows the composition of drivers of the aggregate ERP which, in turn, depends on the relative contribution of Indigenous — including one of the largest Indigenous nations in Australia, Kamilaroi Country — and non-Indigenous components of the population.

3.3 Drivers of Moree LGA outcomes



Data source: DPIE and CIE estimates.

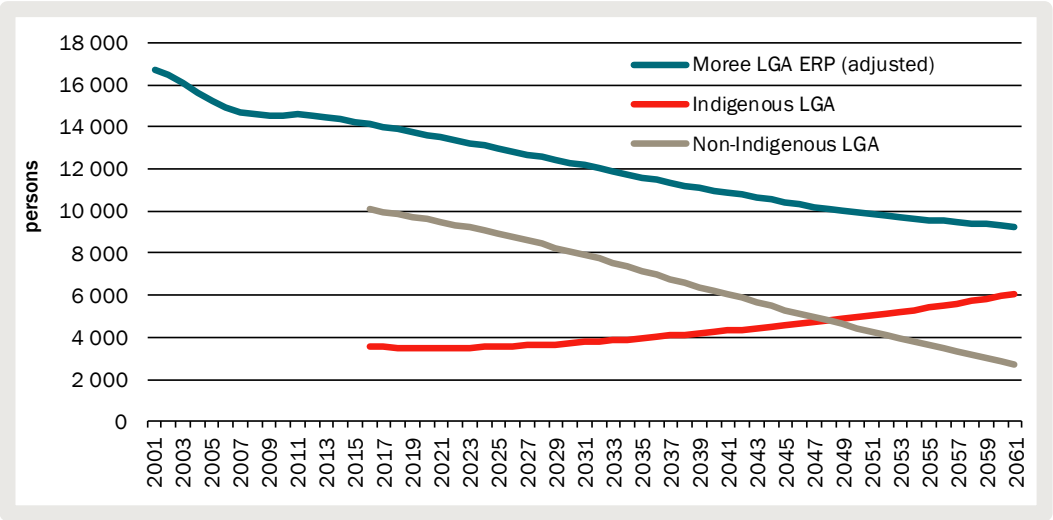
Chart 3.3 also shows that the number of births in absolute terms is likely to fall through to 2030 and then stabilise and increase marginally through to 2061. Similarly, the number of deaths each year should increase marginally to 2040 and then stabilise through to 2061 as cohorts move through the population. Critically, it is projected that net migration out of the region will fall consistently through to 2061 in terms of number of persons.

These outcomes are a function of the shift in the population away towards a more significant Indigenous basis (see chart 3.4), where the proportion of Indigenous in the total increases from 26 per cent in 2016 to 70 per cent in 2061. The logic for this is simple: Indigenous people are less likely to leave the region. [9]

In terms of cohorts, chart 3.5 shows that the proportions across cohort groups are remarkably stable — with the estimated average age increasing from 36 years in 2016 to 38 in 2056 (chart 3.5).

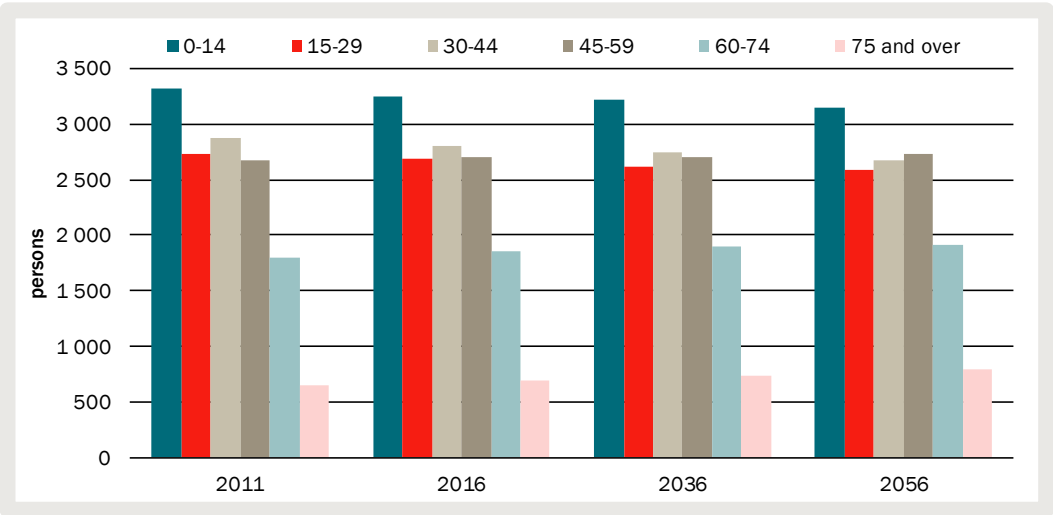
9 Projections of Indigenous and non-Indigenous populations need to be interpreted with care. Within the Moree LGA, population projections are undertaken with a population size far lower than the 30 000 persons required for accurate analysis, and this is compounded when considering subsets of the population. There are also other considerations when modelling the number of people who identify as Indigenous, such as changes in the propensity of people to identify as being of Aboriginal and/or Torres Strait Islander origin between Censuses.

3.4 ERP of Indigenous and non- Indigenous segments for Moree LGA



Data source: DPIE and CIE estimates.

3.5 ERP by cohort for Moree LGA



Data source: DPIE and CIE estimates.

Economic environment

The Moree Plains Shire covers almost 18 000 square kilometres, adjacent to the Queensland border and centred at the junction of major road and rail freight transport routes.[10]

The area has key strategic advantages, particularly for the agriculture sector — which has its foundations on one of the most productive agriculture regions across Australia. These key advantages include:

- Moree's access to both groundwater and surface water is a key advantage for the Moree region. For instance, the Moree SAP investigation area is situated above part

10 Moree Plains Shire Council, '*Moree Plains Shire Economic Development Strategy 2020-2030*'

of the Great Artesian Basin (GAB) and the Lower Gwydir Aquifer. The Moree Plains Shire Council (MPSC) hold a 3 500 ML per year access license for the Lower Gwydir Aquifer for water utility supply to Moree, with 500 ML per year of this high allocation is unused by the town and regarded as an opportunity for water supply to the SAP.[11]

  - There are other opportunities for businesses to purchase water allocations from the Lower Gwydir Alluvium on a temporary ($130–250 per ML) or permanent basis (~$3 000/ML).
  - There are also water access opportunities through the GAB-Surat groundwater and shallow groundwater sources, however, there are water quality issues needing to be resolved for uses and the cost of accessing deep water sources could be significant. These water sources provide year-round access to water, even during times of drought.
  - Through discussions with various business owners, Moree's access to reliable water sources is a key benefit of the region, in particular for agriculture and horticulture producers.
- The region benefits from rich, alluvial black soils that are highly productive for agricultural purposes. This has enabled highly productive large-scale cereal crops and cotton, as well as sheep, cattle, oil seeds, olives, citrus and pecan nuts. This an important factor for business that are considering agriculture or horticulture production.
- Moree has strong transport links across rail, road and air freight, providing producers with reliable and efficient links to local and international markets.
- Land in Moree is cheaper than alternatives that were also being considered by businesses, such as Wagga Wagga, Parkes, Newcastle, Toowoomba and Armidale. This is an important consideration for businesses that require larger allotment sizes. For example, circular economy businesses such as solar farms, recycling, waste-to-energy — and other industries such as biofuels and abattoirs —require significant land allocations that may include buffer zones. However, land values were a consideration for all industries consulted.
- Moree is located at the junction of major national, state, and regional freight routes via road, rail, and air provides various advantages for businesses to take advantage of. In addition to the current infrastructure, there is potential for other opportunities to be generated from the Inland Rail investment with potential changes to logistics exporting from and importing into the Moree region. This existing and future infrastructure network provides various advantages for businesses to leverage transport and movement corridors between Queensland and Victoria and in relation to key markets and export destinations.

Because of these factors, agricultural production within the Shire alone is estimated to account for 17.5 per cent of the NSW's gross agricultural value.[12] This includes large-scale cereal and cotton crops (both typically exported), oil seeds, olives and pecan nuts.

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11 WSP, 2021, '*Water Demand Final Report: Special Activation Precinct, Moree*'

12 Moree Plains Shire Council, '*Local Strategic Planning Statement*'

However, there is potential for the SAP to enable diversification of the local agricultural economy by further leveraging these advantages. This includes unlocking opportunities to value-add, embrace new technologies and develop innovative energy solutions.

From our investigation, industries within the Moree Plains LGA have shown an ability to quickly adapt and take advantages of economic opportunities. For example, changes in prices and gross margins for pulses relative to wheat and barley has seen a distinct increase in the production of chickpeas in the region.[13]

Gross Regional Product

Gross regional product (GRP) — is a key metric used to evaluate the impact of the Moree SAP on baseline economic outcomes for the region is required.[14] Moree LGA GRP was $1 013million in 2018-19 (table 3.6) and the gross value added by industry was $940.4 million (table 3.7).

This GRP estimation is directly linked to many of the economic elements important to the Moree region, such as the number of jobs, number of people employed, incomes (for employees and business owners) and other local production factors.

When considering the baseline and future economic activity in the Moree region, these economic factors will be considered and the impact on the GRP directly linked. The GRP forecast will provide an indicator to the economic benefit, or additional economic activity produced from the change in activity from the SAP.

3.6 Gross Regional Product by expenditure, 2018-19

GRP Expenditure Method	Value $2018-19 million
Household Consumption	707.7
Government Consumption	227.6
Private Gross Fixed Capital Expenditure	230.0
Public Gross Fixed Capital Expenditure	60.1
Gross Regional Expenses	**1 225.4**
plus Regional Exports	754.0
minus Domestic Imports	855.9
minus Overseas Imports	110.6
Gross Regional Product	**1 013.0**

Notes: Moree Region (LGA)

Source: REMPLAN.

13 ABARES Broadacre Survey and ABS

14 The GRP is estimated using the Expenditure method and represents the total value of final goods and services produces in a over a period of one year. It is measured as the sum of all forms of final expenditure. That is, consumption by households, consumption of governments, additions or increases to assets (minus disposals) and exports (minus imports).

In total, the Agriculture, Forestry and Fishing accounts for 26.4 per cent of the total value added in the region. This highlights the dominance of the sector to the Moree LGA and the key strategic advantage of this industry within the region.

3.7 Gross value added by industry sectors, 2018-19

Industry Sector	Gross value added	
	$2018-19 million	% of total
Agriculture, Forestry and Fishing	248.2	26.4
Rental, Hiring and Real Estate Services	121.6	12.9
Financial and Insurance Services	66.4	7.1
Construction	62.3	6.6
Education and Training	59.9	6.4
Health Care and Social Assistance	53.9	5.7
Public Administration and Safety	50.1	5.3
Wholesale Trade	38.9	4.1
Retail Trade	37.4	4
Transport, Postal and Warehousing	36.0	3.8
Professional, Scientific and Technical Services	32.6	3.5
Manufacturing	27.9	3
Administrative and Support Services	26.6	2.8
Other Services	22.7	2.4
Accommodation and Food Services	22.1	2.3
Electricity, Gas, Water and Waste Services	18.4	2
Information Media and Telecommunications	6.9	0.7
Mining	6.6	0.7
Arts and Recreation Services	2.0	0.2
Total	**940.4**	**100.0**

Notes: Moree Region (LGA)

Source: REMPLAN.

Other key industries within the region include Rental and real estate services (12.9 per cent), Financial and insurance service (7.1 per cent), Construction (6.6 per cent), Education and Training (6.4 per cent), and Health Care and Social Assistance (5.7 per cent) industries.

Moree LGA Regional Trade

Table 3.8 presents the regional exports and imports of the region respectively. Agriculture forms the largest share of regional exports (at 62.7 per cent) and imports (25.4 per cent) and is a net exporter in the sector as already established by its dominance in the region. The other key industry in terms of regional trade is manufacturing which accounts for 12.2 per cent of the regional exports and 22.4 per cent of regional imports.

3.8 Regional trade by industry sectors

Industry Sector	Regional exports		Regional imports	
	$2018-19 million	% of total	$2018-19 million	% of total
Agriculture, Forestry and Fishing	469.1	62.7	112.9	25.4
Manufacturing	91.5	12.2	99.2	22.4
Construction	31.2	4.2	49.4	11.1
Accommodation and Food Services	26.8	3.6	22.0	5.0
Rental, Hiring and Real Estate Services	21.9	2.9	19.6	4.4
Transport, Postal and Warehousing	18.5	2.5	18.4	4.2
Wholesale Trade	17.2	2.3	14.9	3.4
Professional, Scientific and Technical Services	16.8	2.2	14.2	3.2
Other Services	12.0	1.6	13.3	3.0
Financial and Insurance Services	11.2	1.5	12.6	2.8
Public Administration and Safety	9.8	1.3	11.3	2.5
Health Care and Social Assistance	6.1	0.8	10.7	2.4
Retail Trade	3.6	0.5	9.7	2.2
Education and Training	3.5	0.5	9.3	2.1
Administrative and Support Services	3.4	0.5	8.0	1.8
Information Media and Telecommunications	2.6	0.3	7.0	1.6
Electricity, Gas, Water and Waste Services	2.6	0.3	6.4	1.4
Mining	0.8	0.1	2.7	0.6
Arts and Recreation Services	0.2	0.0	2.1	0.5
Total	**748.7**	**100.0**	**443.5**	**100.0**

Notes: Moree Region (LGA).

Source: REMPLAN.

Business and employment baseline for the Moree Region

Number of businesses

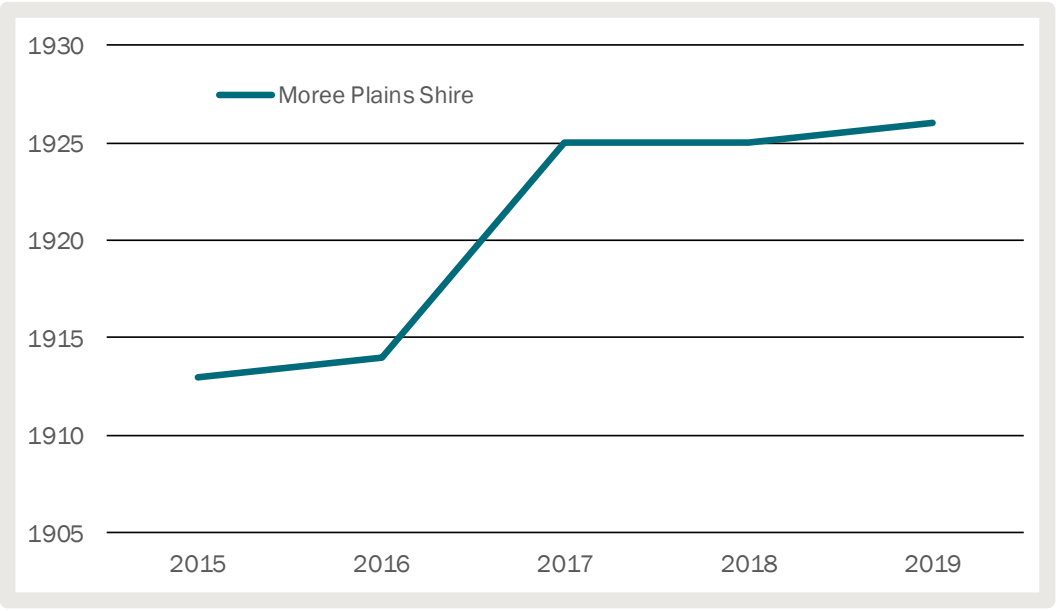
Overall, the number of businesses has been increasing on average since 2015. Chart 3.9 shows that the total number of businesses in the Moree LGA increased from 1 913 in 2015 to 1 926 in 2019, representing a 0.7 per cent increase.

It has been mentioned within the SAP discussions that Moree's first, second and third industry is agriculture. This is clearly shown when considering the number of businesses within the region. Table 3.10 below shows that in 2019, over 40 per cent of the businesses within the region were related to agriculture, forestry and fishing. However, given the discussions undertaken to date, it is safe to say that the vast majority, if not all these businesses relate to agriculture.

Out of the total 814 agriculture businesses within the Moree region, approximately 20 per cent of these organisations are located within the Moree township, with the

remainder located in the Moree Region. This is somewhat expected given the amount of land needed to accommodate the industry.

3.9 Number of businesses for Moree Plains LGA



Data source: 8165.0 Counts of Australian Businesses, including Entries and Exits, June 2015 to June 2019.

3.10 Composition of businesses in the Moree Plains LGA, 2019

Industry	Businesses		Change since 2015
	no.	% of total	%
Agriculture, Forestry and Fishing	814	42	0
Mining	0	0	0
Manufacturing	43	2	12
Electricity, Gas, Water and Waste Services	19	1	-1
Construction	207	11	-1
Wholesale Trade	44	2	-5
Retail Trade	70	4	-8
Accommodation and Food Services	62	3	6
Transport, Postal and Warehousing	117	6	-1
Information Media and Telecommunications	0	0	0
Financial and Insurance Services	82	4	5
Rental, Hiring and Real Estate Services	224	12	16
Professional, Scientific and Technical Services	70	4	12
Administrative and Support Services	30	2	-28
Public Administration and Safety	3	0	-1
Education and Training	6	0	-46
Health Care and Social Assistance	47	2	1
Arts and Recreation Services	9	0	-11
Other Services	75	4	9
Total	**1 926**	**100**	**0.7**

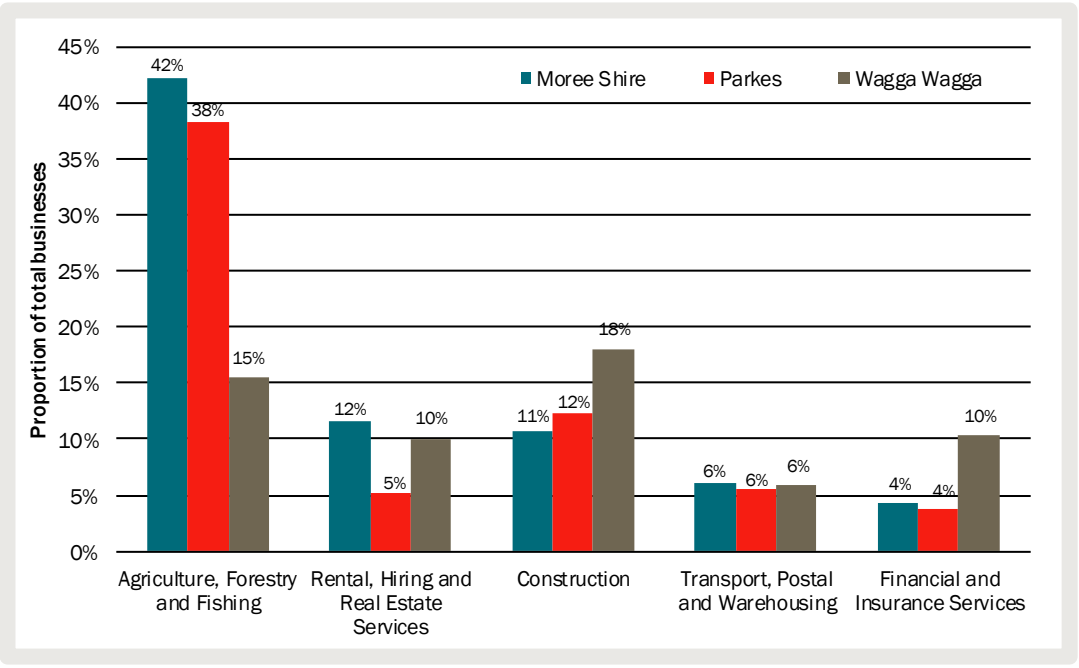
Source: 8165.0 Counts of Australian Businesses, including Entries and Exits, June 2015 to June 2019.

There are other industries and businesses that have established themselves within Moree to support the wider agriculture industry. For example, the rental, hiring and real estate services industry grouping has the second highest number of businesses with 11.6 per cent of the total number of businesses, compared to the NSW economy with 10.9 per cent. This industry has also experienced a 15.8 per cent increase in the number of businesses since 2015. This industry includes transport equipment and vehicle rental and other goods and equipment rental (such as heavy machinery).

Data supporting the importance of the agriculture sector to the surrounding businesses was gathered in a 2016 business survey undertaken Moree Chamber of Commerce and the Moree Plains Shire Council (MPSC). This survey found that the relationship between the survey participants' business performance and the economic performance of the agriculture sector is 'very important' for nearly half of the survey respondents. Only 6 per cent of the respondents found that the economic performance of the agriculture had no impact on their business.

The top five industries by the count of businesses in the Moree LGA has been compared to the Parkes and Wagga Wagga below in chart 3.11.

3.11 Top five businesses for Moree Plains LGA, Parkes, and Wagga Wagga 2019



Data source: 8165.0 Counts of Australian Businesses, including Entries and Exits, June 2015 to June 2019.

Business confidence

In 2016, the Moree Chamber of Commerce and the Moree Plains Shire Council partnered to develop and undertake a 'Business Confidence Survey' across Moree and Mungindi.

This survey was conducted to better understand trading conditions and changes to business performance across these two towns. A total of 87 responses were received for

the Moree Survey and a further 25 for the Mungindi Survey. Responses were received by a wide range of businesses across various industries.

Some of the key aggregated survey results include:

- 66.3 per cent of businesses believed that their trading conditions over the past 12 months were improving or stable. With the remaining believing their conditions are deteriorating
- 62.1 per cent of businesses described their overall business profitability as OK, good or excellent over the past 12 months, 8.0 per cent were unprofitable and 29.9 per cent were marginal
- the majority (72.1 per cent) of businesses are either somewhat or very seasonal. This is linked to climate (such as increases or decreases in activity from rainfall and hot weather), harvest periods and agricultural performance (such as temporary increase in employment within the town and links to sector profitability), and tourism (such as Christmas trade)
- 44.6 per cent of businesses see a major or minor expansion to their businesses in the next 3 to 5 years, 41.0 per cent expect the same as now, and 14.4 per cent expect a reduction in size or closure, sale or disposal.

When considering the survey and the accompanying comments, most of the businesses in the Moree region appear to be optimistic, with improving trading conditions, profitability, and business expansions. However, there are some businesses that are less confident, and believe their conditions are deteriorating and expected to reduce size.

Employment in the Moree region

As expected, the number of jobs in the Moree LGA is strongly aligned to the number of businesses, with the agriculture, forestry and fishing industry contributing the greatest number of jobs. The total number of jobs by each industry is shown in table 3.12 below.

3.12 Number of jobs by industry sector

Industry Sector	Employees	
	no.	% of total
Agriculture, Forestry and Fishing	1 559	26.91
Mining	17	0.29
Manufacturing	145	2.50
Electricity, Gas, Water and Waste Services	39	0.67
Construction	383	6.61
Wholesale Trade	174	3.00
Retail Trade	491	8.47
Accommodation and Food Services	317	5.47
Transport, Postal and Warehousing	241	4.16
Information Media and Telecommunications	28	0.48
Financial and Insurance Services	115	1.98
Rental, Hiring and Real Estate Services	56	0.97

Industry Sector	Employees	
	no.	% of total
Professional, Scientific and Technical Services	230	3.97
Administrative and Support Services	174	3.00
Public Administration and Safety	389	6.71
Education and Training	565	9.75
Health Care and Social Assistance	557	9.61
Arts and Recreation Services	32	0.55
Other Services	282	4.87
Total	**5 794**	**100.00**

Note: Moree LGA.
Source: REMPLAN.

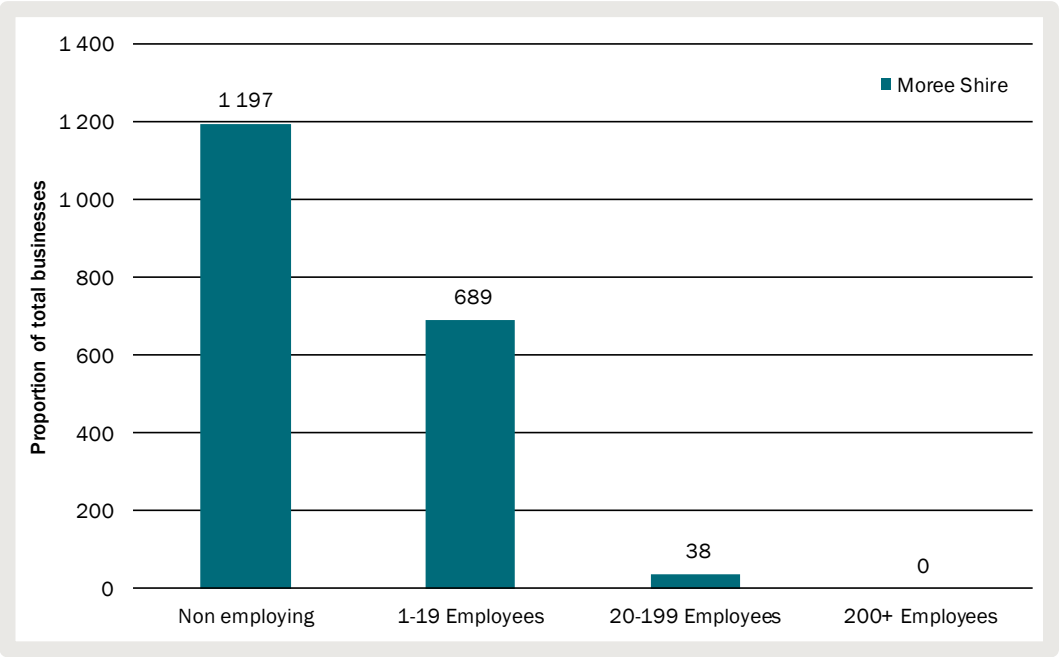
Historical ABS census data suggests that between 2011-12 to 2016-17, there has been a 2.3 per cent increase in the number of jobs in the Moree LGA. Females have been the driving force behind this growth, with the number of females in employment rising 6 per cent between this period, compared to males have had no change in employment numbers.[15]

Census data from 2015-16 also that indicated that across all industries, approximately 67 per cent of these jobs are in Moree, with the remaining 33 per cent in the Moree Region. Agriculture, forestry and fishing is the only industry that has more jobs in the Moree Region than the Moree township (59 and 41 per cent of jobs respectively).

The majority of employment across the Moree LGA comes from either non-employing business (that is, owner operated or with family members supporting the business) or from small businesses employing less than 20 staff. There are very few medium and large businesses employing 20 or more staff (see chart 3.13).

15 6160.0 New South Wales Jobs in Australia Spotlights by LGA

3.13 Number of businesses by number of employees for Moree Shire LGA 2019



Data source: 8165.0 Counts of Australian Businesses, including Entries and Exits, June 2015 to June 2019.

From 2015 to 2019, there has been a moderate increase in the number of businesses employing zero to 19 employees (approximately 2.1 per cent). This increase was being driven by Rental, Hiring and Real Estate Services (increase in 31 businesses) and the Agriculture businesses (increase in 13 businesses).

Also, from 2015 to 2019, there has been a decline in the number of businesses employing over 20 staff (approximately a 10.7 per cent decline, or a reduction in 5 businesses at this size). These reductions are spread across the accommodation and food services, transport, postal and warehousing, and professional, scientific and technical services industries (reduction in 2, 2, and 3 businesses respectively). However, there has been an additional three manufacturing businesses during this same period.

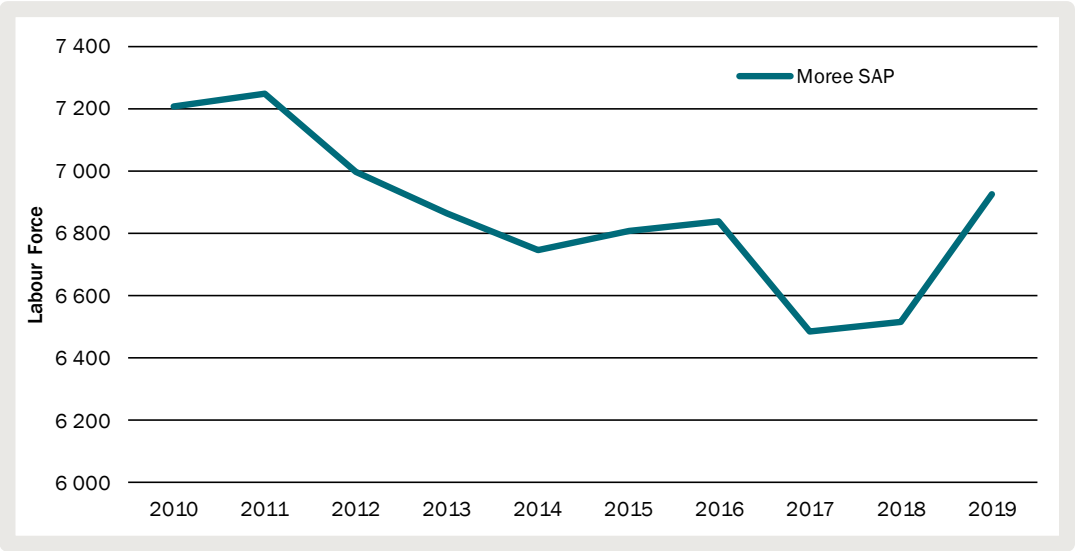
Labour force participation

In 2019, there were 6 926 people in the labour force in the Moree LGA. This was a decrease from 7 209 people in 2010, representing a fall of 283 people (or 3.9 per cent). This decrease has been driven by a fall in the number of employed staff. Over the period, 93 less people were employed within the region (chart 3.14).

The number of people not in the labour force has decreased from 3 129 in 2011 to 3 092 in 2016.[16] This resulted in a small increase in the participation rate from 33.6 to 34.4 per cent. The working age population in the Moree LGA has remained consistent, with a very small reduction of 6 people between 2011 to 2016. This is occurred despite the total number of people in the region falling.

16 Census 2016.

3.14 Number of people in the Moree Plains LGA labour force



Data source: LGA Data tables - Small Area Labour Markets - December quarter 2019.

Skills

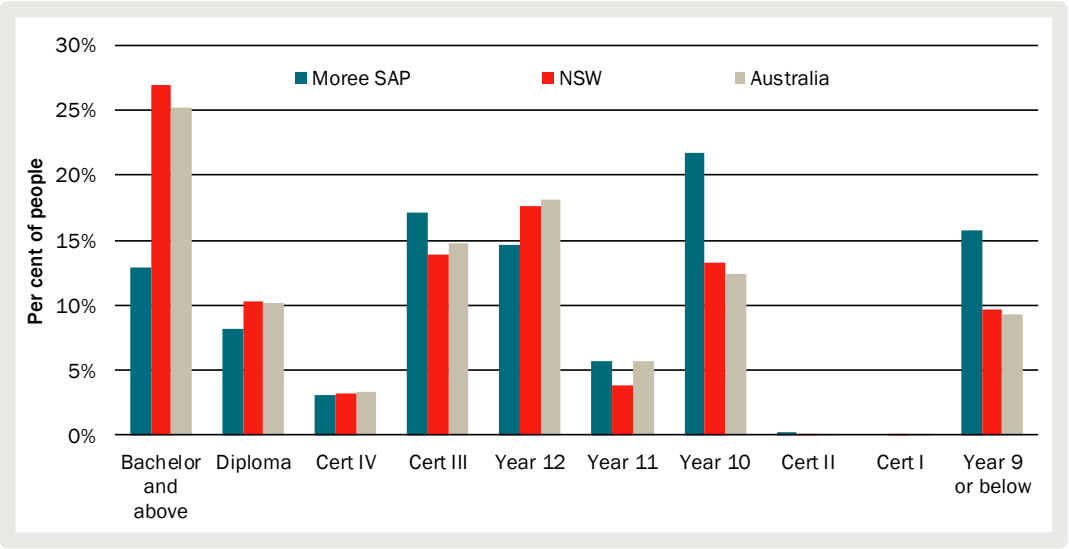
According to the business confidence survey undertaken by the Moree Chamber of Commerce and the MPSC, employment of skilled and/or reliable staff is a significant barrier to improving trading, expanding or innovating for over 44 per cent of businesses. We have also heard through our early discussions that access to suitability trained staff and trades is a concern for businesses and the community (consistent with other regional towns).

To combat this, 44.4 per cent of businesses facilitate training for their staff through TAFE and 14.3 per cent through University education.[17] This has been preliminary discussion that indicates that the opening of the country University Centre could improve local access to university along with engagement with UNE on wide support opportunities.

Within the Moree LGA, there is an above average amount of people with Certificate III level qualifications, as shown in chart 3.15. This chart also shows that there is a high proportion of people with year 10 and below qualifications compared to the NSW average, and a low proportion of people with qualification levels above Certificate III.

17 Moree Chamber of Commerce and the Moree Plains Shire Council 2016, '*Business Confidence Survey*'

3.15 Highest level of education across the Moree Shire LGA, 2016



Note: Per cent from those that responded, includes people aged 15 years and over.

Data source: Census 2016.

Employment income

The majority of employees in the Moree region earn between $800 to $1 249 per week (or an annual income between $41 600 to $64 948).[18] This is higher that minimum wage, which was $672.70 per week in 2016-17.[19]

Income patterns and educational attainment in the SAP are somewhat different to NSW on average. The SAP region has a higher proportion of income earners within the $500 to $999 bracket compared to the state average. NSW, on average, has a higher proportion of income earners receiving more than $1 500 per week compared to those in the Moree region. Higher incomes across NSW reflect the higher weekly incomes received by the large number of individuals that reside in the Greater Sydney region (see chart 3.16).[20]

The majority income generated within the LGA region is from salary and wages.[21]

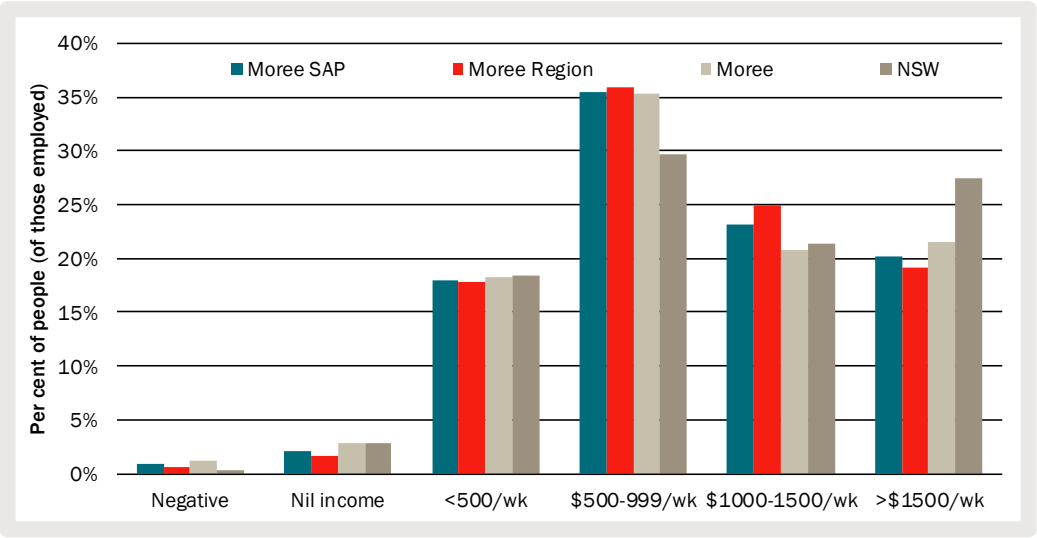
18 Based on the 15 income bands used by the ABS in the Census.

19 https://www.fwc.gov.au/documents/sites/wagereview2017/decisions/2017fwcfb3500.pdf

20 https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/1GSYD?opendocument

21 https://itt.abs.gov.au/itt/r.jsp?RegionSummary&region=15300&dataset=ABS_REGIONAL_LGA2018&geoconcept=LGA_2018&maplayerid=LGA2018&measure=MEASURE&datasetASGS=ABS_REGIONAL_ASGS2016&datasetLGA=ABS_REGIONAL_LGA2018&regionLGA=LGA_2018&regionASGS=ASGS_2016

3.16 Weekly labour force income by location for the Moree Shire LGA, 2016



Note: Income data has been extracted for people in employment (full time and part time) and unemployed.
Data source: Census 2016.

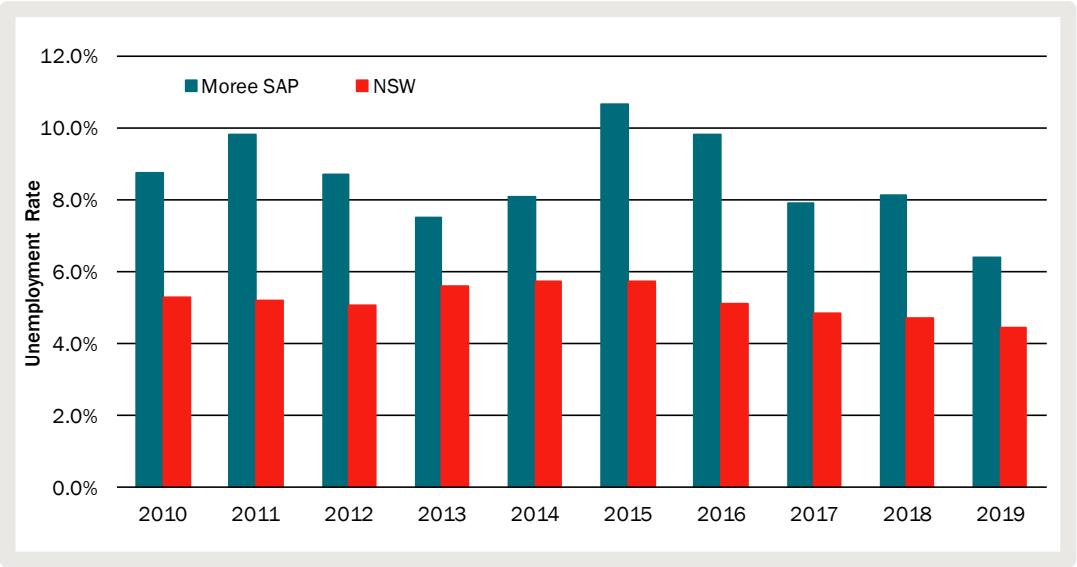
Unemployment

The unemployment rate data is more accurate than measures of the labour force because this is based on allocation of ABS Labour Force measures of unemployment at the SA4 level based on administrative data on the number of people claiming unemployment benefits by postcode.

Overall, the Moree LGA is categorised by higher unemployment levels than the state average (chart 3.17). However, the unemployment rate has been decreasing since 2010, to the current rate of 6.4 per cent in 2019, compared to the NSW state average of 4.5 per cent.

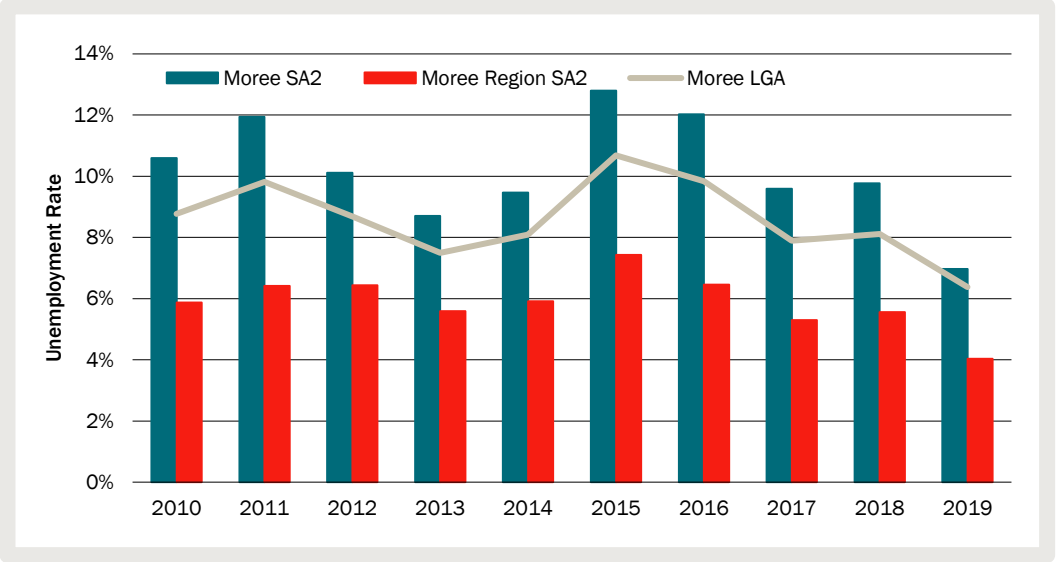
The unemployment rates vary depending on the sub-region. For instance, the Moree township has a higher unemployment rate compared to the Moree Region (chart 3.18). In 2019, the Moree SA2 reported an unemployment rate of 6.3 per cent, while the Moree Region's unemployment rate was 3.6 per cent. These have increased to 7.1 per cent and 4.2 per cent in Moree and Moree region respectively, based on March 2020 estimates.

3.17 Unemployment rate in the Moree Shire LGA region



Data source: LGA Data tables - Small Area Labour Markets - December quarter 2019, and 6202.0 - Labour Force, Australia, Jun 2020.

3.18 Moree Shire LGA unemployment by region



Note: Moree and Moree Region SA2 data provided.

Data source: LGA Data tables - Small Area Labour Markets - December quarter 2019.

However, the Moree township has also experienced the greatest fall in unemployment levels, dropping 3.6 percentage points since 2010.

In 2019, the five-year employment growth to May 2024 in New England North West region was projected to be at 4.6 per cent. However, this does not reflect the impact of COVID-19 and may have to be revised.[22]

22 Department of Education, Skill and Employment, 2019 Employment projections, Regional projection – fiver years to May 2024. Available at: https://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections

4 Key sectors of the Moree region economy

The agriculture sector is the driving force behind the Moree economy. Within this sector, broadacre crops accounted for 92 per cent of the total agricultural production, with wheat, chickpeas, cotton and barley being the key outputs.

The agricultural sector has been going through a period of significant transformation over the past decades as a result of productivity and efficiency improvements and operational requirements, such as;

- **continuous adoption of advanced machinery and automation has resulted in significant productivity and output improvements**
- **streamlining of the supply chain and marketing practices has resulted in an increased use of on-farm storage and forward selling**
- **a general trend of farms consolidating has seen farmers selling to either their neighbours or to corporate farming enterprises, and**
- **an increasing requirement for highly skilled staff and supporting businesses to service the agriculture industry.**

An increased demand for pulses, relative to wheat and barley, has resulted in increased production of pulses within the area. This is despite Moree's advantages towards high-quality bread and durum wheats and malting barley.

Agriculture is the mainstay of the Moree region

The Moree SAP investigation area is positioned alongside interstate transport connections, making it well connected to Melbourne, Brisbane, Newcastle and Sydney. This connectivity in partnership with the region's rich black-soils and access to water sources such as the Gwydir River, the Gwydir alluvium and the GAB has made the Moree region a key producer of grains, cotton and other agricultural products.

It is this strategic and economic advantage for agricultural production that has resulted in Moree becoming a highly specialised economy, focusing on agriculture industries and other supporting and dependent businesses. For instance:

- agricultural jobs across the Moree Plains LGA are vital, and account for over 20 per cent of the total employment in 2019 (this is ten times the state average for the agricultural sector)
- agricultural production within the Moree Shire alone is estimated to account for 17.5 per cent of the NSW's gross agricultural value[23]

23 Moree Plains Shire Council, '*Local Strategic Planning Statement*'

- over 40 per cent of the businesses within the LGA were related to agriculture, forestry and fishing in 2019.

The economic performance of the industry has a range of flow-on impacts to other service industries and the population in Moree.

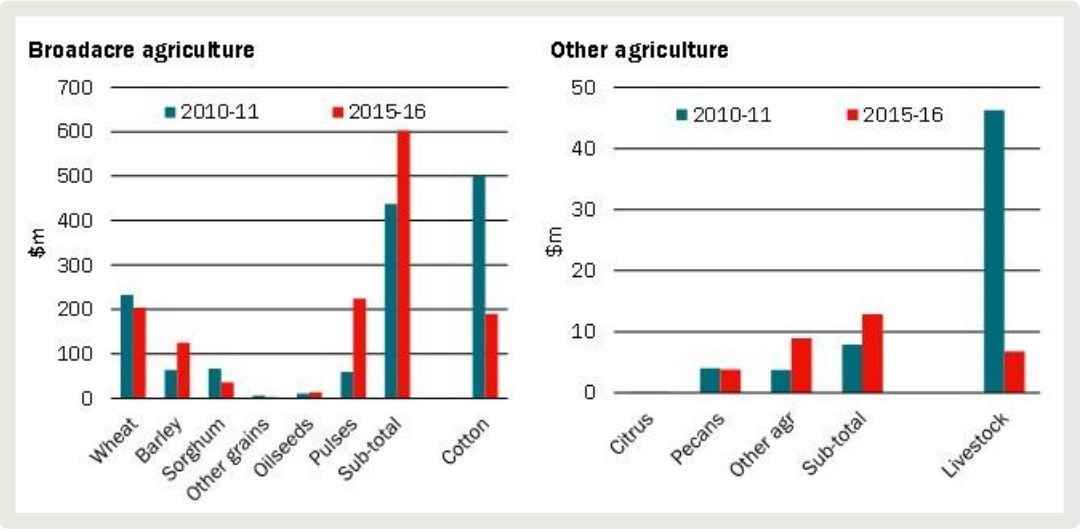
Gross value of the agriculture sector

The agriculture sector is the driving force behind the Moree economy. This is supported through access to water mainly from the Gwydir Valley Water System and rich black soil that surrounds the region.

When considering the whole agriculture sector, it is clear that Moree is a key focus and advantage in broadacre crops, as shown in chart 4.1.

In 2016, broadacre crops accounted for 92 per cent of the total agricultural production of the Moree Plains LGA, with a gross value of $794.7 million. Based on the ABS commodity summary, 1 040,021 hectares or 13 per cent of NSW broadacre crops were produced in the Moree Plains LGA. This includes approximately 11 per cent NSW's production of cereals for grain, 47 per cent of cotton, and 20 per cent of pulses and oilseeds.[24]

4.1 Gross value of Moree region agriculture sector, 2016



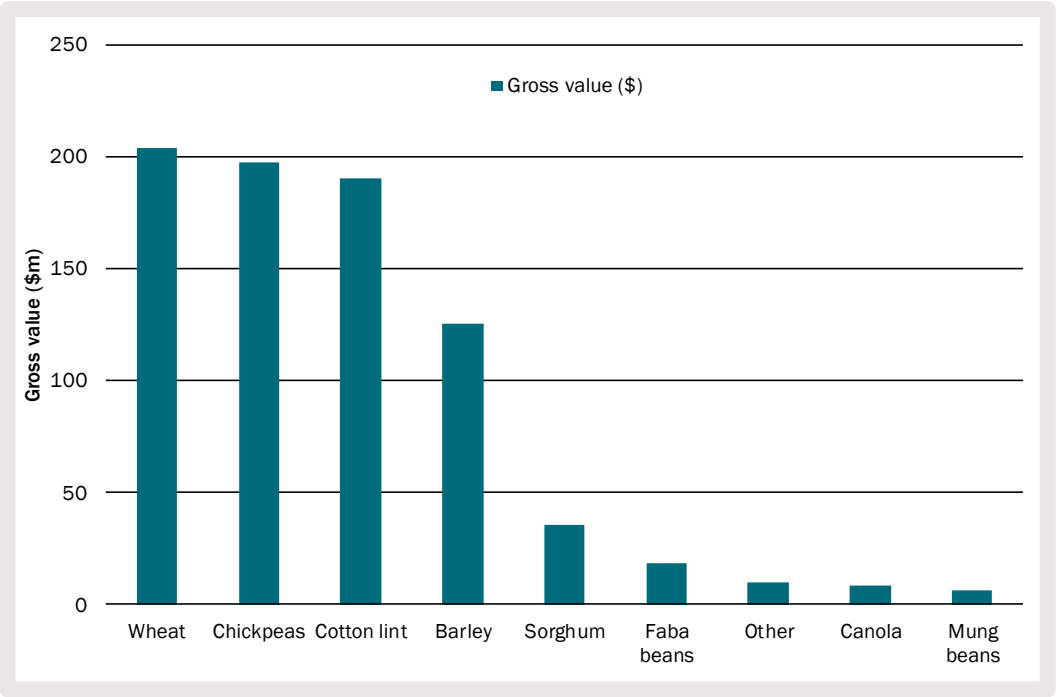
Note: Note different scale on each axis. Moree region defined as SA2 Moree plus Moree region.
Data source: Value of Agricultural Commodities Produced, Australia–2015-16.

Although there are a range of agricultural enterprises produced within the Moree Plains LGA, the 2016 agricultural census showed that there was a clear dominance of wheat, chickpeas, cotton and barley. These four crops accounted for approximately 90.1 per cent of the total value of broadacre crops, as shown in chart 4.2.

These crops strongly align to the strategic advantage of the Moree region built on the following resources:

24 https://www.gvia.org.au/the-gwydir-valley/industry-profiles/broadacre-croppping/

4.2 Value of Moree's broadacre crops, 2016



Note: Other includes oats, maize, triticale, lentils, other pulses, other oilseeds, sugar cane.
Data source: Value of Agricultural Commodities Produced, Australia–2015-16.

- the availability of high-quality black soil country in a reasonably reliable rainfall area, much of which is arable, which has been incrementally converted from livestock enterprises since the early 1980s;[25]
- the completion of Copeton Dam in 1976 was a key to the development of irrigated land to the north-east, north-west and west of the Moree on the Gwydir River;
  - This includes the development of the groundwater resources of the Gwydir alluvium and the GAB.
- a farming community recognised across agriculture as being early adopters of technology and best practice management.

Since the 2016 agricultural census, there has been diversification of the production profile within the Moree region. For instance, there has been an increase in investment in horticulture, including citrus production, pecans and olives.

Trends in the broadacre sector

The agricultural sector has been going through a period of significant transformation over the past few decades. This has led to various productivity and efficiency improvements and operational requirements, such as the following:

- continuous adoption of advanced machinery and automation has resulted in significant productivity and output improvements over the past 20 years. This has

[25] It is noted that wheat and chickpeas are winter crops where production is largely off rainfed extensive broadacre. Whereas cotton is a summer crop that generally relies on irrigation. It is common that wheat, chickpeas and other pulses and oilseeds are used as break crops in predominantly cotton systems.

resulted in increased yields per hectare and an increase in water efficiency. However, this has also led to a reduction in the number of staff employed by the sector, as the productivity of labour increased. Since 1990, improvements in labour productivity have seen the amount of labour use per hectare roughly halve.[26] This is partially why the Moree LGA has been experiencing a decline in the number of jobs. For instance, in 2019, there were 6 926 people in the labour force in the Moree LGA, a decrease of 283 people from 2010 (3.9 per cent).

- There has been streamlining of the supply chain and marketing practices, with a much wider use of on-farm storage and forward selling. For example, since 2013, there has been an increase in the percentage of farms using on-farm storage from 87 per cent to 93 per cent in 2017.[27] The MPSC 2018-19 survey of on-farm storage also found that many farms within the LGA used on-farm storage, with an average of 7 900 tonnes per site.
- There has been a trend of farms consolidating, with farmers selling to either their neighbours or to corporate farming enterprises. This has the overall impact of rationalising overheads and unlocking economies of scale (such as through higher utilisation of capital).
- With an increased level of investment into automation and other technologies, there has been an increasing requirement for highly-skilled staff and supporting businesses to service the agriculture industry. For example, some farmers within the Moree region are investing into autonomous irrigation systems, which would require highly-trained staff and local supporting businesses to service and maintain the technology.

Key underlying trends in the broadacre sector, include:

- variability in land planted and yields with seasonal rainfall in dryland systems — even in irrigated sectors depending on the severity and duration of rainfall and changes in water allocations;
- ongoing trend increase in total factor productivity in terms of:
  - yields per hectare;
  - productivity of labour and overhead costs per hectare (and per tonne) and a result of sustained investment in machinery and other capital; and
  - water use efficiency.
- trends in, and uptake of, improved marketing practices such as supply chain integration, and the wider use of on-farm storage and forward selling; and
- an aging ownership profile in broadacre cropping including the trend to widespread consolidation and corporatisation of farms.

To demonstrate facets of these trends, this section draws on a range of data sources that includes the ABS and Australian Bureau of Agricultural and Resource Economics (ABARES) broadacre survey [28] — which is a survey of businesses in the North West Slopes and Plains which aligns to the ABS SA4 region New England and North West.

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26 ABARES Broadacre Survey and ABS. Labour measured on a full-time equivalent base.

27 GRDC grower surveys.

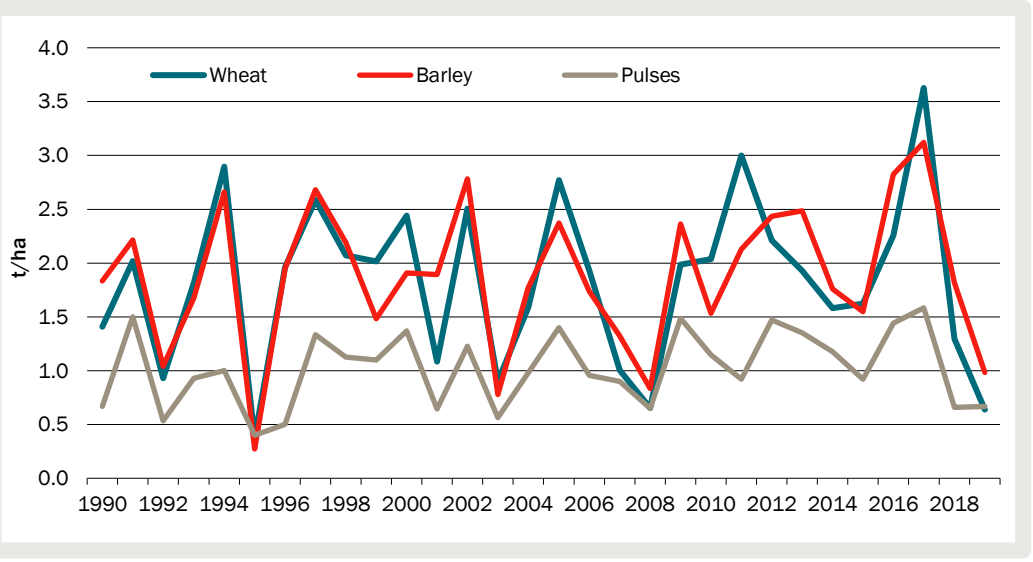
28 http://apps.agriculture.gov.au/agsurf/

It is important to note that the North West Slopes and Plains area is a relatively diverse region that primarily focuses on livestock on the New England tablelands and the North West Slopes. Livestock intensity reduces significantly to Moree Plains and Narrabri Shire area that is dominated by broadacre and intensive cropping. However, many of the trends demonstrated are representative of key drivers in the Moree region.

Increased productivity

Chart 4.3 demonstrates the long-term fluctuations in broadacre yields in the North West Slopes and Plains region. Stakeholders indicated that while agriculture is foundational to the Moree economy, the economic performance of the industry has a range of flow-on impacts to other service industries and the population in Moree. This flow on impact of the agricultural industry was also apparent from the responses in the 2016 Business Confidence Survey. As the economic performance of the agriculture industry improves, the wider economic performance of the region improves.

4.3 Long term variability in broadacre yields[a]



[a] ABARES North West Slopes and Plains region.

Data source: ABARES Broadacre Survey.

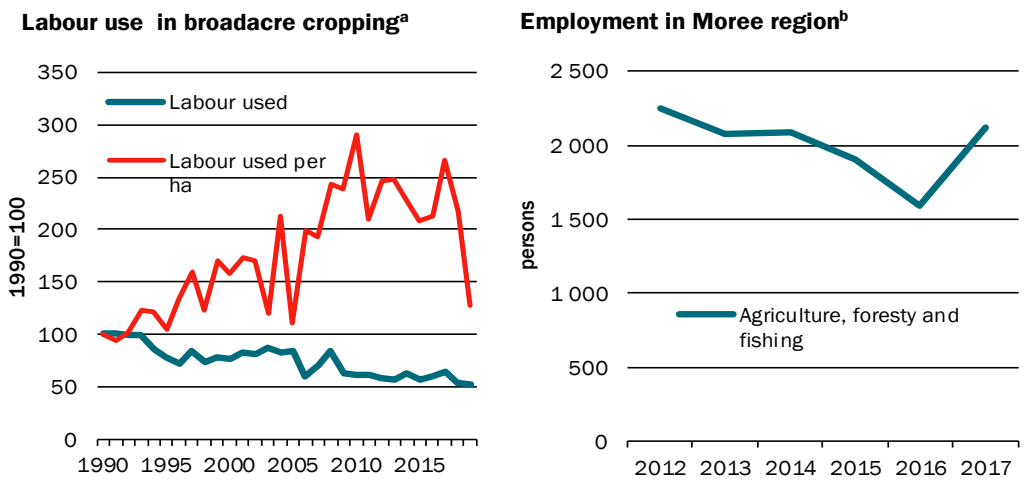
Over this period, the average annual increase in wheat yields (as an indicator of all broadacre crops) was 0.3 per cent per year — it would be reasonable to assume that businesses in the Moree region were performing better than the regional average.

Chart 4.4 illustrates the sustain improvements in labour productivity where roughly half the labour is required compared to 1990.

The amount of land cropped per full time equivalent (FTE) is also subject to significant seasonal variability but has demonstrated sustained growth at the equivalent of a 3 per cent annual improvement. Increasing capital-for-labour substitution including investment in improved machinery and other labour saving technologies — such as those embodied in agrochemicals, genetically modified varieties and AgTech.

For the Moree Plains LGA, this can be seen in the number of agricultural jobs where there is downward decline with an uptick in line with higher district yields.

4.4 Labour trends in the Moree region



[a] ABARES North West Slopes and Plains region. Labour measured on a full time equivalent base. [a] ABARES North West Slopes and Plains region. Labour measured on a full time equivalent base. [b] Employment in the combined Moree SA2 and the Moree Region SA2
Data source: ABARES Broadacre Survey and ABS.

- It would be expected that employment outcomes for the 2019-20 season would be significantly lower than reflected by the ABS data for 2017. However, the 2020 season will be more productive than previous years as a post-drought year.
- This decline in the number of jobs has occurred despite the number of Agriculture, Forestry and Fishing businesses remaining relatively consistent.

Discussions with stakeholders highlight that there has been a substantial loss of employment across the region from the agricultural sector productivity improvements. [29] This includes a reduction in demand for local unskilled labour, and a reduction in demand for seasonal staff, such as additional low skilled labour that previously were drawn into the Moree township (such as backpackers).

Change in the enterprise mix

Stakeholders consulted to date indicate that agricultural businesses are quick to 'follow the money' and adapt to changing climatic and market conditions. While in Moree the strength is in high quality bread and durum wheats and malting barley, there has been a distinct swing towards pulses (chickpeas) as shown in table 4.5.

This swing has been driven by increased demand out of the sub-continent which has changed the price and gross margin of pulses relative to wheat and barley, as shown in chart 4.6) and has also provided the solution for a profitable break crop in wheat/barley rotations.

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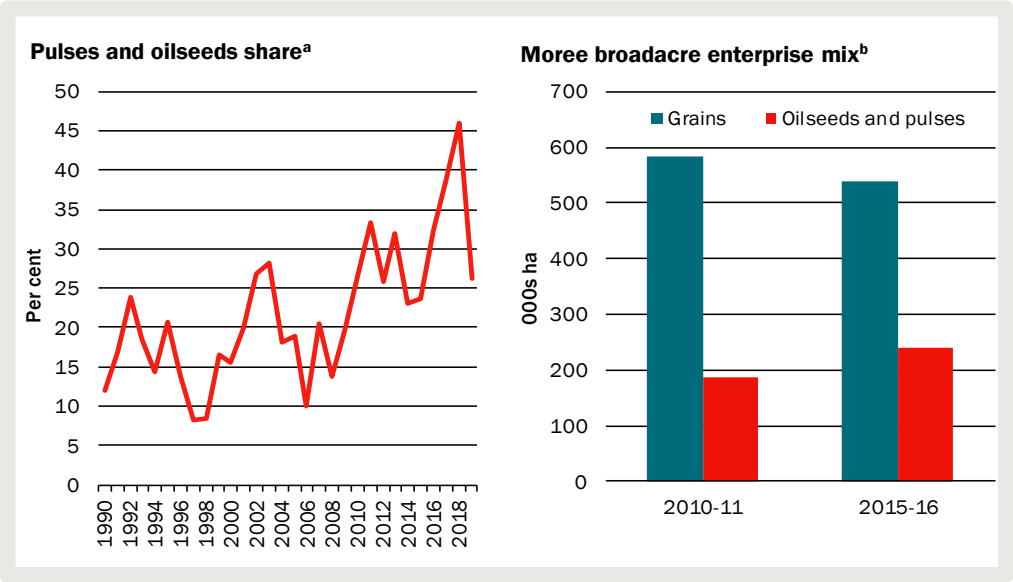
29 It is important to note that some of this loss could be attributed to drought. Additionally. COVID impacts have not been discussed due to lag in data collection, but despite there being many jobs required to be filled from 2020, there will be not as many backpackers to fill them.

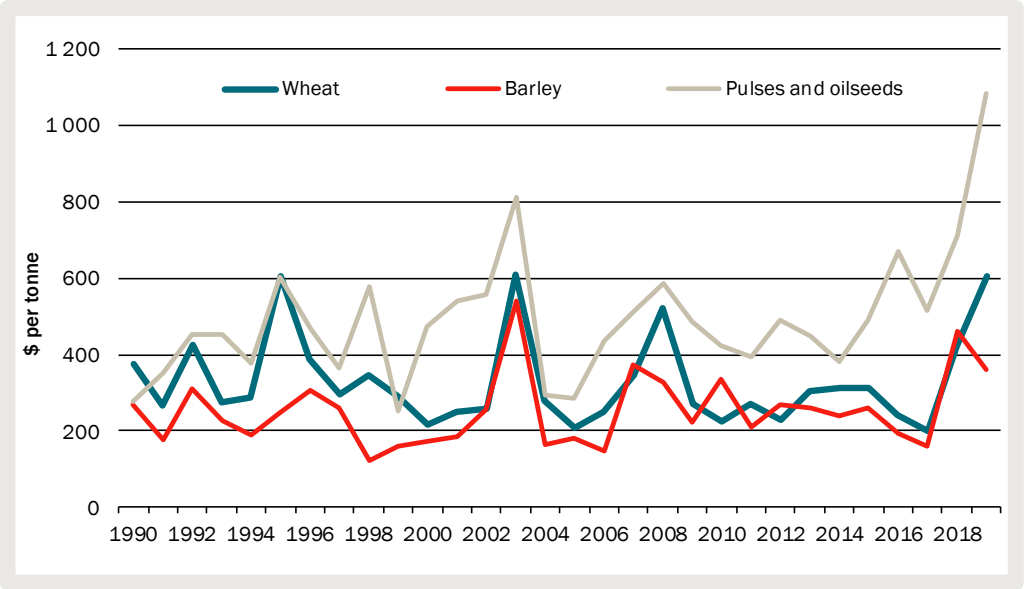
4.5 Change in enterprises mix in land planted to oilseeds and pulses



[a] ABARES North West Slopes and Plains region. Share of land cropped for oilseeds and pulses in total broadacre excluding cotton.
[b] Total land planted to grains and oilseeds/pulses from the Agricultural Census (excludi8ng cotton),

Data source: ABARES Broadacre Survey and ABS.

4.6 Farmgate return for grains pulses and oilseeds

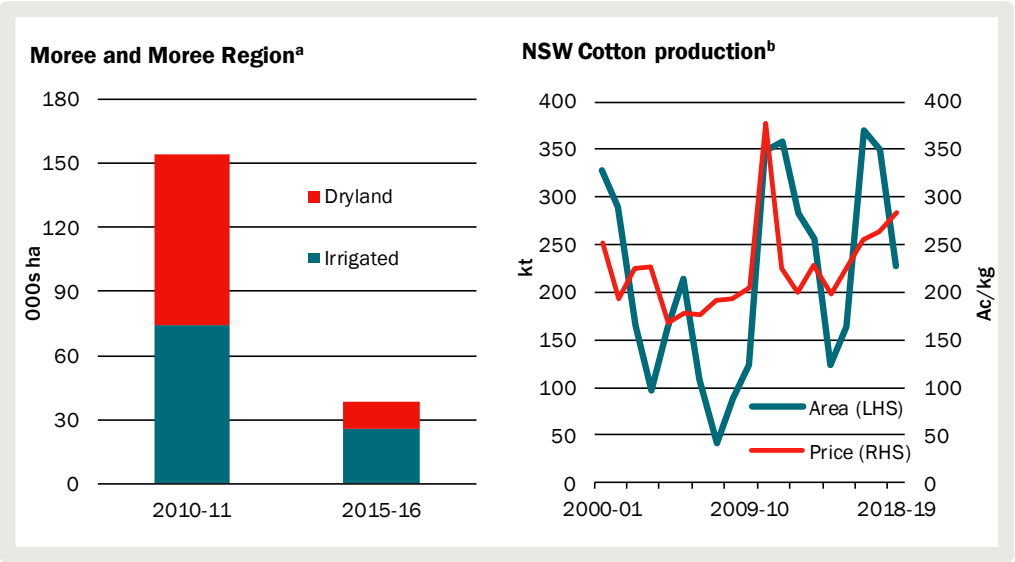


[a] ABARES North West Slopes and Plains region. Farmgate returns in nominal terms.

Data source: ABARES Broadacre Survey.

This analysis excludes the conversion of both livestock and grains land to more intensive activities such as cotton and horticulture (citrus and pecans). In this case, we are largely reliant on ABS data to capture shifts over time. The left-hand panel of chart 4.7 shows that the area harvested for cotton from the Moree district is significantly lower compared to 2010-11.

4.7 Cotton in the Moree region



[a] Production in the combined Moree SA2 and the Moree Region SA2. [b] Australian base price for raw cotton in nominal terms.
Data source: ABS and ABARES 2019, Agricultural commodity statistics 2019.

The right-hand panel of the chart explains these adjustments by looking at time series for NSW cotton production — which peaked in 2010-11 and 2011-12 driven by the world price of cotton. In 2010-11, the expansion of cotton area was a combination of both irrigated and dryland enterprises. Since this time, the lint price has returned to trend and there has been corresponding adjustment in areas planted: dryland cotton is fundamentally a high-risk crop with high upfront and ongoing costs — coverage of these costs depends wholly on rainfall and heat conditions.[30] Therefore, with a return to trend prices, cotton production has reduced back to a core of the most reliable land with high security water allocations.

Farm consolidation

In terms of linkages with demographic changes and with Moree itself, agriculture has a number of key drivers:

- farm consolidation influenced by productivity gains as owners can farm more land themselves than in years gone by. This is also influenced by labour costs, commodity prices, land values, and foreign investment.
- further consolidation of farm numbers through an ongoing process of farmers retiring and selling either to their neighbours or to a corporate farming enterprise
  - Corporates have the objective of investing in multiple and adjacent properties (and the associated water allocations) and rationalising overheads and management across those properties.
  - Consolidation also allows higher capacity utilisation and lower unit costs across tractors and headers resulting in lower operational costs on a per hectare basis.

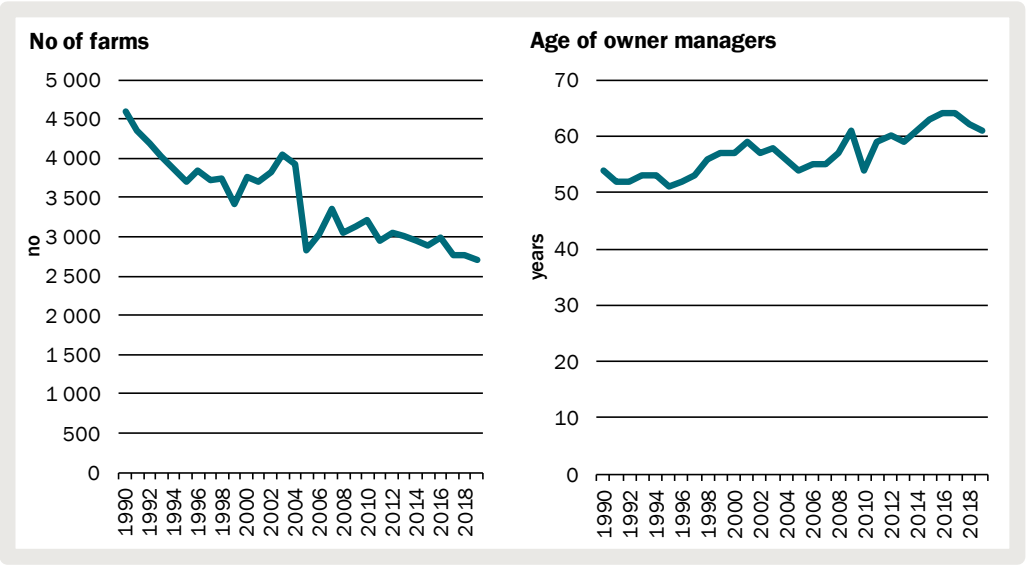
30 The adjustment is also influenced by the feed grain market such as sorghum and to a lesser extent, mung beans for human consumption. An increase in price of these commodities reduces the plantation of dryland cotton.

- despite this consolidation and recruitment of younger managers and specialist staff, the average age of owner managers has been increasing since 1990
  - This is partly driven by the trend of succession planning occurring later as older generation are retiring later and the younger generation being older when they take ownership of the farm.
  - Younger generations are also farming but not captured in the owner data. This is also driven by high land values which makes it more challenging for younger generation to buy agricultural land as compared to the previous generation.

ABARES data for the North West Slopes and Plains shown in chart 4.8 illustrates these trends. Given the focus of corporate investments on cropping and particularly high-quality grains and cotton, it would be expected that the picture of farm consolidation is reasonably representative of the Moree region.

In terms of average age of owner-managers, with the emphasis of livestock in the survey, the average age of owner managers in the chart is likely to overstate what is happening in the Moree region but is likely to be on a similar trend.

4.8 Trends in farm consolidation and ownership



[a] ABARES North West Slopes and Plains region. Farmgate returns in nominal terms.

Data source: ABARES Broadacre Survey.

It is noted that the decision to retire into Moree or another region would be largely driven by the decision of their children to either leave or stay on the farm.

Grain handling and marketing

In the grains sector, since the dismantling of the monopoly arrangements for exports (the single desk) and bulk handling in NSW, the grains sector has rapidly evolved to be more responsive to shifts in markets resulting in a customer, rather than a commodity, focus.

Since 2013, there have been a number of developments that are important considerations for the SAP:

- an increase in bulk storage at rail heads — along with increase in competition in the grain receivals, storage, aggregation and marketing sector;
- increased containerisation of grain around customer specifications for markets with specific requirements and/or export markets without bulk facilities or with shallow draught ports;
- a range of business models have evolved around strategic alliances with customers and supply chain integration rather than providing bulk storage and logistics;
- a dramatic increase in on-farm storage which is linked to greater involvement by owner-managers in when and how their grain is marketed; and
- a wider understanding by farm businesses regarding modal choices based on cost of alternatives and the risks such associated with freighting their product, such as transport choke points.

Increased marketing options, such as direct loading at the port, more containerised grain exports, and newer bulk terminal export capacity, together with increased on-farm storage are all part of the capital shift out of bulk-handling onto farms and to more flexible arrangements.

On-farm storage

The Grains Research and Development Corporation (GRDC) surveys grain growers every four years concerning their on-farm storage. Moree is a significant part of the GRDC northern region which also includes southern and central Queensland. From the 2017 survey, key findings were that:

- 93 per cent of respondents store grain on-farm (up from 87 per cent in 2013)
  - Farms of all sizes were likely to have grain storage.
- average on-farm storage averaged around 2 650 tonnes representing 74 per cent of their annual production.

To supplement this information, MPSC recently estimated the extent of on-farm storage at an LGA level:

- data was captured towards the end of 2018-19 [31]
- the area captured spans about 93 kilometres west, 85 kilometres north, 33 kilometres east and 54 kilometres south of Moree, — which almost full coverage of the Moree Plains LGA
- it is estimated that there is 1 288 225 tonnes capacity across 163 sites (around half of the 290 farms identified in the Moree Plains LGA and this capacity is expected to be increasing)— from the 2015-16 Agricultural Census.
  - This equates to around 7 900 tonnes per site which is significantly higher than the GRDC estimate for the Northern region — possibly reflecting the larger average farm size.

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31 One third of the data captured was estimated from aerial imagery, one third not stated and one third was actual information (as a local person whom contacted some of the landowners in person.

- From the Agricultural Census average farm production levels were 2 600 tonnes of wheat and 2 100 tonnes of barley —it would be a safe assumption that this estimated storage is concentrated around larger farm sizes.

It is not only the quantity but also the quality of these investments. The AEGIC (2018) [32] make the following observations:

> Industry experts estimate that over the past five years the amount of grain stored in good-quality steel silos in NSW, Qld and Vic has doubled. Significant amounts of grain have moved from temporary, or poor quality, shed storage into higher quality facilities that can be gas-sealed, fumigated or aerated. More than 80 per cent of an average harvest can now be placed in permanent storage on-farm in these states. Hence, despite the major grain handlers closing some receival sites, the total capacity to store grain has increased across Australia due to farmers' increased investment in on-farm storage, and upgrades to service providers storage at strategic sites.
>
> Large-scale, high-quality farm storage can be less costly than several commercial warehouse service providers, though does not include the risk management services bundled into the commercial storage cost.… What is apparent is that farm storage does facilitate harvest logistics and helps underpin flexibility in targeted grain marketing, from which many farmers derive commercial advantages.

Stakeholders indicated that short payback periods for on-farm storage was possible[33] and this was strengthened by some businesses making their own supply chain relationships with customers and in some cases, being of sufficient scale to load directly into trains given a suitable hardstand and high-volume augers.[34] In many cases, new machinery can improve on loading rates and efficiencies compared to conventional bulk storage sites.

Increased marketing options including containerisation of grain

Australia-wide export of grain in containers has been steady at about 2–2.5 million tonnes from 2008 to 2016, with about 72 per cent exported to South-East Asia. Over this period, about 37 per cent of New South Wales' total wheat exports have been in containers.[35] This is consistent with CSIRO's estimate that around 30 per cent of grain exported from the Moree region is in containers trucked to Port of Brisbane or trucked to Narrabri and railed to Port Botany.

While there will always a requirement for bulk handling facilities, there is a distinct trend towards greater containerisation — especially for wheat and pulses destined for south east Asian markets. Increasingly, the supply chain is responding to customers' requirements for tighter specification and provenance. This in turn increases the benefits of grain segregation (using emerging near-infrared technologies) and improved treatment of grain for insects, bacteria and fungi in silos using similar infra-red technologies instead

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32 White P, Carter C, Kingwell R 2018, *Australia's grain supply chains: Costs, risks and opportunities*, Prepared for the Australian Export Grains Innovation Centre, 2018.

33 This is partly due to government schemes like instant asset write-offs and interest-free drought loans.

34 https://www.abc.net.au/news/rural/2017-01-03/mainline-loading-at-moree/8157480

35 White P, Carter C, Kingwell R 2018, *Australia's grain supply chains: Costs, risks and opportunities*, Prepared for the Australian Export Grains Innovation Centre, 2018.

of fumigants — that that can now be deployed at farm level. We also note that there are also financial alternatives in marketing that include the use of hedging mechanisms.

All these factors require the bulk handling and marketing sector to evolve business models around the services they provide and the supporting infrastructure they require — particularly those located in the Moree SAP investigation area.

Cotton supply chain

The cotton sector is very much different to grains largely because of the production focused on irrigation areas, and a concentrated supply chain that does not involve bulk storage. The characteristics it shares with grains include:

- a move away from family ownership to corporatisation
- strong management capability in decision making both in production and marketing
- greater integration along the supply chain, and
- good understanding of freight and logistics options and how to minimise these costs.

From 2015-16 there were 63 businesses producing cotton in the Moree LGA of which 48 were irrigated enterprises. This is considerably fewer farms in production now, compared to the cotton 'gold rush' days of 2010-11 when the Agricultural Census reported 160 business of which 104 were irrigated. From this data, it's difficult to detect the extent to which consolidation has taken place in the sector from adjustments due to swings in the cotton price and availability of water allocation (or water to buy-in).

There are currently four gins within 50 kilometres of Moree:

- Louis Dreyfus Company
- North West Ginning
- Brighann Ginning, and
- Midkin Gin purchased from Auscott by Australian Food and Fibre (AFF).

In addition, in the LGA, there is the;

- Namoi gin at Ashley, and
- Koramba gin near Boomi (on the Queensland border).

Part of these businesses also include:

- the marketing of cotton seed — the largest single use is sale as stockfeed into south-east Queensland and ranging up to Northern Queensland as it is used as a supplement in feedlots and a protein source in tropical and sub-tropical areas during periods of low feed availability[37], and
- the composting of waste from the ginning process for sale back to farms or to retail.

While there is a clear difference with grains in terms of the availability of long-term storage options, cotton producers have access to a range of ginning and marketing options that include:

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36 https://www.graincentral.com/property/sale-of-auscotts-midkin-maintains-local-connection/

37 This is also applicable to Moree.

- ginning and marketing within their own supply chain
- toll ginning
- transfer to an integrated ginning and marketing business, and
- the use of hedging and other instruments to manage currency risk.

As noted, cotton is currently all containerised. Given the pivotal positioning of Moree between Brisbane and Newcastle/Sydney, farmers and marketers are acutely aware of the relative freight costs and the impact on their farm gate return.

Constraints in the agricultural supply chain

Many stakeholders considered that increased efficiencies on the Narrabri to Moree line will result in diversion of bulk grain back south through the Port of Newcastle. However, stakeholders also identified that the Narrabri to Moree line was not the only constraint. These other constraints include:

- potential changes (increases) in below rail charges
- rail choke points including congestion beyond Narrabri for container access to Port Botany
- the lack of container access to the Newcastle Agri-Terminal (NAT), and
- lack of direct container access to the Port of Brisbane for Inland Rail.

Disruption from Inland Rail construction

In the short term, stakeholders consulted were concerned above the timing and length of the Inland Rail construction on the Narrabri to Moree line. We understand representations have been made to Australian Rail Track Corporation (ARTC) requesting the upgrade to be conducted outside of harvest and transport period — that spans before Christmas running through to April/May.

It would be expected that in 2021, during the construction period, there will be a greater reliance on trucking of both bulk grain and containers to both Narrabri and southern Queensland.

Below rail charges

In October 2019, increases in below-rail charges for grain users by the ARTC were foreshadowed.[38] Speculation at the time was that ARTC would remove its ad-hoc grain rate and apply a fixed or 'regular' freight rate, which could add up to $1.70 per tonne to the cost of carrying wheat, and $2.20 per tonne for barley.

Following feedback from stakeholders regarding the impact of the proposed rate changes, and the drought's effect on the grains sector, ARTC amended the standing offer to

38 https://www.graincentral.com/logistics/bulk-grain-could-cop-price-hike-in-new-artc-agreement/

include ad hoc rather than regular rates until 30 June 2020. ARTC said it has reserved the right to review the rates applicable from 1 July 2020.

The consultation revealed that key stakeholders who current rely on rail freight believe that the potential size of productivity benefits from Inland Rail depend critically on how ARTC price below-rail charges in the future to recoup their investment. These stakeholders were taking a wait-and-see approach to these benefits especially when, in most cases, the likely charges for the Narrabri-to-Moree line or the Moree-to-Gowrie line would be just one component of the total freight cost incurred to the export point at port.

Port Botany and Newcastle Agri-Terminal (NAT)

Another reason why freight from the Moree region is diverted through the Port of Brisbane is the congestion and costs experienced in getting containers to the Port Botany whether by road or rail and the lack of a container facility at the NAT. Currently container freight sent to Port Botany is competing with passenger trains for rail slots and often have to be unloaded at a hub to be transferred onto trucks for the last leg to the Port.

In March 2019, NSW Farmers pushed for a container terminal to be built at the Port of Newcastle —estimated to save $16-22 per tonne on rail freight from northern NSW. [39]

> Container trade is one of the strongest growth areas for grain exports and, more generally, is expected to increase dramatically," Rebecca says. "Container ships are getting bigger to cut costs and we need ports that can take these new Maxi vessels and infrastructure that maximises wharfside and landside productivity and vessel turnaround.

The Port of Newcastle has a vacant site at Mayfield with direct water frontage and the potential for deep-water berthing, to develop into a two million TEU (twenty-foot equivalent unit) terminal. This development has been effectively blocked by a Port Commitment Deeds signed when Port Botany, Port Kembla and the Port of Newcastle were privatised —the subject of legal action by the Australian Competition and Consumer Commission (ACCC).

The deeds contain provisions that would effectively see the Port of Newcastle compensating Port Kembla and Port Botany if it developed a container terminal above a specified capacity. The ACCC is alleging this is anti-competitive and makes the development of a container terminal at Newcastle uneconomic. That is, NSW Ports will remain the only major supplier of port services for container cargo in NSW for 50 years.

- The ACCC trial is currently proceeding.
- If this agreement was determined to be consistent with competition rules, one option to resolve this impasse would be to negotiate exemption for containerised agricultural commodities from the agreement.

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39 https://www.nswfarmers.org.au/NSWFA/Posts/The_Farmer/Trade/Port_of_Newcastle_set_to_be_export_hub_for_farmers.aspx

Completion of on-rail container access to the Port of Brisbane

Another key uncertainty identified by stakeholders related to the timing of access to the Port of Brisbane for containers on Inland Rail. This relates directly to the completion of the rail link between Gowrie and Acacia Ridge, which has been approved and announced, and between Acacia Ridge (where it is currently planned that Inland Rail will be terminated) and Fisherman's Island at the Port of Brisbane. This is important as it dictates the potential productivity benefits from Inland Rail — which are reduced if containers need to be lifted off rail and loaded onto trucks for the last leg to the Port of Brisbane at either the Acacia Ridge or Rocklea intermodal facilities.

For some stakeholders, they identified that they would continue to truck containers to the Port of Brisbane until this link is complete as the costs of transferring at an intermodal facility were too high. Others indicated that this issue was not so significant as their business was structured around consolidation of containers at facilities outside of the Port of Brisbane and would be trucked-in anyway.

5 Baseline infrastructure investment

- **This chapter outlines key infrastructure developments in the Moree region that will proceed without the Moree SAP as part of understanding of baseline economy outcomes.**
- **The rationale for the Moree SAP is based on the opportunities presented by the Inland Rail investment including lower cost freight from switching from road to rail. To maximise those opportunities, an open-access intermodal terminal will be developed.**
- **Other crucial baseline investments include further upgrades of the Newell Highway and the Moree hospital.**

Inland rail

Inland Rail is Australia's largest freight rail project, representing $9.3 billion in federal government investment and 1 700km of rail line between Melbourne and Brisbane via regional Victoria, New South Wales and Queensland.

The Inland Rail investment provides a significant opportunity for the Moree region and more specifically the Moree SAP investigation area.

Appendix A provides some key details on the opportunities for the Moree region.

The upgrade to the Narrabri to North Star (N2NS) section is to approximately 186 kilometres of track within the existing rail corridor and construction of approximately 2.3 kilometres of a new rail corridor. The objective of the upgrade is to enable the operation of 1 800 metre-long double-stacked freight trains and increase in axel loads to 30 tonnes axel load for carriages. Current estimates of the capital expenditure (capex) for the N2NS are around $300 million.

Open-access intermodal facility in Moree

Currently Moree has two private intermodal facilities that that are part of the grain and cotton businesses that are within or adjacent to the investigation area. These facilities primarily transfer containerised grain onto rail and involve a hardstand area adjacent to the rail siding and lifting equipment to load the containers.

A key opportunity for the Moree region and the SAP would be to have an open-access or public intermodal facility, especially given the investment in Inland Rail, that would allow businesses inside and outside of the investigation area to:

- containerise grains, pulses and oilseeds currently exported from the region on road

- replace road freight for bulk inputs such as fertiliser, petroleum and cement
- develop a range of new opportunities that include new businesses located in the investigation area.

Moree Intermodal Park (MIP)

Due to its location along the Narrabri to North Star (N2NS) section of Inland Rail, an Intermodal Terminal was proposed to be constructed in Moree subject to SAP investigations. This investment has been separated into two stages.

Stage One will establish a North-South Link, comprising of:

- a new road connecting Tapscott's Road to Burrington Road, and
- an upgrade of an existing road running parallel to the Newell Highway east of the Inland Rail corridor linking to major intermodal facilities and the Moree Intermodal Park.

The upgrades are part of the Moree Plain Shire Council's Strategic Transport Plan to ensure the Shire is 'Inland Rail ready' by the time the rail line is upgraded.

A business case was submitted to the NSW Government for the second stage of the MIP development. The funding application is seeking $66.4 million enabling infrastructure:

- the construction of common user rail and utility services for the development of the Moree Intermodal Terminal
- the construction of an East-West Connector to facilitate freight flows to the new Terminal, bypassing the town of Moree and providing access to existing logistics operations and the new greenfield Intermodal Park, and
- the relocation of the Newell Highway overpass, to facilitate the East-West Connector. (this part if to be funded through the ARTC as part of the Inland Rail project).

The benefits from the Intermodal Terminal investment were expected to be:

- grain freight transport efficiency benefit delivered through higher freight volumes per wagon, number of wagons per train and faster trains as well as efficiency through transporting freight from farm to rail due to the East-West Connector
- cotton freight transport efficiency benefit delivered through higher freight volumes per wagon, number of wagons per train and faster trains
- producer surplus (increased profitability and value added) of the Intermodal Facility derived from the FTE jobs created, including an additional 15 FTE jobs with salaries at average wages of $65 000 per FTE
- safety benefit derived from a decrease in truck and rail movements/distances travelled, and
- carbon emission reduction derived from a decrease in truck and train movements/distances travelled.

Baseline investment in an open access intermodal facility

During the FEbD, a representative of ARTC indicated that a 4 kilometre rail siding would be developed as part of the Inland Rail track upgrade. This siding would be

located each side of the current siding that is currently accessed by the Louis Dreyfuss Commodities (LDC) site.[40]

A proponent for the intermodal facility consulted during the market sounding, currently operating outside of the Moree region, indicated that for the short to medium term at least, the Moree market is unlikely to be of sufficient size to support more than one operator.

Analysis of projected Inland Rail projected freight volumes in appendix A indicate that if the projected rail freight volumes were realised, nearly 8.5 million tonnes of freight could pass through Moree by 2050 — of which 80 per cent would be interstate or through freight. [41] This is potentially a significant problem in terms of rail congestion and amenity to Moree residents from movements in heavy trains.

Previous work, discussed at the FEbD, by GHD identified options for a bypass route for Inland Rail around Moree in the future. The FEbD workshop identified the most likely bypass route to be divert off the current rail alignment north of Tapscott Rd, sweeping to the eastern boundary of the SAP and then going on north to re-join the current alignment beyond the Mehi and Gwydir Rivers.

The FEbD workshop identified that the proposed bypass alignment represents the logical location for a second general-access intermodal facility — which should be planned for in the future.

Both of these developments indicate that any investment in a second open-access intermodal facility is likely to be in the medium to long term — possibly beyond 2035.

Implications for the benefits for an open access intermodal facility

While in principle the containerisation of grain and cotton in Moree is enabled by investments intermodal capacity, the degree of benefits and the pathway to export depends critically on container access to NAT, Port of Newcastle, and to lesser extent, Port Botany. If this situation is not resolved, it is possible that current channels will persist, that is export of grains and cotton in containers:

- direct through to the Port of Brisbane via rail when there is a dedicated rail freight connection between Inland Rail and the Port of Brisbane
- direct through to Port of Brisbane via truck if the dedicated rail freight connection is not in place (as is the case now), and
- trucking grain to Narrabri for containerisation for rail south to Port Botany or north to Port of Brisbane (depending on the relative freight charges).

Upgrade of the Newell Highway

The Newell Highway is the longest highway in NSW, stretching over 1 060 kilometres from the Victorian border at Tocumwal to the Queensland border at Goondiwindi. The

40 That site currently has access to a siding of around 300 metres.

41 That is, the economics of heavy trains depends on long distance point-to-point freight. In this case, Moree would not be a sufficient market to 'stop a train'.

highway passes through many regional towns, including; Berrigan, Jerilderie, Urana, the Riverina, Coolamon, Narrandera, Bland, Weddin, Forbes, Parkes, Dubbo, Gilgandra, Coonabarabran, Narrabri, and Moree.

The highway is predominately used for freight and livestock transport, making it the primary transport link between regional producers. As the population in both Melbourne and Brisbane grows, freight movements along the corridor are also expected to grow.[42] However there are also tourism related uses from caravanners and holiday makers.

Both the Australian Government and the NSW Government have invested in further developing the Newell Highway.[43] [44] Part of this investment includes:

- funding to plan for a heavy-duty pavement upgrade between Narrabri and Moree, and
- $122 million investment north of Moree Newell Highway upgrade project.

These projects include the update of the road surface, widening of shoulder, intersection improvements, wide centreline treatments, improved flood immunity and additional overtaking lines across 64 kilometres of road.[45]

Moree's residents and businesses are expected to benefit from these updates from:

- increased travel reliability and reduce travel times
- reduced vehicle operating costs
- improved freight efficiency, and
- improved road safety.

When informing the Moree SAP baseline, there are various potential impacts from the upgrade of the Newell Highway that need to be considered, including:

- potential increase in road freight as reliability and efficiencies increase on the Newell Highway, and
- increased connections between businesses and labour across the Moree township and Narrabri.

Hospital investment

The Moree District Hospital provides the region with imaging, general surgery, orthopaedics, paediatrics, emergency, maternity, renal, acute, occupational therapy, social work, physiotherapy, speech pathology, and dietetics services.[46] In 2019, the

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42 Infrastructure Australia, 'Newell Highway upgrade', see https://www.infrastructureaustralia.gov.au/map/newell-highway-upgrade

43 https://investment.infrastructure.gov.au/projects/ProjectDetails.aspx?Project_id=101273-19NSW-NP

45 Roads and Maritime Services, 2018 'Newell Highway upgrade, Narrabri to Moree and North Moree heavy duty pavement projects: Project update', see https://www.rms.nsw.gov.au/projects/01documents/newell-highway/newell-hwy-narrabri-moree-heavy-duty-pavement-project-update-2018-06.pdf

46 While the MDH is equipped to provide all of these services, the actual provision of such is dependent on the availability of suitably trained therapists, GPs and specialists.

hospital received 8 344 presentations to the Emergency Department, undertook 1 000 operation procedures, and admitted 3,762 patients into the hospital.

Over the past few years, there have been a few minor investments to develop the hospital, such as a new $2 million renal dialysis unit extension to the ground floor of the hospital and a $1.8 million to upgrade the operating theatres.

However, the 2019-20 NSW Budget saw an announcement of $80 million to redevelop the hospital. Northern Tablelands MP Adam Marshall referred to this investment as the 'single largest health project in the Northern Tablelands in living memory and the largest single project undertaken in Moree that anyone can recall'.[47]

When considering the Moree SAP baseline, the $80 million investment into the hospital may have the following impacts that will need to be considered:

- There will be an initial construction phase supporting the redevelopment. This may see an increase in demand for skilled and unskilled labour within the Moree region, depending on the contractor drawing from local suppliers and the local labour force.
- The operational phase may see an increase in demand for skilled labour and medical staff (such as general practitioners, specialists and nurses). Noting that there is already a gap in medical staff across NSW regions.
- There may be long term impacts on the internal migration within the region and potentially the surrounding region, particularly if people are currently leaving the Moree Region because of a lack of health services. This may be of increasing importance in future years if the population continues to age.

Like many of the other government investments into the region, the Moree District Hospital redevelopment is still in planning phase. The 2020-21 NSW budget will fast-track $2 million allocated for final planning of the redevelopment. Because of this, the expected impact is yet to be confirmed.

47 https://www.adammarshall.com.au/people-power-secures-80-million-for-a-new-moree-hospital/

6 Economic advantages and barriers

Key advantages for the Moree SAP

Access to water

Part of the Moree SAP sits above the GAB and the Lower Gwydir Aquifer, giving the Moree township access to artesian and sub-artesian underground water resources via the Surat, Eastern Recharge and Southern Recharge Groundwater Sources.

Currently the water allocation owned by MPSC is not being fully used, with this additional allocation potentially available for new businesses within the SAP. It is this source of water that allows the Moree township to be minimally impacted by drought and water restrictions. For instance, Moree and several other villages were not put on water restrictions throughout the entire drought.

From these various water sources, most of the Moree Shire has access to a large and generally reliable source of water. This high level of water security provides a significant competitive advantage for the Moree region (in particular for the agriculture industry) and potentially generates opportunities that the Moree SAP can unlock.

A key part of the background is that there is a perception by businesses, that one of the key advantages of the SAP investigation area is the availability of water and more particularly high-quality water. Table 6.1 summarises the status of water availability at the Investigation area — which has been substantially revised upwards from those estimates presented at the FEbD workshop.

- Between 4 and potentially up to 7 GL could be available annually.
- High quality town water of 500 ML — or a maximum of 10 per cent of the total — would be suitable in horticultural and industrial applications without pre-treatment. [48]

In terms of a quality assessment, broadly, high quality water is potable or directly usable in agricultural or industrial users with a minimum of processing whereas lower quality water would require varying levels of treatment to be fit-for-use.

- The remainder of the available water would require some form of treatment — for the majority of prospective industries identified in this report.
  - At minimum water from GAB sources would have to be treated with double osmosis.

48 It needs to be confirmed if Council is gifting this allocation or are they charging a nominal cost.

6.1 Water availability and options

	Quality	Security	Availability scenario		
			Low	More likely	High
			ML	ML	ML
MPSC potable town water	High	High	500	500	500
MPSC new dedicated SAP recycled wastewater	Low	High	122	211	300
Existing MPSC licenced GAB groundwater	Low	General	40	40	40
Potential GAB Surat Groundwater	Low	General	3 360	3 630	3 900
Recycled stormwater[a]	Low	Low	0	1 090	2 180
Total			**4 022**	**5 471**	**6 920**

[a] The WSP estimate of the 2 180 ML was interpreted as an upper limit. To be conservative, this estimate was set to zero for the low scenario.

Source: WSP 2020, *Water Demand Final Report, Special Activation Precinct Moree*, Prepared for the Department of Planning and Environment, December.

  - We understand that this resource groundwater also has high levels of iron which can damage RO membranes in which case further pretreatment may be required. There is little information on how this could add to total treatment costs.
- In the case of recycled stormwater, utilising this resource would require capture of overland flow. Apart from requiring the appropriate licenses, it would also require investment in suitable infrastructure including ring tanks and sumps and the capacity to move this water to the point-of-use. To be conservative, for this report, we have set this availability of this resource to zero in the low scenario reflecting this uncertainty.

Transport and logistics links based on location

Moree is located at the junction of major national, state, and regional freight routes via road, rail, and air. This includes:

- The primary road transport route connecting Victoria and Queensland via the Newell Highway, and the Gwydir Highway that connects east coast NSW to western NSW. In addition to this, the Carnarvon Highway provides an important secondary link to the north-west into southern Queensland. Most grains and cotton produced in Moree Plains LGA is transported to Port of Brisbane via road.[49]
- Rail services provide the transportation of bulk agricultural produce, typically to the Port of Newcastle. With the future development of Inland Rail, the existing restructured rail facilities from Moree to Narrabri will see the capacity of this line increased to 1 800m trains (over time), or 7 700 tonnes of grain (from the current restriction of 800m trains carrying a total of 2 300 tonnes of grain). The Inland Rail development will also accommodate 1 200m trains into the Port of Newcastle.
- Regular air services are provided by QantasLink connecting corporate services between Sydney and Brisbane.

A summary of these transport and logistic links is provided in chart 6.2 below.

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49 Moree Plains Shire Council 2019 '*Snowy Hydro Legacy Fund Moree Intermodal Project Business Case*'.

6.2 Moree transport and logistic networks

Data source: Moree Plains Shire, Economic Development Strategy 2020-2030

The location of Moree makes business productivity and profitability highly sensitive to freight costs. This sensitivity is expected to be partially resolved through the efficiencies gained through the Inland Rail investment. However, there are still unknowns through the development of the Inland Rail, such as if the Inland Rail investment will have direct access to the Port of Brisbane which will impact on this benefit.

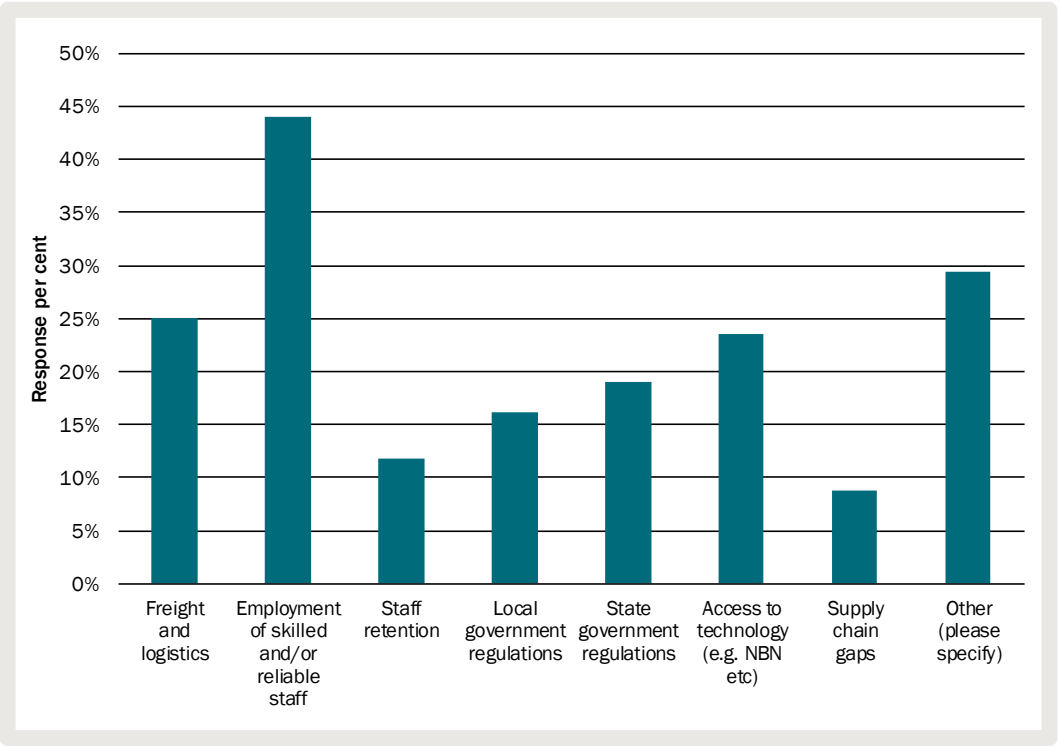
Key barriers for the SAP

Barriers identified in the business confidence survey

In 2016, the Moree Chamber of Commerce and the Moree Plains Shire Council partnered to develop and undertake a 'Business Confidence Survey' across Moree and Mungindi. This survey was conducted between February to July 2016 to better understand trading conditions and changes to business performance across these two towns, with a total of 87 responses were received for the Moree Survey and a further 25 for the Mungindi Survey.

Responses were received by a wide range of businesses across various industries. From these responses the following barriers to improving trading, expanding or innovating are listed in chart 6.3.

6.3 Business confidence survey, 2016, Please identity significant barriers to your business's ability to improve trading, expand or innovate?



Data source: Moree Chamber of Commerce and the Moree Plains Shire Council's 'Business Confidence Survey' 2016

Out of the 68 people who responded to this question, the most common answer was 'employment of skilled and/or reliable staff' with 30 responses (or 44.1 per cent). The 'other' category was the second most common response with 20 responses (or 29.4 per cent). However, there was some overlap between this response and others. For example, within the 'other'category, topics included the cost and access to freight, difficulties hiring and retaining staff, access to skills training, internet access and red tape and compliance. Freight and logistics was the third most common response (17 responses, 25.0 per cent) followed by access to technology (16 responses, 23.5 per cent).

Decline in population

The demographic analysis presented earlier suggests that the population for the Moree region is in decline and will continue to remain in decline in the baseline — without further concerted action.

This is partially explained by the large number of youth leaving the region seeking education opportunities. Moree also has an ageing population, with many of the retirees leaving the region.

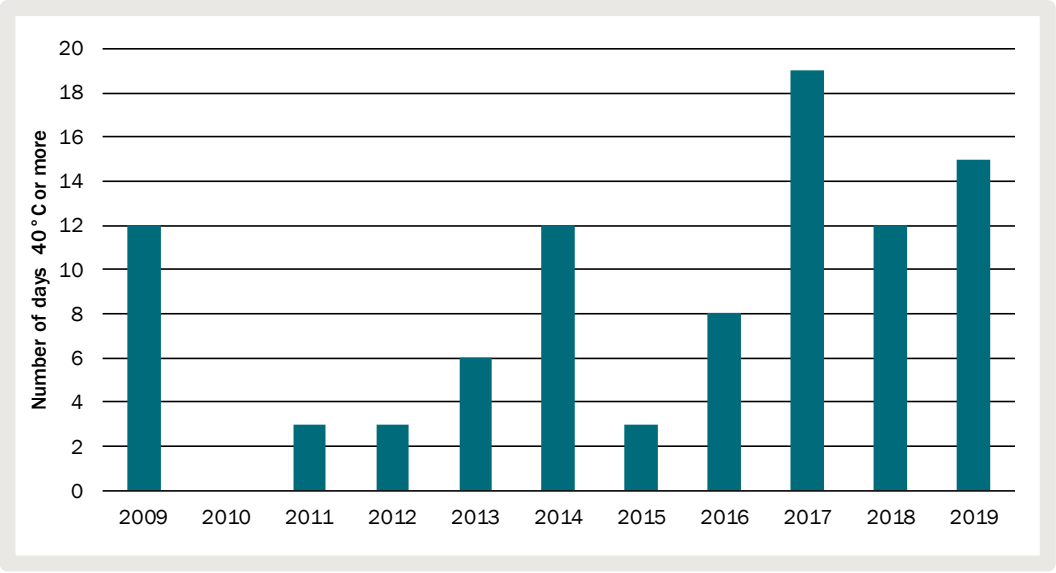
Although there are many locational benefits from the transport and logistic linkages, Moree's location has the negative impact of isolating the town from other metropolitan areas and supporting social infrastructure. Access to and gaps in social infrastructure have been assessed throughout the SAP master planning process.

The demographics of the Moree region have been further discussed in the demographic component of this report.

Climate

When considering the maximum temperature between 2009 to 2019, there are on average 8.5 days of temperature 40°C or higher per year, as shown in chart 6.4.

6.4 Days 40°C or higher in Moree



Data source: www.bom.gov.au.

Through preliminary discussions, the hot weather experienced in Moree can be a barrier to some forms of agriculture. For example, controlled horticulture in hot environments may require cooling systems to reduce the heat. Maintaining suitable climatic conditions inside protected cropping structures in warm climates that require cooling is challenging and requires different approaches from those used in temperate conditions.[50] Stakeholders identified that it is cheaper to warm a glasshouse than to cool it.

Evidence from the market sounding also indicates this also presents opportunities. For example, in the case of medicinal marijuana, up to 5 crops can be grown throughout the year.

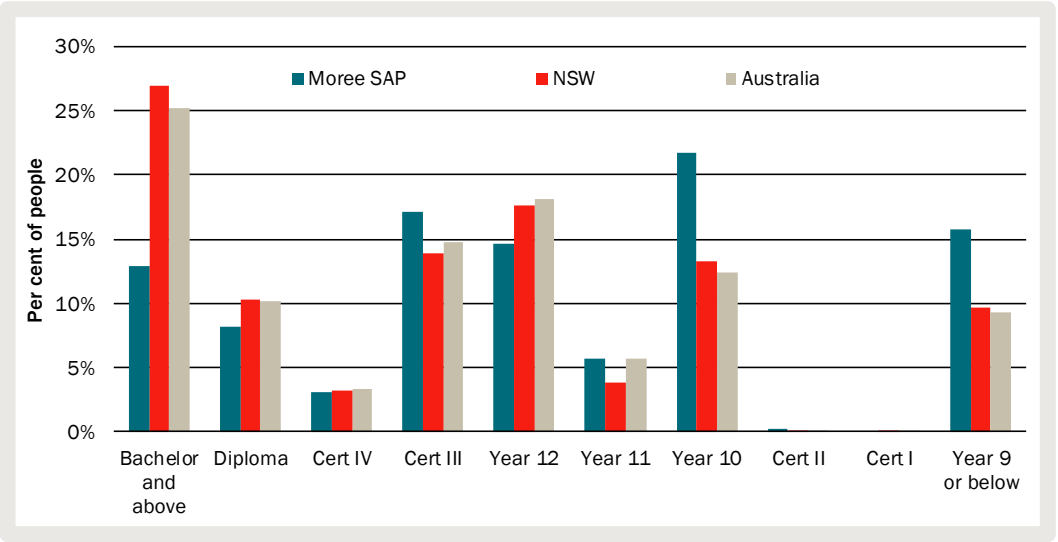
Access to skilled labour

The most common barrier reported by businesses is access to skilled and/or reliable staff. This hypothesis has been provided through preliminary discussions with MPSC, the insights provided through the 2016 Business Confidence Survey and the market soundings.

50 Barkat Rabbi, Zhong-Hua Chen, Subbu Sethuvenkatraman 2019, 'Protected Cropping in Warm Climates: A Review of Humidity Control and Cooling Methods

As shown previously above, the Moree LGA has a high proportion of people with year 10 and below qualifications compared to the NSW average, and a low proportion of people with qualification above the Certificate III level. This is shown again in chart 6.5.

6.5 Highest level of education, 2016

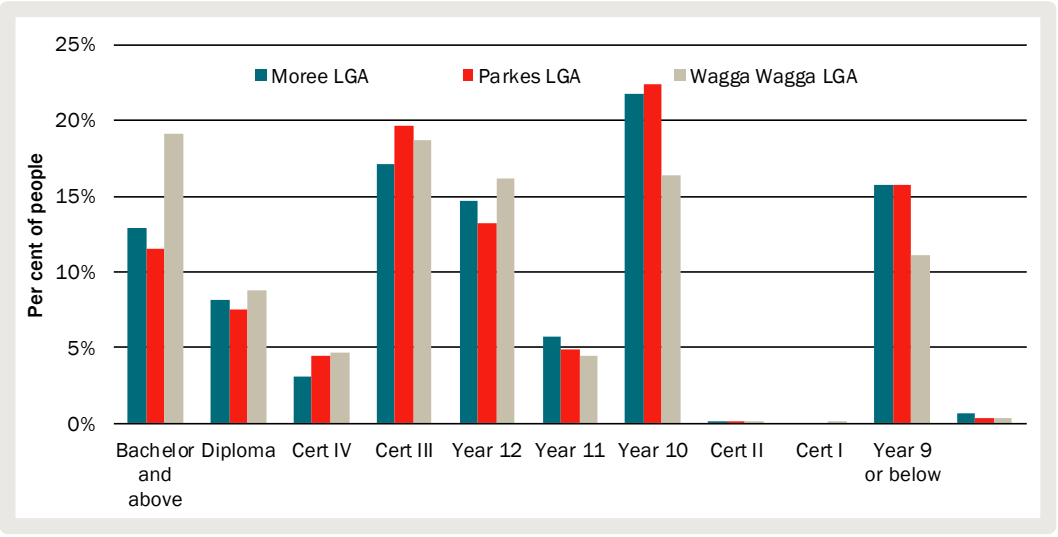


Note: Moree SAP includes the Moree Plains LGA. Per cent from those that responded, includes people aged 15 years and over.

Data source: Census 2016.

When comparing the highest level of education attainment across the Parkes, Wagga Wagga and Moree SAPs, there are similarities between Parkes and Moree. This is shown in chart 6.6 below.

6.6 Highest level of education across SAP regions, 2016



Note: Per cent from those that responded, includes people aged 15 years and over.

Data source: Census 2016.

Both Moree Plains LGA and the Parkes LGA have very similar education profiles. There is a large proportion of the population with year 10 as their highest level of education and a relatively high proportion of people with Certificate III qualifications. However, Wagga

Wagga has a much higher proportion of people with education levels at the bachelor and above level. However, this is somewhat expected with the Charles Sturt University located in Wagga Wagga.

For Moree, and other regional towns, productivity advancements within the agricultural sector has shifted the demand for unskilled and seasonal labour towards skilled labour.[51] However, the education profile of the local labour force does not seem to have followed this trend in upskilling.

Access to suitable labour has been a consideration for many businesses looking to invest within the region.

Requirement for an on-site energy solution

From the market sounding process the provision of cheaper electricity solutions for businesses located in the Moree SAP would assist in investment attraction. However, while potential early anchor tenants have indicated their business models would be sensitive to energy costs, the unavailability of mains gas in Moree has not been a 'deal-breaker' as these businesses could adopt other energy solutions.

A prevailing view was that mains gas was unlikely to be available in the investigation area for a number of reasons:

- uncertainty around the investment in the Hunter Gas Pipeline (HGP) which is planned to deliver gas from the Wallumbilla Gas Hub near Roma in Queensland and Narrabri to Newcastle
  - There was also opposition to the pipeline from a group of local residents including a lack of official support by the Moree Plains Shire Council.
- uncertainty around the approval of the Narrabri Gas Projected proposed by Santos — which was central to the economics of the HGP
- international trends, both political and financial, about the longer-term commercial viability of new gas projects.

Recent developments may indicate a higher probability of the construction of the HGP:

- approval for the Narrabri Gas Project by the Federal Environment Minister in late November 2020
- re-engagement by the proponents of the HGP with
  - the Federal Government — who have a policy of underwriting major new gas pipelines and other infrastructure to deliver cheaper supply of gas [52]
  - stakeholders along the proposed pipeline route.

It is noted that a number of users currently access LPG using on-site storage and delivery by trucks. These businesses have small to moderate gas requirements. It is understood that for a range of applications that include glasshouses and industrial scale users, that this approach is either impractical or too costly relative to a mains-gas solution.

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51 Noting that there are still various producers in Moree that rely on seasonal unskilled labour during harvest.

52 https://www.afr.com/companies/energy/hunter-gas-pipeline-angles-for-government-backing-20200828-p55qe1

The proposed alignment of the HGP pipeline is around 400 metres to the east of the Investigation Area. Therefore, an offtake to the SAP area and to Moree would not only be moderate cost but offer greater opportunities.

- In the short-to-medium terms, it would provide for a greater range of business types that required thermal energy for heating or boiling water but also for greenhouse applications where gas is used for carbon dioxide enrichment.
  - There are also strong linkages between gas and fertiliser production.
  - The opportunities may also include making gas available to other Moree users.
- Over the medium to long term, mains gas would provide the time required to develop the option of alternatives sources of equivalent energy that would include biogas or hydrogen — which would be better aligned to the USP of the SAP.

The FEbD workshop identified production of biogas as a source of energy for business located in the Moree SAP. While the biofuels industry in Australia has been established for some time, which includes ethanol and biodiesel, but as the Renewable Energy Report [53] identifies — there are currently no biogas facilities operational in Australia other than those based on landfill sites and sewerage treatment plants. The same report identifies that the development of facilities based on agricultural residues — including stubble or stalks of cereals and cotton and cotton gin trash — is clearly a future option for the investigation area. However, it is difficult to be specific about the timing of such a business due to the large number of factors at play beyond the likelihood of the HGP coming on-site including:

- having sufficient demand withing the SAP, and possibly within the region, to warrant an investment in a commercial-scale facility
- the overall economics of such a facility where a large consideration would be the labour and transport costs required to collect feedstocks and the prevailing price paid of biogas at the time.

A feature of similar operational facilities overseas is that they are located at points where the resource is naturally collected — at timber mills or export points for instance. [54]

Infrastructure constraints

The Engineering and Energy Leads of the SAP team identified significant infrastructure constraints in terms of existing infrastructure supplying the SAP area and the cost of extending that infrastructure down the 'backbone' of the Newell Highway.

The FEbD workshop identified that that the Newell High was identified as the 'backbone' of the development more than 5 kilometres from Bulluss Drive in the north beyond Burrinton Rd and the LDC site the south. From this spine, infrastructure would extend out to developments as required.

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53 Arcadis 2020, *Renewable Energy Report: Moree Special Activation Precinct*, Prepared for the Department of Planning and Environment, December.

54 https://www.energynetworks.com.au/resources/reports/biogas-opportunities-for-australia-enea-consulting/

7 SAP land use scenarios

Selling proposition for the Moree SAP

The market sounding and the Scenarios report indicated that a clear unique selling proposition (USP) for the Moree SAP was required due to the high level of competition between:

- other SAPs
- other towns and regions that are located on Inland Rail — particularly Narrabri and Toowoomba – and along the route in Queensland and Victoria
- New South Wales, Queensland and Victoria for attracting investment.

Following the FBeD and further market sounding, a USP that focuses on Moree's strength in agriculture, food and a precinct, supported by renewable and circularised utilities and waste streams with a low carbon footprint remains the most plausible. This differentiation is potentially strengthened with a much greater focus on social outcomes than for other SAPs — particularly in terms of Aboriginal business and employment participation.

Approach

As input to the FEbD, the CIE provided a draft of land uptake and employment requirements for the Moree SAP that identified the preliminary composition of businesses that would be likely be attracted to the SAP, with associated land take and employment, that was based on a benchmarking approach. This draft has subsequently been refined in light of:

- key findings that have been forthcoming from the FEbD including technical reports from specialist consultants
- the market sounding process
- plausible judgements about how many additional businesses, similar to those identified by the market sounding, could be attracted and sustained in the Moree region
- additional benchmarking of industry sectors that are prospective that were not considered in the draft.

Table 7.1 identifies the revised list of business types now considered as part of the analysis — as part of a 40-year time horizon for the SAP. This table includes a list of the indicative business types identified by the market sounding and also includes an assessment of probability.

7.1 Revised investment areas and assessment approach

Revised prospective investment areas	Probability assessment	Structure Plan Category	Source of assessment
Building on water and land availability			
Aquaculture	Medium	Horticulture	Assessment/Benchmarking
Outdoor horticulture	Medium-high	Horticulture	Assessment/Benchmarking
Covered horticulture			
▪ Medicinal marijuana stage 1	High	Horticulture	Market sounding
▪ Medicinal marijuana stage 2	High	Horticulture	Market sounding
▪ Medicinal marijuana additional small	Medium	Horticulture	Assessment/Benchmarking
▪ Medicinal marijuana additional large	Medium	Horticulture	Assessment/Benchmarking
▪ Glasshouse/aquaponics stage 1	High	Horticulture	Market sounding
▪ Glasshouse/aquaponics stage 2	High	Horticulture	Market sounding
▪ Glasshouse production additional	Medium-high	Horticulture	Assessment/Benchmarking
▪ Poly tunnels (berries and vegetables)	Medium-high	Horticulture	Assessment/Benchmarking
Building on grain/cotton advantage			
Increasing value from the supply chain — grain storage, sorting and handling			
Early-stage processing			
▪ Flour/chickpea milling/canning	High	Value Add Agriculture	Assessment/Benchmarking
▪ Oil crushing plant	High	Value Add Agriculture	Assessment/Benchmarking
▪ Plant proteins	High	Value Add Agriculture	Assessment/Benchmarking
Grain ethanol	Low-medium	Value Add Agriculture	Assessment/Benchmarking
Reducing reliance on imported inputs			
Diesel replacement (methanol)	Low	Potentially Hazardous	Market sounding
Chemicals manufacture — mixing of reactive ingredients	High	Potentially Hazardous t	Market sounding
Fertiliser mixing— Urea Ammonium Nitrate	Medium	Potentially Hazardous	Assessment/Benchmarking
Building on location			
Intermodal terminal (public access)	Medium	Intermodal (public access)	Market Sounding/ Benchmarking
Freight and logistics	High	Freight and Logistics	Assessment/Benchmarking
Abattoir	Low	Potentially Hazardous	Assessment/Benchmarking
Circular economy			
Resource recovery	Medium	Resource Recovery	Assessment/Benchmarking
Waste to energy — biogas	Medium-high	Bio-Energy	Assessment/Benchmarking
Solar electricity	High	Energy/Solar	Market sounding /Benchmarking
Hydrogen production	Medium	Energy/Solar	Assessment/Benchmarking
Supporting/service industries			
Light industry/commercial	Medium	Enterprise/Hub	Assessment/Benchmarking

Source: Market Sounding and CIE analysis.

This probability assessment implicitly has a time dimension where those activities assessed as being high probability are either underway or likely to be underway in the next 5 years. In the case of medium-high assessment, there is a strong likelihood that this business type will be attracted but timing is less certain.

Appendix B of this report provides a high-level view of these business/industry groupings and their alignment to the objective and the outcomes of the SAP.

We have identified additional information from the market sounding to assist in the transparency of the calculations. For example, in the case of medicinal marijuana and glasshouses businesses, we have received detailed information on the land and employment parameters of businesses that will invest in the Moree SAP and their plans for staging of any expansion.

Assessment of additional businesses

In addition, we have also made an assessment of the number of *additional* businesses that could be attracted, beyond the indication from the market sounding, by investment area or sector. This is a crucial component of the overall assessment that incorporates a number of factors that include the:

- scale of the market or feedstock base available relative to the commercial size of a business
- nature of investment in terms of lumpy capital costs where average operating costs fall significantly with increased capital utilisation
- consideration of international and domestic sector trends and comparative locations and projects.

In the case of potential businesses in horticulture, for example, business numbers are not likely to be limited by market considerations — as they effectively compete in large domestic and export markets nor are limited by physical constraints related to land, growing environment and water availability. This is especially the case for medicinal marijuana where the SAP could potentially host a number of businesses to supply a rapidly growing market.

In fact, there may be synergies between similar businesses. For example, in the case of production of outdoor and indoor horticulture, there could be opportunities for more businesses that allow greater utilisation (and therefore greater profitability) of packout facilities.

There are also a number of examples where it would be only feasible to have individual business located in the SAP. Key examples include:

- inputs manufacture of chemicals and fertilisers — a single commercial-scale plant is likely to preclude direct competition even over a 40-year period
- a bioenergy facility or waste-to-energy —the availability and cost of feedstock, the likely scale of a commercial-scale plant, and the infrastructure required to distribute gas to other businesses indicates that only one business is likely in the SAP.

Where a business type has been investigated and assessed to be unlikely or infeasible, the number of new businesses has been set to zero.

Indicative land uses and employment

Table 7.2 documents key metrics underlying the assessment of potential demand for land and employment at the Moree SAP based on:

- business numbers
- average allotment size and building size per business
- employment per business.

7.2 Key inputs for land and employment assessment

	New businesses	Average allotment size	Building footprint		Employment per business
	no.	ha/business	ha/business	persons	FTEs
Building on water and land availability					
Aquaculture	1	5	0.7	400	300
Outdoor horticulture	3	50	–	60	27
Undercover horticulture					
▪ Medicinal marijuana stage 1	1	40	2.0	90	68
▪ Medicinal marijuana stage 2	1		2.0	70	53
▪ Medicinal marijuana additional small[b]	2	40	2.6	144	52
▪ Medicinal marijuana additional large	1	40	20		
▪ Glasshouse/aquaponics stage 1	1	40	20	333	250
▪ Glasshouse/aquaponics stage 2	1	40	20	333	250
▪ Glasshouse production additional	2	40	20	333	250
▪ Poly tunnels (berries and vegetables)	3	15	10	160	100
Building on grain/cotton advantage					
Increasing value from the supply chain					
▪ grain storage, sorting and handling	5	5	1	10	10
Early-stage processing					
▪ Flour/chickpea milling/canning	2	5	1	10	10
▪ Oil crushing plant	1	5	1	10	10
▪ Plant proteins	1	10	1	60	48
Grain ethanol	1	30	5	30	24
Reducing reliance on imported inputs					
Diesel replacement (methanol) – Gas to liquids	0	5	<1	5	5
Chemicals manufacture/mixing	1	15	1	15	15
Fertiliser mixing– Urea Ammonium Nitrate	1	10	1	10	10
Building on location					
Intermodal terminal (public access)	1	30	5	15	
Freight and logistics	2	10	5	5	
Abattoir	0	30	5	1 000	600

	New businesses	Average allotment size	Building footprint		Employment per business
	no.	ha/business	ha/business	persons	FTEs
Circular economy					
Resource recovery (tyres and plastics)	2	30	5	10	10
Waste to energy — Biogas	1	30	5	10	10
Solar electricity	1-2	700	<1	4	4
Hydrogen production	1	10	<1	4	4
Supporting/service industries					
Light industry/commercial	5	2	2	5	5

[a] Increases field production of hemp.

Source: Market Sounding and CIE analysis.

Detail on water requirements on a per business basis has been identified separately in appendix table C.1. What follows provides the background and rationale used to develop these estimates.

Greenhouse production

Stage 2 of the market sounding process identified two businesses who were ready to invest in the Moree SAP and had commenced engagement of Regional Growth Development Corporation (RGDC) and had also made applications to the NSW Regional Job Creation Fund (RJCF). These include:

- medicinal marijuana glasshouse facility that includes outdoor production of non-narcotic hemp
- a commercial-scale glasshouse operation producing organic tomatoes for high-end retail consumers employing 250 people in stage 1 and a further 250 FTE in stage 2.

Medicinal marijuana

These businesses were able to provide specifics around land requirements, employment numbers (total and FTEs), energy requirements and possible staging of capacity. In each case, the supply of gas for carbon dioxide enrichment as a reasonable cost was seen as essential.

In addition to this information, an assessment was made of the additional businesses in the glasshouse sector that could be attracted over the 40-year time horizon. The draft market sounding report indicated that investment in medicinal marijuana capacity was booming across Australia and the world. One of the attractions of Moree was that the climate enabled multiple crops through the year whereas in Canada, for instance, single crops were possible even in greenhouse conditions. [55]

Recent developments across Australia indicate these investments are across a number of scales:

55 Evidence from the market sounding.

- 1 hectare glasshouses (as with the identified business in table 7.2) the same as similar facilities already constructed at Armidale and Toowoomba and a similar facility planned for Kootingal
- Cannatrek's Shepperton facility of 16 hectares and Asterion's proposed facility at Wellcamp of four, 10-hectare glasshouses.

It has been assessed that additional businesses that would be attracted to the SAP could include:

- 2 businesses based on 1 hectare glasshouses
- 1 larger business based on a 16 hectare glasshouse.

Land, water and employment requirements were benchmarked from the market sounding information or from the other sites.

Glasshouse production of tomatoes and vegetables

A similar approach was taken based on information gathered from the market sounding. This business was investing in a 20 hectare glasshouse with the option to expand to 40 hectares in the future. The business model is based on organic tomato production for high-end retail consumers. The use of aquaponics will strengthen their green credentials and maximise water use efficiency. It is noted that a 20 hectare glasshouse and pack-out area would be the minimum scale for an operation producing conventional product. [56]

The assessment has been made that as least two additional business of the same size would be feasible — it would most probably operate in the same market segment based on the green credentials of the SAP.

Other high value horticulture

Following a previous proposal for an aquaculture facility within the Investigation Area, an allowance has been made for an equivalent business based on similar land, building and employment requirements.

In terms of other horticulture-based businesses, these are seen as essentially activities that would be used to 'fill' land use. At this stage, without form indications from the market, these activities are likely to comprise a combination of:

- outdoor irrigation of vegetables and tree crops (based on a range of technologies from drip irrigation through to pivots)
- undercover production in poly tunnels of vegetables and berries.

It has been assessed that 3 outdoor farms and 3 farms using poly tunnel technology would be feasible for the SAP. The table lists indicative land use, employment and water requirements:

- outdoor production requires more land and water

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56 The conventional market segment, especially for tomatoes, is currently under oversupply pressure.

- production in poly tunnels is more intensive with higher packout rates of first quality product and is more efficient in terms of water use per unit of marketable output.

Early-stage processing

Grain storage, sorting and handling

Grain handling businesses already located in the investigation area will be the anchor tenants for the SAP. There are also similar businesses located outside of the investigation area. We know that these are based on different business models but where the acquisition of available grains and pulses is highly competitive.

- This report identified that likely market trends in this sector are moving from bulk handling to greater value-adding of grains and pulses which includes the customisation of shipments to customer specifications and the greater use of strategic alliances and intellectual property to establish premiums over the bulk trade.

Previous feedback from market sounding indicated that some of these businesses planned further investments, that were ultimately delayed by the drought and COVID-19, while the remaining players were taking a business-as-usual approach.

- Without specific information from the market, it is difficult to assess how many new businesses would be viable. It is also possible that SAP could encourage the incumbents to invest and expand where previously they didn't without the SAP.
- It has been assessed that over a 40 year period, that an additional 5 grains-based businesses could be attracted by the Moree SAP — and that these would be have a similar land and employment requirements to existing players.

Plant protein processing plant

This industry that has yet to be developed in Australia. There is no direct proponent at this stage but currently a facilitator is working to develop a consortium and attract overseas investors.

- Such a business would directly compete for grain and pulses with incumbent businesses in the Moree SAP.
- For the purposes of planning, it has been assumed that a likely plant of commercial scale would be around 10 kt of protein, requiring inputs of around 50 kt of pulses and/or grains. This is 40 per cent of the capacity of the world's largest plant, located in Canada.

Grain-based ethanol

The logic for the location of an ethanol plant in the Investigation area is sound: the availability of grains from the region including the storage capacity on-farm and at rail heads, and the potential to import grain cost-effectively from other regions enabled by Inland Rail.

The past 20 years in Australia has resulted in just one operational grains-based facility based on (the Dalby Biorefinery). Given grain prices are set in international markets and

by the users in the livestock sector, production-costs have proved not to be competitive in the transport fuels market even with excise rebates. [57]

- While these economic drivers may change in the future as a result of oil prices increases, increased competition for ethanol in the transport market is likely to come from a range of other sources including hydrogen and biogas.
- Therefore, while the provision has been made for a new business to enter the SAP, the assessment is that it is low to medium probability.

Flour and chickpea milling/canning

While there is significant scope for additional value-added activities in the Moree for grains and pulse, there are yet to be any form indications of investor interest from the market.

Provision has been made for at least additional businesses in this sector because of the high volumes of agriculture production within the 100 kilometre radius and agglomeration benefits from co-locating with other producers. In each case, it would be expected that the allotment and employment requirements would be similar and should be located in the northern part of the precinct where services are already available.

Oilseed crushing

The market sounding indicated interest for 2 oilseed crushing plants located outside of the Investigation Area. The logic for this was to reduce exposure to the Chinese market and to retain more value-added in the region. This problem has been exacerbated since the closure of the Cargill operation in Narrabri.

- Provision has been made for an additional oilseed crushing plant located in the SAP which would effectively divert cotton seed that is current packed into containers for export, into the manufacture of cotton oil and meal.
- These products would be targeted at the food manufacturing, food service and the livestock industries.

Agricultural inputs

Gas-to-liquids plant

This option was identified in the early-phase of the market sounding.

- As identified in previous reports, this business would be dependent on the availability of cheap (conventional) mains gas — that would result from the Hunter pipeline and the Narrabri gas project.
- In addition, given that methanol would compete directly with the diesel supply chain and the fact that any premium for local production would be unlikely, the assessment

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57 Noting that the Manildra Group Ethanol plant in the Shoalhaven is the lowest-cost producers in Australia based on waste wheat starch. Manildra supplies ethanol to transport fuel but also to industrial and consumer products.

is that this is not an option to be planned for. It was therefore assessed as low probability.

Farm chemicals manufacture

This business was identified during the second phase of the market sounding and involves mixing of reactive ingredients, imported into the region from domestic and overseas sources, to produce inputs for the surrounding broadacre agriculture.

- The logic for this investment is sound based on reducing costs of purchased chemicals (by not importing chemicals mixed with water) and reducing reliance on suppliers located overseas.

The proponent has advised that wastewater from this plant would require suitable treatment in Sewerage Treatment Plant or equivalent.

Fertiliser mixing

In December 2017, Orica announced a liquid urea ammonium nitrate (UAN) plant in Moree adjacent to the Investigation Area. This proposal is essentially another mixing activity based on the same logic as for farm chemical above enabled by more cost-effective Inland Rail (compared to B-Double tankers).

Liquid UAN is a mix of ammonium nitrate, urea and between 20 and 30 per cent water that can be directly injected into the soil at planting, added to irrigation water or applied through a spray. [58] The ORICA proposal was to freight and store the dry ingredients from its Newcastle plant to be heated and mixed in Moree.

Building on location

Intermodal terminal (public access)

As noted, an important consideration for the assessment is the baseline investment in an intermodal facility in the Investigation Area. The FEbD process identified that would be an opportunity for another intermodal site when a bypass is required for Moree as anticipated Inland Rail freight volumes grow.

- The proponent identified that in the medium term, the scale of the Moree market is likely to be confined to one provider in this space.
- Therefore, a provision has been made for an additional intermodal provider — but it would be expected that this investment would have a time horizon beyond 2035.

Freight and logistics

No direct contact was made with a proponent during the market sounding although many of those contacted referred to downstream requirements for capacity and employment in this sector.

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58 UAN has the potential to replace anhydrous ammonia and urea ion many broadacre and horticultural applications.

A key issue for the analysis is how additional demand for freight and logistics in the Moree region will be made up of existing and new businesses — both within and outside of the investigation area. We know that there are currently a number of operators in Moree that focus on local haulage (grain transport and general freight, for instance) and that some of these businesses are also part of national freight networks (required for freight forwarding etc).

It would be expected that new businesses in this sector, that would be located in the SAP, would be specialised (in dedicated vehicles) and aligned with the new activities identified about such as freight of horticultural products.

Abattoir

A realistic assessment is that, although desirable on the basis of its employment potential, the likelihood of such an investment being made in the SAP is extremely low.

While the SAP will be located on the Inland Rail and large numbers of cattle and sheep are routinely transported through the corridor, the economics of such an investment would be poor — especially taking an outlook of:

- static or falling and highly variable livestock supply;
- the comparative low cost of long-distance transport of those animals; and
- the substantial cost disadvantages of investment in a greenfield site (compared to established operations) and excess capacity in existing operations for the foreseeable future.

Circular economy

Resource recovery

In this category, two separate activities have been identified:

- tyres to energy — which was based on a previous development application within the Investigation Area. Such a process would use pyrolysis — the thermal decomposition of scrap tyres in the absence of oxygen — to produce syngas (hydrogen plus carbon monoxide), carbon black and scrap steel.
- plastic recycling — such a business is based on a similar business located in Narrabri which produces pelletised plastic feedstock. The business case for this activity would be based around the drive by plastic companies to incorporate a higher proportion of recycled feedstock into their final product.

In each of these cases, the competition between regions and states is strong. However, the case in the Moree region is based on agricultural and domestic waste that includes large tractor and truck tyres and plastic bags for cotton bales. However, a pilot study would be required to determine the extent of the resource at each of the distances away from the SAP, as transport and collection costs would be crucial in the economics of these plants. Part of the pilot study would be to determine the technology and commercial scale mix of the plant.

Inland Rail will provide the capability to import a wide range of production and manufacturing inputs into the region, principally from the capitals, but this option will also be available to similar facilities in Narrabri and Toowoomba. Therefore, Moree is unlikely to support multiple businesses using the same inputs.

Waste to energy – biogas

The potential for the biofuel sector, focusing on biogas. The key outcome of the analysis prepared following the FEbD is that a bioenergy facility, or more specifically a biogas plant, is possible for the Moree region based on the quantity of feedstock available, primarily residues from broadacre production of grains and cotton. There are several technologies that can be employed in a biogas plant including:

- gasification or pyrolysis (based on high temperature burning)
- anaerobic digestion.

Gasification or pyrolysis yields syngas or biogas (largely hydrogen, carbon monoxide or hydrogen sulphide). Syngas can then be put through methanation (an upgrading and purification process) to produce bio-synthetic natural gas (BioSNG or biomethane) which is equivalent to methane from conventional sources.

Currently there are no similar plants in Australia and very few worldwide using gasification oy pyrolysis — therefore the technology is not tested at commercial scale. A gasification demonstration plant based on Mallee crops was constructed in Perth in 2012 —funded by Arena and Renergi Pty Ltd. This investment has yet to be commercialised.

Plants based anaerobic digestion are producing biogas both in Australia and overseas. In Australia, these plants are based on sewerage and other liquid wastes and have been widely implemented at abattoirs and intensive animal production sites. Anaerobic digestion also produces digestate, a nutrient-rich material that can be used as a fertiliser and applied on agricultural land instead of chemical fertilisers. [59]

Arcadis [60] highlight that the economics of such a facility, at this stage, are largely unproven. The bottom line is that it is unknown if potential users of gas with green credentials would be willing to pay the necessary premium over conventional gas (either located in Moree or in another region) that would make a biogas plant, at commercial scale, economic without ongoing subsidisation.

For the purposes of this assessment, a biogas facility has been incorporated in the group of low amenity land uses.

Solar electricity

The Renewable Energy Report commissioned for the Moree SAP provides a good overview of current situation for solar electricity. Significant network constraints in the Moree region have resulted in a current solar farm being one-third of the total capacity

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59 https://www.energynetworks.com.au/resources/reports/biogas-opportunities-for-australia-enea-consulting/

60 Arcadis 2020, *Renewable Energy Report: Moree Special Activation Precinct*, Prepared for the Department of Planning and Environment, December.

planned. Of this generation capacity, the majority has been contracted out and is not available for use in the local region at least for the next 10 years.

As indicated in the market sounding report, any expansion of solar capacity would require a direct market signal from a business in the SAP and a behind-the-meter contract that would bypass network connection constraints and the prevalence of negative pricing during the peak supply period of the day.

Proponents contacted indicated that with significant experience in the cost-effective development of solar capacity, they would be willing to invest in a scale that would match, or would be scalable, to meet demands as they emerge from the SAP. This capacity could be dedicated to large users such as glasshouses or the cotton gin, for instance.

Being specific about the number of individual businesses in this sector is challenging — and depends not on the revealed scale of demand for electricity at the site but also the business models and degree of exposure potential investors would be comfortable with. For example, there could be a range of possible outcomes:

- one business (such as the incumbent) could be placed to provide all additional capacity at the site by scaling current operations
- multiple operators located at different parts of the SAP site is also feasible — especially if, the solar installation is linked to a particular customer (such as a glasshouse); alternatively
- individual businesses in the other sectors (glasshouses or processing facilities, for example) could choose to build their own dedicated solar capacity.

For this assessment, following the FEbD workshop, an allowance has been made for an additional 700 hectares of solar capacity across the site, without specifics on the ownership structure of this capacity.

Hydrogen production

Hydrogen production has been identified by many of the stakeholders as a realistic option in the future for the Moree SAP with green hydrogen being a good fit with the SAPs USP and the scope for solar capacity identified above.

This view is partly based on the FRV trial of the production of 80 kilograms per day currently within the investigation area for use in two dedicated Moree buses. This scale of production represents what is an appropriately sized trial of the manufacture and use of hydrogen. However, it is difficult to envisage at this stage how this trial could be scalable to that required to be competitive with conventional fuel sources. It would be reasonable to say that production of hydrogen globally is currently in the proof-of-concept stage with very few 'green hydrogen' facilities operational and at commercial scale.

Identifying a specific role of hydrogen in the SAP is also challenging. Arcadis observes that hydrogen could be used in a number of inter-related ways:

- a transport fuel (fuel cell vehicles)

- a part-substitute or replacement for conventional gas or biogas in a range of thermal and other applications [61]
- a battery function — to store electricity where there is an imbalance between supply and demand — using fuel cells
- a feedstock for the manufacture of ammonia and related nitrogen fertilisers. [62]

This report is required to be specific about linkages between activities within the SAP and therefore we need to identify how hydrogen could be used if it is produced within the SAP.

It has been assessed that a hydrogen production facility is unlikely to be used as feedstock into a fertiliser process or as a replacement for conventional battery storage to manage periods of negative pricing for solar electricity. Therefore, production of hydrogen is more likely to be used for a combination of the first two functions: as a transport fuel to the wider Moree region for use, and possibly being connected to a standalone gas network with key users.

Following the lead from Arcadis, an indicative hydrogen business is assumed to have the capacity to produce 5 000 kilograms of hydrogen a day.

Land, employment and water requirements by sector

Table 7.3 estimates the total outcome for land, employment and water demand for each of the sectors by multiplying the number of businesses by the actual/indicative requirement metrics. Following-on from previous reports:

- new business demand from horticulture businesses is anticipated to account for a large proportion of the total land use. Horticulture businesses are also crucial for employment but are characterised by a significant amount of part time work, especially during harvesting and (hand) pollination in glasshouses. Horticulture businesses are also the largest contributor to water demand
- the remaining sectors are expected to employ less people per business, however, a higher proportion of their workforce would be employed full-time. Generally, these other businesses are less water intensive, excluding an ethanol and plant proteins facility.

61 Hydrogen production could potentially compete, or complement a biogas facility identified above.

62 Competing with a fertiliser mixing business.

7.3 Key outcomes across all prospective sectors

	Land take		Employment	Water usage[a]
	ha	persons	FTEs	ML
Building on water and land availability				
Aquaculture	5	400	300	1
Outdoor horticulture	150	180	81	810
Undercover horticulture				
▪ Medicinal marijuana stage 1	40	90	80	100
▪ Medicinal marijuana stage 2		70	60	
▪ Medicinal marijuana additional small	80	288	103	210
▪ Medicinal marijuana additional large	40	600	450	100
▪ Glasshouse/aquaponics stage 1	40	333	250	250
▪ Glasshouse/aquaponics stage 2	0	333	250	100
▪ Glasshouse production additional	80	667	500	200
▪ Poly tunnels (berries and vegetables)	45	480	300	135
Building on grain/cotton advantage				
Increasing value from the supply chain				
▪ grain storage, sorting and handling	25	50	50	Town water
Early-stage processing				
▪ Flour/chickpea milling/canning	10	20	20	Town water
▪ Oil crushing plant	5	10	10	Town water
▪ Plant proteins	10	60	48	250
Grain ethanol	30	30	24	438
Reducing reliance on imported inputs				
Diesel replacement (methanol) — Gas to liquids	0	0	0	Town water
Chemicals manufacture — mixing of reactive ingredients	15	15	15	30
Fertiliser mixing— Urea Ammonium Nitrate	10	10	10	Town water
Building on location				
Intermodal terminal (public access)	30	15	10	Town water
Freight and logistics	20	10	10	Town water
Abattoir	0	0	0	0
Circular economy				
Resource recovery (tyres and plastics)	60	20	20	na
Waste to energy — Biogas	30	10	10	na
Solar electricity	700-1 400	4-12	4-12	na
Hydrogen production	10	4	4	24
Supporting/service industries				
Light industry/commercial	10	25	25	Town water

[a] Town water could be delivered by mains or by truck to sub-precincts with a low level of servicing.

Source: Market Sounding and CIE analysis.

Total outcomes across the Moree SAP

Table 7.4 adds the total requirements for land, employment and water for the SAP:

- 1 485 hectares of land (up to 2 185 hectares including another solar operator)
- employment of around 3 700 persons which are a mix of full and part time workers. On a full-time basis this translates to around 2 600 persons on an FTE basis
  - This reflects the large number of persons that are expected to be part time or seasons. Based on the assumption that one part time job is equivalent to 30 per cent of a full-time job, then full time employment would be around 770 jobs.
- water usage of around 2.75 GL for irrigation and industrial purposes.

7.4 Key outcomes by probability assessment

Probability assessment	Land take		Employment	Water usage[a]
	ha	no.	FTEs	ML
High	905 - 1605	996-1 000	797-801	805
Medium-high	305	1 337	891	1 145
Medium	245	1 362	922	364
Low	30	30	24	438
Total	**1 485-2185**	**3 724-3728**	**2 634-2 638**	**2 752**

[a] Excludes businesses likely to access town water.

Source: Market Sounding and CIE analysis.

Over 1 200 hectares of land take and 2 330 jobs (around 1 1690 FTEs) has been assessed as highly probable in the next 10 years (the total of high and medium-high categories). In terms of feasibility of these estimates within the identified constraints:

- 1 400 hectares focuses land use on the northern precinct down to the area around the proposed intermodal facility on the Newell Highway as was identified in the FEbD workshop
- the employment outcomes highlight the need for the availability and the suitable mix of housing and supporting infrastructure if this level of employment was attracted to Moree
- the estimate of 2.75 GL is comfortably within the lower bounds of total availability identified in table 6.1 — given that GAB water can be treated to specification cost-effectively.

Table 7.5 calculates the same outcomes against structure plan categories.

7.5 Key outcomes by structure plan categories

Probability assessment	Land take		Employment	Water usage[a]
	ha	no.	FTEs	ML
Intermodal (public access)	30	15	10	–
Freight & Logistics	20	10	10	–
Horticulture/Native Horticulture	520	3 441	2 374	1 981
Resource Recovery	60	20	20	–
Value Add Agriculture	80	170	152	688

Probability assessment	Land take ha	no.	Employment FTEs	Water usage[a] ML
Bio-Energy	30	10	10	–
Potentially Hazardous	25	25	25	60
Enterprise/Hub	10	25	25	–
Energy/Solar	710-1 410	8-12	8-12	24
Total	**1 485-2185**	**3 724-3 728**	**2 634-2 638**	**2 752**

[a] Excludes businesses likely to access town water.

Source: Market Sounding and CIE analysis.

Key interdependencies between identified businesses

Land uses and infrastructure/connections

Table 7.6 identifies the links between new businesses identified and sectors that are located in the SAP. [63]. This table can be read as follows: new businesses in the left-hand column purchasing inputs or services from the businesses, located in the SAP, in the columns. For example, these interdependencies include:

- the obvious linkage between new grain value-adding opportunities and the existing grain handling and storage businesses (while acknowledging that there is also scope for these businesses to access grain directly from on-farm storage)
  - These businesses would also require access to an intermodal terminal and freight and logistics for both their inputs and outputs, and could also use energy produced in the SAP as well as light industry and commercial goods and services.
  - The production of plant proteins and ethanol will be significantly more energy, both gas and electricity) than other businesses in this group/
- for intensive horticulture, the non-labour linkages look quite different as these businesses will have their own pack-out facilities and load directly onto trucks. Therefore, there is no direct connection with the intermodal terminal for their outputs, while inputs are more likely to be freighted in using that facility.
  - We note the strong linkages between glasshouse production and both electricity and gas — for both heating and carbon dioxide enrichment.
- the production of agricultural inputs (chemicals and fertilisers) is based on low-cost freight of inputs via Inland rail, so there will be strong linkages with an intermodal facility and freight and logistics
  - Gas is important for the fertiliser where heating is required prior to mixing.
- in the circular economy, there is interdependence between solar electricity and hydrogen production (especially if hydrogen is used as a battery function to redirect power to high-demand periods) which points to obvious co-location.
- all business are likely to require access to light industry/commercial activities especially if they provide specialist or technical services to the SAP.

63 Water requirements have identified in appendix C.

7.6 Key interdependencies between businesses and land users in the SAP[a]

Identified new SAP business sectors	Inputs purchased from sectors from located in the SAP							
	Grains handling and storage /Cotton gin	Intermodal terminal (public access)	Freight and logistics	Airport	Gas/ Biogas	Electricity/ Solar power	Hydrogen	Light industry/ commercial
Aquaculture		✓	✓✓	✓	✓	✓✓		✓
Outdoor horticulture		✓	✓✓			✓		✓
Undercover horticulture		✓	✓✓			✓		✓
— Medicinal marijuana		✓	✓✓	✓	✓✓	✓	✓✓	✓
— Mushroom facility/Glasshouse production		✓	✓✓		✓✓	✓✓	✓✓	✓
—Poly tunnels (berries and vegetables)		✓	✓✓			✓		✓
Grain storage, sorting and handling			✓✓		✓	✓	✓	✓
Flour/chickpea milling/canning	✓✓	✓✓	✓✓		✓	✓	✓	✓
Oil crushing plant	✓✓	✓✓	✓✓		✓	✓	✓	✓
Plant proteins	✓✓	✓✓	✓✓		✓✓	✓✓	✓✓	✓
Grain ethanol	✓✓		✓✓		✓✓	✓✓	✓✓	✓
Chemicals manufacture		✓✓	✓✓		✓	✓	✓	✓
Fertiliser manufacture		✓✓	✓✓		✓✓	✓	✓	✓
Intermodal terminal (public access)		–	✓✓			✓		✓
Freight and logistics			–			✓		✓
Resource recovery		✓	✓✓		✓	✓		✓
Waste to energy - Biogas	✓		✓✓		–	✓		✓
Solar electricity	✓					–	✓[b]	✓
Hydrogen economy						✓✓	–	✓
Light industry/commercial			✓	✓[c]	✓	✓		–

[a] Where ✓✓ = strong linkage. ✓ moderate or probable linkage. [b] Includes the use of solar power but also the possible battery function of hydrogen storage.

Source: CIE.

Interdependencies between the SAP and the wider Moree region

Linkages with the wider Moree region ins shown in table 7.7 which identifies the linkages with broadacre agriculture (both the grains and pulses outputs and as a purchaser of inputs), freight and logistics used for both export and import, and the requirement for a range of light industry, and technical and professional services, that would be most likely to located in Moree.

7.7 Key interdependencies between SAP businesses and the wider Moree region

	Inputs purchased from sectors outside the SAP				
Business sector	**Broadacre outputs**	**Broadacre inputs**	**Freight and logistics**	**Light industry/ commercial**	**Technical and professional services**
Aquaculture			✓	✓	✓
Outdoor horticulture			✓	✓	✓
Undercover horticulture			✓	✓	✓
— Medicinal marijuana			✓	✓	✓
—Glasshouse production			✓	✓	✓
— Poly tunnels (berries and vegetables)			✓	✓	✓
Grain storage, sorting and handling	✓✓		✓	✓	✓
Flour/chickpea milling/canning	✓✓		✓	✓	✓
Oil crushing plant	✓✓		✓	✓	✓
Plant proteins	✓✓		✓	✓	✓
Grain ethanol	✓✓		✓	✓	✓
Chemicals manufacture		✓✓	✓	✓	✓
Fertiliser manufacture		✓✓	✓	✓	✓
Intermodal terminal (public access)		✓✓	✓	✓	✓
Freight and logistics	✓	✓	✓	✓	✓
Resource recovery			✓	✓	✓
Waste to energy - Biogas			✓	✓	✓
Solar electricity			✓	✓	✓
Hydrogen economy			✓	✓	✓
Light industry/commercial	✓	✓	✓	✓	✓

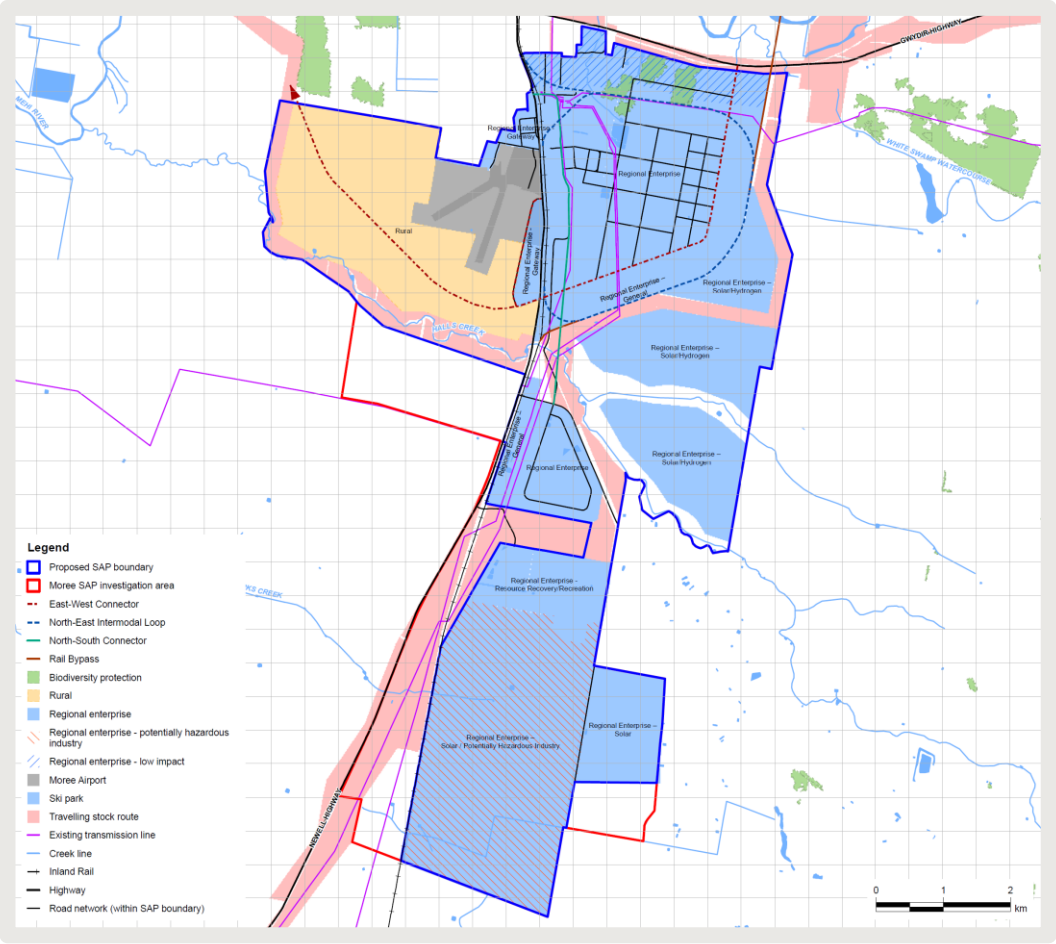
[a] ✓✓ = strong linkage. ✓ moderate or probable linkage.

Source: CIE.

Location of land uses to optimise opportunities

The FEbD identified key sub-precincts that would be the basis of the masterplan (see chart 7.8). These include the following components of Regional enterprise zones:

7.8 Master Plan GIS Layout



Data source: Elton/WSP.

- north low-impact (adjacent to Gwydir Highway)
- west (running either side of the Newell Highway and the rail line).
  - This includes grain handling and storage land uses, the Industrial Estate and the Gateway development are located in this zone.
- north-east (land running from the inter-connector north and east to the eastern boundary of the SAP).
- central (adjacent to the Newell Highway and the rail line ranging east across Halls Creek to the eastern boundary of the SAP.
  - The LDC facility, including ARTC siding, and saleyards are located here.
- South high-impact. The Moree Solar Farm is currently located here.

Table 7.9 proposes possible locations of businesses within the SAP sub-precincts identified above.

7.9 Mapping of new business activities to sub-precincts or zones

Businesses /Sub-precincts	Western Grain handling and storage	Gateway/ Industrial Drive	North low-impact	North-East	Central	South high impact
Aquaculture			✓	✓✓		
Outdoor horticulture			✓✓	✓✓		
Undercover horticulture						
— Medicinal marijuana				✓✓	✓✓	
— Glasshouse production				✓✓	✓✓	
—Poly tunnels (berries and vegetables)			✓✓	✓✓		
Grain storage, sorting and handling	✓✓	✓				
Flour/chickpea milling/canning	✓✓	✓				
Oil crushing plant	✓✓					
Plant proteins				✓✓	✓	
Grain ethanol				✓✓	✓	
Chemicals manufacture					✓✓	✓✓
Fertiliser manufacture					✓✓	✓✓
Intermodal terminal (public access)				✓✓	✓✓	
Freight and logistics		✓✓		✓✓	✓✓	
Resource recovery					✓	✓✓
Waste to energy - Biogas					✓✓	✓✓
Solar electricity				✓	✓	✓✓
Hydrogen economy					✓	✓✓
Light industry/commercial	✓	✓✓				

✓✓ = strong linkage. ✓ moderate or probable linkage.

Source: CIE.

Opportunities and constraints

Employment

Required skills and experience

The assessment presented in this chapter shows that the employment profile will be a reasonably standard mix of occupations if you exclude potential in employment in service industries:

- full and part-time — where the majority of part time employment is likely to be in the horticulture sector including the protected cropping sector (medicinal marijuana and glasshouse vegetable production)
- managers, technicians and trades workers and semi-skilled workers — again, it would be expected that the majority of the semi-skilled workers would be involved in the intensive horticulture components of the SAP.

Businesses consulted indicated that that key personnel such as facility managers and specialist skills would most likely by imported from outside of the region. This recognises that there are already shortages across all skill categories used by the region — from those that are emerging such as digital agriculture through to truck drivers.

For semi-skilled and unskilled workers, some businesses indicated a mixed approach to recruitment and training that included:

- engagement with the local population — where employment of Aboriginal people would strengthen corporate responsibility credentials of business
- use of training programs that are offered by TAFE or equivalent accredited providers
- use of the Australian Seasonal Worker Programme and similar immigration categories especially for seasonal workers.

Moree as a place to live

As identified by the market sounding, perceptions around Moree as a place to live was a large component of the location decision — especially that business was transferring a manager and their family from another region. Other factors include:

- access to full or part-time employment for spouses and suitable education facilities for children
- availability of suitable housing for workers including having the right mix of housing stock that range from quality residences through to attractive temporary accommodation.

Water access

This report has demonstrated that given the current understanding of the availability or water, as part of the FEbD process, that other constraints are likely to be more important for the SAP — particularly employment.

- The current water availability for irrigation and industrial use is in two parts: 500ML of potable town water (assumed to be available in the northern precinct of the SAP) and the remainder being dominated by artesian sources — accessed using bores across the site.
- Virtually all the bulk water users will require high-quality water — therefore the MPSC potable water will be at a premium to the artesian and stormwater sources — which will require treatment using double osmosis at a minimum.
- Further work will be required to establish some of the finer details including:

- In which parts of the SAP, the MPSC potable water will be available and at what cost. At this point, it is assumed that this resource will be made available in the northern section and that it would have to be supplied on a separate network to the network of bores that have been proposed to supply artesian water.
- The potential costs of industrial-scale for treatment of artesian water — both to a basic or common specification and then the requirements of specific users.

Sustainability and Indigenous objectives

This report does not directly address these issues. However, from a market sounding and land utilisation perspective, the Moree SAP is seen as having the potential to incorporate these objectives as part of its USP — which would focus on low carbon production and transport while accessing Indigenous employment.

- In terms of sustainability, these credentials should be enhanced over time in line with staging of a biogas plant, production of hydrogen for fuel cells and greater solar capacity as part of an overall energy package.
- In addition, greater use of Inland Rail which is expected to have lower carbon dioxide emissions per tonne of freight, compared to road freight, will further boost the credentials of supply chains that feature low food miles as part of their branding.

Aboriginal community

The outcomes for the Moree Aboriginal community will come through two pathways:

- the opportunities arising from Aboriginal-owned land in the SAP
- the opportunities for Aboriginal-owned businesses, particularly small businesses, to be involved in the investment and operational stages of the SAP.

The Moree Local Aboriginal Land Council (LALC) own a parcel of land in the Investigation Area that is strategically and centrally located adjacent of the Manildra facility. As identified above, this parcel is likely to be in the high-serviced, high value-added sub-precinct of the SAP.

- A total of $3.4 million is available for an infrastructure upgrade including roads for the parcel.
- The timeframe when this land could become available is uncertain and it still requires resolution through a Native Title claim.

There are a number of options available for this land. These options will need to be further explored in conjunction with the Moree and NSW LALC.

As of January 2021, the market sounding process had not engaged with the LALC. Our understanding is that at this stage, the LALC had not finalised their strategy for this parcel and was not in a position for provide an indication of likely uses of the parcel.

A number of other opportunities were identified through FEbD process for Aboriginal-owned businesses and employments. These include:

- contracting opportunities for Aboriginal businesses and employment during both the capital expenditure and operational phases — especially in the remediation of landscapes and remediation areas
- employment during the operational phase. This opportunity is especially the case where there is mix of full and part time work and the requirement for training — both on-the-job and through registered training organisations.

8 Sequencing and staging of the investment

When considering the sequencing of NSW Government's investments into the SAP, there are two components that should be considered:

- the demand and timing of businesses wanting to invest in the SAP
- the timing of the construction of enabling infrastructure and serviced allotments in the SAP.

Timing of business investment

The detail contained in chapter 2 outlines that:

- there is certainty around businesses who are the early-movers into the SAP. There are two glasshouse-based businesses identified though the market sounding process that were actively investing in the Moree SAP
- in addition to the early-movers, there are other businesses that would be highly suitable for the Moree region and consider investing over the medium term. However the timing and scale of investment for these other businesses is uncertain and often related to factors that are uncontrollable to the SAP, such as global commodity markets and general industry development and maturity (such as the case for bioenergy and hydrogen producers).

When considering the number of businesses that might invest into the SAP in the future, there are various inter-related factors that increase the uncertainty of investment timing, some of these factors include:

- how many additional businesses (and their size) in the same sector could the Moree SAP would support?
- the timing of technology and industry development — especially in the case of hydrogen and biogas (where there are currently no commercial plants in Australia);
- the cost of current industry inputs (such as feedstocks) and potential substitutes, such as the long-term price for natural gas, and how potential alternatives could be produced to replace these inputs
- where the economics of an identified business has not been clearly determined in terms of what would be a commercial-scale investment or how much commercial customers would be willing to pay
  - particularly for solar electricity capacity and the size of a biogas plant (see the previous interdependencies section)
- dependence on external factors such as the timing of mains gas to the Moree SAP or the timing and level of freight volumes through the Moree corridor.

Based on the information gathered throughout the development of this report:

- land use planning should prioritise those businesses and industries that have shown direct investment appetite for the SAP. This includes the establishment of new areas that would facilitate horticulture investments.
  - Land use areas for initial staging could include: medicinal marijuana, glasshouse and other horticulture producers, early-stage processing, and provision for high-impact land uses. This could also include allotments for mixed land use categories.
- Other land zones would take a staged approach, and expand over time as business need is identified. This might include the upfront identification of land uses and zoning changes, with further infrastructure being developed as the number of businesses increase over time.
  - A staged approach to the SAP infrastructure investment will ensure that the operating costs are minimised while allowing for progressive expansion of the SAP responsive to business demand.
  - Land use areas for staging could include: manufacturing and circular economy businesses.

This approach will ensure that existing businesses that are actively looking to invest have access to the SAP upfront and sufficient land is unlocked to enable further investment across other land uses, with future land able to be further developed and expanded as the SAP grows over time.

Sequencing and staging of infrastructure investments

While servicing the requirements of businesses as they come forward would be a priority, it is also important to consider the supporting infrastructure that is required to accommodate each business group.

As developers, the State and the Regional Growth Development Corporation will have to consider a range of principles, such as:

- recognition that each of the land categories have different servicing requirements and costs, and
- the location of the development should be based on maximising leverage from existing infrastructure in and adjacent to the SAP.

Maximise leverage off existing infrastructure

The SAP is placed to leverage-off existing developments and their associated infrastructure where possible. It would be logical that the SAP area should include and leverage off:

- the existing infrastructure including the Gateway (and Moree Airport) and Industrial Drive developments
  - Previous reports have identified that these areas are currently underutilised and already provide a number of allotments that are smaller than 5 hectares, but also

where current allotments could be rationalised for greater utilisation of land that is already developed and existing infrastructure.

- the existing infrastructure that services the businesses south of Industrial Drive (including the grain storages and cotton gin).

The proposed ARTC siding and LDC investment in a public access intermodal facility is also a critical component of the existing infrastructure picture.

Servicing requirements across land categories and locations

The cost of servicing land can occur across two dimensions:

- distance from the existing infrastructure
- different allotment types based primarily on size.

The cost of servicing allotments will increase dramatically with distance away from the core infrastructure — if that infrastructure has to be extended to service a small number of businesses. It would be expected that the 'cost' of providing a full range of services would also significantly increase with distance away from the current location of businesses (and infrastructure) and the 'spine' of the SAP down the Newell Highway.

Land will have also different servicing requirements and costs ($/ha or $ per square metre) depending on the business type and allotment size:

- high servicing costs for high value-add industries on smaller allotments
- lower costs for larger allotments and those activities that include horticulture and high impact activities.

In addition, these servicing costs should reflect servicing that is fit-for-purpose without over servicing. For example:

- high value-add industries on small allotments such as flour milling etc are likely to require fully serviced blocks that include the provision of power and gas, water and sewerage to the boundary, road access and, most likely, kerbing and drainage to a high standard
- however, the businesses that are larger allotments such as horticulture are unlikely to require some of features — such as concrete kerbing, drainage and cast pipes — where lower cost options such as earth banks would be sufficient.

Table 8.1 illustrates these principals against the industries identified in the land planning scenario.

8.1 Relationship between SAP business and level of servicing

Business/Level of servicing	Small allotments, high-level servicing	Medium allotments, moderate/mixed servicing	Large allotments, low level servicing
Aquaculture	✓✓		
Outdoor horticulture			✓✓

Business/Level of servicing	Small allotments, high-level servicing	Medium allotments, moderate/mixed servicing	Large allotments, low level servicing
Undercover horticulture			
— Medicinal marijuana		✓✓	
— Glasshouse production		✓✓	
—Poly tunnels (berries and vegetables)		✓✓	✓✓
Grain storage, sorting and handling	✓✓		
Flour/chickpea milling/canning	✓✓		
Oil crushing plant	✓✓		
Plant proteins		✓✓	
Grain ethanol		✓✓	
Chemicals manufacture		✓✓	
Fertiliser manufacture		✓✓	
Intermodal terminal (public access)		✓✓	
Freight and logistics			
Resource recovery			✓✓
Waste to energy - Biogas			✓✓
Solar electricity			✓✓
Hydrogen economy			✓✓
Light industry/commercial	✓✓		

Source: FEbD and CIE.

Table 8.2 shows how the level of servicing could vary between precincts or zones and even within a zone depending on the distance to the core infrastructure. For example, higher-serviced allotments will be closer to the spine of the Newell Highway. As the distance from the spine increases, allotment sizes should increase but the level of servicing would fall to the minimum required, such as bitumen roads for instance.

Alignment with Inland Rail

A key unknown factor of the Moree SAP is the increase in business activity following the Inland Rail investment. Although there is a general expectation that Inland Rail will increase business opportunities, the precise extent and nature of these opportunities will be driven by market factors that are currently uncertain. For instance:

- the impact on regional employment in the short term and long term has been previously estimated in the Scenarios report
- there is potential for additional freight potential through Newell Highway corridor, which may create value add opportunities for the Moree region

8.2 Mapping of sub-precincts or zones to likely level of servicing

Sub-precincts/level of servicing	Small allotments, high-level servicing	Medium allotments, moderate/mixed servicing	Large allotments, low level servicing
Grain handling and storage	✓✓		
Gateway/Industrial Drive	✓✓		
North low-impact	✓	✓✓	✓
North-East		✓	✓✓
Central		✓✓	✓✓
South high impact		✓	✓✓

✓✓ = strong linkage. ✓ moderate or probable linkage.

Source: CIE.

- the impact from extended train lengths enabled through Inland Rail is unknown, such as fees and charges
- the long-term direct rail access to the Port of Brisbane and getting lower-cost container access through the Newcastle Agri Terminal are at this stage unknown, and
- the growing trend/utilisation of containers for bulk transport.

As factors such as these become increasing clear, there is potential for additional business investments to be identified, changing the demand for the Moree SAP.

A Analysis of Inland Rail impact on the Moree region

The potential benefits from Inland Rail to the Moree region comprises the following components:

- employment benefits from the capital expenditure phase
- lower cost of freight for existing and new businesses during the operational phase
- opportunities that could result from:
  - interstate freight passing through the Newell Highway corridor
  - regional freight with Moree region as the origin or destination

In absence of clear information on demand from the market sounding, what follows is effectively a top-down assessment of potential drawn from freight growth from the:

- Transport for NSW (TfNSW) freight database and projections
- the Inland Rail business case.

Investment phase

The Analysis Report concluded that identifying the scope of the capex phase — in the Narrabri to North Star (N2NS) section — to improve baseline economic and employment outcomes was difficult to assess because:

- the total spend was not known with certainty
- what goods and services would be sourced locally, was unknown at this stage of the contracting process.

The capex for the Parkes to Narromine (P2N) line was $310 million or an average of $3 million per km. As of July 2020, the projected cost of N2NS was around $700 million [64]or an average of $4 million per kilometre. [65]

Based on the observations from P2N, the total regional spend across the Narrabri and Moree regions could potentially be up to $245 million or around 35 per cent of total capex. How this money is spent depends critically on where the successful contractor locates their operations base between Narrabri and Moree and where key inputs, such as ballast materials and hired labour is sourced.

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64 https://www.moreechampion.com.au/story/6842675/full-steam-ahead-narrabri-to-north-star-assessment-to-be-fast-tracked/

65 The number of bridges and crossings required has a large impact on the final per kilometre cost.

Given the distances involved, it would be reasonable to assume that the investment would be run out of Moree for a *minimum* of 40 per cent, and up to 50 per cent, of the construction period with the remainder located in Narrabri (noting that P2N was run principally out of Parkes). This provides a range of between $100 and $125 million to be invested in the Moree region over the year of the investment phase.

In terms of employment, the experience from P2N shows that in FTEs, the regional employment impacts are more likely in the hundreds than the thousands. Official employment of 1 862 persons translated to increased employment in the Parkes Shire of around 300 people — due to importation of labour and the mix of full and part time employment. It would be very difficult to estimate the employment uplift for the Moree region before the fact and more so for Indigenous workers.

Operational phase

The purpose of this section is to better understand the growth prospects for freight across two dimensions:

- in and out of the Moree region; and
- through the region — principally along the Newell and Gwydir Highway corridors — where Queensland is either the destination for, or the source of, interstate freight.

This analysis builds on the business case for the MIP prepared by the MPSC which linked the benefits of lower freight charges for wheat and cotton to investment in the MIP.

Lower cost of freight

Table A.1 summarises the scenario for the potential benefits to the Moree region from lower freight costs. The primary source of data was the CSIRO TraNSIT model which focuses on agricultural commodities. Key findings from the TraNSIT model include:

- the average freight cost for grains (and pulses) would fall by up to $12.17 per tonne for bulk grain railed to Newcastle and between $3.99 and $7.97 per tonne for grain that is currently trucked north and south
  - Across this category, given base freight rates from transport hubs to the port/mill, this is equivalent to a 23.6 per cent reduction in the freight cost from the relevant transport hub to the port/mill. [66]
- the average freight cost for containerised cotton lint would fall by up to $19.76 per tonne currently trucked to Port of Brisbane and between $8.11 for containers that are currently trucked then railed to port Botany.

66 This calculation excludes the freight cost from the farm to the hub.

A.1 Reduction in freight costs to the Moree region as a result of Inland Rail

	Reduction in freight cost	Applicable proportion of Regions industry by value	Final reduction in freight cost	Source
	%	%	%	
Exports from Moree district				
Grains and pulses[a]	**23.6**	100	23.6	CSIRO TraNSIT Model
Cotton lint[b]	**15.1**	100	15.1	CSIRO TraNSIT Model
Cotton seed[b]	15.2	100	15.2	Assumption[d]
Chickpeas[b]	12.1	100	12.1	Assumption[d]
Manufacturing (food) products[b]	22.9	100	22.9	Assumption[d]
Imports into Moree district				
Bulk inputs (Fertiliser and Chemicals)	8.2	50	4.1	Assumption[d]
Petroleum products (fuel)	8.2	50	4.1	Assumption[d].
Other manufactures[c]	18.9	50	9.5	Assumption[d].
Consumables including food	18.9	25	4.7	Assumption[d].

[a] Includes mix of bulk and containerised. [b] Includes mix of bulk and containerised. [c] Including steel and cement. [d] Based on cotton lint saving adjusted for TEU container load rate.

Source: CSIRO TraNSIT Model

- This is equivalent to a 22.9 per cent reduction in the freight cost from the relevant transport hub to the port.
- Note that the CSIRO study did not include cottonseed which is also a significant freight category from the Moree region. [67]

The market sounding indicated that the reduction in the freight costs for bulk grains and containerised cotton, is most likely a maximum as there was some uncertainty around changes in below-rail charges after the Inland Rail investment phase and the costs imposed by other choke points such as by congestion in gaining access to ports.

Table A.1 also includes judgments for the potential reduction in freight costs benchmarked off the TraNSIT model outcomes. It has been assumed that manufactured food products exported from the Moree region (such as flours, oils and meals) are containerised and experience the same cost reductions as for cotton lint on a per container basis — and adjusted for typical container loading rates.

Cost reductions would also be expected for manufactured products and consumables that could be imported into the Moree region —these reductions could be at least equivalent to those for agricultural commodities due to the scope for backloading to the Moree region.

67 The yield of cottonseed is typically 14 per cent higher than the volume of lint of lint.

Impact of these freight cost reductions

These cost reductions are likely to result in:

- higher on-farm, returns for agricultural commodities and manufactures
- lower landed costs of inputs
- a switch between transport modes from road to rail.

Growth in freight through the Newell Highway corridor

Freight in and out of the Moree region

The change in the cost of rail freight relative to rail will also change the composition of the total rail freight task. The first panel of chart 6 below shows the projection of the growth and composition of Moree's freight requirements without Inland Rail — based on TfNSW freight projections. [68] Based on these projections, regional freight requirements for Moree are likely to grow at just over 1 per cent each year over the next 40 pears. The baseline does not identify rail freight volumes for imports into the region.

As a result of changes in relative freight costs between mode as a result of Inland Rail, it is expected that there should be a shift towards the rail relative to road (see the second panel of chart A.2).

- This shift is based on the assumption that regional freight is likely to have a similar modal shift to rail as experience by interstate trade. However, the competitiveness of road freight is partly determined by the capability to deliver point-to-point, without rehandling. The scope to divert to rail would also depend maintenance of the freight cost for rail inclusive of rehandling charges (on and off trucks) required to achieve the same point-to-point cost.
- Exports from the Moree region will continue to dominate the total freight task. However, note that in the event of Inland Rail, imports into the Moree region are likely via rail whereas they are currently negligible.

Interstate freight through Newel highway Corridor

The Newell Highway corridor is a critical transport link between Queensland and the Southern States. Over the next 40 years, total road and rail freight volumes to and from Queensland, through NSW, are expected to increase by 90 per cent at or an average rate of 1.6 per cent each year —before considering the impact of Inland Rail.

- Currently, based on average heavy vehicle truck counts across 2019, the Newel Highway accounts for up to 30 per cent of total estimated movements to Queensland that also include the Pacific and the New England Highways.

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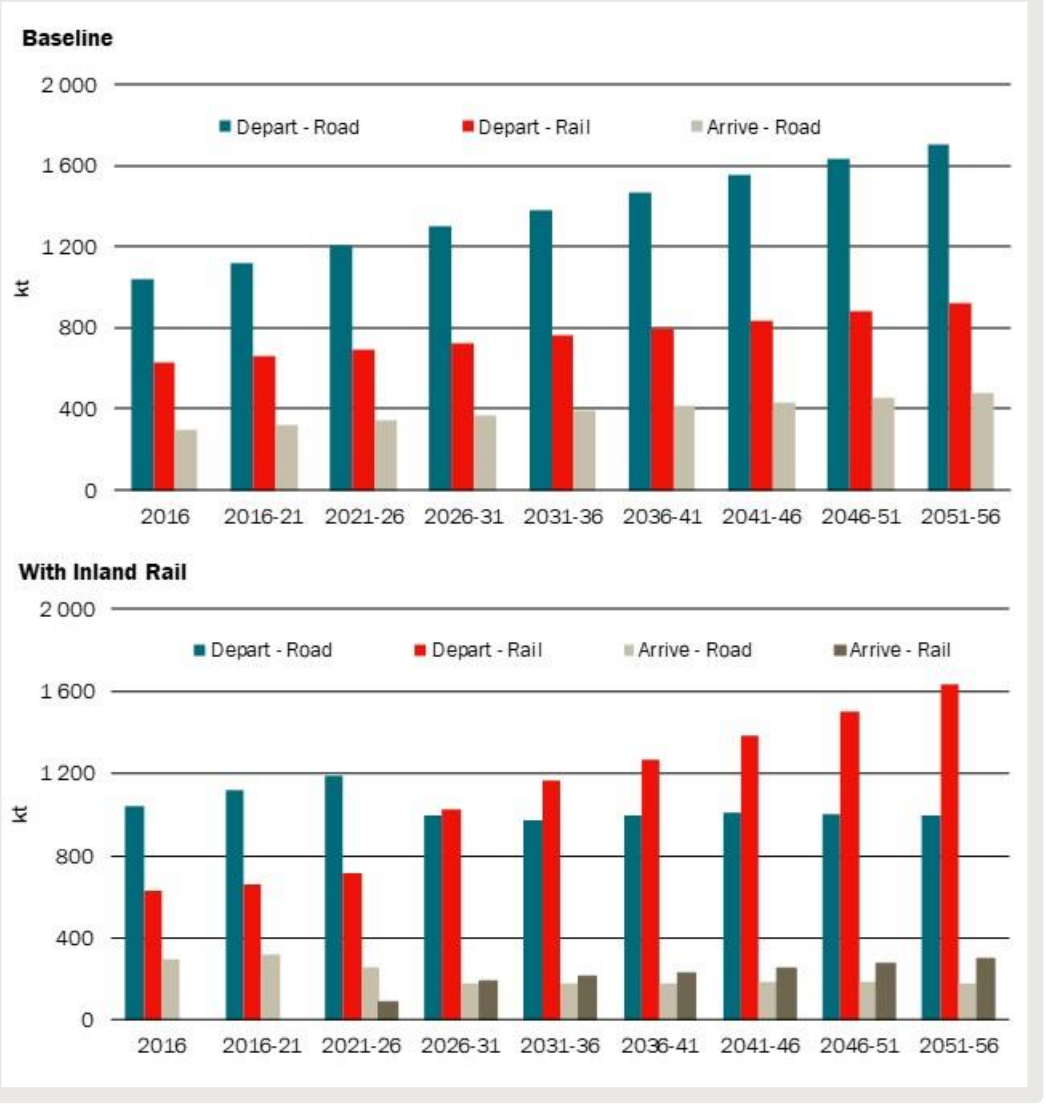
68 See the appendix for details.

A.2 Moree freight growth excluding interstate trade with Queensland

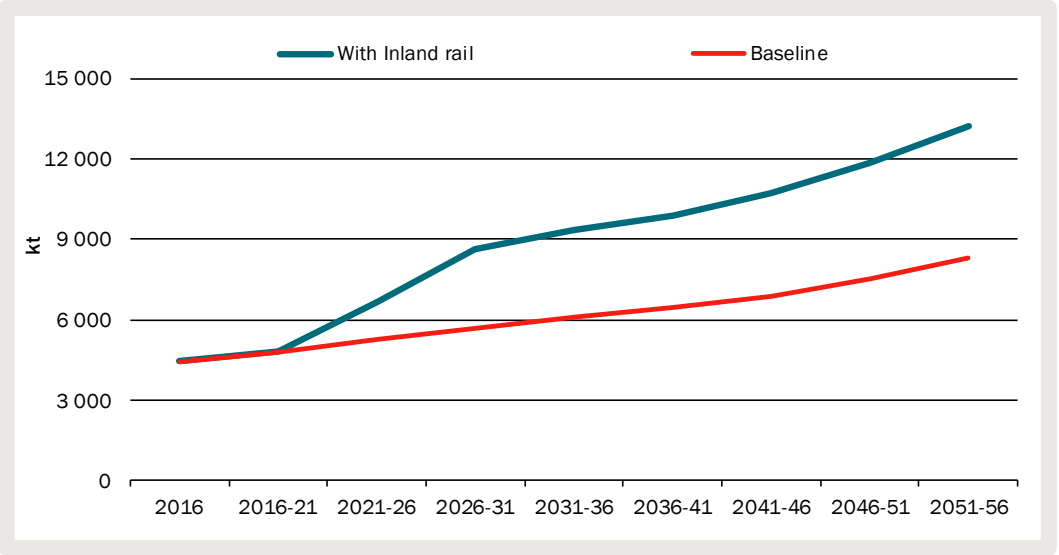


Data source: TfNSW Freight projections, Inland Rail business case, CIE calculations.

- By 2056, using TfNSW projected freight volumes and the likely contribution of the Newell Highway to these movements, annual road freight volumes through the Newell corridor could rise to 8.3 million tonnes — up from 4.4 million tonnes in 2016 (see chart A.3) without Inland Rail.
- By 2056, using TfNSW projected freight volumes and the likely contribution of the Newell Highway to these movements, annual road freight volumes through the Newell corridor could increase to 8.3 million tonnes — up from 4.4 million tonnes in 2016 (see chart A.3) without Inland Rail.

As a result of this diversion, freight passing through the corridor could increase considerably as shown in chart A.3 — by 60 per cent to over 12 million tonnes by 2056 compared to baseline road freight of 8.3 million tonnes. Chart A.4 shows that, Inland Rail could reduce the baseline road freight requirement. By 2056, Inland Rail could carry 60 per cent of the interstate freight carried through the Newell Highway corridor.

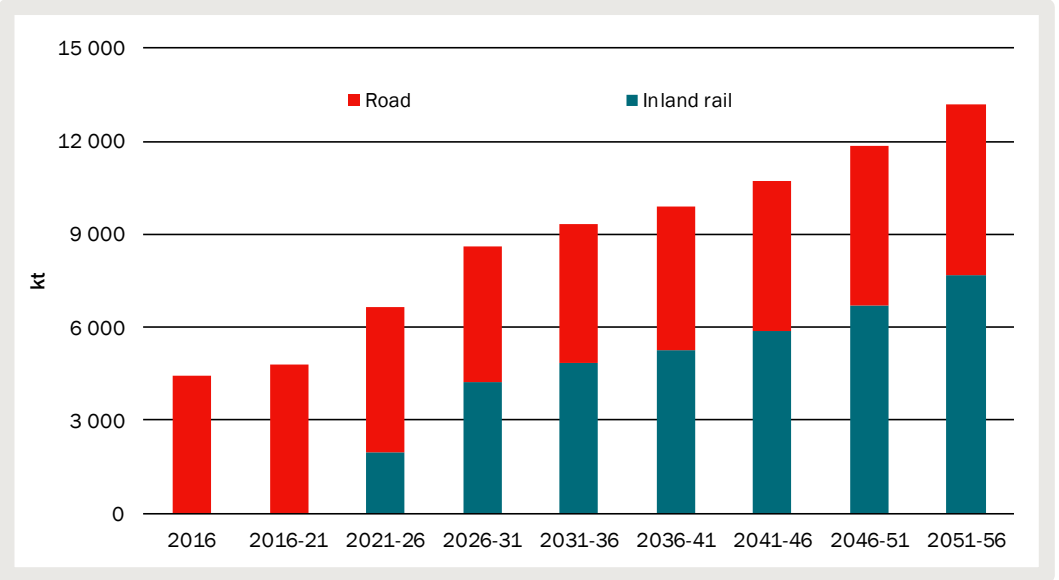
A.3 Projected interstate freight volumes through the Newell Highway corridor



[a] Baseline includes road freight only.

Data source: TfNSW Freight projections, Inland Rail business case, CIE calculations.

A.4 Interstate freight volumes moving through the Newell Highway corridor[a]



[a] With Inland Rail scenario.

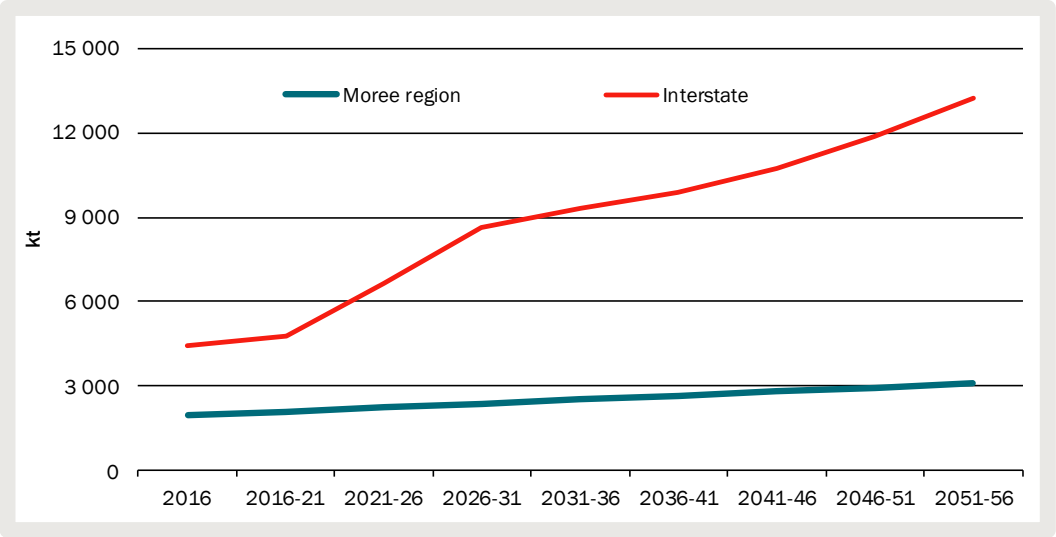
Data source: TfNSW Freight projections, Inland Rail business case, CIE calculations.

Regional freight is comparatively small to interstate freight

To put these volumes in perspective, chart A.5 shows that interstate freight volumes through the Newell Highway corridor will far exceed those for the region if the scenario from the Inland Rail business case is to be realised.

By 2056, dedicated freight in and out of Moree could represent just 20 per cent the total freight task moving through the Newell Highway corridor down from 30 per cent currently.

A.5 Comparing freight volumes through the Newell Highway corridor



Data source: TfNSW Freight projections, Inland Rail business case, CIE calculations.

Implications for an Intermodal facility

The size and scope of an intermodal facility located in Moree, or more specifically within the investigation area depends on:

- the extent of shift in freight from bulk to containers for grains and pulses
- the transfer of freight in containers from road to rail
- the emergence of new businesses in the region that will use the facility
- the scope to divert interstate freight through Moree for rehandling and storage.

The business case for the MIP did not consider these components. The core benefits for the MIP were based on the assumption that the benefits of Inland Rail resulted in reduction in freight costs identified above for grains and cotton, could not be realised with investment in the facility.

- This is a assumption given that the freight savings identified by the cover both bulk and containerised freight by the TraNSIT model and that users of bulk freight are already serviced by existing loading facilities both in Moree and within the region.
- Another opportunity is for the capacity for bulk receival of grain off rail in Moree — where the grain could be imported for use in the region. Such a facility does not necessarily fit within an intermodal facility and could be located at existing bulk handling sites.

The preparation of a detailed business case for the MIP, as a likely anchor tenant for the investigation area, is beyond the scope of this report. However, this analysis is to provide

some indication of potential demand. Demand for an intermodal facility in Moree would be the result of:

- growth in containerised freight from production within the Moree region
- the scope to divert interstate freight for storage and redistribution.

Shift from bulk to containers

The scope for container freight (and market for intermodal facilities) depends on a range of factors:

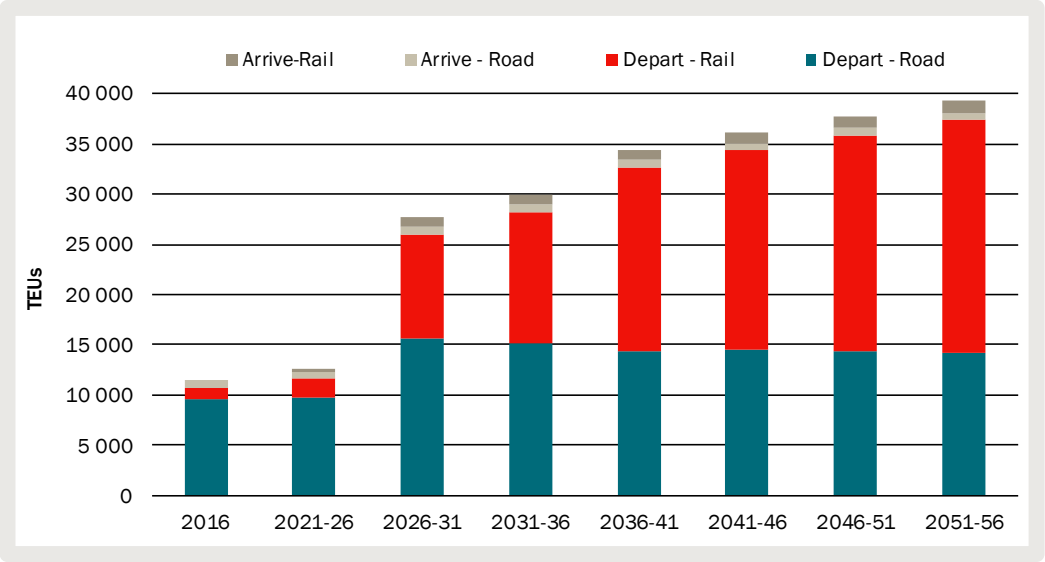
- the relative change in the cost of bulk and container freight — including the cost of loading and unloading containers at both ends
- the demand drivers of containerised freight including demand for grains and pulses by countries such as Bangladesh and the greater extent of value adding into flour and other products that require containerisation.

The extent of this shift is difficult to determine given that Moree is crucially located at a point where there are a number of freight and marketing options available, north and south, and that small changes in relative prices will result in significant swings in freight patterns.

Based on TfNSW projections, chart A.6 shows the potential increase in container freight that could be possible as a result of Inland Rail. While cotton lint and cotton seed are already containerised, the increase in container volumes (in TEUs) is directly attributable to the likely increase in the containerisation of grains and pulses exported from the Moree region. By 2056 under a simple scenario: containers could account for 45 per cent of total regional exports of grains and pulses on a weight basis (up from 30 per cent in 2016).

- total throughput of containers could be close to 40 000 TEUs over the next 35 years — but this total will be phased-in in line with the timing of Inland Rail operations
- under this grain and pulses could account for around two-thirds of all containerised throughput

A.6 Scope for regional containerised trade for the Moree region



Data source: TfNSW Freight projections, Inland Rail business case, CIE calculations.

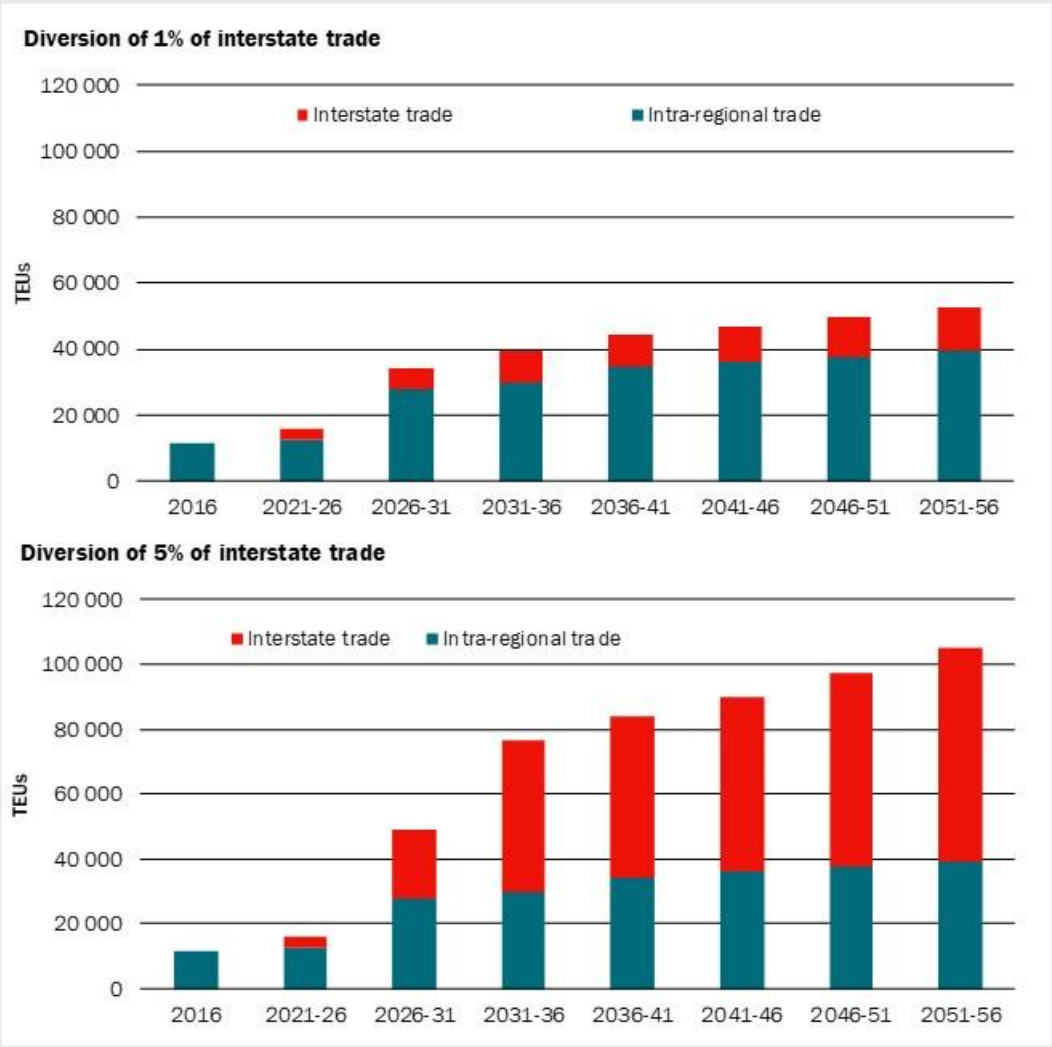
This is before considering other freight, produced inside and outside of the investigation area, that requires containerisation.

Scope to divert interstate trade

As noted, the strength of both current road freight and the Inland Rail investment is the capacity to deliver interstate freight point-to-point. In addition, competition throughout regional NSW and Queensland is increasing with existing providers expanding capacity and new facilities proposed and under construction.

However, to put this opportunity is in perspective, chart A.7 shows the impact of two scenarios — where just 1 and 5 per cent of interstate freight passing through the Newell Highway is diverted through the Moree facility. In terms of TEUs, when added to regional freight demand, this provides a range between 40 000 (regional freight only) and 105 000 TEUs (regional plus 5 per cent diversion) by 2056 in 35 years' time.

A.7 Potential scale of IMT throughput from diversion of Newell Highway corridor freight



Data source: TfNSW Freight projections, Inland Rail business case, CIE calculations.

B High level assessment of industry suitability

Our investigation considered a wide range of industries and provided a rating of their suitability and likelihood of business investment into the SAP investigation area.

This analysis has considered current business demand and potential future business demand that would enable the SAP to achieve its objective of diversifying the local agricultural economy, building on Moree's strong connection to Country and sustainable water and energy, unlocking opportunities to value-add, embrace new technologies and develop innovative energy solutions.

The below discussion summarises some of the industries and business analysed through the economic analysis, market sounding and other SAP investigation studies. This includes an analysis of the suitability and potential for various businesses to be located in the Moree SAP. The analysis is intended to inform what 'could happen' if the SAP vision was realised.

This high-level discussion supplements the detailed discussion in Chapter 8.

Freight and logistics

Nationally, the freight and logistics industry is estimated to growth at a rate of 2.5 per cent from 2019 to 2024.[69] Overall, there has been a trend towards larger operators. These national companies can be integrated across all components, including intermodal facilities.

The general tends for freight and logistics businesses are linked to the demand for general freight rather than core agricultural products which will be handled at and stored at respective specialist facilities.[70] This includes horticultural products which use cool stores at the packout facility and are trucked direct to customer or to exit port.

There are a number of existing facilities in Moree that cater to the receival of inbound freight of inputs and household goods or forwarding outbound freight. In some cases, these are co-located with other businesses.

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69 Mordor Intelligence, *'Australia freight and logistics market – Growth, trends, and forecast (2020 – 2025)'*, see https://www.mordorintelligence.com/industry-reports/freight-logistics-market-in-australia

70 Excluding grains, cotton, pulses and oilseeds. See for example, the Seaway facility at Merbein, Mildura, where intermodal, freight and warehousing are co-located.

Alignment to the SAP

Overall, the freight and logistics industry is well aligned to the vision of the Moree SAP, and has the potential to help support specialised agribusiness and food processing industries. These businesses would benefit from road access and direct integration with an Intermodal facility. These businesses could include:

- transport depots and freight forwarding [71]
- general and cold-store warehousing — bonded and secure facilities.

Note that these businesses exclude bulk handling and storage of grains and storage of cotton in dedicated facilities. Each of these activities can be is carried out by both regional level and national businesses who are heavily integrated.[72]

Given the strong linkages to Intermodal facilities, and existing players in the regional market, this is already a highly competitive area now and is likely to be more so the case in the future, especially given the existing and new facilities proposed along the Inland Rail route.

Moree offers various benefits for the freight and logistics enterprises, such as being on flat terrain, and offering potential colocation with the proposed intermodal facility. When considering the SAP proposed infrastructure, warehousing is potentially an integral component of an intermodal facility based on the potential of Inland Rail. This is especially the case for interstate freight that can be diverted and rehandled in Moree.

The potential growth in freight and logistics businesses have been considered alongside the trends in freight volumes through the Newell Highway corridor. It is assumed that the increased demand for businesses would be somewhat aligned (although a small proportion) to the growth in general freight for the Moree region. However, larger scale facilities could be required if interstate freight was diverted for warehousing and rehandling/repackaging in Moree.

Typically freight and logistics businesses are low employing, with the number of job created not necessary linked to the size of the business. The estimated land use requirements and employment numbers have been informed through market sounding discussions and benchmarking businesses from the Parkes SAP analysis.

Resource recovery

Resource recovery is an emerging industry based on the premise of the circular economy. Commonwealth and State governments continue to invest into this industry to promote the development of infrastructure to build capacity and capacity of the sector. This includes the development of a 20-year waste strategy for NSW. The industry has

71 A freight forwarder, organises shipments for individuals or business to transport goods from the manufacturer or producer to a market, customer or final point of distribution.

72 Who use smaller businesses as agents in smaller regional centres.

significant potential, for instance, it is estimated that Australia generates 74 million tonnes of waste per year, and this figure is expected to grow.[73]

Alignment to the SAP

Moree's location could make it suitable for resource recovery businesses, such as tyres to energy and plastics recycling. The key connection between resource recovery businesses and the Moree region is the advantage of location, based on the likely cost advantage of backloading waste from urban areas (tyres and plastics) and local industries including agriculture (including plastics from cotton bales and industry and agricultural tyres. Resource recovery businesses would also benefit from both freight-in and out or Moree. This is anticipated to be predominately bulk transport through the rail system, and well serviced by local businesses and infrastructure through road networks.

The likely businesses that have been identified include:

- tyres to energy (producing oil, carbon and steel)
- plastics recycling (flaked product shipped in bulka bags on pallets)
- processing of household and greenwaste.

However, consideration will need to be given to the zero net emission vision of the SAP, as these businesses could somewhat contradict this. However, the potential benefits include an improved approach to disposal of waste tyres and plastic waste in the region and the creation of additional economy.

Based on this assessment of suitability, it's anticipated that resource recovery businesses are moderately likely moderately suitable for the Moree SAP. The land use and employment assumptions have been benchmarked against the Parkes SAP land estimates, and the Warren Green Distillation Technologies rubber tyre recycling and Narrabri Australian Recycled Plastics.

Value added agricultural industry

Across the industry, there has been a long period of consolidation, especially for large-scale flour milling. For instance, it is estimated that the biggest four producers account of over 80 per cent of the total milling market. While bulk marketing will always be important, there is a trend towards a greater customer focus and retention of value added by grading and packing to consumer requirements. This includes greater control of the supply chain through customisation for individual markets, branding, new product development and control of intellectual property.

This has led to various opportunities in the market for small to medium sized value add businesses to developed high customised products to meet market specifications.

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73 Department of Agriculture, Water and the Environment, '*Waste and recycling*', see https://www.environment.gov.au/protection/waste-resource-recovery

Alignment to the SAP

There would be clear benefits from having value adding businesses that are clearly aligned to output of the region, such as a flour milling plant located alongside the raw grains from the region. In addition to this, there are other potential value adding businesses that have various synergies with the local cotton production, such as a crushing plant in the SAP or a dehulling processor for cotton.

The agricultural value adding industry has strong synergies within the established infrastructure in Moree based on bulk grains handling for grains and trucking containers of cotton lint and seed north and south.

An oilseed processing facility could also have strong synergies with the surrounding economy, however, this would reduce dependence on export markets and we note that the Cargills' processing centre At Narrabri is currently close and in care and maintenance.

From this strong alignment and synergies, the value-added agricultural sector considered for the Moree SAP included:

- customer-focused marketing of grains, pluses and oilseeds (including grading to specification, supply chain alliances both with growers and customers), and
- early-stage processing including, flour and chickpea milling/canning, oilseed crushing plant.

The analysis also considered that there are benefits from establishing a value-add facility in combination with solar power facilities. This would provide reliable and cheap electricity to support these activities.

The number of additional businesses is difficult to determine as there are already a number of established businesses within the Moree region who are integrated to different extents with supply chains. These existing players can expand on their current allotments to meet additional demand. Especially considering supply growth is expected to be moderate and highly variable with climate variability.

Within the analysis, land use assumptions have been aligned to the Parkes SAP land estimates and benchmarked against Austgrains facility in Moree and Bellata Gold Westdale in Tamworth, Namoi Flour Mills Gunnedah and market sounding discussions.

Bio energy/high impact

When analysing the potential for bio energy/high impact industries in the Moree SAP, four specific industries were considered as potential examples or proponents. This includes; ethanol from grains, ethanol from waste agricultural products, diesel replacement from methanol, and an abattoir.

- Ethanol production – there are three producers of ethanol in Australia. One using wheat, one from sugar cane, and one from grain. COVID-19 has seen all three of these plants cease ethanol production. However, even prior to COVID-19, the demand for ethanol production was low. The long-term trends for ethanol production

are less certain, and future demand will be influenced by other markets such as the price for oil and future hydrogen production/uses.

- Methanol production – currently there is no Australian producer of methanol. The only previous producer ceased operation because of the low price of substitutes (natural gas). The application of methanol as a diesel replacement has been tested internationally, however, there is limited studies and proof-of-concepts being undertaken in Australia.
- Abattoir industry trends – Australia is one of the largest red meat exporters in the world, and this industry is expected to grow. The red meat processing industry is characterised by a few major players and many smaller regional players, adding up to 140 meat processing establishments varying in size across Australia. However, the production market is highly saturated, with only one new abattoir opening over the past 30 years.

Alignment to the SAP

Drawing from these businesses as a case study style analysis, the suitability of bio energy/high impact industry in the Moree SAP was considered to be low. This low rating was partly given by the poor alignment to the SAP's vision, market factors (as those outlined above) and poor alignment to energy requirements, which would need a potential business to invest in an expensive bio-energy plant for key inputs.

However there are some synergies between these businesses and existing industries in Moree. For example, production of ethanol using grains is currently in operation in the Dalby BioRefinery plant, and an alternative would be to produce ethanol using cotton waste. Both processes would have strong connections with local producers and reduce the transport cost of this key input, although producers would need to compete for the cost of grains and waste products on the global market. There is also a strong demand for diesel in the Moree region, which would make a methanol replacement facility appealing for an investor, as being close to a large source of demand would lower transportation costs. Moree is also well located to house service businesses that maintain vehicles operating on methanol.

For all three case study businesses, importing would be important for consumables (abattoir) and bulk inputs (backloading of grains from other regions including waste materials). This could be facilitated through the existing road (ethanol) and rail networks (abattoir through containers). Although trucks are more likely to be the primary form of transport in the short to medium-term, there is long term potential for ethanol to be transported via the rail network, however this is somewhat speculative.

The key benefit of the Moree region for these businesses is the affordable land and any necessary buffer zones. For example, an abattoir or an ethanol plant is estimated to utilise up to 30 ha of land.

However, overall, the economics of these business types over the medium term is highly uncertain. This includes a high level of uncertainty as government globally move towards

solar and hydrogen. Medium to long term outlook for abattoirs is also low given livestock numbers and barriers to entry into the industry.

The analysis has also considered that Bio-energy may be an important energy provider for the Moree SAP in the medium to long term, particularly if natural gas is not provided to the SAP. Land use assumptions have been benchmarked against the Dalby Bir-refinery, the Coogee Energy Methanol Plant in Laverton Victoria, and Bindaree beef Inverell and market sounding discussions.

Horticulture / intensive agriculture

Low backloading rates for airfreight leading up to the COVID-19 pandemic enabled strong growth in airfreight volumes of high value horticulture to Asian and the Middle East. Particularly for commodities such as Cherries, Table grapes, Summerfruit (which are not suited to Moree). There has also been growth in products such as sub-tropical varieties of blueberries, leafy greens and rock melons that are more suited to both indoor and outdoor production in Moree.

Alignment to the SAP

Although there is limited connections with existing businesses,[74] horticulture/intensive agriculture businesses are consistent with Moree endowment of black soil and availability of water and fits with zero net emission objective of the SAP. In particular, this includes:

- outdoor horticulture — focusing on vegetables — most likely for export markets
- undercover horticulture — covering range of potential fruit and vegetables products growth in structures ranging from poly tunnels through to glasshouses
- medical cannabis (undercover in glasshouses) and hemp (grown outside).

Most likely a combination of outdoor growing and the use of low-cost low-risk poly tunnels that could phase into a higher proportion of glasshouse production over time as markets are established production conditions understood.

To support these businesses, the SAP is able to provide high-security water and access to road and rail for less perishable products. As export-based, a natural connection to Asian markets would be through Wellcamp airport. Middle Eastern markets could have to be accessed out of Sydney airport. Medical cannabis could be transported through secure trucks for the freight of leaves and air freight for the final refined oil product when the business evolves.

Because of the strong suitability of horticultural and intensive agricultural businesses in the Moree SAP, it is estimated that there will be a high likelihood of these businesses investing into the SAP. The estimated land use and employment figures have been benchmarked from the Parkes SAP, Moree Valencia's for juicing, NSW Oranges for fresh market, ABARES Australian average for outdoor horticulture, ABARES Australian

74 Typically dedicated (refrigerated) trucks are loaded straight from packout facilities but do require rehandling for airfreight containers.

average for covered vegetables, ABARES Australian average for hydroponic vegetables, Cannatrek Shepparton, Cannatrek Toowoomba, Asterion Cannabis Toowoomba, Australian Natural Therapeutics Armidale, CannaPacific Lismore, Cann Pharmaceuticals and market sounding discussions.

Enterprises

Broad industry trends are difficult to identify given the wide range of potential businesses that could be considered under the "enterprise" type. However, the ABS classification "retail trade" has been considered to inform the general trends of the industry.[75] Across Australia, this industry group has experienced a 2.6% growth in employment between 2009-10 to 2018-19.

Alignment to the SAP

There are various existing businesses within the Moree Town Centre and within the SAP investigation area that would be in direct competition with new businesses within the enterprise group. There is a risk that allocating an extensive amount of land towards enterprise businesses in the SAP would risk the viability of the Moree Town Centre if businesses were to be pulled into the SAP from the town. This is particularly the case for retail businesses.

In our analysis, we also considered that there is existing land capacity for this industry type within the SAP. For example, the current Moree Gateway precinct has spare capacity that could accommodate these businesses if the demand was to substantiate. There is also spare capacity within the allotments surrounding industry drive that could accommodate some of these business types.

Based on the demand modelling and investigations undertaken, there appears to be sufficient capacity within the Moree Town Centre and the existing Moree Gateway site to accommodate this business type throughout the forecast period.

However, over the full forecast period, there may be potential for a small amount of new businesses in the Enterprise group, including:

- light industry and service industry
- retail and wholesale including bulky goods
- specialist equipment and spares providers.

Based on the assessed suitability and the existing capacity in the region, only a small amount of enterprise zoning was seen to be suitable for the master planning scenarios. This small amount of land uptake acknowledges that existing enterprises across Moree are interspersed amongst residential dwellings. The Moree SAP vision includes locational

75 Retail Trade includes Motor vehicle and motor vehicle parts retailing, Fuel retailing, Food retailing, Other store-based retailing, and Non-store retailing and retail commission-based buying and/or selling

advantages for similar existing uses, such as impacts on amenity, better connections to the region via an upgraded road network, concentration of similar uses that can provide inputs to SAP operations.

Solar power and hydrogen

Australia has one of the highest photovoltaic electricity potentials worldwide. This had allowed Australia to become a global leader in solar power, with one of the highest growth rates in residential solar installation, per-capita capacity, and utility-scale markets. Approximately one third of the national solar capacity originates from centralised grid-connected solar farms (over 5MW) and two thirds from distributed grid-connected rooftop systems.[76]

The growth of solar farms is expected to continue. This includes over 40 larger scale solar projects planned over the next few years.[77] There has also been growth in the number of smaller solar farms, and this is expected to continue as the efficiency and price of solar panels improve.

Leveraging both large and small-scale solar production is the potential for hydrogen production. There are various strategic documents nationally and internationally promoting the use and production of hydrogen. However, the industry and the production of hydrogen is very prospective at this stage. The current production and practical uses are focused towards proof-of-concepts, and there are various logistical and practical hurdles to overcome, such as storage, transport and establishing a supporting service industry.

Alignment to the SAP

Moree's location benefits from a high amount of daily sun, making it a highly suitable location for a solar farm. This includes both large and smaller scale solar farms. For example, the existing Moree solar farm produces 56MW and existing businesses in the region are also considering small (20 hectare) solar farms. These smaller solar farms would primarily power small facilities on their property, such as cotton gins and oilseed crushing plants. Small scale solar farms such as this could operate behind the metre, offering cheap energy for cotton gins and oil crushing plants in the SAP. These facilities are relatively inexpensive and can be located on relatively small parcels of land (a 1MW solar farm can be developed on approximately 2 to 3ha of land).

The strong solar potential also presents opportunities for hydrogen production, drawing from the energy output. Such a system is being piloted in the Moree township by FRV to power hydrogen buses for Moree. However, this pilot is an early proof of concept.

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76 IEA (2019), National Survey Report of PV Power Applications in Australia 2018, see http://apvi.org.au/wp-content/uploads/2019/10/NSR-Guidelines-2018_AUSTRALIA_v2.pdf, p. 12

77 See https://www.canstarblue.com.au/solar-power/solar-farms-australia/ and https://gienergy.com.au/worlds-largest-solar-farm/

Future hydrogen production has potential to power buses and trucks and be exported along the Newell Highway and Inland Rail. This has clear linkages to Moree's existing freight and transport networks. There is also potential for hydrogen to be used in trucks and stationary machinery in the Moree region. However, the extent this potential will be realised is to be determined.

Goonumbla Solar Farm and Nevertire Solar Farm have been used as benchmarks to inform the land use and employment number for a solar farm in the SAP. Small scale solar farms are more likely to be placed next to other facilities, so that grid connection charges can be avoided. This additional land use requirement has been factored into other industry land use estimates.

C Water requirements

Table C.1 shows the development of the water requirements against business and land use types. These calculations were developed using a range of information that included:

- proponents from the market sounding identified either the total water licence or allocation that they would be seeking or provided likely irrigation rates on a per hectare or per shed basis
- in other cases, benchmarking from similar activities was used.

In the cases, where the production process of a business is unlikely to use water as an input, town or potable water has been required for employees at the site. Note that in these cases, this requirement could be supplied either through mains or from tanks — supplied by rainfall or from tanker deliveries.

C.1 Key inputs for assessment of water requirements

	Water use footprint per business		Water usage
	%	ha or unit	ML/ha or ML/business
Building on water and land availability			
Aquaculture	13.5	1	1
Outdoor horticulture	60	30	9
Undercover horticulture			
▪ Medicinal marijuana stage 1	53	21	4.8
▪ Medicinal marijuana stage 2[a]	–	–	–
▪ Medicinal marijuana additional small	55	22	4.8
▪ Medicinal marijuana additional large	50	20	5.0
▪ Glasshouse/aquaponics stage 1	50	20	12.5
▪ Glasshouse/aquaponics stage 2	50	20	5.0
▪ Glasshouse production additional	67	27	7.5
▪ Poly tunnels (berries and vegetables)	60	9	5
Building on grain/cotton advantage			
Increasing value from the supply chain			
▪ grain storage, sorting and handling			Town/potable water
Early-stage processing			
▪ Flour/chickpea milling/canning			Town/potable water
▪ Oil crushing plant			Town/potable water
▪ Plant proteins			250

	Water use footprint per business		Water usage
	%	ha or unit	ML/ha or ML/business
Grain ethanol			438
Reducing reliance on imported inputs			
Diesel replacement (methanol) — Gas to liquids			Town/potable water
Chemicals manufacture — mixing of reactive ingredients			30
Fertiliser production— Urea Ammonium Nitrate			30
Building on location			
Intermodal terminal (public access)			Town/potable water
Freight and logistics			Town/potable water
Abattoir			730
Circular economy			
Resource recovery (tyres and plastics)			Town/potable water
Waste to energy — Biogas			Town/potable water
Solar electricity			Town/potable water
Hydrogen production			23.5
Supporting/service industries			
Light industry/commercial			Town water

[a] Water use included in total license requirement.

Source: Market Sounding and CIE analysis.

The following documents sources and key assumptions listed in the table.

- Aquaculture. Following existing proposals in the SAP, a barramundi facility of the scale identified is likely to use more than 1 ML annually.
- Outdoor horticulture. Given year-round production and high summer temperatures, it has been assumed that these activities would be intensive water users benchmarked off similar irrigation areas.
- Medicinal marijuana and glasshouse vegetables. Information was supplied by the proponents both in terms of requirement per hectare and total license sought.
- High tunnel horticulture. Poly tunnels reduce evaporation and water consumption and increase marketable product yield on a per hectare basis compared to outdoor systems. Water use depends on the crop produced but also the irrigation technology used — which can range from sprinklers through to sophisticated fertigation systems as used in glasshouses. To be conservative, a high value of 5 ML per ha undercover has been used.
- Plant protein manufacture. Water use has been based on a plant with a rated capacity of around 50 000 tonnes of input grain/pluses per year. This water would need to be pre-treated to a high level.
- Grain ethanol. This estimate was based on benchmarking of water use by the Dalby Biorefinery. The scale of the plant for these purposes is around 100 kt of grain,

primarily wheat. It is noted that Dalby uses a mix of town and class A+ recycled water.

- Chemicals manufacture — mixing of reactive ingredients. The proponent is seeking a licence of around 30ML per year to mix with reactive ingredients that will be imported into the region from domestic and imported sources.
- Fertiliser mixing. Allowance has been made for up to 15 ML of water use. At mixing rates of 20 to 30 per cent, this implies an annual production capacity of UAN of between 50 and 75 kt.
- Abattoir — a medium-scaled facility such as North West abattoirs at Inverell or Teys/Cargills at Wagga Wagga would require around 2 ML per day throughout the year.
- Resource recovery (tyres and plastics) — these production processes are based on heating of the feedstock and are unlikely to consume significant volumes of water.
- Biogas facility. It has been assumed that the likely production process for a biogas plant would be based on gasification or pyrolysis rather than anerobic digestion. Thus, a water requirement has not been identified for this activity.
- Hydrogen. Following the assessment made by Arcadis, the first phase of a possible hydrogen project is likely to have a daily capacity of 5 tonnes of hydrogen.
  - If the manufacture of hydrogen requires a maximum of 14 litres (in a range of 9 to 14 litres) for each kilogram of hydrogen, then daily consumption of such as facility would be 70 kilolitres per day.
  - Assuming that the plant operates 24-7 for 48 weeks of the year (allowing for maintenance and other shutdowns), total demand for water could be around 23.5 ML or 25.5 ML if the plant operated tear-round.
  - Also, noted that as identified, this water would need to be pre-treated to high level and be free of salt, iron and other minerals.

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