ORANA FREIGHT AND LOGISTICS CAPABILITY STUDY

REGIONAL DEVELOPMENT AUSTRALIA ORANA

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URBIS

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EXECUTIVE SUMMARY

New South Wales covers an area of 809,000 square kilometres, with key population centres widely dispersed. Regional economic growth and prosperity are therefore particularly reliant on effective freight and logistics networks to transport goods and commodities to markets in a timely and efficient manner.

Orana, in central northern NSW, covers almost one quarter of the State and is its largest region. Orana has a strong agricultural history and growing mining tradition, with a diverse range of production activities undertaken across the region. Orana is well-recognised as a major producer of wheat and other grains, intensive irrigated crops such as cotton, livestock and meat products, and coal and mineral production. These commodities form the backbone of the Orana regional freight task, and have the largest impact in determining the underlying freight and logistics requirements of the region.

The Orana Freight and Logistics Network

The Orana region is well-supported by a freight and logistics network that is characterised by good intra- and inter-regional road and rail connectivity, with particularly strong road connectivity.

The regional freight and distribution hub of Dubbo is well connected to the broader NSW road freight network, located at the intersection of the Mitchell, Newell and Golden Highways. Orana also has direct rail access to coastal ports with Port Botany acting as the region's gateway to the world.

This study has found that existing freight and logistics networks underpinning the Orana region do not yet constrain regional productive capacity nor impede access to markets. However, the regional freight and logistics network is not without its challenges and impediments.

Parts of the network are variously impacted by poor condition, congestion, inefficient utilisation and access restrictions. These lead to load constraints, slower speeds, less direct routes and increased wear and tear on vehicles, ultimately affecting the efficiency, cost structure and productivity of the freight sector.

The inherent variability of seasonal agricultural production makes predicting freight demands difficult and, combined with the recent consolidation of parts of the network, conspires to place additional pressure on the regional freight network.

The challenges and impediments impacting the regional network have the potential to result in higher freight costs for regional producers and industry, impacting regional competitiveness and profitability, and resulting in higher costs to consumers.

The Current and Future Freight Task

The estimated regional freight task is approximately 27,800 kilotonnes (kT) per annum. This includes all internal, outbound and inbound freight that makes use of the Orana freight road and rail network.

The regional freight task is forecast to grow significantly over the next 20 years to almost 49,000kT per annum by 2035, an increase of 76% over current freight volumes.

Road is by far the dominant regional freight mode, accounting for 85% of the regional freight task (Table 1-1). The road freight network is critical to regional industry activity with many producers completely reliant on it to access domestic and export markets.

While it plays a less significant role, rail is still important for transporting the region's bulk commodities and resources destined for export markets via Port Botany and the Port of Newcastle.

Table 1-1 – Current and future freight task

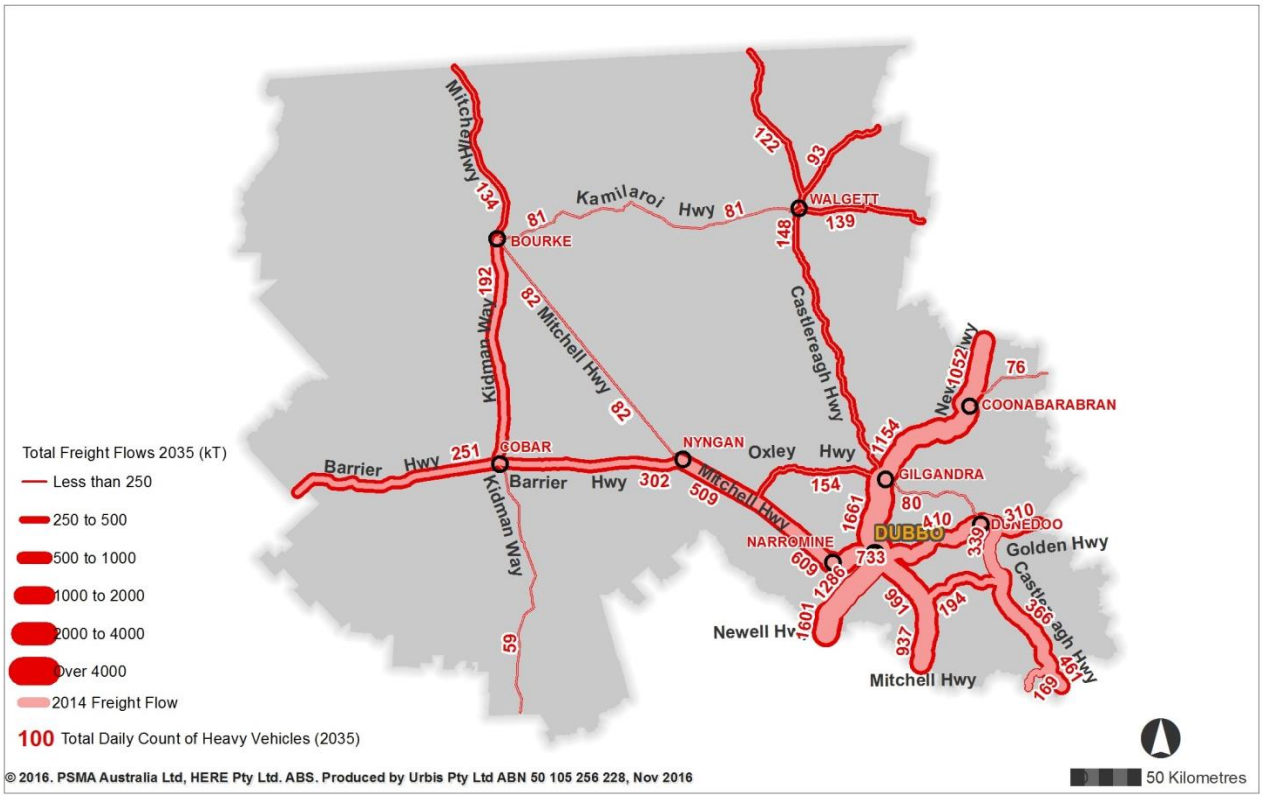
Freight Mode	Current	Forecast - 2035	Change %
Road	23,600kT	41,830kT	77%
Rail	4,200kT	7,160kT	70%
Total	27,800kT	48,990kT	76%

Source: Urbis calculations

The expected increase in the freight task will place additional pressure on parts of the Orana freight network that are already constrained by poor condition, congestion and access. Furthermore, without additional investment, the increased freight task may create new constraints and barriers in the network over time.

For example, the bulk of the region's freight task is currently carried by a small number of key road freight corridors including the Newell, Mitchell, Oxley and Golden Highways. The freight task around the regional hub of Dubbo is expected to intensify significantly by 2035, with these key corridors likely to be leaned upon to handle the growth of the freight task (Figure 1-1).

Figure 1-1 –Forecast road network corridor freight flows, 2035



Source: Urbis calculations

Managing the future freight task

The forecast increase in the regional freight task represents a potential risk to the efficiency and productivity of the regional freight and logistics network.

In particular, the condition of the road network, already recognised as being poor in many places, will be placed under greater pressure to handle the growing task. This will place additional pressure on local councils to fund increased future maintenance costs of local and regional roads.

While the rail network is expected to handle a smaller proportion of the freight growth, in reality, targeted investment is likely required to simply maintain the rail sector's market share relative to road. Failure to maintain the current standard of the network would likely continue the transition away from rail freight to road freight, placing further burden on the road network.

Failure to address the current challenges and implement network initiatives to meet the additional pressures resulting from the increased regional freight task has the potential to constrain regional productive capacity and impede market access for regional producers over the longer term. This, in turn, could impact Orana's future economic prosperity.

It is therefore critical that an integrated approach to planning and investing in the Orana regional freight network is adopted by local, state and federal governments with input from businesses producing and moving freight. Failure to adopt such an approach could lead to initiatives simply resulting in a mode shift rather than an improvement in whole-of-network performance.

However, potential investments face budgetary constraints at all levels of government and financial challenges in delivering fully user-funded network investments. Careful consideration therefore needs to be given to where investments align with policies (regional, transport, trade and so on) and can deliver the greatest returns, in financial, economic and social terms.

1. INTRODUCTION

"Economic growth in regional NSW relies on the movement of goods through efficient and effective transport networks. The ability of NSW producers to move agriculture, industrial products and natural resources to domestic and export markets in a timely and efficient manner directly impacts on productivity and competitiveness – and hence the economic performance of regional NSW" – NSW Freight and Ports Strategy

The continued growth and development of Australia's Asian trading partners has seen significant growth in demand for Australian exports, predominantly resource and agricultural products, over the past decade. This trend has played to the Orana region's strengths, with agricultural, mining and manufacturing sector exports totalling $3.9 billion in 2015, or 2.5% of NSW's total exports.[1]

The recent execution of Free Trade Agreements (FTAs) with China, South Korea, and Japan will lower tariffs on a range of Australian products, including key Orana exports such as meat and livestock, improving competitiveness. However, to capitalise on the continuing opportunity afforded by Asian growth, there is a need to ensure the region is supported by the necessary infrastructure. In particular, an efficient freight and logistics network is critical to facilitate competitiveness and growth in regional areas of NSW by ensuring optimised end-to-end connectivity.

At present, many key freight routes in the Orana region are constrained by ageing, missing or poorly maintained infrastructure. Examples include sections of road not fit for use by heavy vehicles and rail track that is not designed to carry modern freight loads. Deficiencies in the capacity and condition of regional freight networks undermine the competitiveness and productivity of regional producers wishing to access national and international markets, as well as the freight and logistics businesses that support them.

Adding to the complexity of network challenges facing the Orana region, freight volumes and movements are highly seasonal; production may vary significantly both through the year and between years. For example, agricultural production will be affected by the availability of water, while mining production will be managed to accommodate fluctuating market prices and demand.

This variability in production creates challenges in optimising investments across the freight and logistics network. Providing peak load capacity will place significant cost burdens on operators in low volume years, while insufficient investment will lead to second best outcomes to deliver products to markets. These uncertainties are exacerbated by the vast distances to destinations, requiring very significant investment budgets.

At current production levels, there is an on-going tension between the requirements of producers to maximise efficiency and competitiveness and the financial challenges facing freight network investors and operators.

1.1. STUDY PURPOSE

Urbis has been engaged by Regional Development Australia (RDA) Orana to undertake a capability study into freight and logistics and its supporting infrastructure for the Orana NSW region. This study is intended to extend previous work undertaken by RDA Orana and other government agencies to assist the region to more precisely identify regional freight and logistics infrastructure needs.

The study investigates the existing freight network and task in the Orana region and reports on the condition and capacity of networks to support current freight movements within and through the Local Government Areas (LGA) of the Orana region. The study also identifies potential projects and initiatives which could enhance freight and logistic productivity and promote regional growth.

In providing a more complete understanding of the freight and logistics needs of the Orana region, Urbis has sought to:

[1] REMPLAN, 2015, see: http://www.economicprofile.com.au/regionaldevelopmentorana/economy/regional-exports, accessed 2 November 2016.

- identify and define current freight volumes, origins, destination and pathways of the Orana region
- explore potential market accessibility, including export accessibility
- provide a comprehensive understanding of the supply chains in the study area, their users and the infrastructure requirements to support future growth
- identify impediments and opportunities to increase productivity and profitability of the freight network
- consider emerging national and global trends and their impact for the study area.

A core objective of this study is to provide an information base of freight flows that will support the identification of future initiatives and improvements in the regional freight network. Detailed recommendations on specific regional initiatives are outside the scope of this study.

The focus of this analysis is the freight and logistics network that underpins the Orana region. However, this study also recognises the interconnectivity between the region and the broader state and national freight networks, documenting those relationships where possible.

There has already been a considerable investment and effort in undertaking a range of studies across the region by Commonwealth, State and LGA agencies. Key among these has been the NSW Government's recent *NSW Freight and Ports Strategy* and the accompanying initiatives delivered to support it.

This study does not seek to replicate previous work undertaken. Rather, the objective is to build on the work completed to date and to provide a more complete understanding of the current and future freight and logistics needs of the Orana region.

1.2. ROLE OF RDA ORANA

The role of RDA Orana in relation to freight and logistics is to support regional growth by providing information that assists government and businesses to make sound planning and investment decisions.

RDA Orana is committed to improving the region's capacity for growth, attracting new investment and enabling business development.

1.3. METHODOLOGY

Regional agricultural production volumes presented in this study were estimated using publicly available data sources such as Australian Bureau of Statistics (ABS) agricultural commodity estimates and Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) commodity data.

The average production volumes for major agricultural commodities produced in the region were based on the five-year period from 2011 to 2015. Mining production volumes have been estimated from the most recent available company annual reports.

The regional road volumes presented in this study were estimated using data from the ABS Road Freight Movements Survey (2014) and network corridor traffic count data provided by Roads and Maritime Services (RMS). Regional rail freight volumes were estimated from data provided by Transport for NSW (TfNSW) and the Australian Rail Track Corporation (ARTC).

All future commodity production and freight volume forecasts for the Orana region presented in this report have been developed in line with TfNSW forecasts presented in the *NSW Freight and Ports Strategy* to ensure consistency with key NSW Government strategies.

1.4. STAKEHOLDER CONSULTATIONS

Extensive consultations were undertaken with major regional stakeholders to support the development of this study. The consultations provided critical insights and detailed experiences on the regional freight network including:

- how regional producers interacted with the network to access markets?
- what are the major impediments and constraints affecting freight efficiency?
- does the network currently constrain regional production and access to markets?

- what are the opportunities to improve regional freight productivity?

Consultations were conducted across the Orana region with a broad cross-section of industry and government, with stakeholders including:

- regional producers and growers
- potential regional investors
- road and rail transport companies
- bulk commodity traders
- facility operators (including port, airport, intermodal and livestock market operators)
- local councils
- state and federal departments and agencies.

In addition to consultations, Urbis also undertook an online survey to supplement information gathered in consultations.

A summary of the stakeholder consultation and survey findings is presented in Appendix A.

1.5. STRUCTURE OF THIS STUDY

This study is presented as follows:

- an overview of the Orana region including regional commodity production is presented in Section 2
- a description of the regional freight and logistics network is provided in Section 3
- the current regional freight task is presented in Section 4
- a forecast of regional commodity production and the accompanying regional freight task in 2035 is provided in Section 5
- the potential regional opportunities to support improved freight productivity and discusses the economic value of infrastructure investment is identified in Section 6.

2. ORANA REGIONAL PROFILE

2.1. REGIONAL OVERVIEW

The Orana region stretches from the western slopes of the Great Dividing Range in the east, to the plains of Cobar and Bourke in the west, and north to the Queensland boarder (Figure 2-1), covering an area of approximately 25% of New South Wales. The region consists of 12 LGAs and had an estimated population of 122,897 in 2015.[2]

Figure 2-1 – Orana Region

Source: Urbis

The Orana region has a strong agricultural history, with a diverse range of production activities undertaken across the region. Agriculture ranges from extensive broadacre cropping, meat and wool production to intensive and irrigated crops including cotton, fodder, and viticulture and horticulture in the south-east of the region. The agricultural sector is the largest employer in the region, and the highest contributor to Gross Regional Product (GRP) in nine of the 12 LGAs making up the region.[3] The importance of agriculture within Orana is highlighted by the extent of primary land use across the region (see Figure 2-3 below).

Regional exports in Orana are dominated by mining ($2,318 million in 2015) and agriculture ($1,046 million). Combined, these sectors represent 65% of total regional exports.

[2] Regional Development Australia, 2015, see: http://www.economicprofile.com.au/regionaldevelopmentorana/trends/population, accessed 2 November 2016
[3] REMPLAN, 2015, *Orana Economic Profile*, see: http://www.economicprofile.com.au/regionaldevelopmentorana/, accessed 2 August 2016

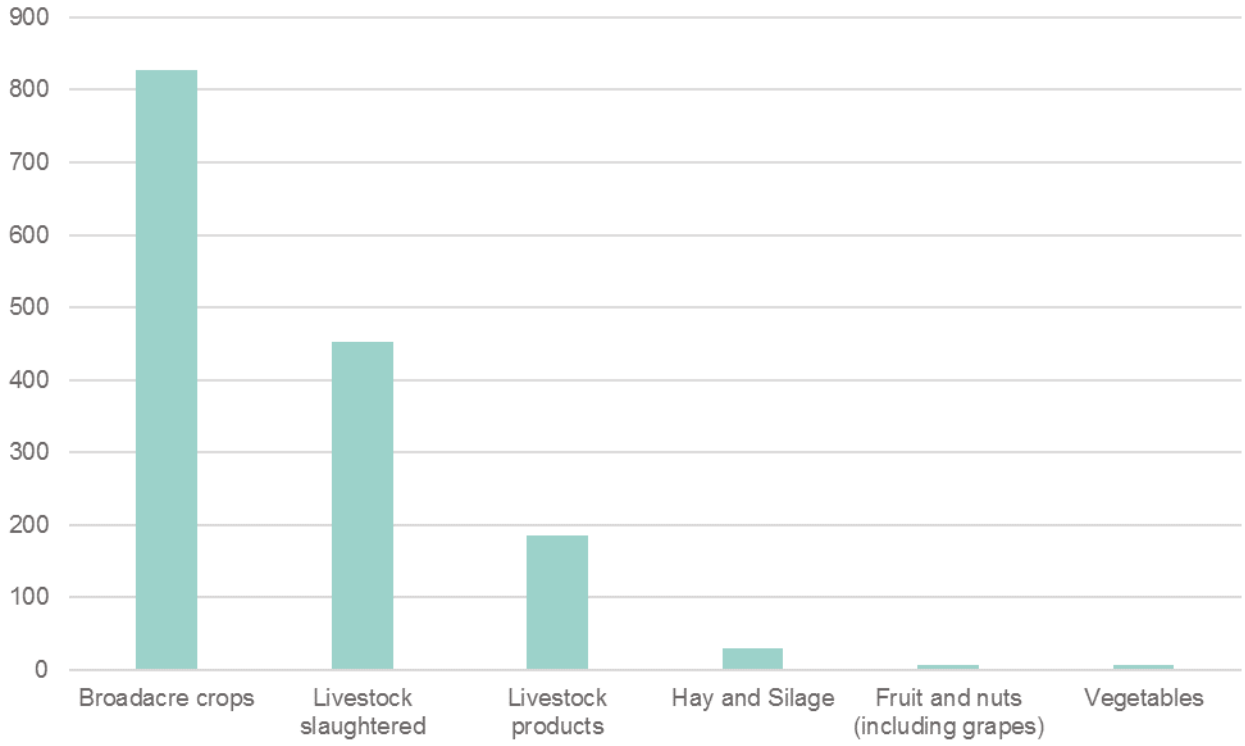
As of 2015, there are an estimated **5,014 agricultural businesses** in the Orana region. It is important to note that many businesses produce more than one commodity. For example, farms often produce a variety of broadacre crops, depending on the season and prevailing market and weather conditions.[4]

66% of agricultural businesses operate as sole traders (i.e. are family-owned business and have no employees), while only 1% have over 20 employees.[5]

The Orana region produced an estimated **$1.5 billion in agricultural commodities in 2014-15**.[6] The region has particular strengths in the **broadacre crops** and **livestock sectors.** In 2014-15, the region produced $827 million in broadacre crops (wheat, grain, cotton and other broadacre crops), $452 million in slaughtered livestock and $186 million in livestock products (e.g. wool, milk etc.) (see Figure 2-2). While NSW is not currently directly involved in the live export trade, it does freight livestock interstate. Hay and silage production was also significant, at around $30 million.

In contrast, horticulture and viticulture production represent a relatively minor proportion of the total value of agricultural production across the region. Figure 2-2 details the value of agricultural production in the region for 2014-15, by key commodities.

Figure 2-2 – Value of agricultural products, 2014-15 ($m)



Source: ABS, Urbis

With respect to mining, there are 16 mines across 10 different mining operations throughout the Orana region. Major resources mined include coal, copper, gold, zinc and other minerals. Coal mining is focused in the Mid-Western Regional LGA. Minerals, particularly copper, gold and zinc are predominantly found in Cobar and Bogan, with some operations in the Dubbo Regional LGA.

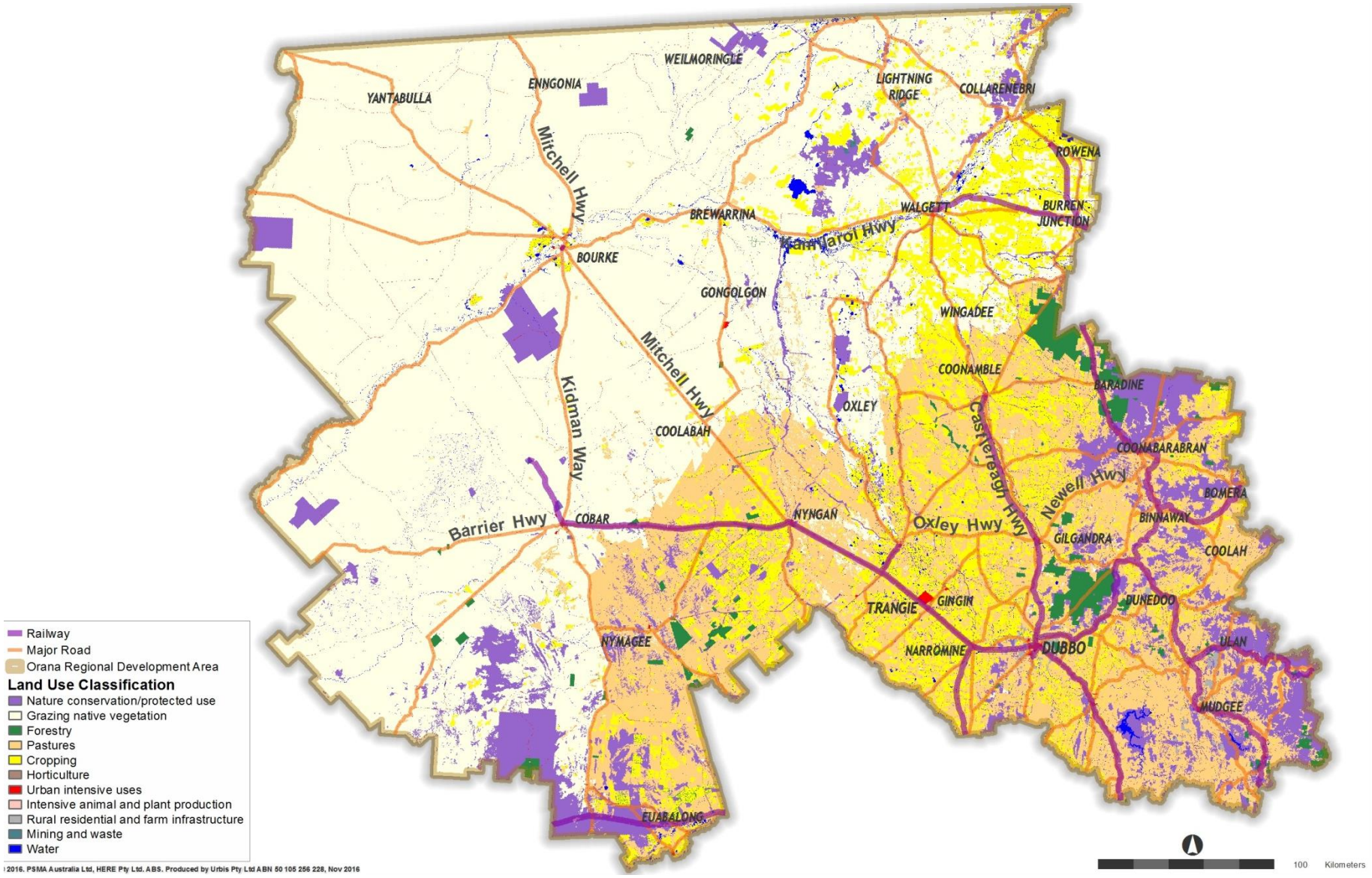
Mining production and agricultural commodity production form the backbone of the Orana regional freight task, and have the largest impact in determining the underlying freight and logistics requirements of the region.

[4] ABS 2016, *Counts of Australian Businesses, Businesses by Industry Division by SA2 by Employment Size Ranges, June 2015,* cat. no. 8165.0

[5] ABS 2016, *Counts of Australian Businesses, Businesses by Industry Division by SA2 by Employment Size Ranges, June 2015,* cat. no. 8165.0

[6] ABS 2016, *Agricultural Commodities,* cat. no. 7121.0, Table 2

Figure 2-3 – Primary land use within the Orana region



Source: Department of Agriculture and Water Resources

2.2. REGIONAL COMMODITY PRODUCTION

The volume of agricultural, coal and mineral commodities produced in the region provides an important relative measure of the freight task within the Orana region. It provides useful insights into which sectors are driving the regional freight task, and where the production is occurring within the region.

This section provides an estimate of the production volumes of major regional commodities that form the majority of the regional freight task. For each commodity group a discussion is also provided of the regional supply chains.

A summary of the major commodities produced in the region, the major production regions, key markets and the major freight requirements for each commodity is provided in Table 2-1.

Table 2-1 – Summary of major regional commodity production

Commodity	Main production regions	Key markets	Major freight requirements
Wheat and grain	Walgett, Narromine, Bogan and Warren	• Export markets (bulk and containerised grain) • Domestic stockfeed • Domestic consumption	• Road is dominant freight mode • Rail critical for bulk exports to Port of Newcastle
Cotton and other broadacre crops	Walgett, Narromine, Warren	• Cotton - almost exclusively exported • Other broadacre crops – mix of domestic and export markets	• Road is dominant freight mode, particularly between gins and warehouses, rail important link to export terminals
Livestock and meat production	Coonabarabran, Dubbo, Walgett	• Exports • Domestic consumption	• Road is dominant freight mode • Rail important link between intermodal facilities and export terminals
Livestock products (wool, milk etc.)	Dubbo, Narromine[7]	• Wool - predominantly exported • Milk – predominantly domestic consumption, limited exports	• Road is dominant freight mode • Rail is important for transporting wool from selling centre to export terminal
Coal and minerals	Mid-Western Regional (coal), Cobar (minerals)	• Power generators (coal), export markets (coal and minerals)	• Rail (coal), road (minerals)

Regional agricultural production volumes were estimated using ABS agricultural commodity estimates for Statistical Area level 2 regions, which broadly align with the LGA boundaries of the RDA Orana region, in combination with data from ABARES. The average production volumes for all agricultural commodities are based on the five-year period from 2011 to 2015.[8]

[7] Wool is produced in a number of other LGAs, such as Warren and Bogan, but production there is small in comparison to Dubbo and Narromine.
[8] Due to a change in reporting boundaries in 2011, comparative data is not available in a consistent manner for the years prior to 2011.

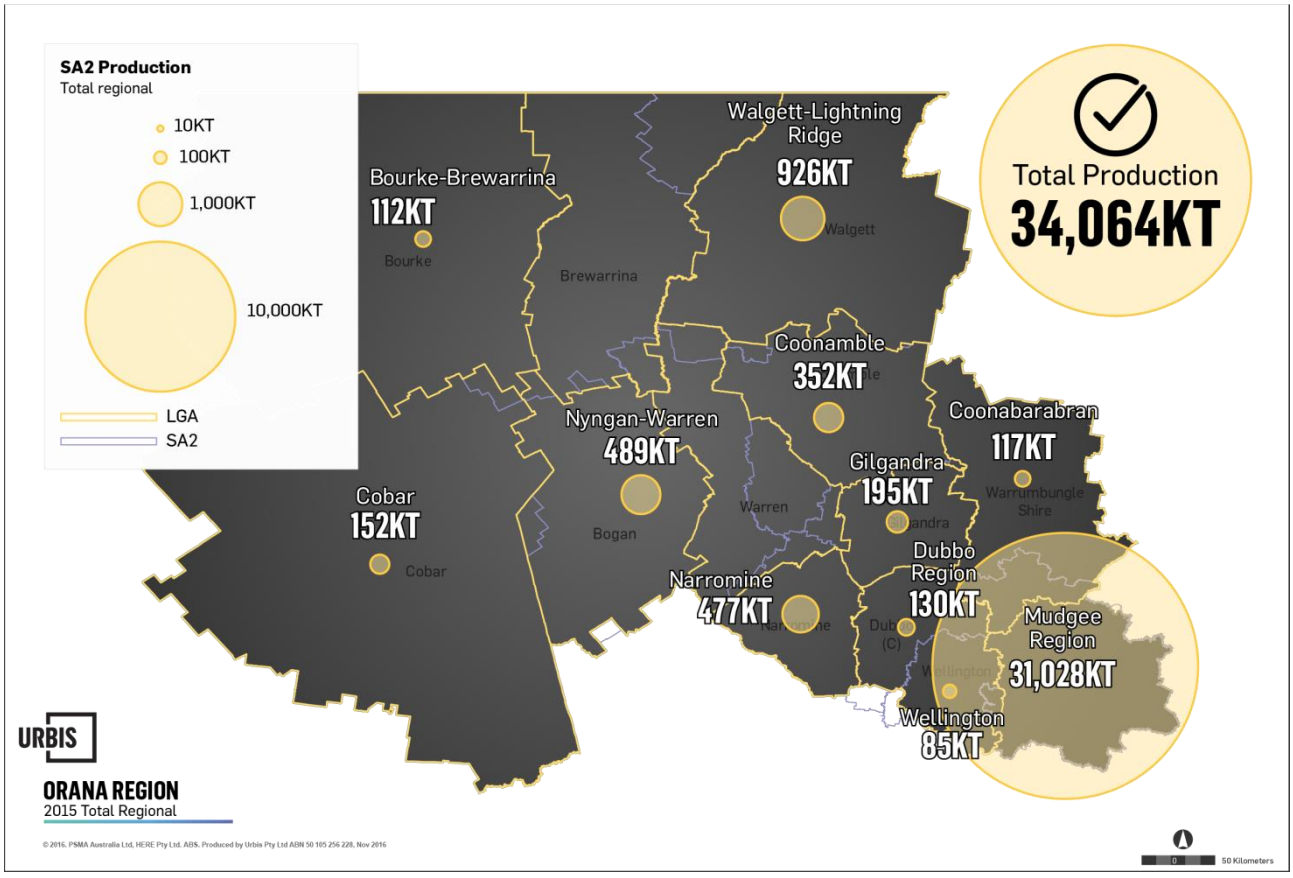
Mining production volumes have been estimated from the most recent available company annual reports. Given the highly variable nature of agriculture and mining production, the estimates presented in this section should be considered indicative annual averages.

2.2.1. Regional Commodity Production

The Orana produces 34,064kT of agricultural and mining commodities in an average year. This figure is dominated by the production of approximately 31,000kT of thermal coal that is produced at the Moolarben, Ulan and Wilpinjong coal mines located at the eastern edge of the Mid-Western Regional LGA.

Excluding coal production, total annual regional agricultural and mining commodity production is approximately 3,097kT in an average year. Total regional commodity production is outlined in Figure 2-4.

Figure 2-4 – Total regional commodity production, five-year annual average 2011-2015



Source: ABS, ABARES, Urbis calculations

The Mid-Western Regional LGA's production is overwhelmingly dominated by thermal coal production. Excluding this production, total production is approximately 62kT, of which almost half is cotton and other broadacre crop production.

Ignoring thermal coal production, Walgett is the largest regional commodity producer in the Orana region, accounting for 926kT or 30% of production in an average year. The Bogan, Warren, Narromine and Coonamble LGAs are also major regional commodity production regions within Orana.

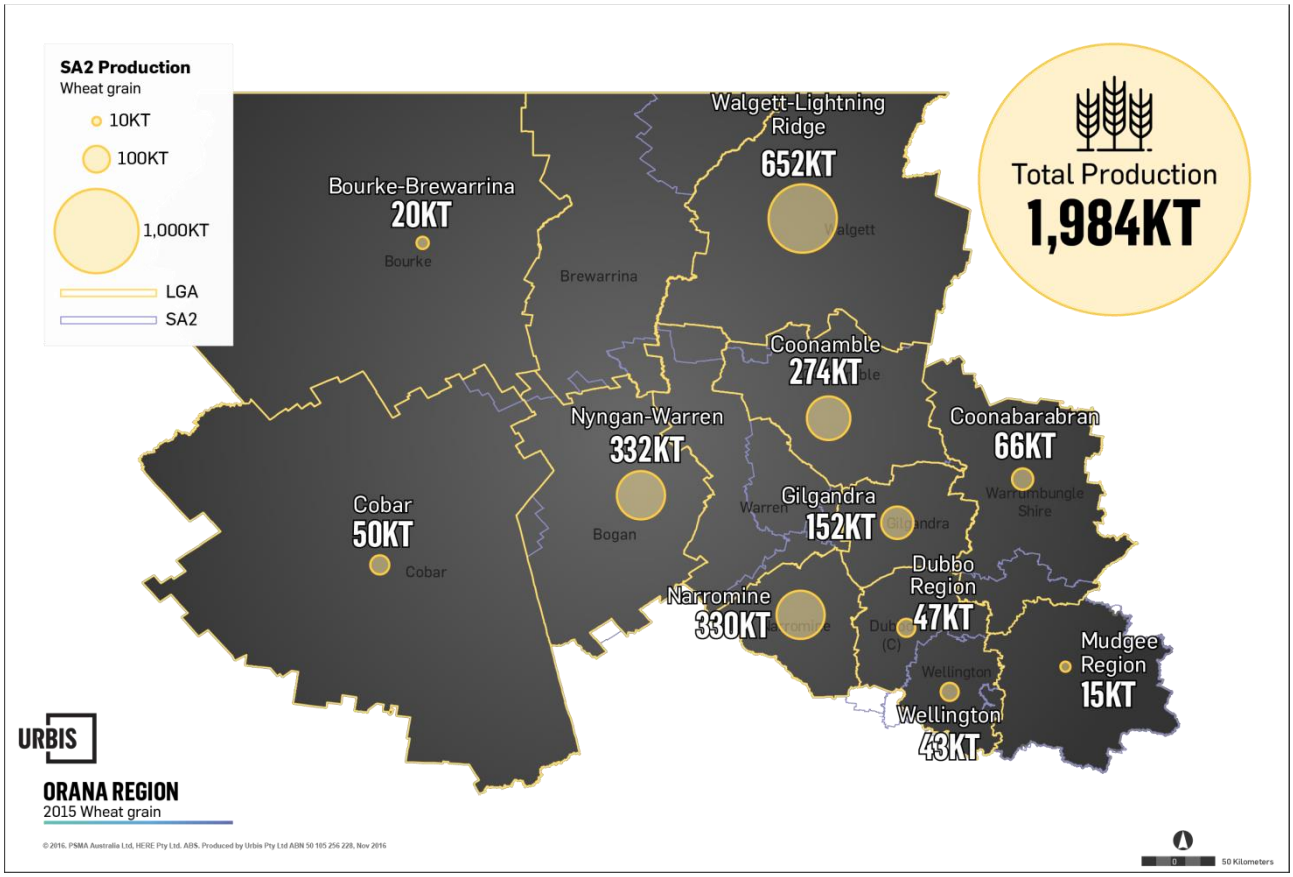
2.2.2. Wheat and other grains

Average annual regional production of wheat and other grains[9] is estimated at 1,984kT, representing two-thirds of all estimated agricultural production in the Orana region. **Wheat and other grains represent the largest and most geographically extensive agricultural freight task in the Orana region.** The average annual production across the Orana region is illustrated in Figure 2-5 below.

[9] Includes cereal crops such as oats, barley, sorghum, maize and triticale.

The Walgett, Narromine, Bogan, Warren and Coonamble LGAs dominate regional production of wheat and other grains. These five LGAs account for around 80% of regional production in an average year.

Figure 2-5 – Regional wheat and other grains production, five-year annual average 2011-2015



Source: ABS, ABARES, Urbis calculations

Production of wheat and other grains in the Orana region (and indeed across wider NSW) is highly variable from year to year, depending on a range of growing and climatic conditions.

While wheat is the dominant cereal product, the Orana region produces a range of other grains including oats, barley, sorghum, maize and triticale. Given that many grain crops share the same handling system, it is appropriate to consider the whole grain industry across the region when assessing potential freight and logistics impacts.

Regional Supply Chain

A key aspect of the NSW wheat and grain industry (unlike Western Australian where around 80% of grain is exported) is that it supplies to three major markets; **domestic consumers, domestic stockfeed and bulk and non-bulk exports**.[10]

Domestic consumers including large milling companies like Manildra and Ben Furney provide a stable and predictable base demand for locally grown grain, while domestic stockfeed demand is particularly significant in NSW.[11] However, bulk and non-bulk exports make up the largest share of regional grain flows in an average year.

The destination and proportion of regional produced grain consumed in an average year is summarised as follows:

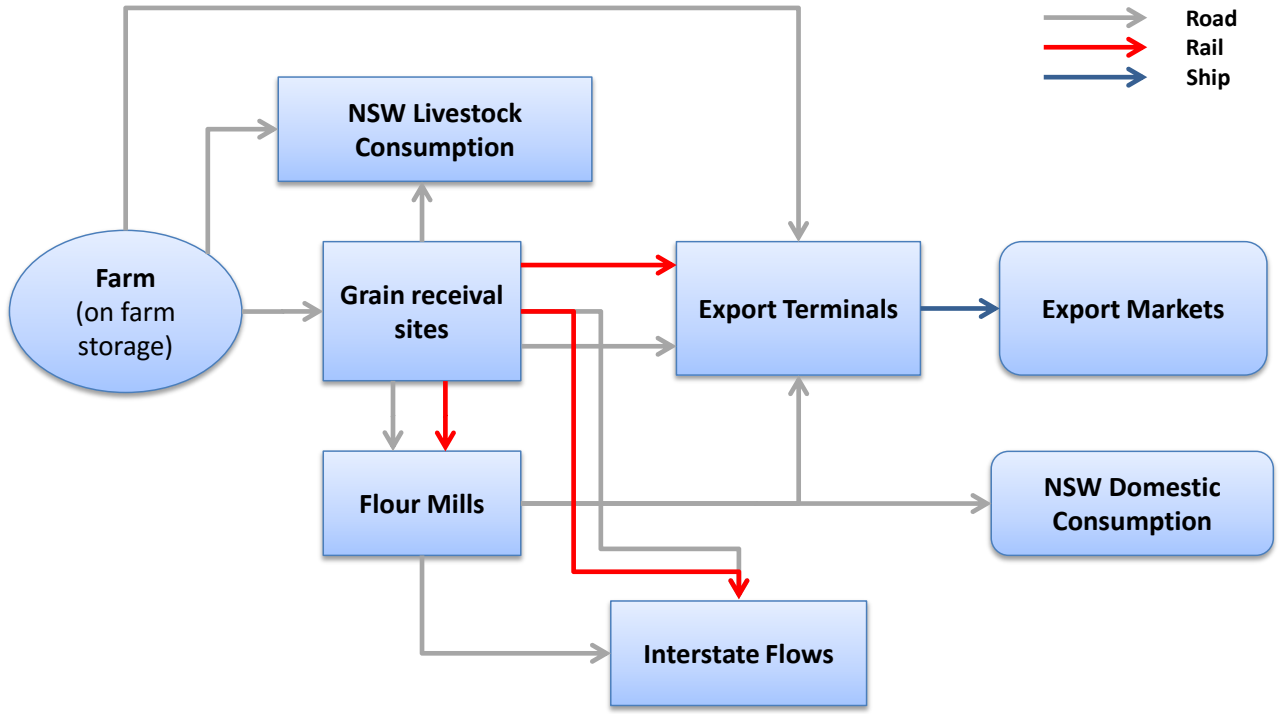
- NSW livestock consumption – 23% or 456kT

[10] Department of Infrastructure, Transport, Regional Development and Local Government, 2009, *New South Wales Grain Freight Review*
[11] Department of Infrastructure, Transport, Regional Development and Local Government, 2009, *New South Wales Grain Freight Review*

- interstate flows – 18% or 357kT
- export markets – 44% or 873kT
- NSW domestic consumption – 15% or 298kT.

Figure 2-6 provides a stylised grain supply chain for the Orana region, which is assumed to reflect the broader NSW grain industry.

Figure 2-6 – NSW grain supply chain



Source: Derived from ABARES, DITRDLG

A key trend impacting the grain supply chain in Orana is the consolidation of up-country receival sites by bulk handlers.[12] Bulk handlers have adopted site-based costing, differentiating charges by receival sites and have begun closing uneconomic sites. For example, there has been a significant reduction in the number of storage sites operated by GrainCorp in the Orana Region (and across NSW) under Project Regeneration.[13]

Road is the dominant freight mode for transporting grain throughout the supply chain. The domestic stockfeed market is almost entirely road based because customers are spatially fragmented and few can be serviced by rail. Feedlots are usually located in areas close to grain and livestock properties, so the trip from grain supplies to feedlots is relatively short. Road is vital in transporting grain from farms to up-country receival sites. Road transport also has a role in managing the overflow of export grain in periods when exceptionally high volumes of grain need to be moved.

However, rail plays a significant role in areas of Orana well-served by rail (in particular Walgett, Narromine and Coonamble) in transporting bulk and containerised grain, particularly to export terminals such as the Port of Newcastle. Rail dominates the transport of grain destined for export markets, accounting for around 95% of NSW export grain.[14]

Walgett, for example, produces around 652kT of grain in an average year. The majority of this grain (and grain produced in northern NSW, in general) is transported in bulk via rail to domestic flour mills in Gunnedah, Sydney and Nowra and export terminals at the Port of Newcastle and Port Kembla. Port of Newcastle accounts for the overwhelming majority of grain exports. However, there has been a recent

[12] Productivity Commission, 2010, *Wheat Export Marketing Arrangements – Inquiry Report*

[13] GrainCorp, Project Regeneration, see: http://www.graincorp.com.au/regeneration, accessed November 9, 2016

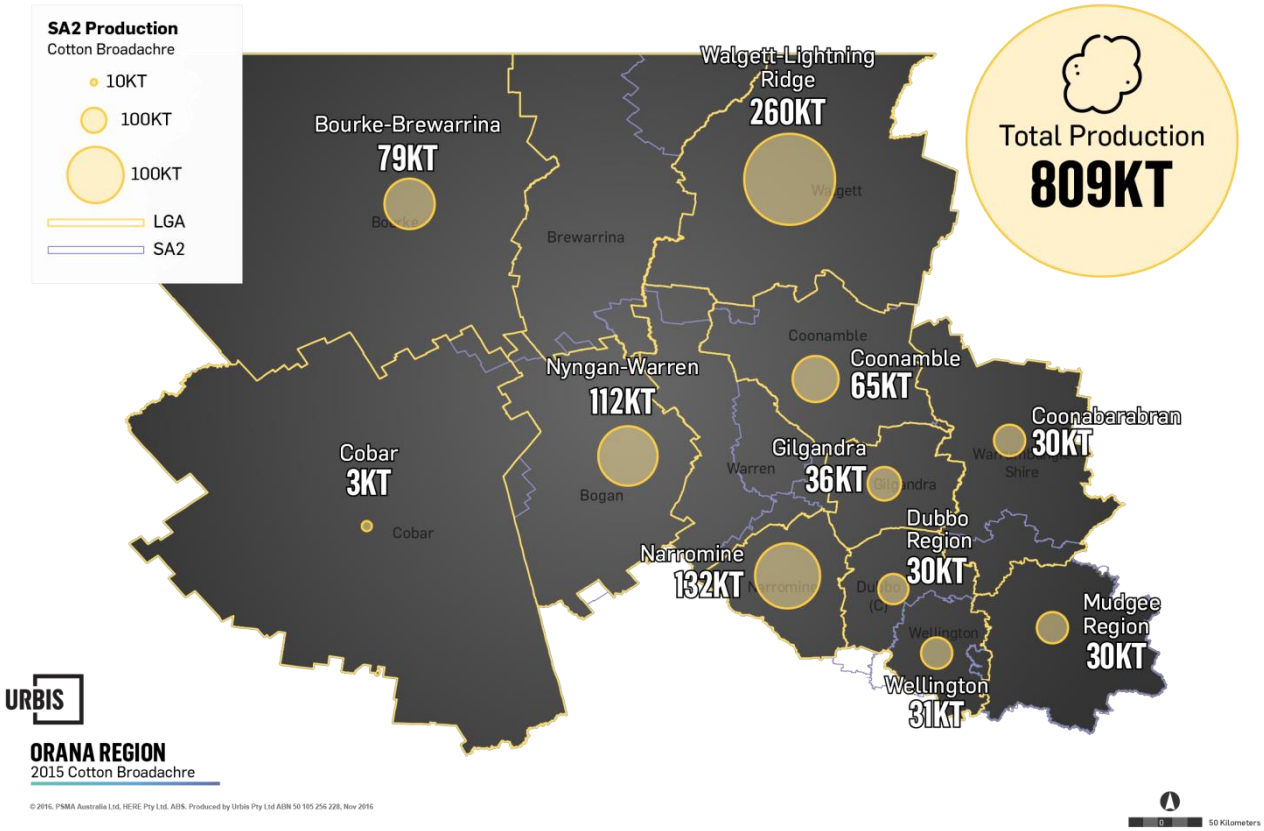
[14] Department of Infrastructure, Transport, Regional Development and Local Government, 2009, *New South Wales Grain Freight Review*

increase in the volume of containerised grain transported by rail from Walgett for export via Port Botany – although this volume remains a very small proportion of total grain exports.

2.2.3. Cotton and other broadacre crops

The Orana region produces around 809kT of cotton and other non-cereal broadacre crops in an average year. This includes cotton, canola (and other oil seeds), pulses and hay and silage. The average annual production across the Orana region is illustrated in Figure 2-7 below.

Figure 2-7 – Regional cotton and other broadacre crop production, five-year annual average 2011-2015



Source: ABS, ABARES, Urbis calculations

Orana is home to some of the largest cotton producing regions of Australia including the Macquarie Valley region (covering the towns of Warren, Trangie and Narromine), Walgett and Bourke. Walgett is the largest producer of cotton and other broadacre crops in the Orana region, accounting for 32% of production in an average year. Narromine, Bogan, Warren and Coonamble are the other significant producers in the region.

Regional cotton production is particularly dependent on prevailing climatic conditions and is consequently highly variable season to season. For example, low water storage levels and low river flows over the period from 2001 to 2009 resulted in significantly reduced water access and extraction, **resulting in an 80% reduction in cotton production in the lower Macquarie Valley over that period**.

Cotton production has rebounded recently, before falling again in 2015 due to low water availability. However, with the Burrendong Dam now 114% full (as of November 2016)[15], **cotton production is expected to increase significantly over the next two seasons, and potentially remain high for a third consecutive season.**

Regional Supply Chain - Cotton

[15] Water NSW, see: http://www.waternsw.com.au/supply/dam-levels, accessed 11 November 2016.

Over 99% of raw cotton produced in Australia, and Orana, is exported.[16] The industry has a reputation for producing high quality fibre for key export markets Indonesia, China, Korea and Japan.[17]

As with other containerised commodities, cotton is predominately transported by long distance road hauliers. In NSW, approximately 95% of all cotton is moved by road[18]. Other key contributing factors for the use of road over rail transport is that very few cotton gins in the region have direct access to rail sidings, and axle mass restrictions on rail freight reduce the competitiveness of rail compared to road.[19]

The majority of road transport is from the farm to gin and from the gin to warehouses. From warehouses and intermodal terminals, the cotton is transported by road and rail to ports for export, either in Sydney or Melbourne. The three main stages of the cotton supply chain are summarised in Table 2-2 below.

Table 2-2 – Cotton stages of production

Stage	Description	Method of transport
Cotton modules from farm to gin	Cotton modules are packed on farm and can either be rectangular or cylindrical. They are carried on open sided flat top semi-trailers. Rectangular modules usually weigh around 14-18 tonnes.[20] Each cylindrical module weighs approximately 2.5 tonnes.[21]	Semi-trailer: either one rectangular module or up to five cylindrical modules.
Separated cotton lint and seeds from gin to warehouse/processor/feedlot or to export	Ginning separates cotton into lint, seeds and trash. One rectangular module of cotton can make about 14 bales of lint[22] – each weighing around 230kg.[23] Cotton lint bales are containerised for transport to warehouses. Cottonseed is transported by container with approximately 13 tonnes per container.[24] Either trucked to warehouses for export, returned to farms, or to processors for further uses.	Open sided flat top semi-trailer and curtain-side trailers
From warehouse to domestic and overseas markets	Containerised cotton lint and seed are aggregated at regional warehouses at intermodal terminals. From here they are shipped predominately by rail to port for export.	Predominately rail in 40 foot containers, each container holding 26 tonnes

Source: QLTC 2013

Figure 2-8 provides a stylised supply chain for the cotton industry. Cotton lint is predominately exported. Cotton seed however, has a variety of uses. While it can be exported like cotton lint, it can also be returned to farms for seed cotton or feed, crushed into oilseed for export or for use as stock feed.

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16 Cotton Australia 2016, *Australian Cotton Industry Statistics*

17 NSW Department of Primary Industries, see: http://www.dpi.nsw.gov.au/content/agriculture/broadacre/summer-crops, accessed 4 August 2016.

18 Transport for NSW 2013, *NSW Freights and Ports Strategy: Appendix A – NSW Logistics Task (2011-2031)*

19 Queensland Transport and Logistics Council 2013, *Supply Chain Perspective: Cotton*

20 Queensland Transport and Logistics Council 2013, *Supply Chain Perspective: Cotton*

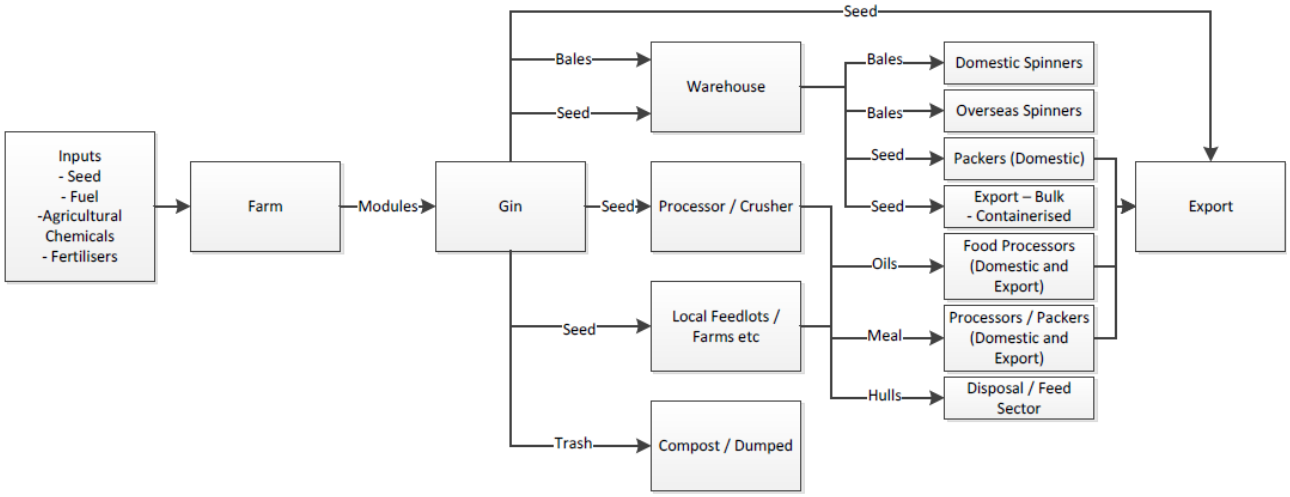
21 Cotton Australia 2013, *Module Restraint Guide*

22 http://www.cotton.org/edu/faq/

23 Cotton Australia, see: http://cottonaustralia.com.au/cotton-library/fact-sheets/processing-exporting-and-marketing

24 Spellson, A. 2013, *Cotton's Export Freight Task*

Figure 2-8 – Australian cotton industry supply chain



Source: AUSTROADS 2001, Cotton Industry: Freight Logistics Case Study

Looking at cotton production specifically, Walgett is the largest cotton producing region in Orana, accounting for around 46% (or 159kT) of all cotton produced.[25] Walgett Shire has three cotton gins, one in the south of the Shire at Carinda, and two in the north at Collymongle and Moomin. There are also six cotton gins in the neighbouring Narrabri Shire, which is not part of the Orana region but is a major cotton producer. The closest intermodal terminal and warehousing facilities are eastward, in Moree, Wee Waa and Narrabri.

The majority of cotton produced in Walgett is trucked to Narrabri for ginning and/or warehousing via the Kamilaroi Highway. Cotton lint is taken to intermodal terminals, containerised and shipped by rail, predominately to Port Botany. Cottonseed is either exported via rail, or trucked for other uses.[26]

The Macquarie Valley produces around 31.2% (or 108kT) of total cotton in the region. The cotton industry in the Macquarie Valley is relatively well serviced by local infrastructure. Cotton picked goes to one of six gins in the area – located reasonably evenly between the towns of Warren, Nevertire, Trangie and Narromine. Cotton gins within the region also process approximately 100kT cotton transported via road from the production regions of the Riverina.[27]

From the gins cotton is transported to intermodal terminals in Warren, Narromine or Dubbo. Major highways through the area include the Mitchell Highway going northwest to southeast, and the Oxley Highway going east to west.

Bourke produces, on average, around 22.8% (79kT) of the Orana region's total cotton. However, despite being a major producer the LGA is not as well serviced by gins as other major producing regions. There are only two cotton gins in Bourke, and no intermodal terminals. After ginning, the cotton lint is trucked either to intermodal terminals in the east or directly to port in Sydney, Brisbane or Melbourne.

2.2.4. Livestock and meat production

Average annual livestock and meat production in the Orana region is around 99kT. This includes beef, sheep and lamb, pork and poultry production.[28] Beef production is by far the largest component of livestock production, accounting for 70% of total regional production, or around 70kT.

Sheep and lamb is the second largest contributor to livestock and meat production, accounting for around 27kT, while pork and poultry account for 2.3kT and 0.3kT, in an average year. The average annual production across the Orana region is illustrated in Figure 2-9 overleaf.

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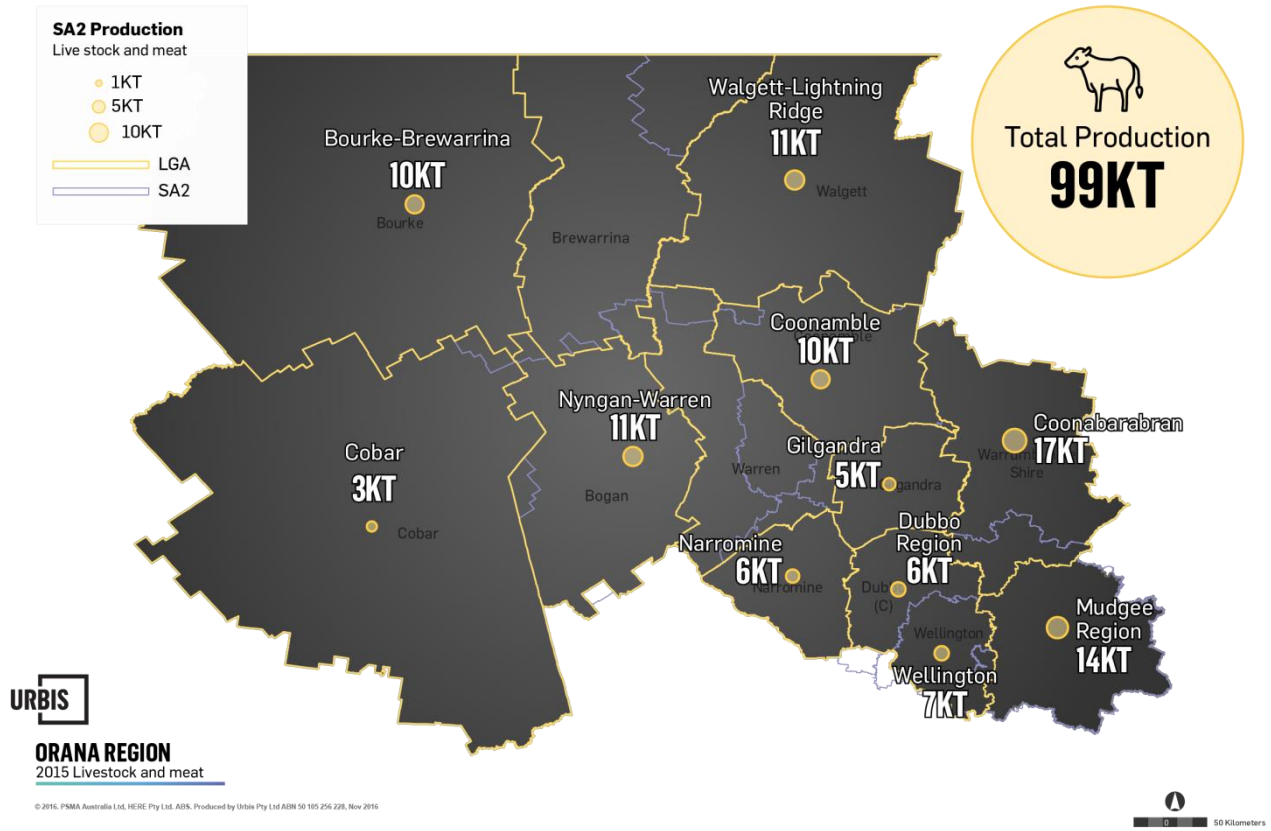
[25] ABS 2012, *Value of Agricultural Commodities Produced 2010-11,* cat. no. 7503.0, Table 6. Note, cotton includes lint, seed and cotton trash production.

[26] Narrabri Shire Council 2016, *Regional Intermodal Terminal Taskforce,* submission to TfNSW

[27] Transport Performance Analytics, 2013

[28] Goat meat production also occurs, but is very small, at $0.9 million in Bourke and $0.4 million in Cobar.

Figure 2-9 – Regional livestock and meat production, five-year annual average 2011-2015

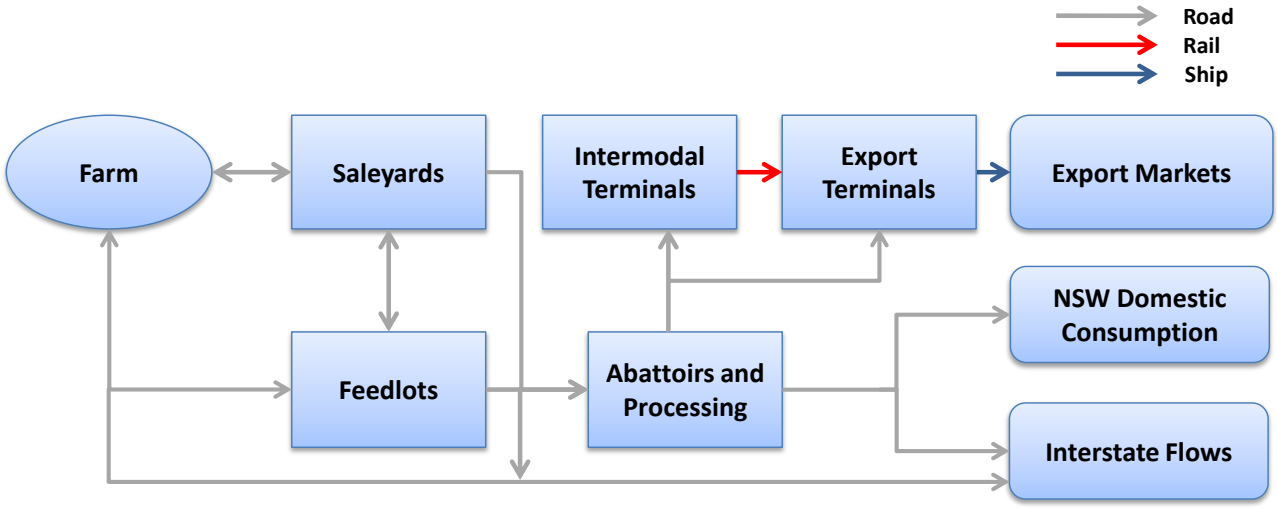


Source: ABS, ABARES, Urbis calculations

Regional Supply Chain

Figure 2-10 provides a stylised livestock and meat production supply chain for NSW region, which is representative of the Orana region.

Figure 2-10 – NSW livestock and meat supply chain



Source: Derived from ABARES

Road is the dominant freight mode for transporting livestock and meat products throughout the supply chain. Animals are transported between farms, feedlots and saleyards entirely by road due to the spatially fragmented nature of customers and operators.

Saleyards are often the first point of aggregation in many livestock supply chains, providing a venue for the auction of a range of livestock types. The Dubbo Regional Livestock Market (DRLM) is strategically located within Dubbo close to major road and rail routes to facilitate the sale and distribution of livestock to:

- other farmers for fattening or backgrounding for entry into feedlots
- to feedlots for grain finishing
- to abattoirs for slaughter.

In 2015-16, the DRLM had a sale throughput in excess of 1.3 million sheep (4.9% of total NSW flock) and 197,000 cattle (3.7% of total NSW herd).

Feedlots are also usually located in areas close to grain with ready access to livestock. Across NSW (and Australia) there has been a significant expansion of lot feeding over the past 30 years. The increase in intensive feeding is mainly attributed to export demand for a consistent supply of meat that meets market specifications. Livestock are transported by road from the feedlots and DLRM (and other saleyards) to abattoirs for processing.

From there, processed meat is transported to intermodal terminals (such as the Fletcher Intermodal Freight Terminal in Dubbo) for direct transport via rail to export terminals or domestic retailers in NSW or interstate via road.

While still in its infancy, online auctions of on-farm livestock are increasing. This will see trucking directly from farm to the purchaser, without the need for transport via the yards, reducing the overall trucking distances required.

2.2.5. Livestock products (wool and milk)

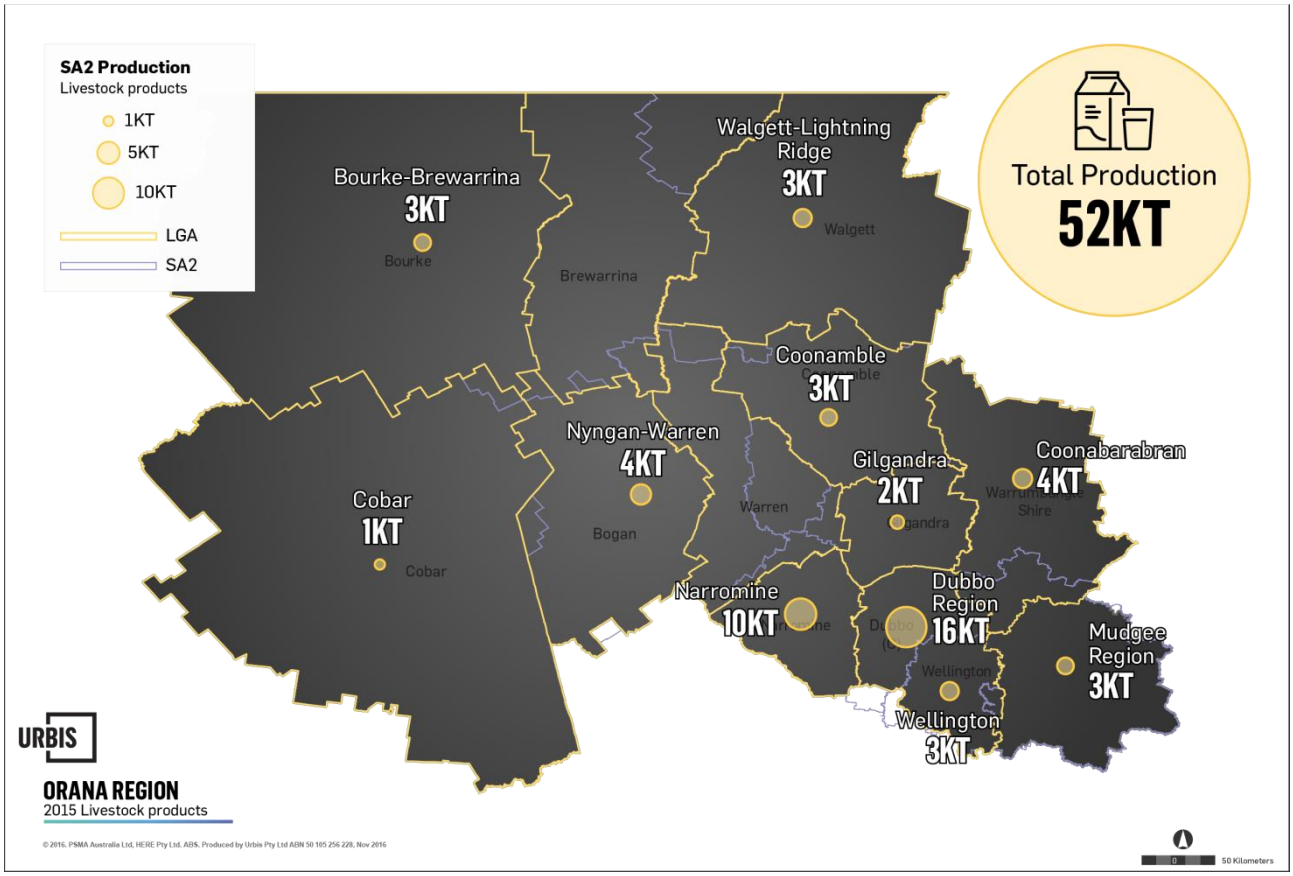
The Orana region produces around 52kT of livestock products in an average year, predominantly wool and milk, with production split evenly between these two commodities.[29] The region is also a major egg producer.[30]

Milk production is clustered around the Dubbo and Narromine LGAs, while wool production is spread fairly evenly through the entire region. The average annual production across the Orana region is illustrated in Figure 2-11 overleaf.

[29] ABS 2012, *Value of Agricultural Commodities Produced 2010-11,* cat. no. 7503.0, Table 6

[30] It is difficult to estimate the volume of egg production with any certainty and has therefore been excluded from livestock product volumes.

Figure 2-11 – Regional wool and milk production, five-year annual average 2011-2015



Source: ABS, ABARES, Urbis calculations

Regional Supply Chain

Road is the principal freight mode for livestock products in the Orana region. The fragmentation of farms, warehouses, processing facilities and domestic customers means that road is the most effective freight mode. Refrigerated transport vehicles also allow for transportation of chilled products such as milk and eggs.

Rail however, is used to transport wool from the wool selling centre in Yennora (Sydney) to export terminals in Port Botany.[31]

2.2.6. Coal and minerals production

There are 16 mines across 10 different mining operations throughout the Orana region. Major resources include coal, copper, gold, zinc and other minerals. As noted above, coal mining is focused in the Mid-Western Regional LGA. The region is also a strong producer of minerals, particularly copper, gold and zinc, with some of the largest copper and gold mines in NSW located in Cobar and Bogan, including:

- CSA Cobar, located in Cobar, produced 48,660T of copper in 2015[32]
- Peak Gold Mines, located in Cobar, produced 6,350T of copper and 91,500 ounces of gold in 2015[33]
- Straights Resources, located in Hermidale in the Bogan LGA, produced 30,425T of copper in 2015.[34]

The Orana region is also a growing and increasingly important producer of zirconium and rare earth elements. The $1 billion Dubbo Zirconia Project owned by Alkane Resources received formal approval in August 2015 and is expected to produce around 25kT of concentrate per annum.

Coal production dominates regional mining output. There are three coal mining operations in the region with a total volume of 31,000kT of coal produced in 2015. This estimate is based on the most recent annual

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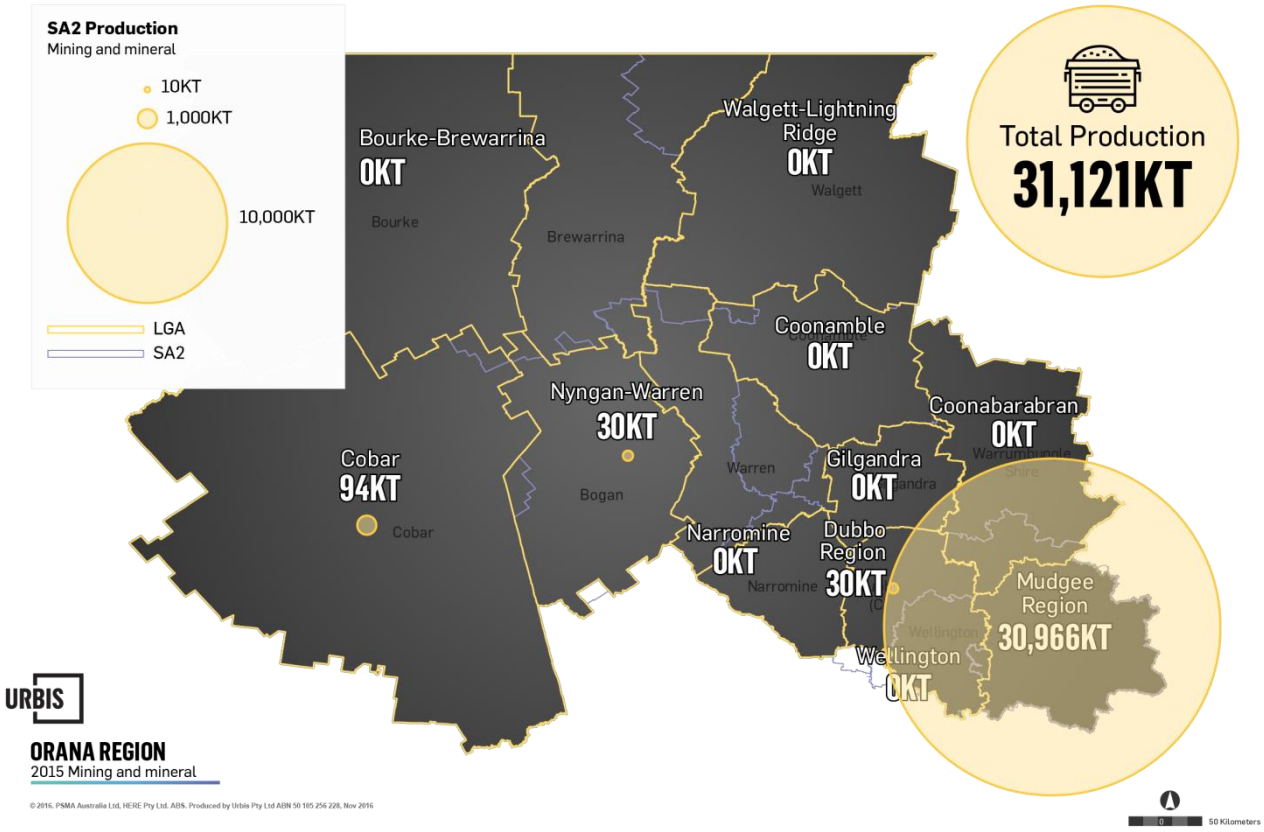
[31] NSW Department of Primary Industries, 2015, *NSW Wool Industry and Future Opportunities*
[32] CSA Mine Glencore 2015, *Annual Environmental Management Report*
[33] Newcrest Mining Ltd 2015, *Annual Report 2015*
[34] Straits 2015, *Annual Report 2015*

reports from individual coal companies operating in the region. This estimate should be taken with caution, as local and global conditions can see significant fluctuations in the volume of coal produced year-on-year. Mineral production was approximately 154kT in 2015.

Coal and mineral production across the Orana region is illustrated in Figure 2-12 below.

Figure 2-12 – Regional coal and mineral production, 2015



Source: Urbis calculations

Regional Supply Chain

The three coal mines operating in Orana are located in the developing western coalfields of NSW in the Mid-Western Regional LGA. The region is known for its production of high-quality thermal coal. Regionally produced coal is almost universally transported by rail along Australian Rail Track Corporation (ARTC) main rail lines to power generators or Port of Newcastle for export.

Regional mineral production is focussed in Cobar and Bogan. Operators undertake initial processing onsite and then rely on a mix of road and rail freight modes to transport their mineral concentrate depending on their location in the region. For example, Aurelia Metals, located in Cobar, transports its mineral concentrate via road to storage facilities in Hermidale, and then bulk freight the concentrate via rail to the Port of Newcastle.

In contrast, other operators such as Alkane Resources, transport 100% of their output via road directly to the Port of Newcastle via the Golden Highway. All mineral production in the region is ultimately freighted to the Port of Newcastle for bulk export.

The decision on freight modes depends on the volume of production and distance from appropriate intermodal facilities. Stakeholders have indicated that transfer costs between freight modes (i.e. transfer from road to rail) and associated storage costs can often be cost neutral or cost prohibitive, resulting in some operators preferring to use road to transport their product despite the distances involved. Operators often review their choice and mix of freight modes based on projected production rates and volumes.

2.3. OPPORTUNITIES AND EMERGING TRENDS

A discussion of the market opportunities that play well to the Orana region's strengths, and emerging trends of how Orana producers access and use regional freight and logistics networks, is provided below.

2.3.1. Market opportunities

A more detailed discussion of the major market and export opportunities for the Orana region is provided in the accompanying report *Orana International Air Freight Feasibility Study*.[35]

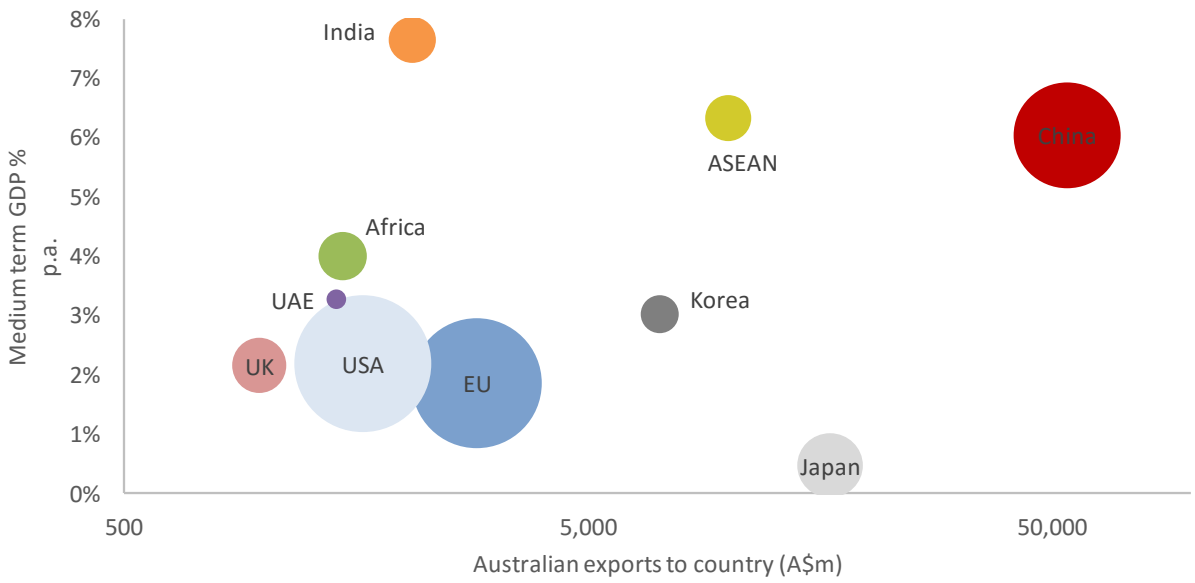
China, India and Indonesia represent the strongest growth markets over the next three decades, while the USA and Europe will fall in GDP rankings, according to leading global economic research house, the Economist Intelligence Unit (EIU).

Over the medium term these growth markets will remain strong for Australian exporters. However, competition for access can be expected to continue to rise – in particular for processed or partially processed commodities where low wage, resource-rich developing countries represent a significant competitive threat (Indian buffalo exports to Indonesia are a recent example).

Recent Australian bilateral Free Trade Agreements (FTAs) with China, Japan and Korea may improve market access over time but will take up to ten years to fully come into effect.

Figure 2-13 below shows how regional opportunities play well to the Orana region's strengths. The horizontal axis shows the relative strength of Australian exports to key markets, while the vertical axis shows expected annual GDP growth rates in those markets over the medium term. The size of the bubbles represents the comparative size of the export destination country. GDP growth is expected to translate into increased per capita incomes in developing economies.

Figure 2-13 – Australian exports and markets (by size and growth)



Source: IMF World Economic Outlook Database 2016

The chart shows the strong current and potential relationship between Australian exporters and our Asian trading partners, notably China and the ASEAN[36] economies.

However, the opportunities presented by China may not be as large or as easily established as some of the hyperbole suggests. China's goods imports are dominated by minerals and metals, as well as machines and transport. Crude oil and integrated circuits – the top two imports – account for more than a fifth of China's goods imports.

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[35] Urbis, 2016

[36] Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam

Among 'other' imports, such as beef, the story is more subdued. Frozen and fresh beef accounted for just 0.1% of total Chinese imports in 2014, although the value of this market is US$1.7 billion and Australia dominates, accounting for almost half of all China's imports. Wheat is also a dominant market for Australia with a 49% share of US$875 million in imports.

Across other Asian markets, product demand from Australia is similar, relying largely on primary produce. The relatively high wages structure in Australia compared to these countries means that most producers will export unprocessed goods for further processing offshore.

2.3.2. Emerging trends

A range of emerging trends have the potential to impact how freight and logistics networks are used and accessed within Orana, how products from the region access markets and the future infrastructure investment needs of the region. Emerging trends include:

- **Containerisation of freight:** there has been a recent marked increase in the use of containers to ship agricultural commodities, particularly grain and to a lesser extent cotton. The containerisation of agricultural commodities enables producers to access exports markets through container ports (some international markets don't have bulk facilities) and by-pass the bulk handling sector (when combined with on-farm storage – see below). For Orana, this is likely to result in larger freight volumes transported by both road and rail to Port Botany. However, containerised wheat is still likely to remain a niche market compared to bulk wheat.

- **Consolidation of up country receival sites:** since the deregulation of the grain sector in 2008, bulk handlers have moved more towards site-based costing, differentiating charges by up-country receival site and have begun closing uneconomic sites.[37] This has directly resulted in a significant reduction in the number of bulk storage and up-country receival sites in the Orana Region (and across NSW, and also WA). This trend is likely to continue, resulting in greater use of road to freight commodities to sites that are located further away, or potentially producers by-passing the bulk handling system altogether and directly accessing markets themselves or via co-operations.

- **Transition from rail to road freight:** significant improvements in high performance vehicles, increased truck loads, improved fuel efficiency and safety have resulted in significant productivity gains for the road transport sector. In contrast, the rail sector has not been able to keep pace with the productivity gains, and has been impeded by a lack of investment to improve coordination, axle load and speeds. Combined with the ability of the road sector to provide point-to-point and direct market access, this has seen road capture an increasing market share of the freight task.

- **On-farm storage and direct access to markets:** on-farm storage continues to increase, driven by the benefits of being able to: increase control over selling to maximise price; reduce post-harvest weather damage to grain; and, avoid centralised handling costs.[38] Being able to store wheat on-farm is an important factor in being able to service domestic markets; feedlots and domestic millers are likely to have limited storage capacity, and are likely to prefer grain to be delivered when needed. The relatively new market for containerised exports also allows producers to bypass the up-country receival system by delivering wheat directly from farm to port.

- **Use of economic development zones:** stakeholder consultations confirmed that many major agricultural producers and resource companies within the Orana region are in the process of, or are considering, developing offshore processing and manufacturing facilities in import countries, often within Economic Development Zones or Special Development Zones. Rather than undertake value-adding activities such as processing or manufacturing locally and then exporting the finished product, producers are exporting the raw/unprocessed products and processing them directly in the destination country within their own facilities. The benefit for the company is that it maintains control over the product throughout the supply chain, but with lower wages and other input costs. This has potential implications for local manufacturing employment, and could result in a greater proportion of raw/unprocessed products being transported directly to export terminals.

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[37] Productivity Commission, 2010, *Wheat Export Marketing Arrangements – Inquiry Report*

[38] Australian Bureau of Agricultural and Resource Economics and Sciences, 2015, *Australia's wheat supply chains: Infrastructure issues and implications*

It is unclear what the long-term implications of the above trends will be on regional freight network demand and use, and future investment requirements. RDA Orana should continue to actively consult with industry and the State Government to understand the potential implications and infrastructure requirements.

3. REGIONAL FREIGHT AND LOGISTICS NETWORKS

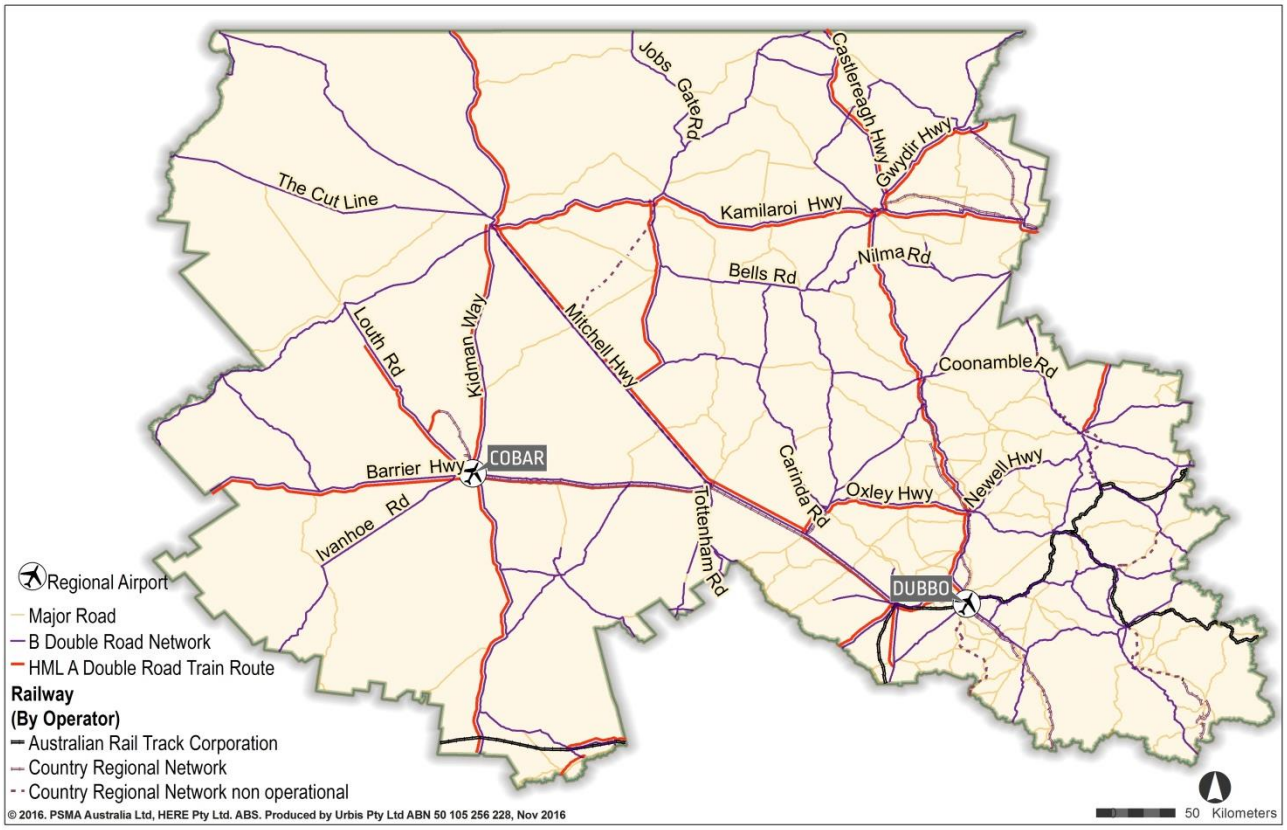
3.1. REGIONAL OVERVIEW

The Orana region is underpinned by strong connectivity to transport infrastructure, in particular road and rail. Dubbo, with its location at the intersection of the Mitchell, Newell and Golden Highways is particularly well-placed as a freight and distribution hub for the region.

The region is served by large and well-connected road freight networks including B-double and road-train networks, with connectivity to Port Botany, Port of Newcastle and Port Kembla. The region also has good interstate road connectivity, particularly with Queensland in the north (via the Newell, Mitchell and Castlereagh Highways) and Victoria to the south (via the Newell Highway and Kidman Way). The road network is the backbone of the regional freight network. It is by far the dominant regional freight mode, accounting for 85% of total regional freight volumes, and underpins regional industry activity.

The Orana region, particularly the south-east of the region, has strong rail freight connectivity. Dubbo has direct rail connectivity to all the major export terminals in NSW including Port Botany, Port of Newcastle and Port Kembla. Key regional road and rail freight networks are presented in Figure 3-1 below.

Figure 3-1 – Regional freight network



Source: Transport for NSW, Urbis

Extensive stakeholder consultations with major regional producers and a detailed literature review have confirmed that the existing freight and logistics networks underpinning the Orana region do not yet constrain regional productive capacity nor impede access to markets. However, profitability and competitiveness are adversely impacted by inefficiencies in the freight and logistics network, predominantly the poor quality of infrastructure in some places. These lead to load constraints, slower speeds, less direct routes and increased wear and tear on vehicles.

The NSW Government recognises that continued investment is required in the region's critical road and rail infrastructure to better support the region's economy.[39] This is particularly important as NSW's freight task is expected to double by 2030 and triple by 2050, with a large proportion of this growth occurring in the Orana region.[40]

3.2. REGIONAL ROAD NETWORK

The Orana has an extensive road freight network, with approximately 2,500 km of road train (A-double, high mass loads) and 6,700 km of B-double networks.[41]

3.2.1. Major Network Corridors

Major national and state road network corridors in the region include:

- Newell Highway (north/south, from Parkes through Dubbo, to Narrabri and Moree)
- Mitchell Highway (east/west, from Bathurst through Dubbo and to Bourke)
- Golden Highway (east/west – goes eastwards from Dubbo towards Newcastle)
- Oxley Highway (east/west from Gilgandra to Gunnedah)
- Castlereagh Highway (north/south)
- Kamilaroi Highway (east/west from Bourke to Gunnedah)
- Barrier Highway (east/west, from Cobar to Nyngan)
- Kidman Way (north/south in the west of the Orana region).

The region is also served by a vast network of local and regional roads that feed major regional freight corridors.

The Newell, Mitchell, Oxley and Golden Highways are particularly critical freight corridors for the Orana region, and are discussed in further detail.

Newell Highway

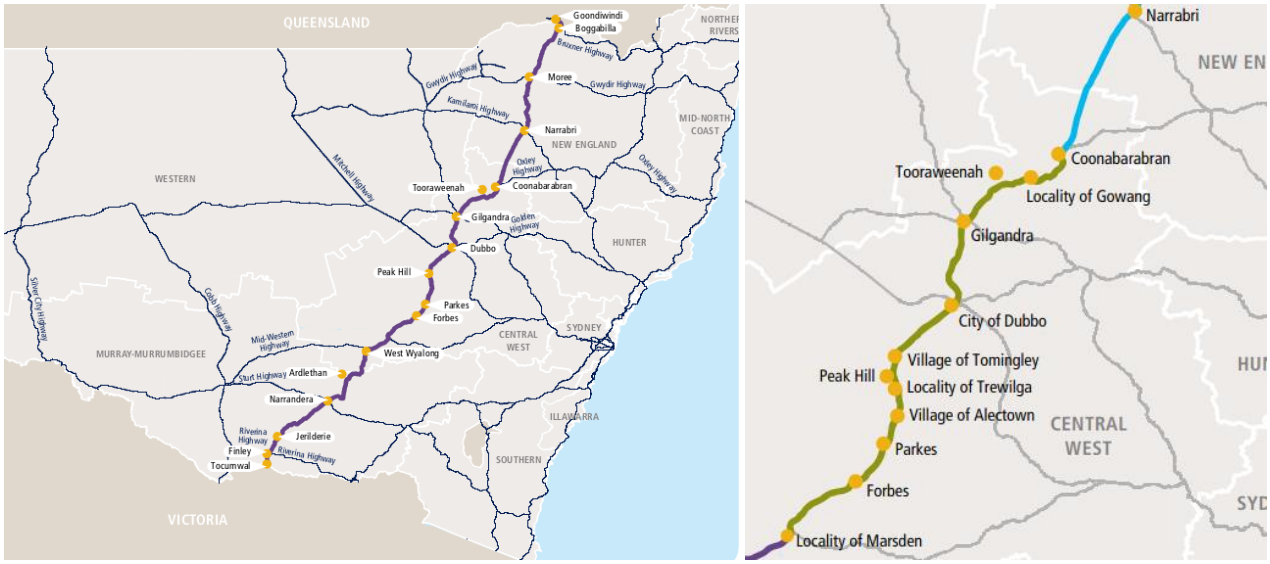
The Newell Highway is the longest highway in NSW, running south to north through the State and providing an essential corridor for the Orana region and central western NSW more generally. It is a major interstate freight connector between Victoria, NSW and Queensland. The Newell Highway corridor is shown in Figure 3-2 below.

[39] NSW Department of Premier and Cabinet, 2012, *Orana Regional Action Plan*

[40] NSW Government, 2016, *Draft Central West and Orana Regional Plan*

[41] Calculated from Transport for NSW, see: http://freight.transport.nsw.gov.au/map/index.html

Figure 3-2 – Newell Highway corridor



Source: Transport for NSW

The Newell Highway is a critical freight corridor for the Orana region, carrying between 800 to 1,000 heavy vehicles per day from Tomingley to Gilgandra (including Dubbo)[42]. This is equivalent to between 2,000 and 2,600kT of annual freight.[43]

The Newell Highway has a high proportion of heavy vehicle usage, which fluctuates along various parts of the route between 26% and 52% of all traffic.[44] Currently, restricted access vehicles (including 25 metre and 26 metre B-doubles) can access the Newell Highway along its full length, except through the centre of West Wyalong where a restricted access vehicle bypass is used. Within the Orana region the Newell Highway is open to double road trains from Tomingley to Gilgandra (through Dubbo). Higher productivity vehicles (HPV) including B-triples and AB-triples are also allowed to travel along the Newell Highway from Dubbo to Gilgandra.

Mitchell Highway

The Mitchell Highway commences in Bathurst (NSW) and extends north-west to connect with Dubbo, Narromine, Nyngan and Bourke and on to the Queensland border. It is a critical link in the Orana region's freight network, intersecting with the Golden, Newell, Oxley, Barrier and Kamilaroi highways.

The average number of heavy vehicles travelling along the Mitchell Highway varies greatly, with greater numbers closer to regional centres. Around the regional centre of Dubbo, the Mitchell Highway carries between 450 and 620 heavy vehicles per day. This is equivalent to between around 1,150kT and 1,600kT of annual freight. In contrast, between Coolabah and Bourke, the highway carries around 50 heavy vehicles per day, equivalent to around 130kT of annual freight.[45]

Oxley Highway

The Oxley Highway (Figure 3-3) is a major freight corridor and connector in the south-east of the Orana region. The highway is 514 kilometres in length, starting on the mid north coast of NSW at Port Macquarie and extending west to connect with the inland centres of Tamworth, Gunnedah, Coonabarabran, Gilgandra and Warren. It terminates at Nevertire in the Orana region where it intersects with the Mitchell Highway. It also intersects with two other important freight corridors in the Orana region; the Kamilaroi and Newell Highways.

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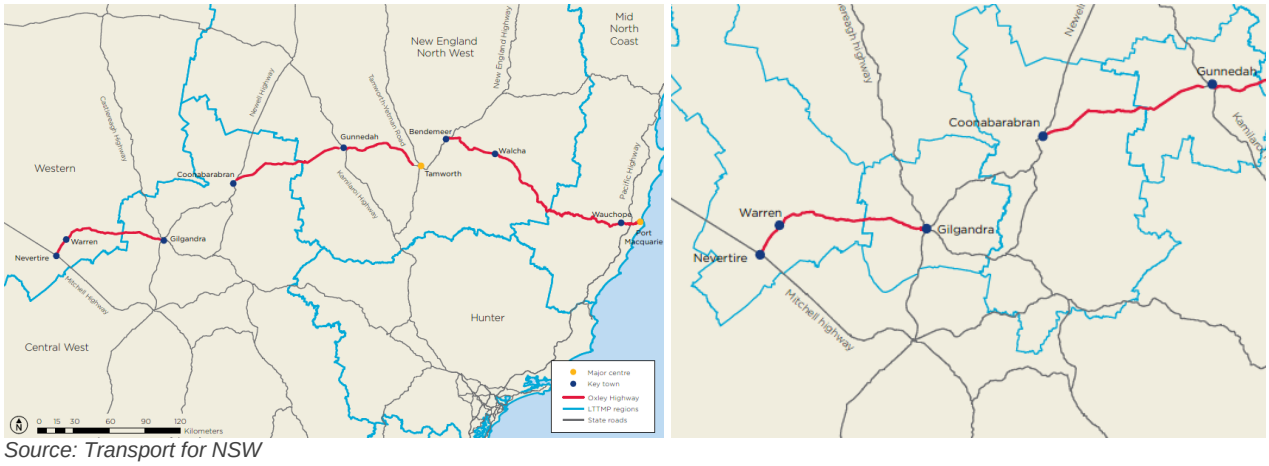
[42] Roads and Maritime Services

[43] Based on traffic count data provided by Roads and Maritime Services

[44] Transport for New South Wales, 2015, *Newell Highway Corridor Strategy*

[45] Based on traffic count data provided by Roads and Maritime Services

Figure 3-3 – Oxley Highway corridor



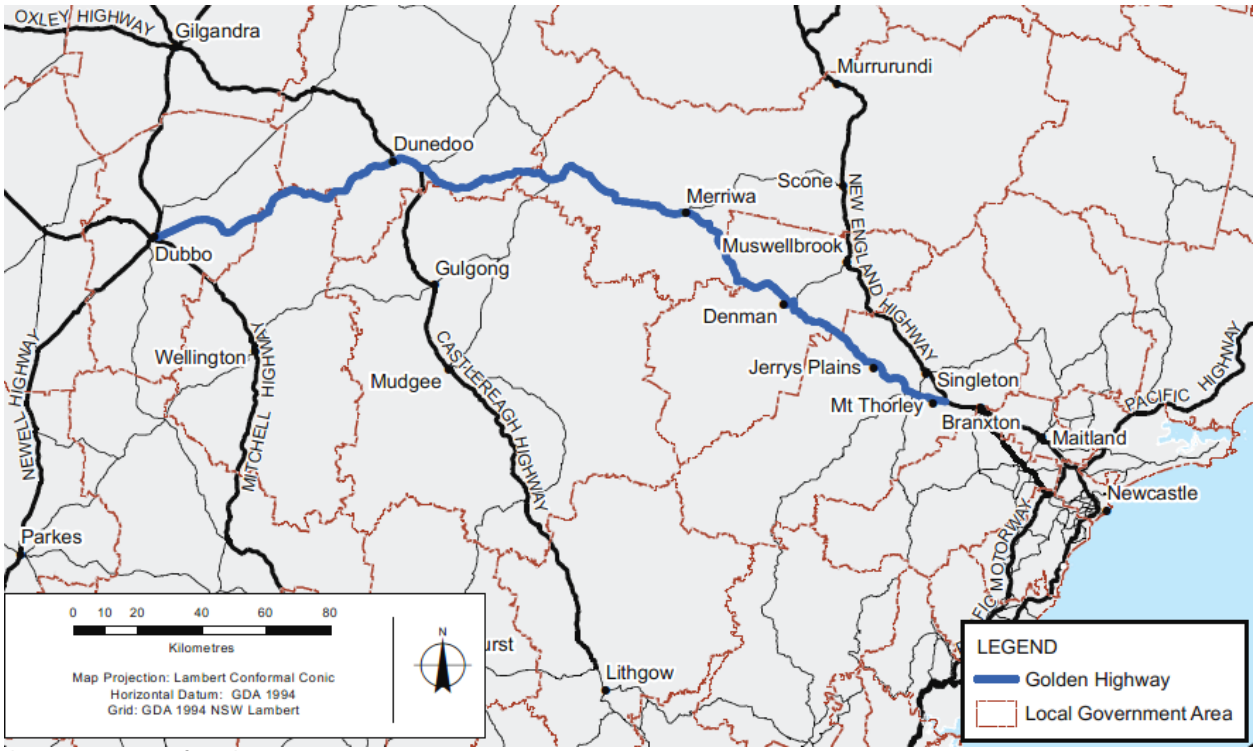
Source: Transport for NSW

The Oxley Highway carries on average over 700 heavy vehicles per day between Gilgandra and Coonabarabran, equivalent to around 1,800kT of annual freight.[46]

Golden Highway

The Golden Highway (Figure 3-4) is a critical freight corridor link of 313 kilometres between the Orana region and Newcastle, running from Dubbo in the west to the New England Highway in the east. It also provides access to Tamworth, Armidale and south-east Queensland in the north.

Figure 3-4 – Golden Highway corridor



Source: Transport for NSW

[46] Based on traffic count data provided by Roads and Maritime Services

Between Dubbo and Dunedoo, the Golden Highway carries more than 250 heavy vehicles a day on average, equivalent to more than 650kT of annual freight.[47] The Golden Highway is particularly important for the region, providing connectivity to a range of critical markets:

- movement of grain and other agricultural products from Western NSW for processing, packing and supply to domestic and export markets
- movement of non-coal minerals from north-western NSW to Newcastle and Sydney
- distribution of consumer and industrial goods and agricultural inputs in the north-west of NSW and long distance movements to other states.

3.2.2. Road Funding

The management of roads in Australia (summarised in Table 3-1) is the responsibility of the three tiers of government.

The overwhelming majority of roads in the Orana region are local and regional roads funded by Local Government. The low population and rates base for many local councils in the Orana region mean local councils are severely constrained with the amount of funding available to maintain and invest in existing road infrastructure.

The pressure on local councils to identify additional revenue to maintain and upgrade existing road networks will intensify as the freight task along local and regional roads also increases over time.

The NSW Government has established the Fixing Country Roads program to alleviate pressure on local councils. The program provides targeted funding to local councils for road projects that will eliminate connectivity constraint on local roads in NSW and reduce the cost to market for regional businesses. Under the program funding is provided for vital road and bridge upgrades to improve connectivity between local and regional roads and state highways.[48]

Table 3-1 – NSW road hierarchy

Road Network	Responsibility	Description
State roads (including national road components)	NSW Government Australian Government	The State road network comprises 18,028 kilometres of roads, which includes 4,323 kilometres of national roads supported by the Australian Government. The State road network also includes 147 kilometres of privately funded toll roads
Regional roads	NSW Government Local Government	Local Government has management and funding responsibility for 18,231 kilometres of regional roads. State funding grants are also available. The NSW Government also manages 2,970 kilometres of regional and local roads in the unincorporated area of NSW

[47] Based on traffic count data provided by Roads and Maritime Services

[48] Transport for NSW, see: http://www.freight.transport.nsw.gov.au/strategy/projects/fixing-country-roads, accessed 16 November 2016

Road Network	Responsibility	Description
Local roads	Local Government	Councils are the authorities for 145,619 kilometres of local roads. Financial Assistance Grants and Roads to Recovery Program funding is also made directly available to councils by the Australian Government

Source: Transport for NSW

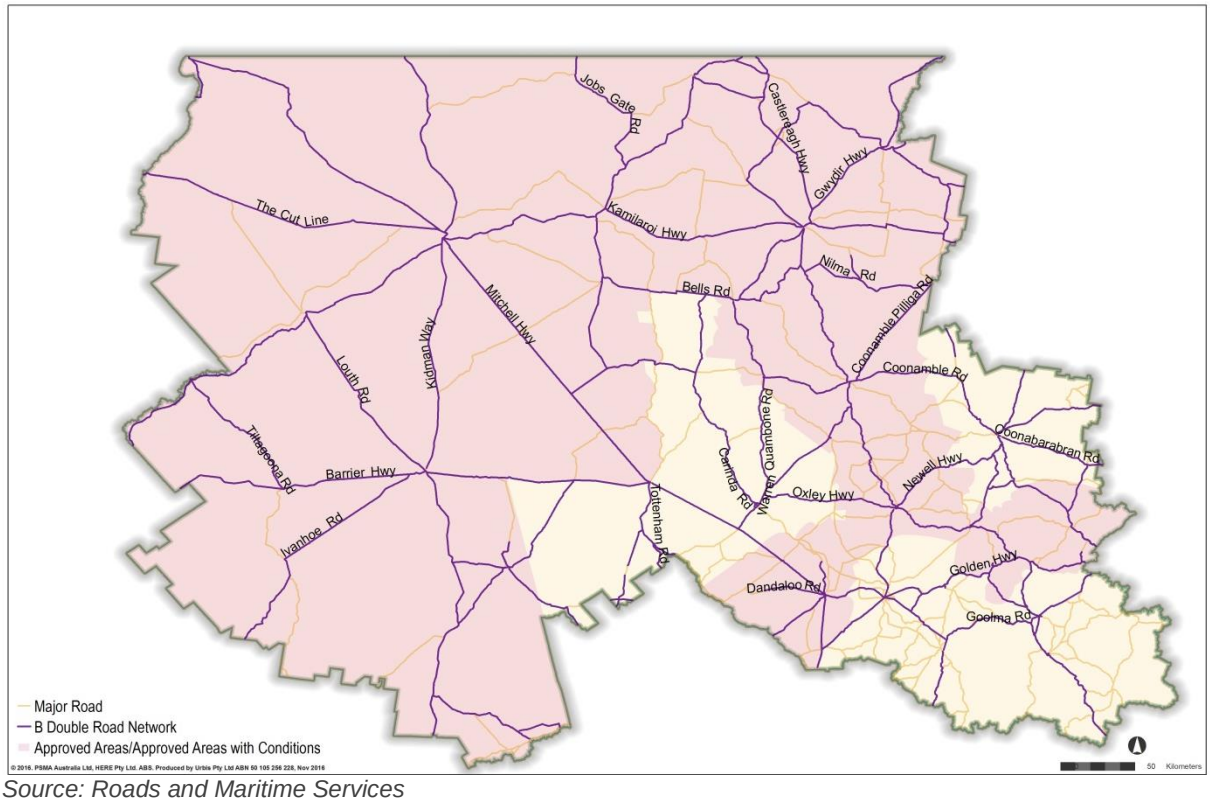
3.2.3. Freight Networks and Vehicle Access

Heavy vehicles that are less than 19 metres in length (such as standard semi-trailers) have unrestricted access to the road system across NSW, except where there are road or bridge sign postings.

Heavy vehicles that exceed the length and load limits as defined by the National Heavy Vehicle Regulator have restricted access to the road network. Examples of restricted heavy vehicles include B-doubles over 19 metres in length, road trains and vehicles operating at Higher Mass Limits (HML).[49] Access to the road network for these vehicles is managed through Notices and specific permits.

The Orana region is well-served by an extensive restricted access vehicle network that provides B-double and road train access to most the region. Rather than declaring specific routes, RMS has recently moved to simplify access arrangements and has declared whole areas accessible by high performance vehicles such as B-doubles and road trains. An overview of freight network access in the Orana region is provided in Figure 3-5 below.

Figure 3-5 – Approved B-double freight network, Orana



Source: Roads and Maritime Services

As can be seen by the shaded area in Figure 3-5, almost the entire Orana region road network can be accessed by B-doubles with the exception of Warren, Bogan, Dubbo Regional, Mid-Western Region and

[49] HML eligible vehicles can carry higher loads than standard mass limits and must meet the conditions set out by the NSW Higher Mass Limits Declaration.

parts of Warrumbungle and Narromine. However, there are extensive specific road networks within these LGAs that enable B-double access.

Road train access is similar to B-double access, with the exception of limitations in Warrumbungle and parts of Gilgandra LGAs. Road trains are prohibited east of the Newell Highway across NSW.

To improve the management of freight networks across the State, the NSW Government has established a Road Network and Corridor Strategy Program (see Box 3-1 below).

Box 3-1 – NSW Government Road Network and Corridor Strategy Program

Transport for NSW and Roads and Maritime Services are progressively preparing network and corridor strategies to cover every State road in regional NSW as a response to the challenge of how to best manage transport infrastructure to maximise benefits for our customers.

Of particular importance to the Orana region, Draft Corridor Strategies have been developed for the Newell Highway, Oxley Highway and Golden Highway. A Draft Great Western Highway (including part of the Mitchell Highway) is currently being developed.

Source: Transport for NSW

3.2.4. Challenges and Impediments

Road network connectivity is a strength of the Orana region. However, the road network throughout the region is under increasing stress; the number of road freight movements is continuing to increase while the transport industry is moving towards the use of larger (and heavier) vehicles. While the move towards larger vehicles may remove some truck movements in the short term, the forecast increase in the overall freight task is expected to more than offset any such impact. Significant investment at the national, state and local government level is required to improve, repair and maintain the regional road network.

A range of challenges and impediments constrain the efficient and reliable movement of freight along the Orana region's road freight network. The most significant challenges and impediments impacting the Orana region identified by this study in consultation with stakeholders include:

- condition of local and regional roads
- congestion and freight access restrictions on key freight networks leaving the Orana region
- regulatory barriers that affect competitiveness.

These challenges and impediments are discussed in more detail below.

Condition of local and regional roads

The condition of the local and regional road network varies across the Orana region. However, stakeholders consulted regularly noted the general poor condition of local roads throughout the region. Roads in poor condition are also highly susceptible to further damage from heavy trucks. The general poor condition of regional roads has also been recognised by the NSW Government.[50]

Poor road conditions can increase transport costs through:

- damage to trucks,
- slower delivery times because of:
  - extended routes (due to closures and restrictions)
  - reduced speeds.

Poor road conditions also mean that 'first kilometre' connectivity is a major issue in the Orana region. HPVs and other heavy vehicles are often unable to access the farm gate. Transport operators are required to downsize or 'break-up' vehicles to smaller configurations at the start of the freight trip to meet local road restrictions. This affects freight efficiency with sub-optimal freight loads and more truck movements.

[50] Transport for NSW 2011, *NSW Freights and Ports Strategy*

Much of the freight generated from the region's agriculture starts and travels on local roads. These roads (and bridges) were not designed to take the load of larger vehicles and consequently are either failing under the pressure of increasing freight movements or reducing the efficiency and reliability of freight movements. This issue will become increasingly challenging as freight movements grow in the future, increasing maintenance costs of local and regional roads, which are predominantly borne by councils.

The NSW Government has established the Fixing Regional Roads program. The program provides targeted funding to local councils for road projects that will eliminate connectivity constraints and reduce the cost to market for local businesses. This is in addition to the Bridges for the Bush Program which seeks to improve road freight productivity by replacing or upgrading bridges over the next five years at 17 key locations in regional NSW. Major NSW Government infrastructure investment programs relevant to the Orana region are summarised in Section 6.

Congestion and freight access restrictions

Congestion and freight movement restrictions (particularly road trains) on road freight leaving the Orana region are significant barriers to the productivity of regional road freight, particularly on the Golden Highway and Great Western Highway over the Blue Mountains.

These barriers severely restrict freight access to Sydney and coastal ports. Congestion and capacity restrictions reduce the efficiency of the network, causing time delays and costs which can affect the economic viability of delivering produce from the region to elsewhere in the State and other markets.

For example, movements along the Newell Highway and along the Great Western Highway to Sydney are constrained by physical road limitations. Narrow winding sections of these roads limit access for High Productivity Vehicles.

Freights movements over the Blue Mountains are currently limited to vehicles no longer than 19 metres (a standard B-double or semi-trailer configuration). Restricting access to HPVs further impacts the efficiency of the regional road network.

Unfortunately, there is a lack of information regarding the capability of State and local road infrastructure.[51] Many barriers on the freight network remain unknown and unquantified by governments at all levels, although they are reported anecdotally and were certainly raised in consultations with Urbis. Access for HPVs and other heavy vehicles will continue to be restricted until a rigorous and detailed understanding of local infrastructure capability is developed.

Regulatory barriers

A wide range of regulatory barriers and impediments to more efficient transport networks have been identified through this study, as discussed below.

Inconsistent cross border freight regulations

Inconsistencies between jurisdictions' treatment of HPVs inhibits cross-border freight. For example, the National Transport Commission (NTC) has found B-triples "are disadvantaged by inconsistent treatment between each state and territory, and their access to the road network is often not commensurate with their safety and productivity offering."[52]

In NSW, the limitations of the road network and operating conditions constrain operation of highly productive B-triples within NSW and also discourage B-triples wishing to enter from surrounding jurisdictions – the result is stifled opportunities for better national freight movement.[53] Conversely, NSW permits the movement of new module-building cotton harvesters on its roads, while Queensland does not.

In this context, the objective of the 2013 National Land Freight Strategy (NLFS), a cross-government and industry partnership led by Infrastructure Australia, is to "improve the efficiency of freight movements across infrastructure networks, minimise the negative impacts associated with such freight movements and influence policy relating to the movement of freight."[54]

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[51] Transport for NSW 2011, *NSW Freights and Ports Strategy*

[52] National Transport Commission, 2012, *A national framework for modular B-triple operations*

[53] National Transport Commission, 2012, *A national framework for modular B-triple operations*

[54] Transport for NSW, 2013, *NSW Freight and Ports Strategy*

Restricted Access Vehicle route approval assessments

Restricted Access Vehicles (RAVs) are any heavy vehicle longer than 19 metres (such as B-triples), livestock vehicles and special purposes vehicles such as combine harvesters and truck-mounted drill rigs. RAVs are restricted to approved routes on the road network given their size, weight and overall dimensions.

Local government authorities have a key role in RAV route approvals because of their impacts on amenity, safety and road maintenance.

However, TfNSW has noted that barriers exist in some areas where the approval process is protracted and/or where the council lacks the resources to conduct a RAV route approval assessment. For example, councils are not compensated for staff time and resources in processing RAV route approvals.

A related issue arises in respect of the intersection of land use planning and freight logistics; many local government authorities may not have ready access to the technical expertise necessary to fully consider and integrate freight issues in local planning decisions. As a consequence, TfNSW has suggested this can lead to 'blunt instrument' regulation including HPV bans or curfews.

RAVs have a disproportionate impact on road maintenance requirements given the loads carried. TfNSW has noted that councils may be reluctant to grant approval of RAV route assessments on local roads because of the road maintenance cost implications and concerns regarding safety and amenity.

Operators face multiple local approvals processes

Regionally, operators are often required to apply for permits for various irregular configurations that may require approval by several LGAs for each trip. This is despite these being the norm for the company's cargo, such as the movement of combine harvesters during the harvest season or truck-mounted drilling rigs.

Variable registration charges distort efficient competition

Registration charges associated with different HPV configurations do not necessarily reflect the relative productivity and safety benefits in some contexts. For example, the NTC has pointed out that charges to B-triple configuration are substantially higher than A-double or A-triple configurations, placing B-triple operators at competitive disadvantage when competing for freight on a road train network.[55]

Volume constrained freight

The NTC has estimated that 80% of heavy vehicle trips are constrained by the volumetric storage capacity of the vehicle (i.e. ability to fit freight into the allowable length, height and width), rather than mass limits.[56] The NTC is currently exploring opportunities to improve the productivity of volume constrained freight.

Other constraints identified

Other barriers impacting the efficiency of the regional road freight network identified include:

- **lack of regional city bypasses for heavy vehicles:** regional city freight bypasses can improve freight efficiency by reducing travel times and costs, while improving safety for road users and town amenity. Stakeholders consulted considered that the lack of heavy vehicles bypasses for regional centres such as Dubbo and Coonabarabran have significant impacts on freight efficiency, local road safety and town amenity. However, preliminary modelling by Urbis (see Section 6.2.1) suggests efficiency gains may not always result from a freight ring road.
- **mobile 'black spots':** poor mobile coverage and 'black spots' creates safety concerns for the transport industry, and can affect freight efficiency by requiring drivers to take longer journeys on alternative routes to avoid communication 'black spots'.

3.3. REGIONAL RAIL NETWORK

The Orana region is well served by rail infrastructure. The major rail lines in the Orana region are operated and maintained by two key network operators: ARTC and John Holland, responsible for managing the Country Regional Network (CRN) on behalf of TfNSW.

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[55] National Transport Commission, 2012, *A national framework for modular B-triple operations*

[56] National Transport Commission, 2016, see: http://www.ntc.gov.au/current-projects/increasing-allowed-volume-where-mass-is-not-the-constraint/, accessed 8 August 2016

Across the Orana region there are almost 1,400 kilometres of operational rail track, of which 577 kilometres are managed by ARTC as part of the national rail network and 813 kilometres are managed by John Holland as part of the CRN. In addition to the operational lines, a significant proportion (600 kilometres) of the CRN remains non-operational.[57]

There is also a range of privately owned sidings, spur lines and loops connected to the major ARTC and CRN lines. To move freight on rail across the Orana region, a rail operator will need to negotiate separate access agreements with each network operator.

Across the region, **rail is predominantly used to move bulk commodities such as wheat and other grains, cotton, slaughtered livestock and mineral concentrates**.

3.3.1. ARTC Network

ARTC is responsible for managing the Hunter Valley Corridor main line which is a critical component of the rail network in the Orana region. The Hunter Valley Corridor is an integral link in the world's largest coal export supply chain.[58]

The ARTC rail line runs from Parkes to Narromine, from Narromine to Dubbo and then runs eastward towards Merrygoen, and provides the Orana region with direct access to the Port of Newcastle.

Another component of the Hunter Valley Corridor is the rail line from Narrabri to Werris Creek. While this is outside the Orana Region, two CRN rail lines in the Walgett LGA feed into and connect with this ARTC line.

3.3.2. Country Rail Network

There are six CRN rail lines in the region, representing 58% of the total rail network in the region. Four of the CRN rail lines are dedicated grain lines. The CRN rail lines in the region include:

- Cobar to Narromine (via Nyngan and Trangie)
- Dubbo to Lithgow (providing access to Sydney and Port Botany)
- Coonamble to Troy Junction (Dubbo) – dedicated grain line
- Walgett to Burren Junction – dedicated grain line
- Merrywinebone to Burren Junction – dedicated grain line
- Warren to Nevertire – dedicated grain line.

A detailed discussion of freight volumes and flows for each of the above CRN rail lines is provided in Section 4.2.2.

Freight on dedicated grain lines is currently limited to 19 tonnes per axle and speeds of either 50 kilometres per hour or 70 kilometres per hour. The NSW Government has recognised that low traffic volumes create cost recovery issues and impact the long-term sustainability of the network. Consequently, much of the CRN network in the Orana region is maintained to a 'fit-for-purpose' standard, with lower mass and speed limits in place.[59] A lower overall cost structure for the rail networks, however, reduces the competitiveness of the rail network by limiting potential economies of scale.

As noted above, a significant proportion of the CRN rail network remains non-operational. There are currently no plans by the NSW Government to re-commission these rail lines.

3.3.3. Challenges and Impediments

The Orana region has strong rail connectivity in the south and north-west. However, the movement of low volume general freight in the region is uncompetitive compared to road freight, particularly for short haul (less than 400 km). Continued underinvestment in rail infrastructure has meant that much of the rail network is now managed on a 'fit-for-purpose' basis with relatively low load and speed restrictions.

In contrast, the road freight industry has experienced significant productivity improvements over the past four decades, with truck productivity more than doubling between 1971 and 2007 alone. This was achieved,

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[57] Transport for NSW, see: http://www.transport.nsw.gov.au/content/non-operational-lines

[58] Australia Rail Track Corporation, 2016, *2016-2025 Hunter Valley Corridor Capacity Strategy*

[59] Transport for NSW, 2013, *NSW Freight and Ports Strategy*

despite deteriorating road conditions, with the move towards larger and longer vehicles, including HPVs.[60] The combination of improved productivity and ability to provide point-to-point delivery has meant that road continues to capture an increasing share of the freight task.[61]

For example, it was estimated by one stakeholder that approximately 1.5 million tonnes of annual grain freight has transitioned to road from rail over the past decade.

The most significant challenges facing the efficient and reliable movement of rail freight in the Orana region include:

- condition of rail infrastructure
- uneven network utilisation
- rail pricing and rationalisation of dedicated grain lines
- lack of access to rail sidings and loading points.

These challenges and impediments are discussed in more detail below.

Condition of rail infrastructure

The majority of the CRN in Orana is categorised as either Class 3 or Class 5 branch lines. These branch lines are typically dedicated grain lines and carry low volumes of freight. There are weight and speed restrictions on these branch lines. The dedicated grain lines are recognised as being in relatively poor condition.

These lines predominantly transport grain and little else, with grain accounting for around 95% of freight, with general freight and minerals accounting for the remaining freight load.[62] This concentration of use by the grain sector and the relatively low levels of utilisation have implications for cost recovery, with dedicated grain lines recovering only a fraction of costs incurred in operating and maintaining the network from access revenue.

The condition of rail infrastructure often means that the productivity gains of modern, powerful and efficient locomotives are wasted. Modern locomotives with the capability to haul in excess of 1,000 metres of wagons at high speeds are forced to pull between 600 and 800 metres of wagon at much slower speeds than they are capable of. This further constrains the efficiency of rail freight in the region.

Currently, there are no formal plans to invest in a significant upgrade of the CRN branch lines and improve load limits and speed restrictions. In the absence of continued rail investment, it is likely that the market share of rail (particularly in traditional commodities such as wheat, other grains, cotton and general freight) will continue to be eroded by road freight due to increased freight competition and the trend towards larger and more efficient heavy vehicles.

The NSW Government has, however, established the Fixing Country Rail program to fund specific rail infrastructure enhancement projects that eliminate connectivity constraints on the NSW regional rail network and reduce the cost to market for regional businesses. It is designed to complement the Fixing Country Roads program to build an efficient freight transport network in regional NSW.

Uneven network utilisation

Demand for rail services is very uneven along the rail network in the Orana region. Freight volumes on the rural, dedicated grain lines are low. Consequently, there is significant excess capacity on many, if not all, the CRN rail lines in the region, resulting in an inefficient use of rail infrastructure. Industry, rail operators and below-track operators recognise the need to improve coordination of the outbound freight task to improve rail utilisation and increase network efficiency.

In contrast, the rail journey time from the Orana region through Sydney to Port Botany is significantly constrained by the need to share the network with the Sydney metropolitan passenger lines, a lack of

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[60] Bureau of infrastructure, Transport and Regional Economics, 2011, *Research Report 123 – Truck Productivity: sources, trends and future prospects*

[61] Transport for NSW, 2013, *NSW Freight and Ports Strategy*

[62] Independent Pricing and Regulatory Tribunal, 2012, *Review of access pricing on the NSW grain line network – Final Report*

sufficient pass lines and load restrictions.[63] Freight trains are often forced to wait in Lithgow upon entering the Sydney metropolitan rail network, often for up to 8 hours, because of a curfew on rail movements.

Congestion can also occur on the ARTC rail network leading to Newcastle, particularly in the Hunter Valley because of competition for access to the port terminal between coal and wheat.

Almost all rail freight along the CRN and ARTC networks in Orana is outbound. There is minimal inbound freight volume heading into the region. This significantly affects the productivity of the rail freight network as customers effectively have to pay to bring an empty train back up-country. Better coordination of the inbound freight task would significantly improve the efficiency, competitiveness and cost recovery of the rail network.

Rail pricing and rationalisation of network

Below-rail services (rail track infrastructure) across NSW are heavily subsidised. This is particularly true for rural CRN branch lines dedicated to grain freight. Access fees only cover a small proportion of the operating costs of rural branch lines.

Commercial pressures to increase cost recovery on rail lines since deregulation of the rail sector have been constrained by the price of road transport. This has in turn limited investment in the rail sector, and contributed to some rationalisation of the rail network.[64]

Competitive pressures that have led to the rationalisation of dedicated grain lines are likely to continue, potentially resulting in a further transition from rail to road freight. This would place additional pressure on an already stressed road network.

IPART recently undertook a review of access pricing on the grain line network and recommended increasing access fees. This recommendation was adopted by the NSW Government. Despite the increase in access fees, cost recovery remains very low in parts of the CRN that have low freight volumes.

It appears that the only way to continue to operate regional rail networks that are competitively priced for users is for these to be subsidised by the State Government. This may not be the optimal use of taxpayer funds, particularly where existing road networks could be used.

Access to rail sidings and loading points

Since the deregulation of the grain industry in 2008, bulk handlers have moved towards site-based costing, differentiating charges by up-country receival and bulk storage sites. Sites deemed uneconomic have been closed throughout the Orana region. For example, there has been a significant reduction in the number of storage sites operated by GrainCorp in the Orana Region (and across NSW).

The closure of sites has consequently reduced the number of rail sidings and loading points operating in the region. Land-side access is often restricted because the sidings and loading points are often adjacent to private land. Consultations have indicated that this has had the effect of restricting third-party access to the rail sidings along the CRN in the Orana region.

Over the longer term there is a clear trend towards fewer bulk receival and storage sites because of the consolidation of bulk storage facilities.[65] In 2014, GrainCorp announced Project Regeneration, which involves rationalising its upcountry receival network with the aim of operating only 96 receival sites across NSW by 2016.[66] The continued consolidation of bulk receival sites and the adjacent rail sidings has the potential to further restrict access to rail loading points throughout the CRN in Orana. This would further reduce the utilisation and efficiency of the existing regional rail infrastructure, with a transition to road freight a likely outcome.

3.4. INTERMODAL AND OTHER FACILITIES

The Orana region is supported by a broad range of logistics and other auxiliary facilities that support the movement of freight throughout the region. In particular, the region is well serviced by intermodal facilities, with eight operational intermodal facilities (see Table 3-2).

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[63] RDA Central West, 2014, *NSW Central West Freight Study*

[64] Australian Bureau of Agricultural and Resource Economics and Sciences, 2015, *Australia's wheat supply chains – infrastructure issues and implications*

[65] Department of Infrastructure, Transport, Regional Development and Local Government, 2009, *New South Wales Grain Freight Review*

[66] GrainCorp, 2014, *Project Regeneration*

Table 3-2 – Operational intermodal facilities in Orana

Location	Company
Coonamble	Agrigrain
Hermidale	Hera, Tritton
Warren	Namoi Cotton, Auscott
Trangie South	Grain Pro
Narromine	Agrigrain
Dubbo	Fletcher International Exports

Source: Transport for NSW

The importance of an efficient and reliable network of intermodal terminals across the state has been recognised by the NSW Government.[67] Intermodal facilities are particularly important to the movement in freight in regional areas as they provide a range of services including:

- freight consolidation and de-consolidation
- warehousing and cross dock operations
- container storage
- quarantine and customs clearance
- refrigerated container points and cold storage
- servicing of containers, vehicles and rolling stock.

In addition to intermodal facilities, there are 29 up-country bulk grain receival sites in the Orana region with the majority of these operated by GrainCorp. However, as noted previously, there is a trend towards consolidation in the sector.

The Orana region is also home to 11 cotton gins, reflecting the scale and importance of the regional cotton sector.

The DRLM – a multi-million-dollar facility and one of Australia's major regional livestock sales centres – is also located in Orana. The DRLM has an annual throughput in excess of 1.3 million sheep and 200,000 cattle, with a combined annual throughput value of stock of about $250 million.[68] The DRLM recently achieved EU accreditation status, providing access to higher value market segments for regional producers that were previously denied.

3.4.1. Challenges and Impediments

The Orana region is well supported by a broad range of logistics and auxiliary facilities that form the broader regional freight and logistics network. However, there are some challenges impacting the productivity of these logistic and auxiliary facilities.

Consolidation of up-country receival sites

As noted above, there is a trend towards the consolidation of up-country grain receival sites across the Orana region (and across NSW more generally).

The consolidation of commercially unviable sites should lead to increased deliveries to remaining higher volume, more efficient sites.

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[67] Transport for NSW, 2013, *NSW Freight and Ports Strategy*

[68] Australian Livestock Markets Association Inc., Dubbo Regional Livestock Markets, see: http://www.saleyards.info/public/saleyard/index.cfm?Saleyard=Dubbo&SaleyardID=6

However, offsetting these lower unit costs of receival will be additional transport costs to producers required to transport freight over longer distances, and higher road maintenance costs to councils due to increased road traffic.

Access to intermodal facilities

Access to intermodal terminals is often restricted for road trains and other HPVs due to unsuitable road infrastructure on local roads, such as undersized intersections and narrow road sections. Often, access to intermodal facilities is restricted to B-doubles, meaning road trains must be de-coupled into smaller units. This is inefficient, increasing costs as a result of double handling, and placing more trucks on the road network.

Consultations indicated that older intermodal terminals in the region are often constructed around pre-existing sidings that are not designed for modern trains. Terminals can often have poor road access, have minimal scope for expansion and lack buffer zones to ensure public amenity. These issues impact the discharge rates being achieved at some intermodal facilities, reducing the efficiency of the freight and logistics network.

The NSW Government has committed to support the operation of regional intermodal facilities by working with councils and industry to identify relevant planning issues, investigate road access issues, optimise the design of facilities and identify future sites.

4. CURRENT REGIONAL FREIGHT TASK

Urbis estimates the total regional freight task is approximately 27,800kT per annum. This includes all internal, outbound and inbound freight that makes use of the Orana freight network. Of this, around 23,600kT or 85% is transported by road. The remainder, around 4,200kT, is transported by the rail freight network.

With respect to inbound freight (freight coming from outside the region), road freight is almost entirely responsible for the inbound freight task within Orana (e.g. general freight, consumer durables, production and manufacturing inputs etc.).

While it is possible to estimate the freight task originating and concluding in the region, the quantification of through freight (freight that does not originate or conclude in the region but moves through the region to its ultimate destination) in the region is more challenging. Regardless, the quantity of through freight is likely to be minor compared to the quantity of freight originating in the region. The focus of agricultural and mining production within the region means freight typically either commences or ends its journey in the region. The remoteness of large portions of the region and absence of large population centres (with the exception of Dubbo) is also likely to limit the volume of through freight.

The regional freight task identified above excludes an additional 31,000kT of thermal coal that is produced at the Moolarben, Ulan and Wilpinjong coal mines located at the eastern edge of the Mid-Western Regional LGA. These mines are located adjacent to the ARTC Hunter Valley Corridor rail line. Coal from the mines is loaded directly onto trains and freighted to power generators and to the Port of Newcastle for export. The coal is transported along approximately 60 kilometres of ARTC rail line before leaving the region. The line is not considered to be constrained or congested and it does not intersect with any other freight and logistics networks within the Orana region.

Regional coal production has therefore been excluded in an analysis of the Orana region's freight task given its scale and containment within an isolated area of the region, as this would distort any assessment of the challenges, impediments and pinch points impacting the region's freight productivity.

A detailed investigation of the composition of the freight flows is not possible due to data limitations. However, insights gained on freight flows from stakeholder consultations have been used to add comment where appropriate.

A discussion of the regional air freight task is provided in Urbis' accompanying *Orana International Air Freight Feasibility Study*. Readers are encouraged to refer to this study for an analysis of the Orana air freight task.

4.1. ROAD FREIGHT TASK

Road freight is transported by heavy vehicles with a Gross Vehicle Mass (GVM) or Aggregate Trailer Mass (ATM) of more than 4.5 tonnes.[69] The road freight task for the Orana region was estimated using the ABS Road Freight Movements Survey (2014) and network corridor traffic count data within the region provided by RMS.

In 2014, 23,600kT of freight was transported along the road freight network within Orana. Of this, 17,300kT (73%) of freight originated within the Orana region, and 6,300kT (27%) of freight concluded within the Orana region but originated outside the region.

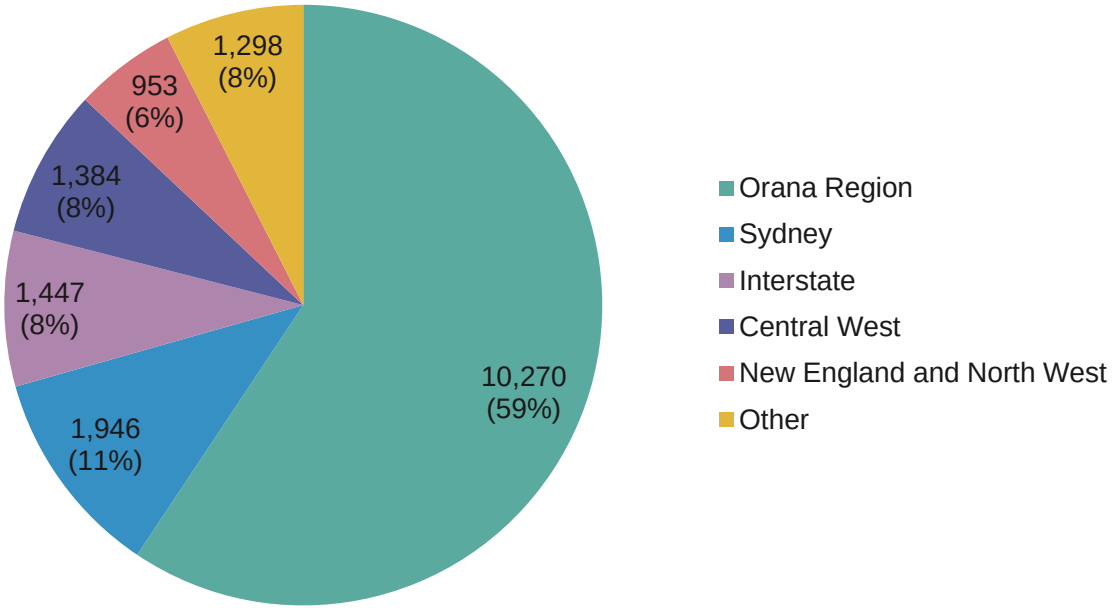
Almost half (44%) of all road freight that is destined for Orana, that originates outside the region, comes from the Central West region (which includes Bathurst, Lithgow, Orange and the Lachlan Valley), reflecting the close links between the two regions. This is predominantly made up of grain (almost 1,000kT) being transported to receival sites and intermodal facilities and general freight transported throughout the region. Interstate freight flows account for 22% of road freight that is destined for Orana, likely to reflect a mix of general freight, construction materials and agricultural inputs.

Figure 4-1 outlines the major destinations of freight originating from within the Orana region. Newcastle is a not a major destination of Orana road freight. Figure 4-2 shows the key external sources of freight flows terminating in the Orana region.

[69] Roads and Maritime Services

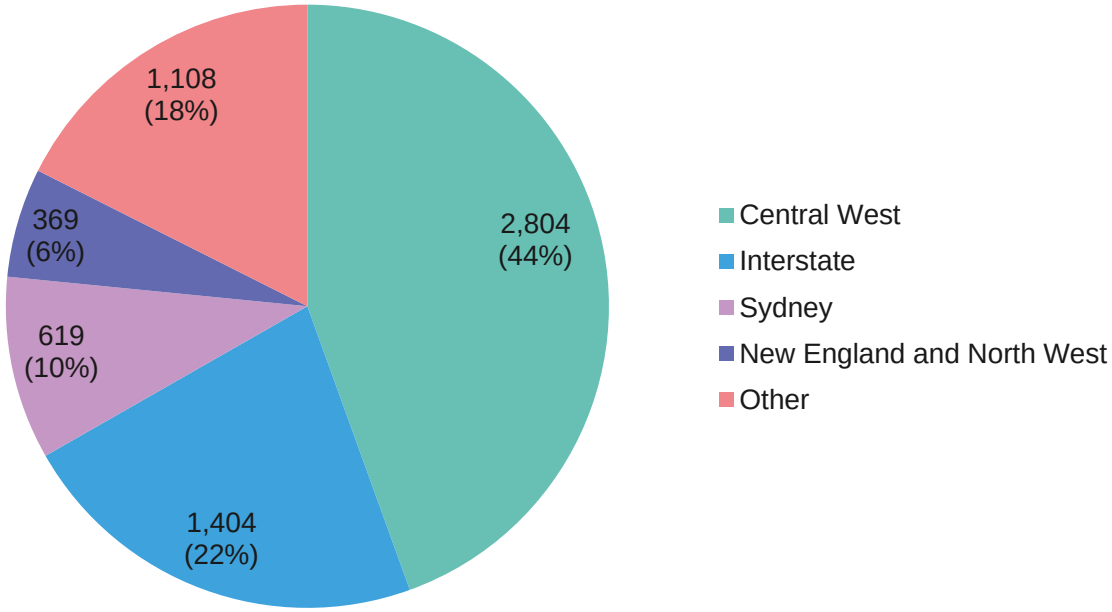
Of the total freight flows originating within Orana, 59% or around 10,270kT of freight concludes in Orana (i.e. internal freight movement). Sydney accounts for 11% of freight originating in the Orana region. Much of this is likely to be containerised cargo destined for the Port Botany export terminals.

Figure 4-1 – Road freight flows originating from Orana, key destinations, 2014, kT



Source: ABS, Urbis Calculations

Figure 4-2 – Road freight flows destined for Orana but originating outside, key origins, 2014, kT

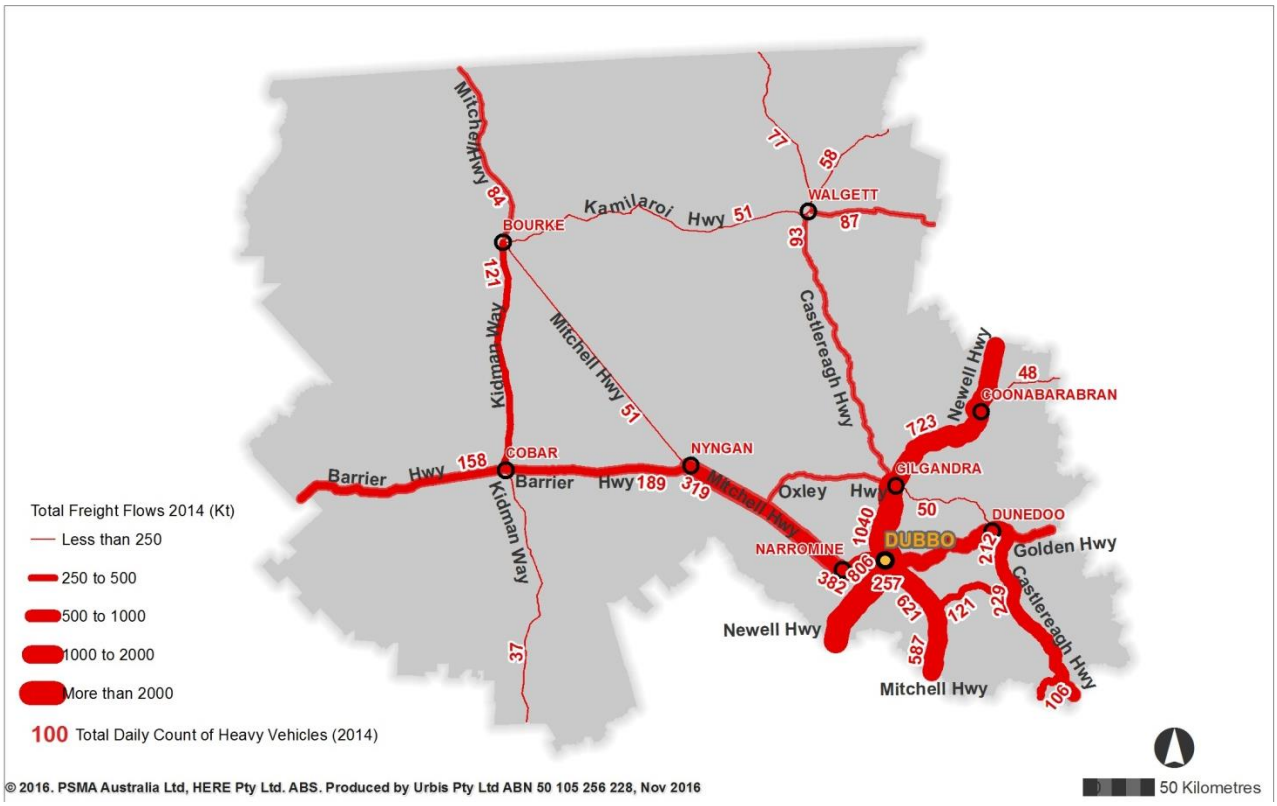


Source: ABS, Urbis Calculations

4.1.1. Freight Flows by Network Corridor

Figure 4-3 shows the annual freight volumes and daily heavy vehicle movements on key freight corridors throughout the Orana region.

Figure 4-3 – Road network corridor freight flows, 2014



Source: ABS, RMS, Urbis Calculations

The regional road freight task is concentrated around the regional hub of Dubbo. This confirms Dubbo's role as the freight and distribution centre for the Orana region. It also highlights how the volume of freight dissipates away from the regional hub of Dubbo. Figure 4-3 also illustrates the importance of the Newell Highway as a major freight corridor and reinforces the connectivity between the Orana region, the adjacent Central West region and the flow of freight eastwards Sydney, Newcastle and the coastal ports.

In Section 3 we noted the importance of the Newell, Mitchell, Oxley and Golden Highways as key regional freight corridors – this is confirmed with the following key observations:

- **Newell Highway:**
  - carries the largest freight task and more heavy vehicle movements than any other corridor in the Orana region
  - south of Dubbo the highway carried an estimated annual freight task of 2,300kT, equivalent to approximately 900 heavy vehicle movements per day
  - between Dubbo and Gilgandra is the busiest freight corridor in the Orana region, carrying around 2,650kT of annual freight, equivalent to 1,040 heavy vehicle movements a day
  - north-east of Dubbo, between Gilgandra and Coonabarabran (which also doubles as the Oxley Highway), the highway carries in excess of 1,800kT of annual freight, or around 720 heavy vehicles daily
  - north of Coonabarabran (towards Narrabri) the highway carried almost 1,700kT of freight, or 660 heavy vehicles per day.

- **Mitchell Highway:**
  - south of Dubbo the highway carried an annual freight task of around 1,540kT, equivalent to around 600 heavy vehicle movements per day, emphasising the importance of the highway as a key link between Orana and major regional centres such as Orange and Bathurst
  - between Dubbo and Narromine, the highway carried around 1,170kT of freight, equivalent to around 460 daily heavy vehicles movements
  - following the Mitchell Highway further north-west towards Nyngan and Bourke shows the freight task dissipate, from around 800kT (or 320 heavy vehicles per day) to 130kT (50 heavy vehicles per day).
- **Oxley Highway:**
  - north-west of Dubbo, between Nevertire and Gilgandra, the highway carries an annual freight task of around 240kT, equivalent to almost 100 daily heavy vehicle movements
  - north-east of Dubbo, between Coonabarabran and Gunnedah, the annual freight task reduces to around 120kT or 50 daily heavy vehicle movements Oxley Highway.
- **Golden Highway:**
  - between Dubbo and Dunedoo, the Golden Highway carries approximately 650kT of annual freight, equivalent to over 250 daily heavy vehicle movements, reinforcing the importance of the highway as a key link between Dubbo (and the broader Orana region) and Newcastle.

4.2. RAIL FREIGHT TASK

The annual rail freight task for the Orana region is approximately 4,200kT. The majority of rail freight originating in the Orana region is destined for Port Botany and Port of Newcastle.

As noted above, it is estimated that an additional 31,000kT of thermal coal is freighted along the ARTC main line near Ulan and Moolarben. Coal from the mines is loaded directly onto trains and freighted to power generators and to the Port of Newcastle for export. This freight task is isolated to the eastern edge of the Orana region and does not interact with the regional freight and logistics network and has been excluded from the following analysis.

Stakeholder consultation with below-rail and above-rail operators has confirmed that the overwhelming majority of rail freight volumes in the region are outbound; there is very little inbound rail freight entering the Orana region.

4.2.1. ARTC Network

ARTC estimates that approximately 2,785kT of freight originating from the Orana region is transported along the ARTC network in an average year.

Table 4-1 provides a summary of the regional freight task transported on the ARTC rail network and destination. Sydney (and Port Botany) is the key destination of Orana's rail freight, accounting for 39% of all freight transported on the ARTC network, reflecting the importance of the Port Botany export container terminal to Orana's regional exports.

Table 4-1 – Freight originating in Orana transported on ARTC rail network

Destination	Average Annual Volume (kT)
Hunter Valley	50
Port of Newcastle	700
Orana	200
Parkes Area	450
Port Kembla	250
Sydney (incl. Port Botany)	1,100
Other	35
TOTAL	2,785

Source: ARTC

It is important to note that the above freight volumes are also captured in the following analysis of the CRN freight task within the Orana region. Discussions with ARTC and CRN confirmed that combining the freight task across each network would overstate the total regional rail task.

4.2.2. Country Rail Network

Around 4,200kT of freight was transported on the CRN within the Orana region in 2013.[70]

With the exception of the Dubbo to Lithgow line, the CRN has a heavy focus on the grain sector. In 2013, the estimated freight volumes carried on CRN rail lines in the region were:[71]

- Cobar to Narromine – 970kT
- Warren to Nevertire – 160kT
- Coonamble to Troy Junction (Dubbo) – 370kT
- Dubbo to Lithgow – 2,400kT
- Walgett to Burren Junction – 301kT
- Merrywinebone to Burren Junction – 73kT.

As previously noted, rail freight volumes in the region are low, particularly on the dedicated grain lines. The excess capacity on these lines means rail infrastructure in the region is not being efficiently used.

A detailed discussion of the freight volumes and flows along the above CRN rail lines is provided below.

Cobar to Narromine (CRN corridor 6)

The Narromine to Cobar CRN rail line (corridor 6) is located in the west of the Orana region. Rail freight volumes from Nevertire to Warren CRN rail line (corridor 14) feed directly into this corridor. Volumes from corridor 6 indirectly feed into other CRN lines in the central west of NSW.

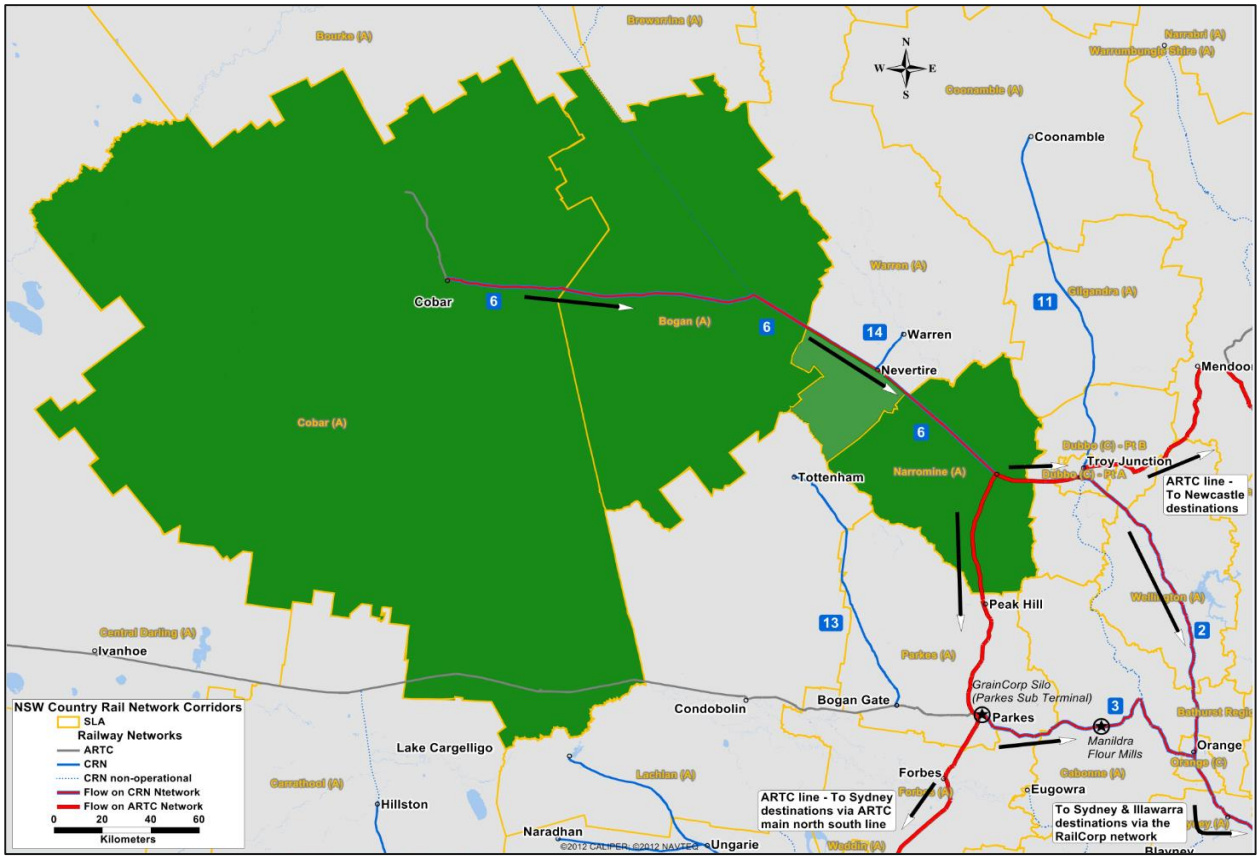
In 2012-13, approximately 970kT of minerals, grain (bulk) and general (containerised cotton and grain) was freight on this corridor. Minerals and grain (bulk) comprised 45% and 32%, respectively, of total rail volumes.

[70] 2012-13 is the most recent period that detailed freight volume data for the CRN within the Orana region was made available for this study.

[71] All CRN freight volume estimates presented in this report were provided by Transport for NSW, courtesy of Transport Performance Analytics.

Figure 4-4 shows the location and catchment of the Narromine to Cobar rail line and displays the flow of rail freight volumes originating from it into adjoining CRN corridors and ARTC rail lines. The corridor is serviced by the Cobar, Bogan and Narromine LGAs. The southern part of the Warren LGA is also considered part of the corridor catchment area.

Figure 4-4 – Cobar to Narromine CRN corridor



Source: Transport for NSW

Major freight volumes on the Cobar to Narromine corridor include:[72]

- mineral exports (zinc, lead, silver and copper) from Cobar move east on the ARTC Narromine to Dubbo line. The task subsequently moves further east on ARTC lines through Mendooran, Gulgong and Muswellbrook on route to Port of Newcastle for export
- grain (bulk) moves onto the ARTC Narromine to Parkes line and onto the CRN Orange to Parkes line (corridor 2) to reach the Parkes grain sub-terminal and the Manildra flour mill (in Manildra). A small amount of grain also moves on ARTC Narromine to Dubbo line before entering the Lithgow to Dubbo line
- containerised export cotton and grain moves onto the ARTC Narromine to Parkes line, south to Parkes, Forbes, Stockinbingal to access the ARTC main north south line at Cootamundra. Freight subsequently moves north to reach its Port Botany destination.

Warren to Nevertire (CRN corridor 14)

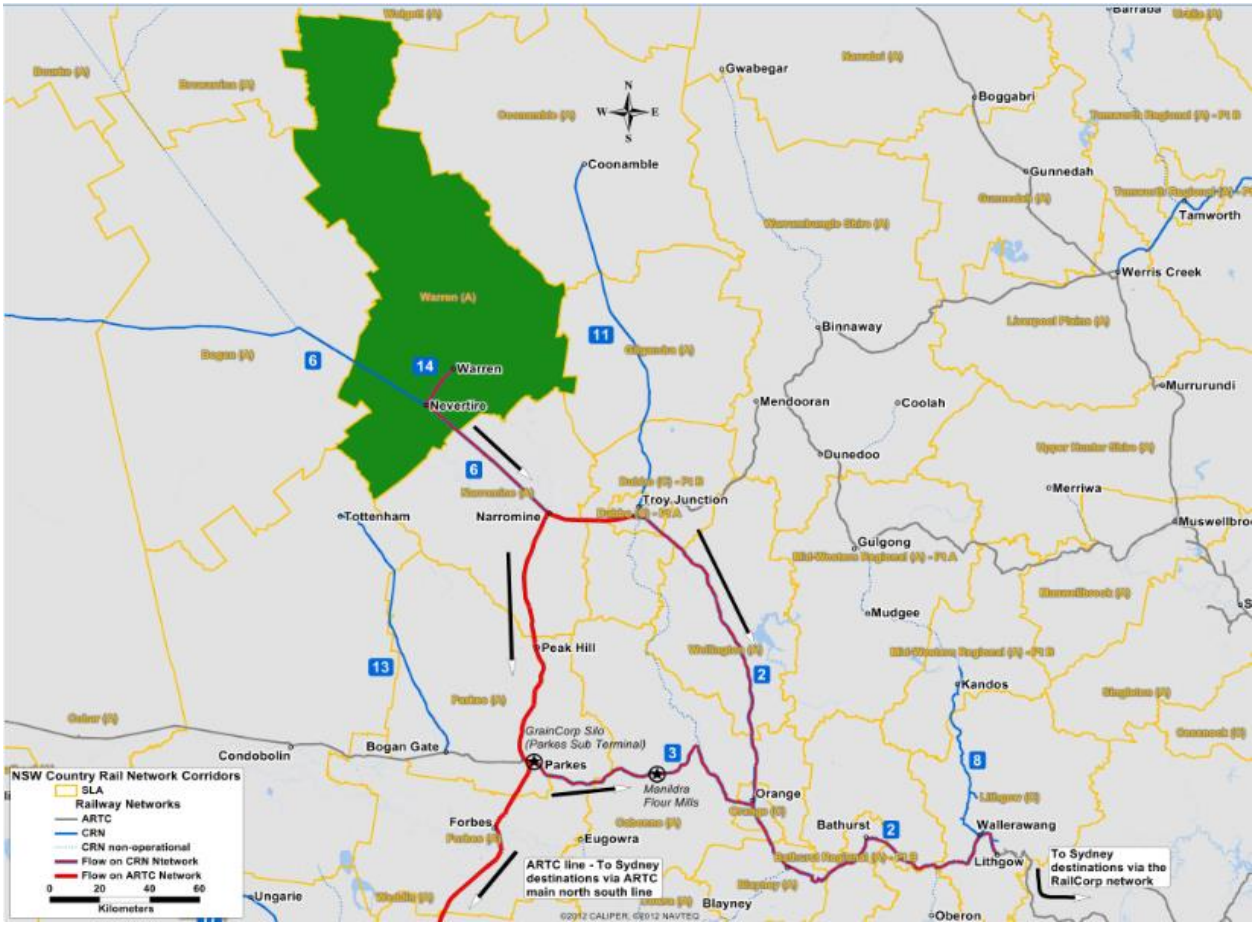
The Nevertire to Warren CRN rail line (corridor 14) is a branchline of the CRN network. Rail freight volumes from this branchline directly or indirectly feed into other CRN lines in the north and central west of NSW, including the Narromine to Cobar (corridor 6), Orange to Parkes (corridor 3) and Lithgow to Dubbo (corridor 2).

In 2012-2013, **approximately 160kT of containerised cotton was freighted along the corridor to Port Botany for export. In the same year, no bulk grain volumes moved out of the corridor by rail.**

[72] Transport Performance Analytics, 2013

Figure 4-5 shows the location and catchment of the Warren to Nevertire rail line and displays the flow of rail freight volumes originating from it into adjoining CRN corridors and ARTC rail lines. The corridor is serviced by the Warren LGA.

Figure 4-5 – Warren to Nevertire CRN corridor



Source: Transport for NSW

Major freight volumes on the Warren to Nevertire corridor include:[73]

- freight moves on the Narromine to Parkes line, further south through Forbes to access the ARTC main north south line at Cootamundra. Freight subsequently moves north to reach destinations in Sydney. Most of the containerised export cotton on this corridor follows this path to reach Port Botany
- freight also moves into the ARTC Narromine to Dubbo line and onto the CRN Orange to Parkes line (corridor 3). When grain (albeit a small amount) does originate from corridor 14 it follows this path to reach the Parkes grain sub terminal and/or Manildra flour mill.

Coonamble to Troy Junction-Dubbo (CRN corridor 11)

The Coonamble to Troy Junction (Dubbo) CRN rail line is a branchline of the CRN network. Rail freight volumes from this branchline directly or indirectly feed into the Orange to Parkes (corridor 3) and Lithgow to Dubbo (corridor 2) rail lines.

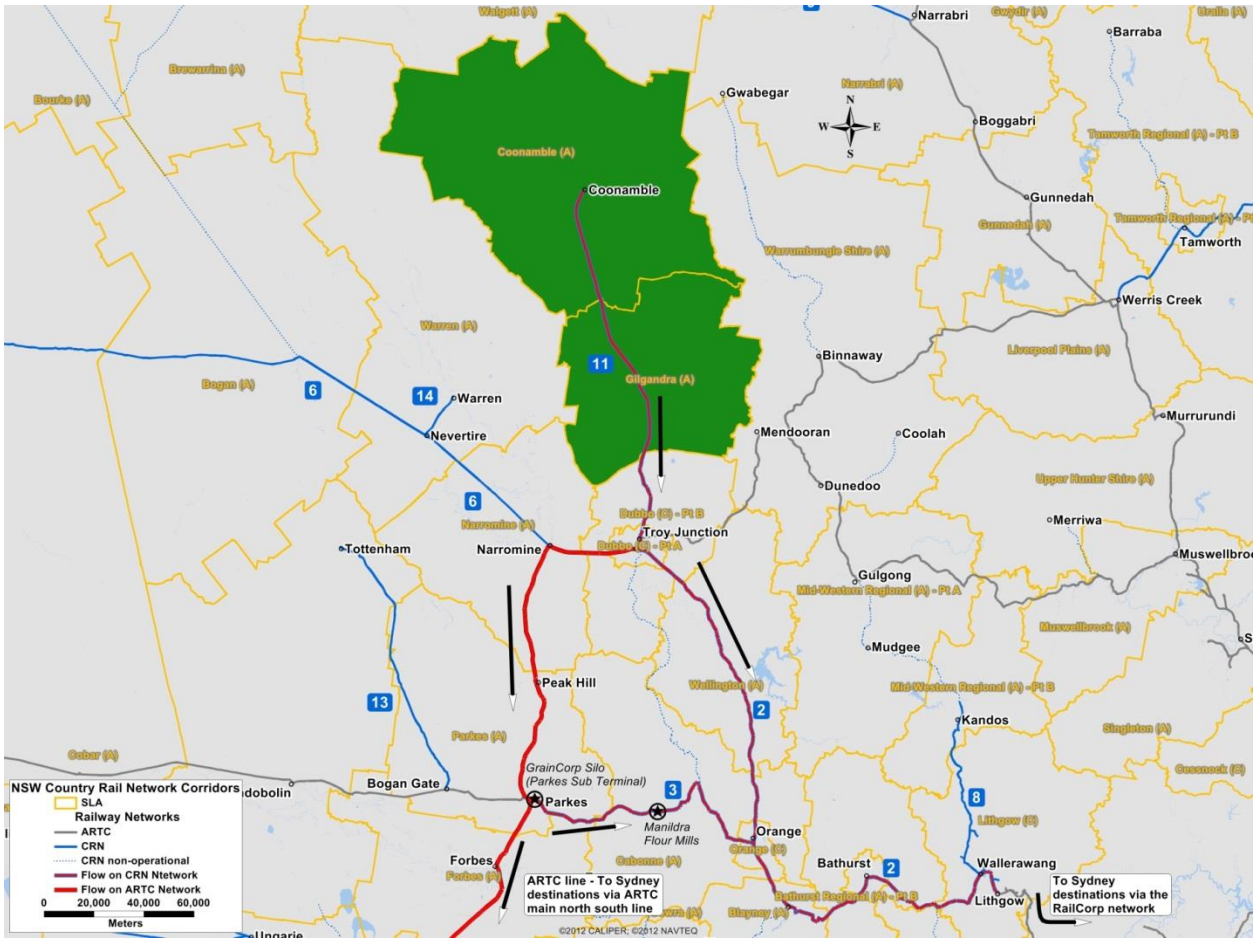
In 2012-2013, **approximately 370kT of grain freight was railed on the corridor**. This consisted of 115kT of containerised export grain destined for Port Botany and 255kT of bulk grain destined for the Parkes grain sub-terminal and/or Manildra flour mill (in Manildra).

Figure 4-6 shows the location and catchment of the rail line corridor and displays the flow of rail freight volumes originating from it into adjoining CRN corridors and ARTC rail lines. The corridor is serviced by the

[73] Transport Performance Analytics, 2013

Coonamble and Gilgandra LGAs. The Dubbo Regional LGA is excluded as it is part of the catchment area for the Lithgow to Dubbo rail line (corridor 2).

Figure 4-6 – Coonamble to Troy Junction-Dubbo CRN corridor



Source: Transport for NSW

Major freight volumes on the Coonamble to Troy Junction corridor include:[74]

- containerised grain moves on the Narromine to Dubbo ARTC line, south to Parkes, Forbes, Stockinbingal to access the ARTC main north south line at Cootamundra. The majority of containerised export grain on this corridor follows this path to reach Port Botany
- all bulk grain originating from corridor 11 moves onto the ARTC Narromine to Dubbo line before heading south on the ARTC Parkes to Narromine line. It subsequently moves onto the Orange to Parkes CRN line (corridor 3) to reach the Parkes grain sub terminal and/or the Manildra flour mill
- some containerised grain also moves south into the Lithgow to Dubbo CRN line (Corridor 2) and subsequently moves into the RailCorp network to reach Port Botany.

Dubbo to Lithgow (CRN corridor 2)

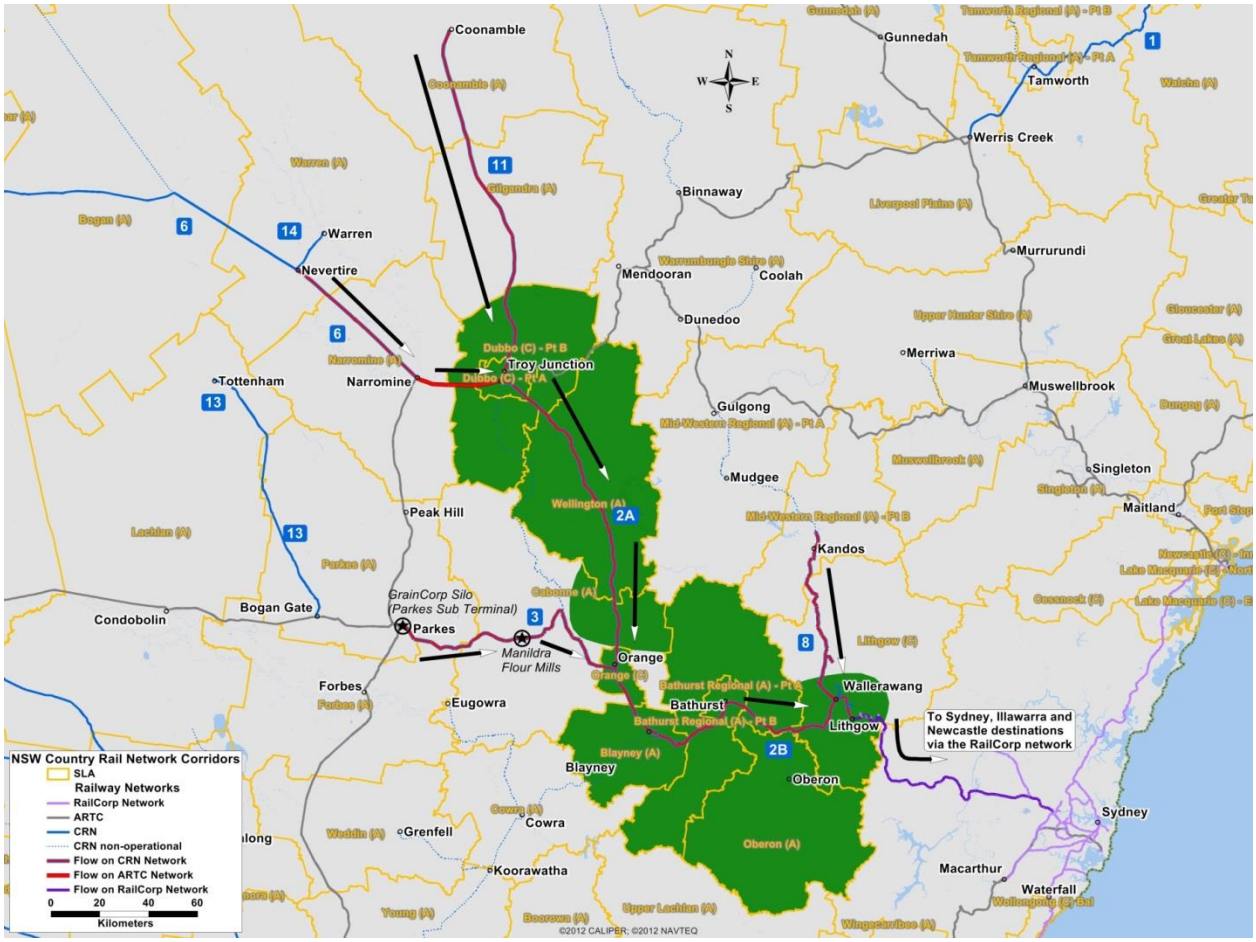
The Dubbo to Lithgow rail line is a complex component of the central west network in NSW. Due to its strong linkage to the Parkes to Orange rail line (CRN corridor 3), a relatively large number of bulk and containerised commodities are freighted on the corridor including grain, flour, meat, logs, minerals and coal. These commodities have various origins and destinations inside and outside the corridor and therefore rail path demand differs by line section in the corridor.

[74] Transport Performance Analytics, 2013

In 2012-13, **approximately 2,400kT freight was railed on the corridor**. Of this, around 1,400kT of freight flowed into the corridor from other CRN corridors (primarily from corridor 3), while 900kT was sourced from various points inside the corridor.

Figure 4-7 shows the location and catchment of the rail line corridor and displays the flow of rail freight volumes originating from it into adjoining CRN corridors and ARTC rail lines. The corridor is serviced by the Dubbo Regional LGA, as well as the Orange, Bathurst and Lithgow LGAs outside the Orana region.

Figure 4-7 – Dubbo to Lithgow CRN corridor



Source: Transport for NSW

The most significant commodities railed on this corridor included containerised meat, grain and other (550kT), steel (500kT), bulk flour (400kT) and intermodal containers in the down direction (300kT).

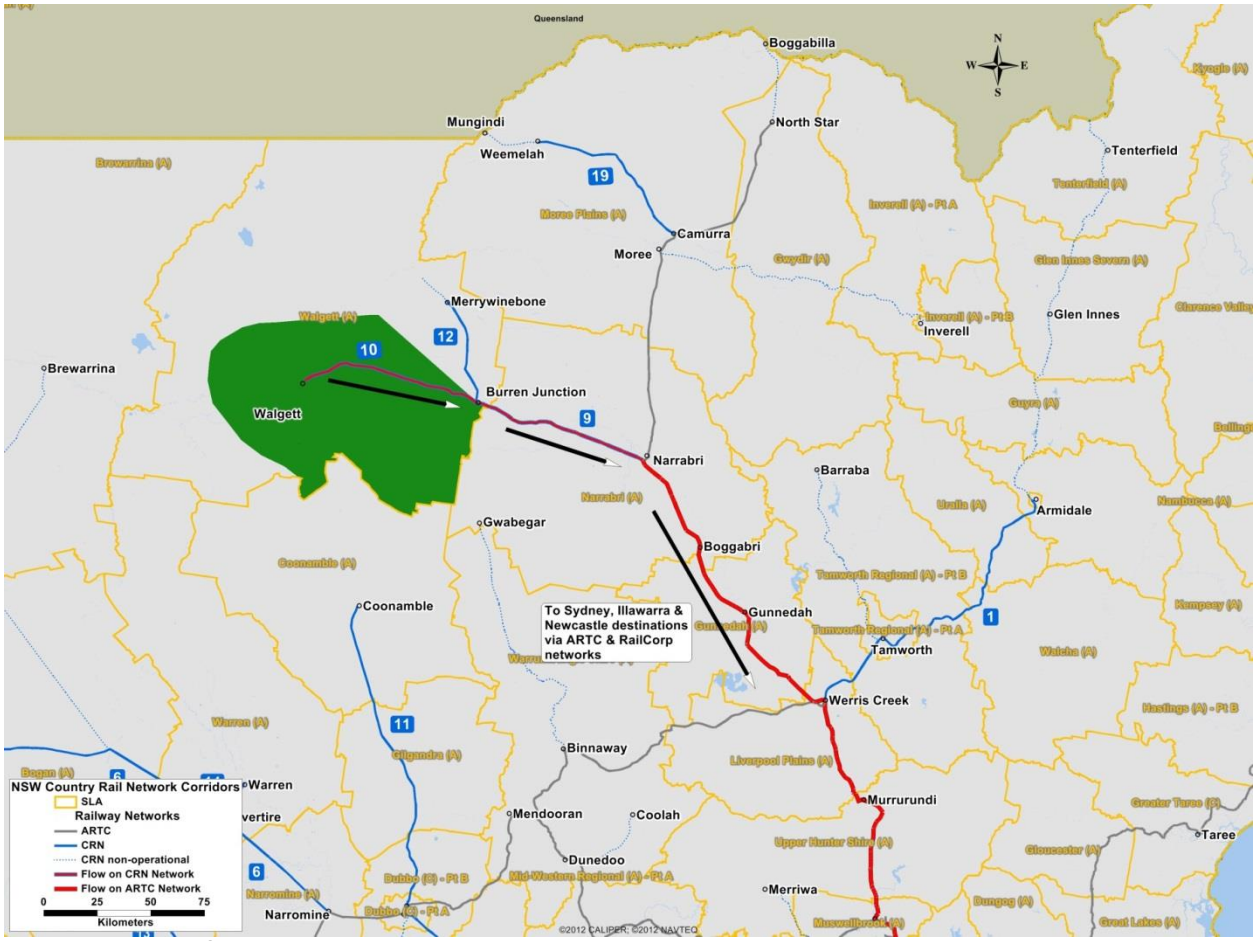
Walgett to Burren Junction (CRN corridor 10)

The Walgett to Burren Junction CRN rail line is a branchline in northern NSW. Bulk grain accounts for almost all the rail freight task on this corridor. It flows into Burren Junction to Narrabri CRN rail line (corridor 9) and onto the ARTC line at Narrabri for subsequent travel to destinations in the south east including domestic flour mills in Gunnedah, Sydney and Nowra and bulk export terminals at the Port of Newcastle and Port Kembla. A very small volume of containerised grain originates from the corridor and is destined for Port Botany.

In 2012-13, **a total of 301kT of bulk and containerised grain was freighted on this corridor.** Of this, approximately 290kT was bulk grain. This is consistent with the 10-year annual average volume estimated by GrainCorp for the corridor. In the same year, 11kT of containerised export grain was loaded at Walgett and Beanbri. While this is a very small volume, this segment of grain market is expected to experience solid future growth.

Figure 4-8 shows the location and catchment of the rail line corridor. The corridor is serviced by the Walgett LGA.

Figure 4-8 – Walgett to Burren Junction CRN Corridor



Source: Transport for NSW

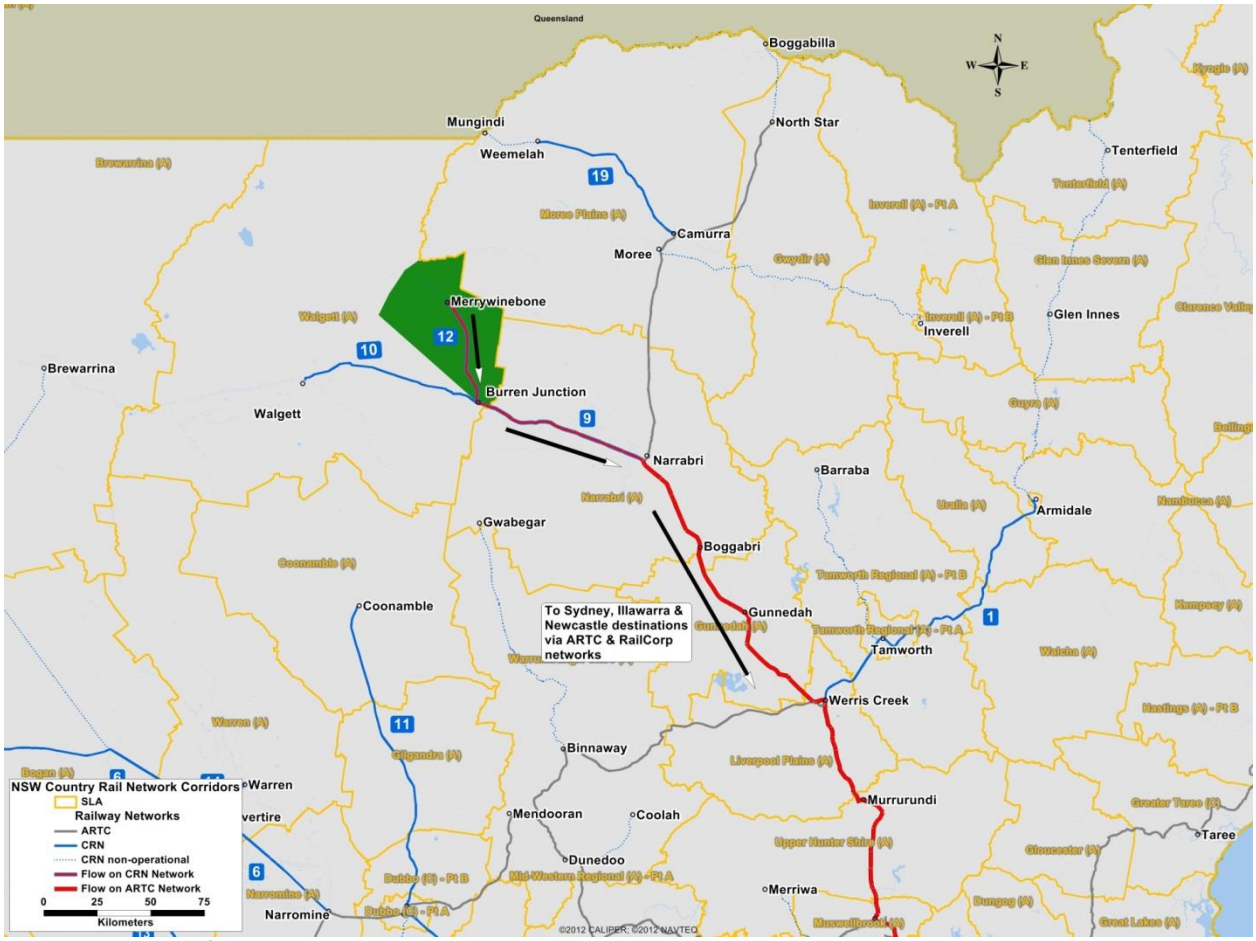
Merrywinebone to Burren Junction (CRN corridor 12)

The Merrywinebone to Burren Junction CRN line (corridor 12) is a branchline in northern NSW. Bulk grain is the only commodity railed on the corridor. It directly flows into corridor 9 and onto ARTC line at Narrabri for subsequent travel south east to destinations including domestic flour mills in Gunnedah, Sydney and Nowra and export terminals at the Port of Newcastle and Port Kembla.

In 2012-13, **a relatively small amount of bulk grain, approximately 44kT, was railed on the corridor**. This is below the 10-year annual average volume of 73kT estimated for the corridor by GrainCorp.

Figure 4-9 shows the location and catchment of the rail line corridor. The corridor is serviced by a small region of the Walgett LGA.

Figure 4-9 – Merrywinebone to Burren Junction CRN Corridor



Source: Transport for NSW

5. FUTURE REGIONAL PRODUCTION AND FREIGHT TASK

The growth in regional commodity production and the accompanying regional freight task, by mode, has been estimated by TfNSW from 2015 to 2035. **Over this period, the NSW freight task is predicted to almost double**.[75]

This study has adopted the same projected growth rates in commodity production and freight volumes as the *NSW Freight and Ports Strategy*, to ensure consistency with key state strategic plans.

Predicted annual growth rates in commodities and freight volumes over the 20-year period from 2015 to 2035 include:[76]

- coal and minerals: 4%
- wheat and grains: 1%
- cotton and other broadacre crops: 1%
- livestock and meat: 3%
- livestock products (milk, wool): 1%
- general freight: 3%.

5.1. FORECAST FUTURE COMMODITY PRODUCTION

Total future annual regional commodity production is forecast to increase to 71,855kT in 2035, an increase of 111% % from 2015 or around 37,800kT in annual production. A summary by commodity is provided in Table 5-1.

Table 5-1 – Current and forecast annual commodity production, kT

Commodity	2015	2035	% Change
Wheat and grains	1,984	2,429	22%
Cotton and other broadacre crops	809	987	22%
Livestock and meat	99	178	80%
Livestock products (milk, wool etc.)	52	63	21%
Coal and minerals	31,121	68,189	119%
Total regional commodity production	**34,064**	**71,855**	**111%**

Note: totals may not add precisely due to approach in aggregating regional commodity production
Source: Urbis Calculations

It is important to note that 97% of growth is driven by the expected growth in coal production in the Mid-Western Regional LGA – annual coal production is forecast to grow from 31,000kT to almost 68,000kT by 2035.

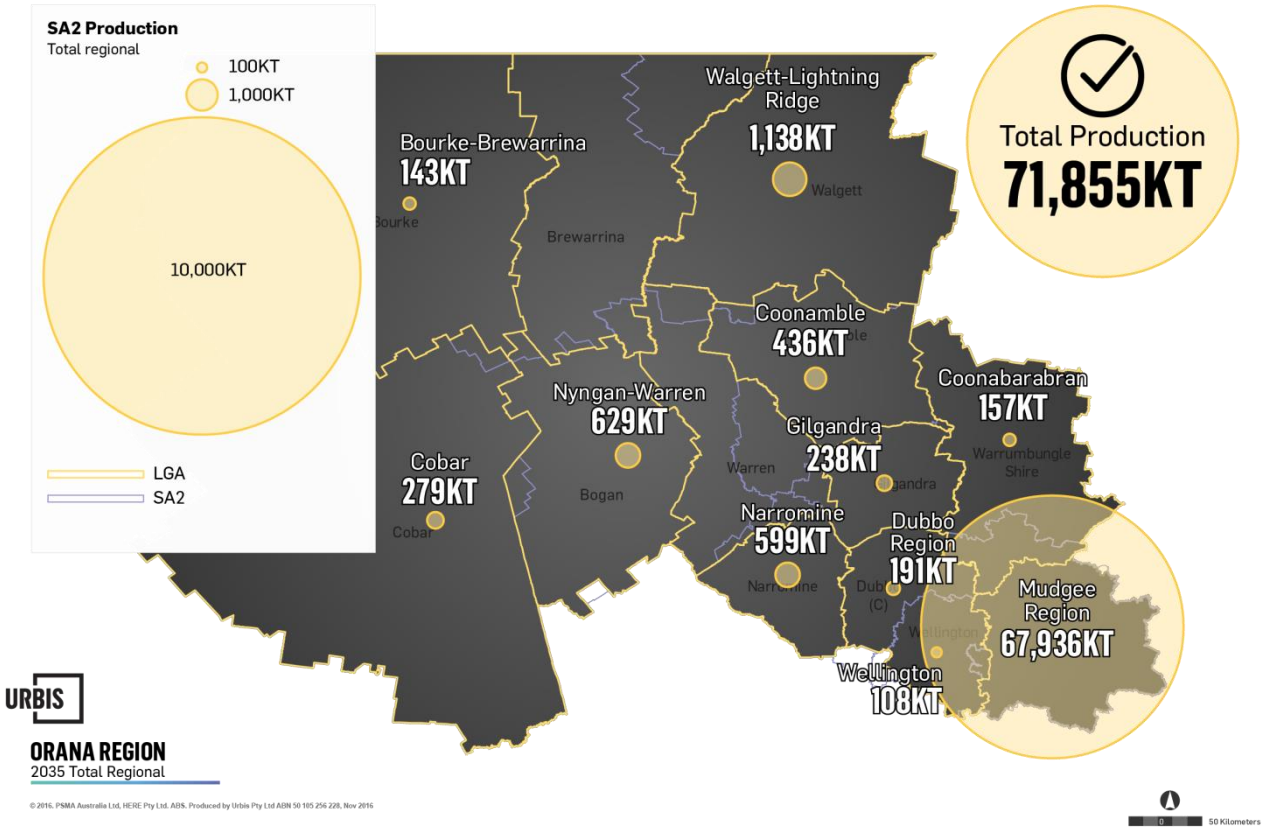
Given the dominance of coal in regional production, it is important to look at regional commodity growth in its absence to gain a more reflective understanding of future regional production and its potential impact on freight networks. **Total annual regional commodity production, excluding coal, is forecast to reach**

[75] Transport for NSW, 2013, *NSW Freight and Ports Strategy*
[76] Transport for NSW, 2013, *NSW Freight and Ports Strategy*

4,004kT in 2035, an increase of 29% or 906kT. This reflects the slow rates of growth predicted for agricultural commodities production over the next 20 years, in turn due to global market conditions as well as local environmental conditions.

Forecast future production across the Orana region is outlined in Figure 5-1 below.

Figure 5-1 – Forecast future regional commodity production, 2035



Source: Urbis Calculations

A summary of current and forecast future regional commodity production is provided in Table 5-1. The modest growth in many agricultural commodities can be seen, reflecting the relatively slow growth rates expected for this sector. Livestock and meat production, however, is expected to almost double to 178kT in 2035.

5.1.1. Risks to Future Productivity

There is a range of environmental and sustainability matters with the potential to significantly impact the region's agricultural and mining productivity. Issues such as climate change, water availability and soil health all have the potential to significantly change production outcomes. Regional agricultural production is particularly dependent on prevailing climatic conditions, and can be highly variable season to season. Cotton production, as noted earlier, is particularly reliant on regional water availability, with production volumes having varied by as much as 80% over the past decade.

The Climate Council has stated that climate change is making weather patterns more extreme and unpredictable, with serious consequences for Australia's agricultural production. In particular, the Climate Council has reported:[77]

- climate change is driving an increase in the intensity and frequency of hot days and heatwaves in Australia, changing rainfall patterns, increasing the severity of droughts, and driving up the likelihood of extreme fire danger weather

[77] Climate Council, 2015, *Feeding A Hungry Nation: Climate Change, Food and Farming in Australia*

- average rainfall in southern Australia during the cool season is predicted to decline further, and the time spent in extreme drought conditions is projected to increase
- water scarcity, heat stress and increased climatic variability in our most productive agricultural regions, such as the Murray Darling Basin, are key risks for our food security, economy, and dependent industries and communities.

Each of these trends has the potential to have very significant effects on the Orana region's productive capacity, competitiveness and export potential.

The NSW Department of Primary Industries (DPI) has identified the potential impacts of climate change as follows:[78]

- **Pastoral farming:** climate change is expected to negatively impact pasture yields and quality, potentially leading to environmental degradation of some grazing lands. Increased temperatures and humidity will also impact livestock productivity, particularly cattle, with increased animal heat stress. There is also potential for increased parasite risk to animals with the potential of the 'tick line' to move further south
- **Cropping:** it is likely that climate change conditions will favour increased wheat yields across NSW, however climate change is likely to reduce wheat quality as a result of increased carbon dioxide concentrations. Elevated carbon dioxide reduces the protein content of wheat grain, which can reduce feed value, particularly when used as a protein supplement
- **Dryland cotton:** reductions in rainfall due to climate change are likely to limit future dryland cotton production, which has already been extremely limited in the past few years. Increases in rainfall variability and extreme events will further negatively affect cotton production in NSW
- **Irrigated crops:** in the current climate, up to 50% of stored water can be lost by evaporation before use. These losses are projected to increase over much of NSW due to climate change
- **Weeds and pests:** climate change may exacerbate the impacts of weeds, pests and diseases, through increased prevalence and changes in geographic distribution. There is also potential for increased rust incidence in crops and pasture species.

DPI recognises that climate change is likely to increase pressure for irrigation to become more efficient. To be able to effectively meet this demand, there is an increasing need for improved technology that will enable systems to be managed and operated in a more responsive mode.

Soil health

Soil health across the Orana region also has the potential to significantly impact agricultural production, affecting plant growth, water quality and crop yields. Key issues impacting soil health, and potential agricultural production, include:

- salinity
- acidification
- erosion
- fertility depletion/soil carbon depletion
- soil structural decline and compaction.

A detailed assessment of the above issues on future regional productivity and the most appropriate mitigation approaches is outside the scope of this study. However, there is a risk that the above issues will affect Orana's future agricultural productivity, leading to lower production than forecast and therefore a reduced freight task.

This risk and uncertainty illustrates the difficulties associated with estimating the return on investment of individual freight investments over a prolonged period.

[78] Department of Primary Industries, 2016, Project impacts of climate changes on agriculture, see: http://www.dpi.nsw.gov.au/content/research/topics/climate-change/agriculture, accessed 18 November 2016

5.2. FORECAST FUTURE FREIGHT TASK

The future regional freight task is forecast to grow to approximately 49,000kT, an increase of 76% over current freight volumes. Road is estimated to account for 41,830kT (85%) of the task, and rail the remaining 7,160kT of freight.

This forecast excludes the impact of coal production, as outlined in Section 4. As noted above, while the coal freight task is expected to grow to almost 68,000kT by 2035, this task will be constrained to a dedicated coal line on the ARTC Hunter Valley Corridor on the eastern edge of the Orana region, and is unlikely to impact the remaining regional freight task.

The assessment of future freight tasks is based on the existing regional freight and logistics network and state-wide projections for commodity and freight growth. It is not possible to forecast with any certainty the potential impact of future investment in the regional freight network on the contestability of freight between road and rail freight modes. As such, our assessment has not factored in any changes to the existing freight network.

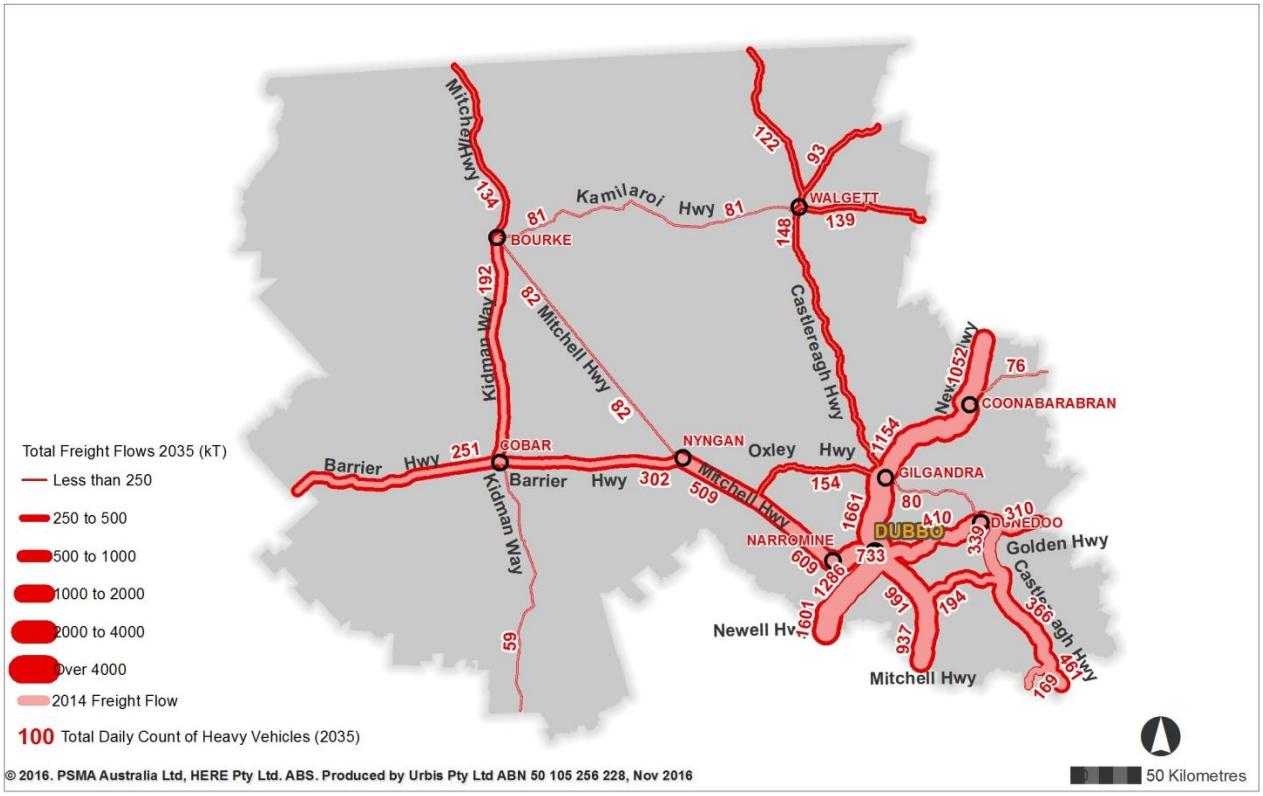
Rather, the forecast increase in freight flows provides a useful indication as to where likely constraints and pinch points may occur in the regional network in the absence of additional infrastructure investment.

5.2.1. Road Freight

The annual freight task carried by the regional road network is forecast to grow to 41,830kT by 2035, an increase of 77% from current levels. While the growing freight task is expected to be partially offset by an increase in truck productivity, daily heavy vehicle movements are anticipated to increase by 59% through the regional network.[79]

Forecast annual freight volumes and daily heavy vehicle movements across major regional road freight corridors for 2035 shown in Figure 5-2 below.

Figure 5-2 – Forecast road network corridor freight flows, 2035



[79] Bureau of Infrastructure, Transport and Regional Economics, 2011, *Truck Productivity: sources, trends and prospects*. An assumed increase in truck productivity of 0.5% has been factored into forecast heavy vehicle movements – below trend productivity improvements realised in the sector over the past 40 years.

Source: ABS, RMS, Urbis Calculations

The concentration of the freight task around the regional hub of Dubbo is expected to intensify significantly, with key corridors such as the Newell, Mitchell, Oxley and Golden Highway under increased pressure to handle the bulk of the freight task.

The forecast increase in the regional road freight task represents a potential risk to the efficiency and productivity of the regional freight and logistics network. The condition of the road network, already recognised as being poor in many places, will be placed under greater pressure to handle the growing task.

5.2.2. Rail Freight

The annual rail freight task for the Orana region is forecast to grow to 7,160kT by 2035.

As noted above, it is forecast that an additional 68,000kT of coal will be freighted annually along the ARTC main line. This freight task is expected to remain isolated with little interaction with the broader regional freight and logistics network and has been excluded from the following forecasts.

Table 5-2 summarises the forecast freight volumes to be carried on CRN rail lines in 2035. The increased freight volumes, and resulting increase in access fees, should assist in contributing to a more self-sufficient network that is better able to recover maintenance and operating costs.

Table 5-2 – Current and forecast annual rail freight volumes, kT

CRN Rail Line	2015	2035	% Change
Cobar to Narromine	970kT	1,500kT	55%
Warren to Nevertire	160kT	199kT	24%
Coonamble to Troy Junction (Dubbo)	370kT	461kT	24%
Dubbo to Lithgow	2,400kT	4,532kT	92%
Walgett to Burren Junction	301kT	375kT	24%
Merrywinebone to Burren Junction	73kT	91kT	24%

Source: Urbis Calculations

The Dubbo to Lithgow CRN rail line is expected to carry the overwhelming majority of rail freight within the region. However, growth on the Cobar to Narromine rail line is also expected to be significant.

It has previously been noted that rail's share of the freight task has been trending downward as it has failed to keep pace with the productivity gains made in the trucking sector.

The above forecasts have not factored in any changes to the existing freight network. However, in reality, targeted investment in the regional rail network is likely required to simply maintain the sector's market share relative to road. Failure to maintain the current standard of the CRN branch lines, at a bare minimum, would likely result in a continuation of the trend away from rail freight to road freight for grains and other agricultural commodities.

6. REGIONAL INVESTMENT INITIATIVES AND ECONOMIC BENEFITS

The Orana region is supported by a freight and logistics network that is characterised by good intra- and inter-regional road and rail connectivity, with particularly strong road connectivity. The regional freight and distribution hub of Dubbo is well connected to the broader NSW road freight network, located at the intersection of the Mitchell, Newell and Golden Highways, and with direct rail access to coastal ports.

The freight and logistics network that underpins regional agricultural and mining production, however, is not without its challenges and impediments. As noted earlier in this report, sections of the freight network are variously impacted by poor condition, congestion, inefficient utilisation and access restrictions. The inherent variability of seasonal production which makes predicting freight demands difficult, combined with the continued consolidation of some aspects of the network (up-country receival sites etc.), also conspire to place significant pressure on the regional freight.

While neither the region's productive capacity nor its ability to access markets is constrained by the regional freight and logistics network, these challenges and impediments do constrain the efficiency and productivity of the freight sector. This, ultimately, has the potential to result in higher freight costs for regional producers and industry, impacting regional competitiveness and profitability, and resulting in higher costs to consumers.

This section identifies potential regional opportunities and initiatives to support improved freight productivity and producer profitability, and discusses the economic value of infrastructure investment.

6.1. OPPORTUNITIES TO SUPPORT FUTURE GROWTH

The State Government is leading a significant regional infrastructure investment program with a focus on upgrading regional freight road and rail corridors to remove network constraints and 'pinch points' and improve freight efficiency and market access.[80] The NSW Government has reserved to $4.1 billion to improve and upgrade regional transport including:[81]

- Regional Road Freight Corridor Program - $2 billion
- Regional Growth Roads Program - $1 billion
- Fixing Country Roads Program - $500 million
- Fixing Country Rail - $400 million
- Bridges for the Bush - $200 million.

Of significance to Orana, $500 million has been committed by the NSW Government to upgrading the Newell Highway as part of the Regional Road Freight Corridor Program. As the backbone of the regional road freight network, **the Newell Highway upgrade has the potential to greatly benefit the region**. As previously noted, Draft Corridor Strategies have been developed for the Newell Highway, Oxley Highway and Golden Highway and a Draft Great Western Highway (including part of the Mitchell Highway) is currently in development.

In addition to the above programs, a range of large infrastructure investment projects of relevance to the Orana region are being considered/developed, including:

- Port Botany rail freight duplication (business case stage)
- road freight connections from Port Botany and Sydney Airport to WestConnex (business case stage)
- Moorebank Intermodal Freight Terminal road connection (options assessment).

These programs and projects will address a range of 'last kilometre' issues identified by stakeholders, including removing local and regional 'pinch points' on the road and rail networks, alleviating coastal port

[80] Infrastructure NSW, 2014, *State Infrastructure Strategy Upgrade*

[81] Infrastructure NSW, 2016, *State Infrastructure Strategy*, see: http://www.nsw.gov.au/initiative/state-infrastructure-strategy#regionaltransport, accessed 21 November 2016

congestion, improving network condition, and improving network connectivity and market access for regional producers.

The focus of this study, however, is on freight and logistics initiatives and opportunities within the Orana region. Potential initiatives address 'first kilometre' issues and improve regional freight network efficiency are identified and briefly discussed below.

This study has not sought to undertake a detailed assessment of any of the identified initiatives and the resultant impact on regional freight productivity. However, **it is critical that an integrated approach to planning and investing in the Orana regional freight network is adopted, given the interaction and interdependence of road and rail freight modes. Failure to adopt an integrated approach could lead to initiatives simply resulting in a mode shift rather than an improvement in whole-of-network performance.**

It is important to note that stakeholders consulted identified a broad range of investment opportunities – there was no consensus on what the key regional "projects" or requirements were. This is not surprising; rather, it reflects the diverse range of industry priorities, issues and requirements among regional stakeholders.

6.1.1. Road Initiatives

A broad range of road initiatives to improve regional freight productivity was identified through consultations and accompanying literature review, including:

- **upgrade and maintenance of local and regional roads** – stakeholders noted that increased funding is required for the upgrade and maintenance of local and regional roads to address the general poor condition of the network and improve access
- **regional city freight bypasses for regional centres such as Dubbo and Coonabarabran** – regional city bypasses have the potential to improve freight efficiency by reducing travel times and costs, while improving safety for road users and town amenity
- **upgrade of the Golden Highway** – stakeholders noted an upgrade to the Golden Highway, a critical link to Newcastle, is required to address congestion and freight access restrictions. The highway is currently only accessible to standard 19 metre B-doubles
- **upgrade of key freight corridors** – stakeholders variously identified a need to upgrade the Newell, Great Western, Oxley, Mitchell, Kamilaroi and Barrier Highways to address specific congestion and freight access restrictions
- **elimination of radio 'black spots'** – radio black spots create safety issues for drivers, and can affect freight efficiency by requiring drivers to take longer journeys on alternative routes
- **investment in truck stops and washes** – stakeholders noted a lack sufficient truck stop facilities throughout the region, impacting driver safety and wellbeing. It was also noted that there is a need for further investment in truck washes throughout the region to manage the spread of weeds and pests
- **establishment of dedicated heavy vehicle freight network west of Newell highway** – improving access to HPVs will improve the efficiency and productivity of the regional road network (Urbis notes that the State Government is in the process of developing options for a dedicated freight region west of the Newell Highway).

Urbis notes that TfNSW, as part of the Regional Road Freight Corridor Program, has identified an extensive suite of actions to support the upgrade of key regional freight corridors in the Orana region to address congestion and freight access concerns. **It is recommended that RDA Orana consult with regional industry and coordinate a regional response to TfNSW's soon-to-be-released Draft Great Western Highway Strategy.**

The NSW Government has recognised that there is a lack of understanding regarding the capability of State and local road infrastructure.[82] Many barriers on the regional freight network remain unknown and unquantified. **There is a need to develop a rigorous and detailed understanding of local infrastructure**

[82] Transport for NSW 2011, *NSW Freights and Ports Strategy*

capability to inform a review of existing access restrictions for HPVs and other heavy vehicles on local and regional roads through the Orana region.

6.1.2. Rail Initiatives

Stakeholder consultations with State Government and below-rail and above-rail operators confirmed that **the priority for the Orana rail network is improving the utilisation and efficiency of the existing network**.

Specifically, improving the coordination of outbound freight and increasing the demand for inbound freight is considered critical to enhancing the utilisation of the network. Improving access to rail sidings on the CRN and developing mobile main line loading facilities were identified as specific initiatives to increase the utilisation of the network.

Targeted investments identified to improve network utilisation and efficiency include:

- increase the number and capacity of passing loops on the network
- improve train signalling
- removal of specific bottlenecks such as aging wooden bridges (ARTC is in the process of developing a bridge replacement program at an estimated cost of $40 million)
- improve maintenance regimes to increase axle loads on specific rail lines.

The above targeted investments would remove barriers to operating longer and more efficient trains on the regional rail network. Below-rail operators estimated that **increasing the length of freight trains from 600 metres to 1,000 metres could reduce freight costs by an average of 30%**.

State Government and below-rail and above-rail operators agreed that any large-scale infrastructure investment or upgrades on the rail network is unlikely until there is a demonstrable improvement in network utilisation and efficiency to make such investments financially viable.

6.2. THE ECONOMIC VALUE OF INFRASTRUCTURE INVESTMENT

As noted previously in this report, a unifying theme of the consultations and literature review was that the current freight network is not impeding production levels nor access to markets.

Potential upgrades to road and rail infrastructure are therefore about improving the productivity of these networks by reducing the freight journey time and therefore costs. Costs are lowered as a result of reduced labour inputs as well as lower operational costs, particularly fuel consumption, wear and tear on tyres and maintenance costs. The degree to which each of these is affected will vary according to the nature of upgrades.

In the case of many potential rail or road upgrades, the benefits will be increased speed (due to shorter routes and/or better quality roads) and/or load capacity.

6.2.1. Case Study: Dubbo Ring Road

An outer Ring Road for trucks, or Freightway, around Dubbo city centre has been proposed for a number of years now, but is not slated for construction until at least 2026.[83]

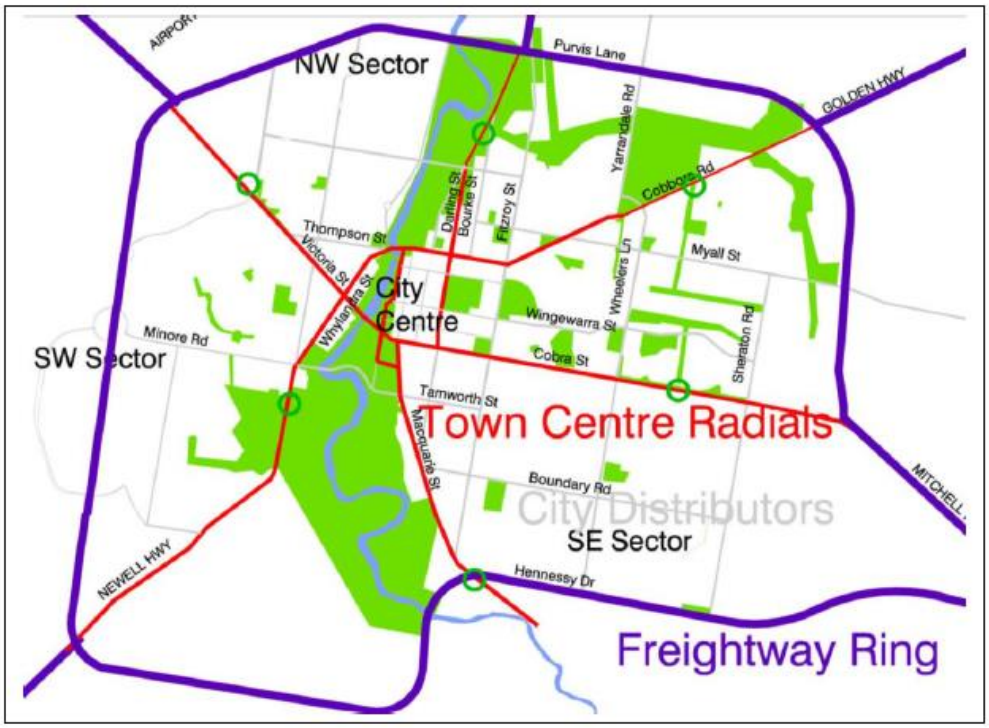
The Freightway, illustrated in Figure 6-1, would ideally serve a range of purposes:

- minimise interference with town traffic and improve travel times for truck drivers by reducing gear changes
- improve the amenity of Dubbo centre by removal of heavy vehicles
- increase the attractiveness of Dubbo for ‘warehousing, trucking and distribution industries’.[84]

[83] Stapleton Transportation and Planning Pty Ltd 2009, *Dubbo City Planning and Transportation Strategy 2036*

[84] Stapleton Transportation and Planning Pty Ltd 2009, *Dubbo City Planning and Transportation Strategy 2036*

Figure 6-1 – Dubbo Freightway

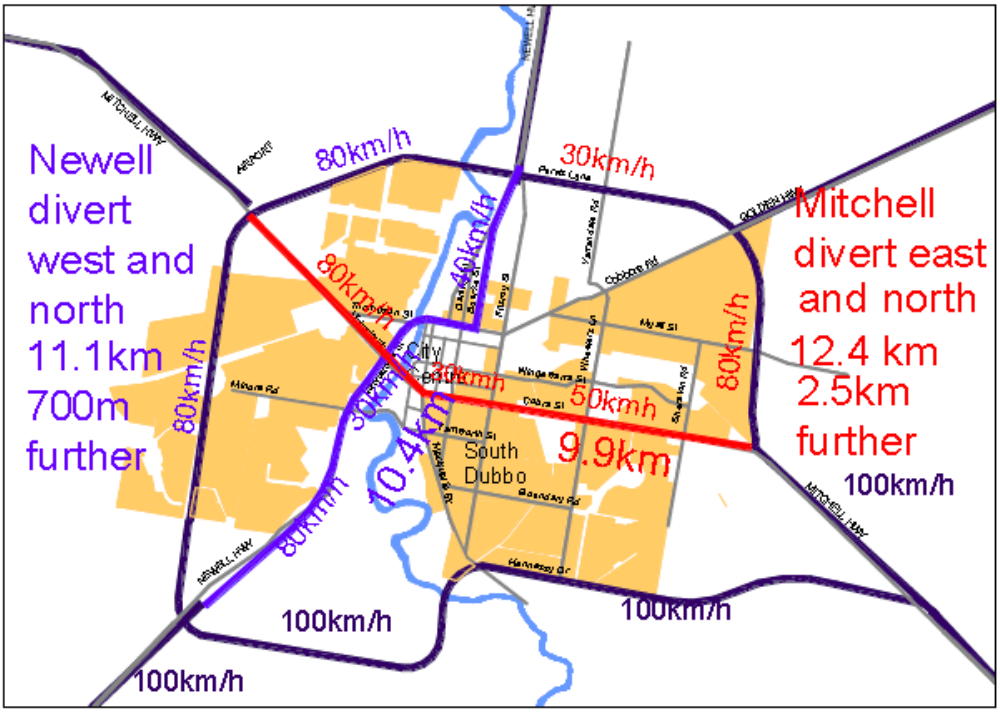


Source: Stapleton Transportation and Planning Pty Ltd

As illustrated above, the Freightway would divert freight traffic on the Newell Highway to the west of the town centre and traffic using the Mitchell Highway would divert north through Purvis Lane.

The impact of these changes on truck distances and speed is shown in Figure 6-2 below.

Figure 6-2 – Impact of Freightway on truck distances and speeds



Source: Stapleton Transportation and Planning Pty Ltd

To demonstrate the potential return on investment of this project, Urbis undertook a high-level Cost Benefit Analysis (CBA).

The only source of information on the project cost available is a report from the Daily Liberal of 23 February, 2016, which puts an estimate of $75 million. This appears conservative for a 32.5 kilometre road, however, as even in low-density regions, road costs are estimated at $5 million per lane per kilometre. For medium density suburban infill areas, the cost rises to $10 million per lane per kilometre.[85]

Urbis then estimated the potential savings resulting from the proposed changes, drawing on:

- distance and time changes for trucks as illustrated above
- average earnings data for truck drivers, sourced from ABS
- fuel, tyre and maintenance costs per kilometre for heavy vehicles, sourced from the Freightmetrics website
- number of truck movements on both the Mitchell and Newell Highways around Dubbo, sourced from RMS.

Urbis estimates that the per annum impact on trucking costs for freight is as follows:

- Mitchell Highway diversion: cost **increase** of $936,373
- Newell Highway diversion: cost **decrease** of $542,633
- net change: cost **increase** of $393,740.

The increased cost to trucks of the Mitchell diversion is due to the fact that the increased distance (2.5km) is not sufficiently compensated for by the net increase in speed along the diversion.

If only the Newell diversion were to be constructed, assuming a cost of roughly $35 million (based on the relative distances of each of the diversions but considered conservative), the Benefit Cost Ratio (BCR) is 0.2, representing a negative economic impact in Net Present Value (NPV) terms of -$28.9 million. The potential economic value resulting from improved urban amenity and air quality, for example through increased visitation, is unlikely to be significant enough to have a meaningful impact on the BCR.

The economic impact of the road construction is not taken into account, in accordance with NSW Treasury principles. As funding is most likely to be through State Government, given finite government resources, if this funding were not available to Dubbo, it would be likely be spent on a similar project elsewhere - generating similar activity.

If the Freightway were to lead to new investment in Freight and Logistics infrastructure in the region, for example new warehousing and distribution facilities, or a truck stop, then this new activity could potentially generate a BCR greater than 1. Urbis was unable to identify any logistics enterprises currently considering such investment that was contingent upon the construction of the Freightway.

6.2.2. General principles

Consultations raised the issue of the very poor condition of some local and regional roads in Orana, notably in less densely populated areas.

To understand the potential economic gains of road upgrades in these areas, it would be necessary to collect and collate the condition and usage of each of these roads. Upgrading from dirt to sealed road reportedly can cost between $250,000 and $500,000 per kilometre.[86] While significantly cheaper than bitumen roads, the usage of these roads is also much lower and the potential BCR generated needs to be examined closely.

There are two other considerations for assessing the reasonableness of investing in network upgrades beyond perceived economic costs.

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[85] Nichols,M 2013, *Road Costs Associated With Differing Forms of Urban Development*, State of Australian Cities National Conference SOAC 2013, Sydney

[86] Purtill, J 2014, *Outback Way: Huge difference in cost to seal dirt road between NT, WA, Qld* http://www.abc.net.au/news/2014-09-11/outback-way-seal-dirt-road-millions-dollars-price-difference/5735650, accessed 18 November 2016

Firstly, consideration needs to be given to the degree to which failure to upgrade may result in roads falling into total disrepair. Poor conditions in some regions reportedly already force drivers to take unauthorised ‘short cuts’, typically through the night, to reduce driving time. This poses some safety issues for both drivers of trucks and other vehicles.

Secondly, while production is not currently constrained by roads, the significant increases expected over the next twenty years suggest this may not always be the case.

More detailed mapping of data for smaller regional roads throughout Orana (which in itself requires a significant investment) would assist in better understanding the networks’ needs at a more granular level.

APPENDIX A STAKEHOLDER CONSULTATION AND SURVEY FINDINGS

STAKEHOLDER CONSULTATIONS

Urbis consulted directly with over 25 regional stakeholders including:

- regional producers and growers
- potential regional investors
- road and rail transport companies
- bulk commodity traders
- facility operators (including port, airport, intermodal and livestock market operators)
- local councils
- state and federal departments and agencies.

A summary of the stakeholder consultation findings is documented below.

General observations

Overall, stakeholder views of the critical freight and logistics issues impacting the region were wide ranging and fragmented, with no unified themes emerging; rather they presented a reflection of their respective sectors and focus.

Overall, insufficient information and data was gained through the consultations to provide a robust understanding of regional freight volumes and destinations. However, key data sources within TfNSW and RMS were identified as a consequence of consultations.

Regional products and markets

Stakeholders confirmed that regional producers and growers supply to a wide range of domestic and international markets including:

- regional NSW, Qld, Vic, WA and capital cities
- China, Korea and south-east Asian countries are key international markets – especially for grain, cotton, beef, sheep and mineral exporters
- the USA is also an important market for lamb.

Stakeholders confirmed that road is the dominant freight mode in accessing markets – it underpins regional industry. Growers/producers use roads to access storage facilities, gins, intermodal facilities and ports while rail transport operators rely on roads to bring product to their rail sidings, loading points and warehouses.

However, stakeholders confirmed that rail remains critically important to the region for exports (bulk and containerised). Growers and producers confirmed that rail remains the preferred freight option for transport distances greater than 400 kilometres.

All stakeholder groups noted the region has good options in accessing export markets, including:

- Sydney (container port and international airport)
- Newcastle (bulk port)
- Brisbane (port and international airport)
- Melbourne (container port and international airport).

However, growers, producers and traders noted that they considered that Sydney and Newcastle ports were Orana's gateway to the world. Subsequent analysis of road and rail freight flows provided by

TfNSW and ABS as part of this study has indicated that Newcastle is a not a major destination for freight originating from the Orana region.

The majority of stakeholders agreed that global markets are changing, with an ever-increasing demand for fresh, safe, high quality and shelf ready produce.

Producers and miners are particularly interested in the establishment of economic development zones (EDZs) in export markets including Vietnam, Thailand and Bangladesh. This has the potential for both current and potential value adding activities (such as manufacturing and processing) to be increasingly moved offshore. This could result in a greater proportion of raw and unprocessed products being transported from the Orana region directly to coastal export terminals.

There is an increasing move towards on-farm storage, farmers accessing markets directly, and commodity traders competing with co-ops.

However, stakeholders believe Orana is well placed to adapt to changing markets – industry is investing in EDZs and the region is well recognised for its safe, high quality product, highly efficient agricultural sector.

Market access

Stakeholders observed that access to markets can, at times, be impeded by poor road condition and insufficient rail access, such as:

- roads – closures, poor condition, insufficient shoulder width and mobile black spots all impede access to markets and add to transport costs
- rail – insufficient 'slots' to port botany, speed and axle load restrictions, lack of loading points and inefficient use of existing network reduce competitiveness of rail and result in mode shift.

Rail transport companies and rail line operators agreed that rail has not been able to keep pace with productivity gains of road sector due to significant improvements in high performance vehicles, increasing truck loads and safety. This has resulted in the road freight mode capturing an ever-increasing market share.

Key observations included:

- significant improvements in high performance vehicles, increasing truck loads and safety
- leading to significant improvements in $tonne/km in road sector
- road can provide point-to-point access, direct market access
- rail has not kept pace by improving coordination, axle loads and speeds
- rail operators noted that road is capturing increasing market share of grain, cotton, and general freight.

Consequently, it was estimated by CRN that approximately 1.5 million tonnes of annual grain freight have transitioned to road over past decade.

The majority of stakeholders reported that **the absence of an international air freight facility was not an impediment to market access.** Stakeholders variously noted:

- there was good access to Sydney International airport and (to a lesser extent) Brisbane and Melbourne
- Toowoomba (Wellcamp) and Canberra airports were beginning to provide international access
- dedicated freight charges for relatively small, irregular deliveries cannot compete with passenger 'belly freight'
- a minimum of $55 million in capital expenditure was required in the first instance to accommodate wide body aircraft at Dubbo Regional airport
- there was insufficient demand in the region to support freight-only services and insufficient passenger demand to support belly freight international services; the investment required to support these was unlikely to be sound
- NSW and Commonwealth Government stakeholders confirmed there was no support for an international facility in the region.

Products

All growers and producers interviewed believed that production was not constrained by existing freight and logistics networks.

Stakeholders noted that regional productive capacity is driven by resource constraints (e.g. water availability, growing conditions, mineral deposits). However, profitability and competitiveness is impacted by inefficient freight and logistics networks.

Growers and producers noted that they don't factor the condition and/or improvements in freight and logistics networks into business decisions on:

- expansion of production
- commodity and product selection and development
- identification of target domestic and international markets.

Freight and logistics networks

Pinch points and barriers

Stakeholders agreed that **the road freight network underpins the regional freight task** but has many issues. Key issues consistently identified by transport companies and growers/producers included:

- poor condition of local and dedicated freight roads (critical issue):
  - safety concerns, road closures, speed restrictions, shoulder widths, unable to handle freight task
- insufficient funding for local roads:
  - but a transport operator noted "councils do the best they can"
- lack of access and capacity over Blue Mountains, in particular the Great Western Highway
- lack of a regional heavy freight network, resulting in need for "dog runs", indirect routes, inconsistent mass limits some routes
- mobile 'black spots'.

Transport industry and local government stakeholders agreed that there is a lack of truck stops, washes and facilities for drivers throughout the region. It was noted by a transport operator that the lack of driver facilities was a significant WHS issue.

The majority stakeholders consider **rail network to be critically important to region, but:**

- a rail network operator considered the lack of physical access to country rail network (CRN) as a key constraint:
  - access to sidings is constrained by privately owned land
  - ability to load freight is severely constrained
  - significant amounts of infrastructure are underutilised
- rail and rail network operators noted load and speed restrictions recognised as major impediments to rail productivity – reduce advantage of modern, powerful locomotives
- only one multi-user loading point in Orana – Hermidale
- lack of passing loops – don't accommodate larger, modern trains, restricts network efficiency
- train slots to port botany are severely constrained – train operators and traders can't get enough slots during peak growing seasons:
  - a bulk trader noted they would ideally want 4 slots per week during peak season, but can only access 3 slots per week to Botany

- rail operators and producers recognised that freight network is constrained by Sydney metropolitan network:
  - a transport company noted that trains can wait for up to eight hours in Enfield
  - 16 hour turnarounds in and out of Sydney
- rail closures can result in missed shipments.

Investments and improvements

There was no consistent one key regional 'project' or 'investment' identified by stakeholders. Rather, a range of investments were identified, including:

- upgrade of Great Western Highway (over Blue Mountains)
- upgrade of Golden Highway to expand access to Newcastle
- Newell, Oxley, Barrier and Mitchell Highways were all identified as requiring investment
- significant general investment to improve condition of local roads – improve first kilometre access
- need for coordinated funding between councils on major routes – transport company noted that condition of some roads dramatically changes at LGA boundary
- Dubbo freight ring road – could significantly reduce transport costs of going through town
- a transport company noted the need for the establishment of a dedicated heavy freight network – but state regulators noted work was being undertaken in this area
- investment in truck stops, washes and related facilities was required, but economically challenging
- the road regulator noted that many future road projects, upgrades and actions are identified in the respective corridor strategies (e.g. Golden Highway, Oxley Highway, Newell Highway corridor strategies).

It was noted that the cotton harvest is expected to increase the freight task on some freight routes by 200% over next 2 years – significant concern over ability of road network to handle task.

Stakeholders identified a range of broad investment needs for the rail network. Examples include:

- CRN and ARTC – "must improve utilisation of existing network and improve efficiency before invest in major infrastructure upgrades"
- rail operators and state regulators consider that coordination of freight task is critical to improving efficiency and a 1st order priority over infrastructure investment
- ARTC and CRN agree that improving train lengths will significantly reduce costs – ARTC estimate that a 30% reduction in costs is achievable by increasing train lengths from 600 metres to 1,000 metres
  - but operators and regulators note that train length constrained by lack of passing loops in parts of network.

Other rail investment and improvement needs included:

- identify opportunities for main line loading access – use of mobile loading facilities
- improve access to branch line sidings – one stakeholder considered this a key impediment to the uptake on CRN
- maintenance programs to improve axle loads
- bridge replacement program - $40 million to replace six bridges.

With respect to the logistics facilities, stakeholders' views on the necessary improvements and investments were wide ranging and fragmented. There were general observations on storage facilities – but universally recognised as a private sector investment and little scope for government to intervene.

A few stakeholders identified the development of Newcastle container facility as a potential opportunity, providing the additional benefits:

- would accommodate 1,300 metre trains – potentially saving growers $20-$30 per tonne (port operator estimates)
- provides direct port-side access (unlike Port Botany)
- estimate over 400,000 containers come out of Orana and Central West regions
- estimate savings of $600 per container compared with Port Botany, and would significantly free up capacity at Port Botany.

Policy and regulation

Stakeholders identified a range of regulatory and policy constraints – however there was no strong consensus on the key issues impacting the region.

Stakeholders in the transport sector identified a range of vehicle permit regulatory issues, including:

- compliance costs are significant and incentivise non-compliance, e.g. HML vs GML licences
- compliant companies can't compete cost wise with 'cowboy' operators
- inconsistency between jurisdictions – e.g. movement of oversized freight between NSW and Qld, NSW don't allow quad configurations but Qld do
- time to have permits approved – 28-day turnaround.

Transport companies noted the inconsistent vehicle lengths and configurations on key routes and lack of dedicated freight network in the region and across NSW more generally.

However, the state regulator noted that work was being undertaken to address the lack of a freight network and noted the development of a freight 'region' west of the Newell highway.

Rail operators questioned whether road users pay the full the access price and therefore had an unfair competitive advantage.

STAKEHOLDER ONLINE SURVEY RESULTS

Urbis undertook a survey of key stakeholders to support information gathered in consultations, and to provide further insight into the freight and logistics capabilities of the region. The survey gathered information on key domestic and international markets, movement of freight including physical and regulatory limitations, and the appetite for air freight in the region.

Overall, Urbis received 27 responses with 16 complete and 11 partial responses. Insufficient responses were received to provide a robust understanding of regional freight volumes. However, the survey provided a valuable contribution to broader understanding of the regional freight and logistics needs of the region.

Key findings

Most respondents supply the NSW market, with key interstate markets in Queensland and Victoria. Those exporting overseas predominately do so to Asia or the Middle East. There is considerable appetite in the region to expand operation into new markets, domestic and international.

Most freight in the region is moved by road, with rail in limited use due to potential time delays and inefficiencies. Most physical and regulatory limitations of the freight network focus on issues with the road network, including poor mobile phone coverage, poor or unsafe roads and restrictions on heavy vehicle movements.

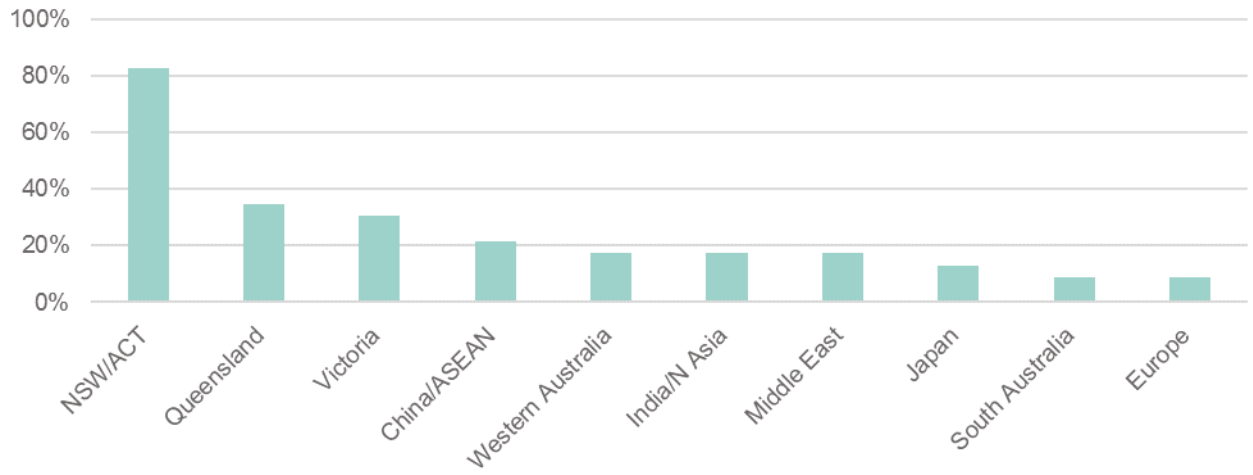
While only one respondent reported currently using air freight, four respondents indicated that they were considering it as a future freight option.

Key markets

Survey results indicate that NSW is the key market for the majority of respondents (19 of 23 respondents, 83%). Major interstate markets are Queensland and Victoria (35% and 30% respectively), which is to be expected considering their proximity to the Orana region.

Major overseas markets that respondents supply to are China/ASEAN (22%), India/North Asia (17%) and the Middle East (17%).

Figure A–6-3 – Where does your company supply to?

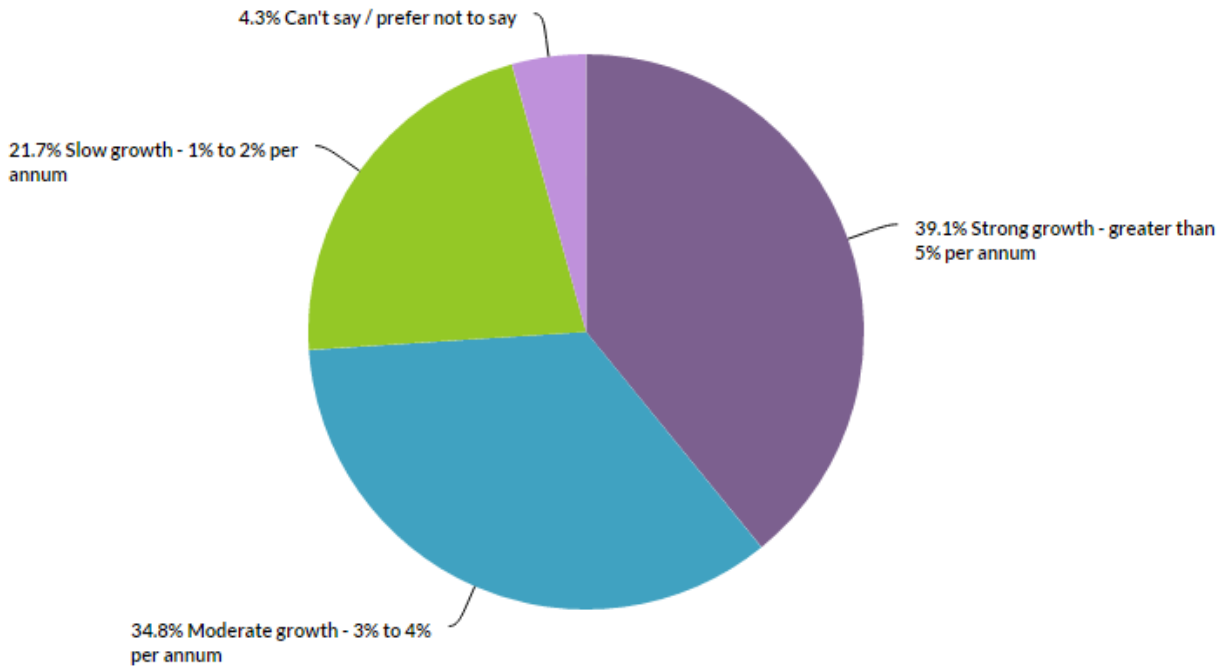


n=23
Source: Urbis survey

Growth expectations

Industry respondents were reasonably bullish on future growth prospects, with over 70% of respondents expecting moderate to strong growth over the next five years.

Figure A–6-4 – What are your growth expectations over the next five years?

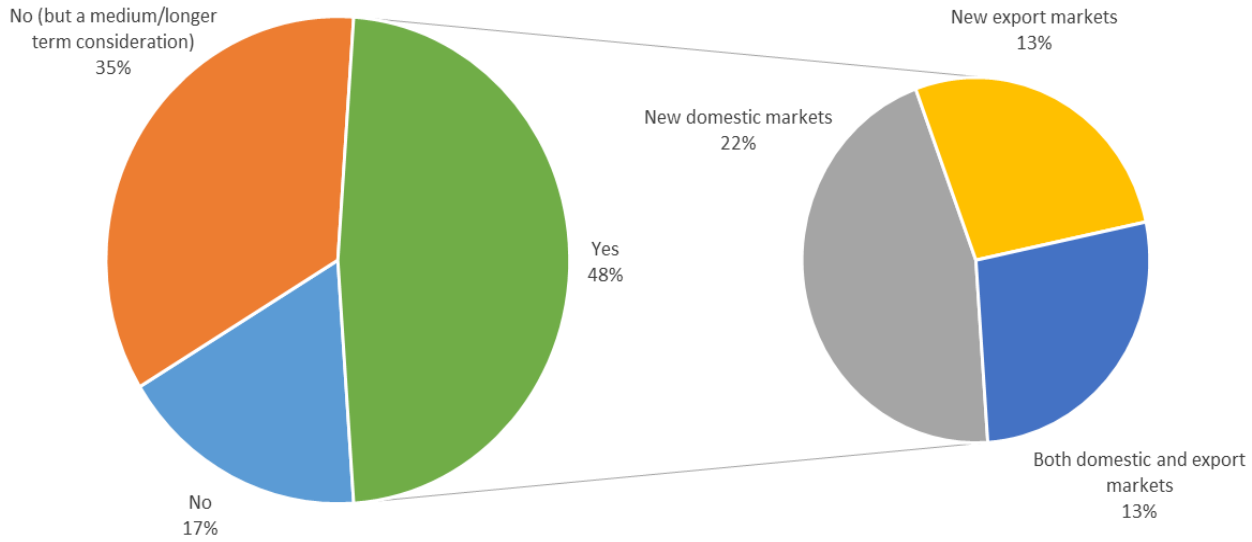


Expansion into new markets

Almost half of companies surveyed indicated they were currently considering expanding into new markets (11 out of 23 respondents, 48%), however, 8 of the 12 who said they were not currently considering expansion did see it as a medium/longer term consideration.

There is an appetite to expand into overseas markets. Of those companies considering expansion, 6 out of 11 are considering new export markets, with 3 of those 6 solely focused on export markets. See Figure A–**6-5** below.

Figure A–6-5 – Is your company currently considering expanding into new markets?

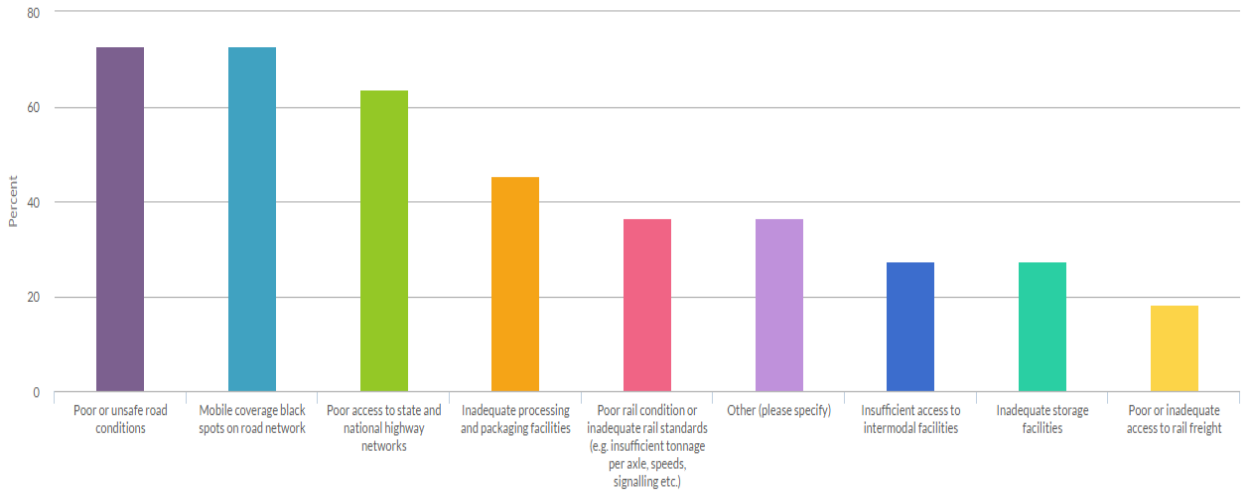


n=23
Source: Urbis survey

Physical barriers impacting the freight network

Almost 70% of respondents believe there are physical barriers or limitations impacting freight in the region. Poor and unsafe roads, poor mobile coverage and poor access to networks were the major issues identified.

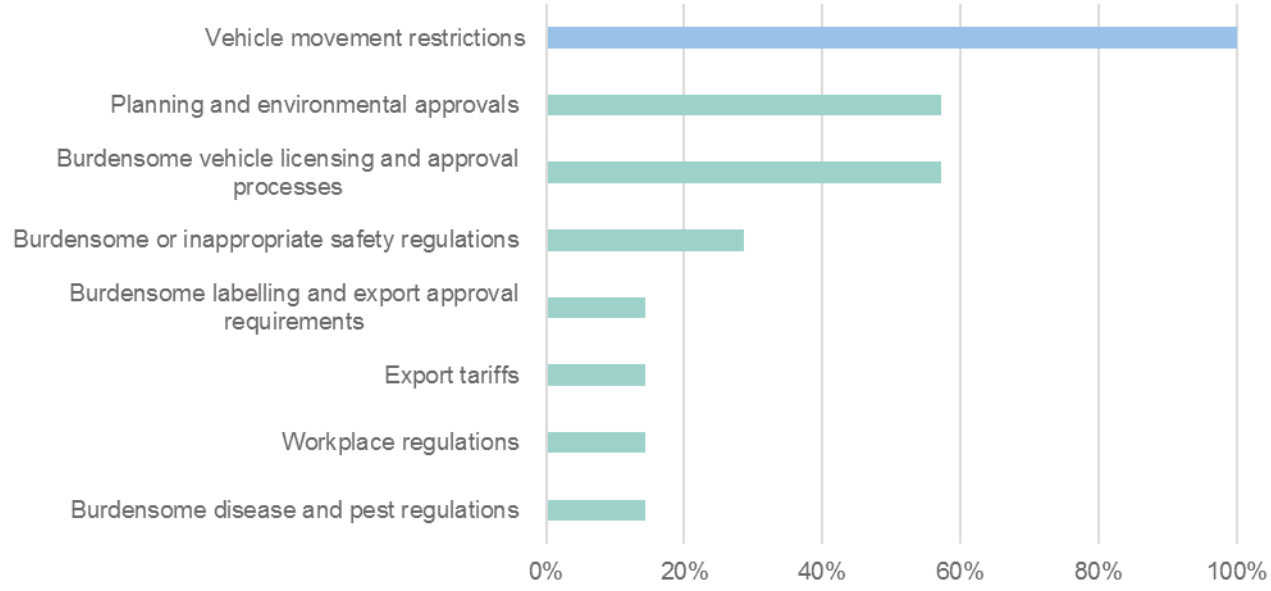
Figure A–6-6 – What do you consider to be the key physical barriers or limitations impacting the region?



Regulatory barriers impacting the freight network

Regulatory issues were considered to be less of an issue to the regional freight task than physical limitation – 7 out of 16 respondents (44%) indicated that there were regulatory and/or policy barriers.

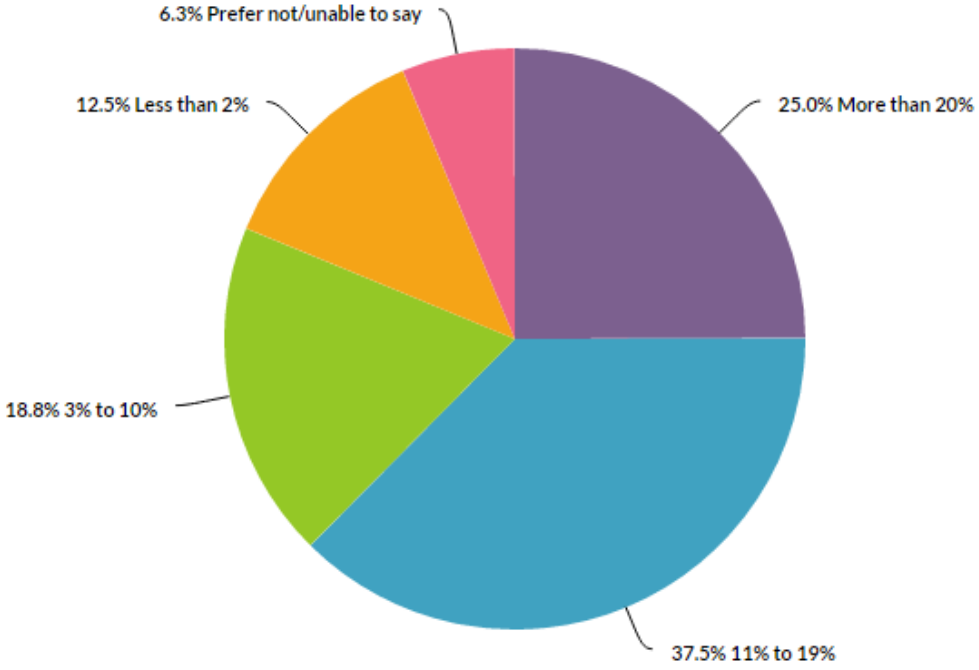
Figure A–6-7 – What do you consider to be the key regulatory and policy barriers impacting the region?



Supply chain expenditure

Respondents indicated that supply chain costs can be significant for regional businesses. For example, more than 60% of businesses spend more than 11% of gross revenue on supply chains.

Figure A–6-8 **– What proportion of gross revenue do you spend on supply chain costs?**



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