Report prepared for the

Roads and Traffic Authority of NSW

South Eastern NSW Road Freight Supply Chain Study

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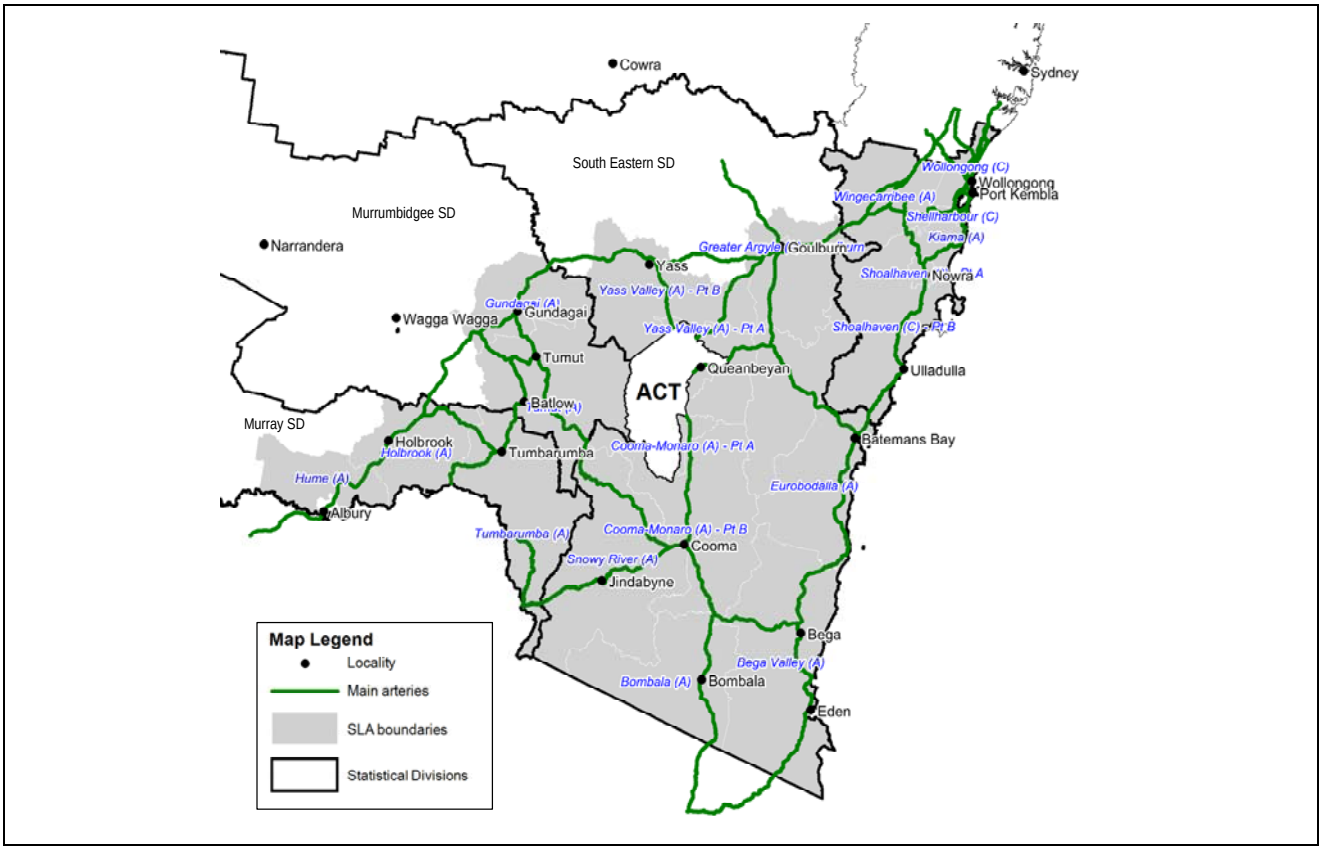
1. EXECUTIVE SUMMARY

Study objective

The objective of the South Eastern Road Freight Supply Chain Study is to describe and quantify the current and future freight logistics including supply chains to assist the RTA in identifying short and long term needs of the State roads in the study area. The RTA will use the information in this study in developing its strategic network strategy for the area.

Figure 1 – Study Area

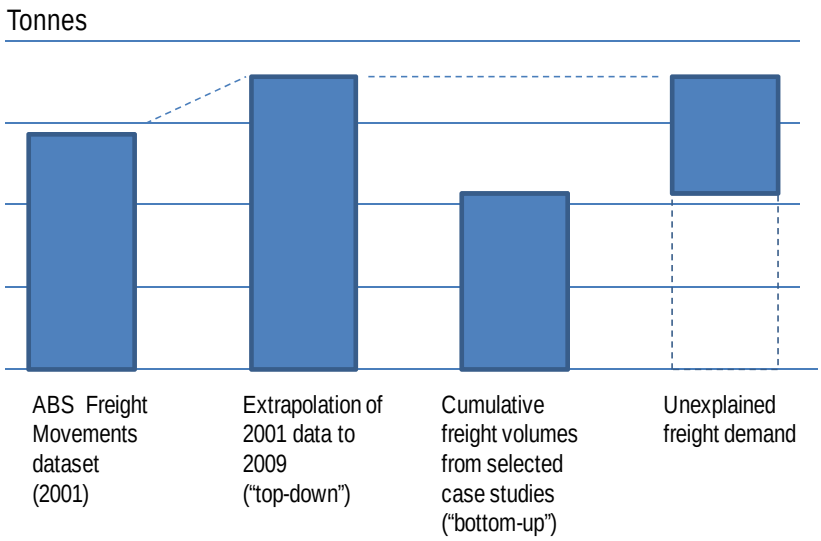


Study Methodology

The cornerstone of Sd+D's approach to quantifying truck movements is to first understand that freight is a derived demand – goods move in response to the relationship between production and consumption.

The methodology for the project was based on a bottom-up approach involving industry consultation on a case study basis to map the supply chains of the key industries in the study area. This process included gathering data from the major freight generators in the region as to the type of freight that is moving, the frequency of movements, origin and destination profiles, truck configurations and the routes travelled. This data was then aligned with and reconciled to top-down freight movements based on data collected by ABS to derive factors that quantified demand not captured by the case studies.

Figure 2 – Analytical framework



To forecast future freight movements, the growth and changes in industry supply chains and the future population were both used to quantify the growth in commodity movements. Tonnages of goods were then converted to truck movements and assigned to the road network assuming that no major changes occur to the network that would affect the choice of route. This process preserves the essential link between the need to move goods and truck movements. A central range of future demand has been produced along with lower and higher growth assumptions.

Only articulated vehicles were forecast. They are the basis of the ABS freight data that underpinned the study. Articulated vehicles dominate the inter- and intra-regional long haul freight task and this medium to long haul movement of goods is concentrated on the strategic road network being studied. In contrast, rigid trucks tend to be constrained to the local distribution function in and around population centres. Because these trucks do not carry high tonnage they are not efficient for long distance travel and as such contribute little to the major flows captured in this study.

Case Studies

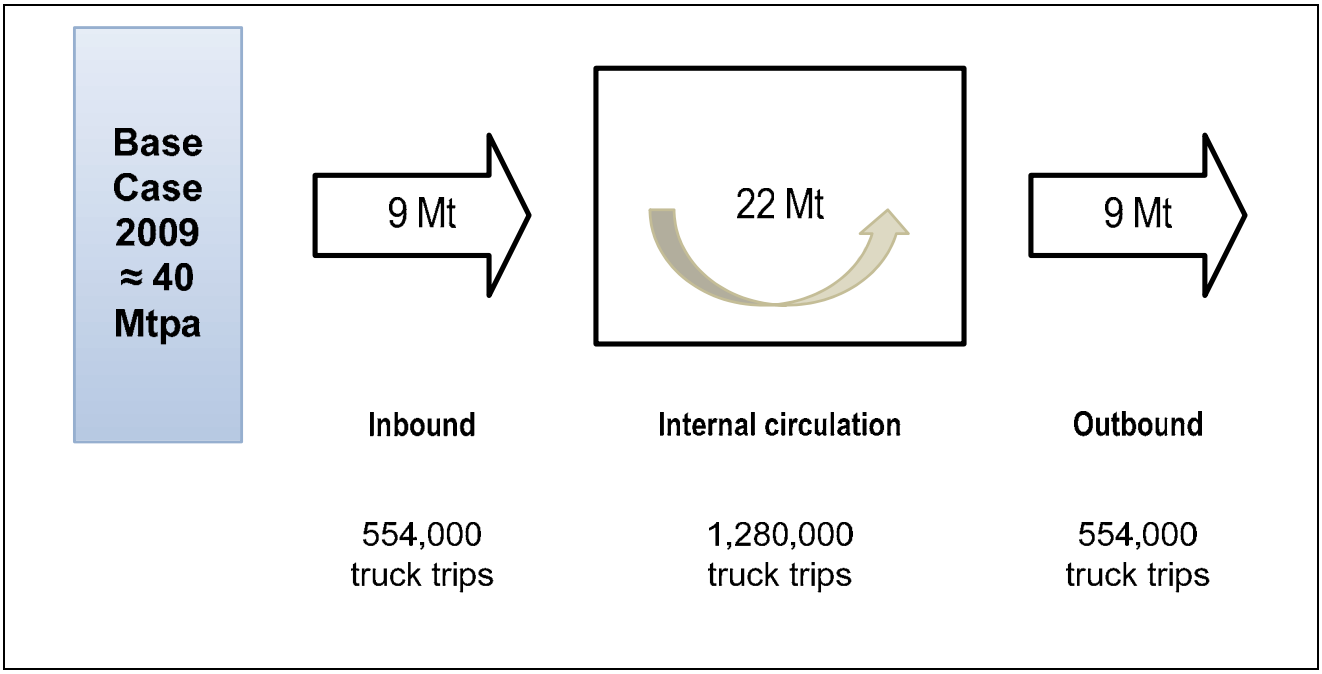
The industries identified as contributing significantly to road transport in the study area that were detailed in case studies are tabulated below.

Table 1 – Case studies

Case	*Data sources*	*Volume of freight (Mt p.a.)*		*Total articulated vehicles including backloads ('000 trips)*
		Captured in case study	*2009 estimate*	
Fast moving consumer goods (FMCG)	Interviews; economic data	2.5	3.0	249
Fuel	Interviews; economic data	0.9	1.1	85
Forestry plantation	Interviews; industry data	5.9	6.5	415
Timber/paper	Interviews; industry data	1.4	1.5	86
Coal (road only)	Port data; prior studies	6.9	7.3	399
Grain (export/domestic)	Prior studies	0.2	0.2	11
Horticulture and marine	Interviews; economic data	0.1	0.2	11
Dairy	Interviews; industry data	0.4	0.5	34
Steel	Prior studies	3.6	3.8	244
Ethanol and starches	Interviews; industry data	0.8	0.8	38
Quarry and building products (e.g. Boral)	Interviews; industry data	12.4	13.6	656
Motor vehicles	Interviews; port data	0.4	0.5	80
Port related (not elsewhere included)	Interviews; port data	0.8	1.1	80
Total		36.4	40.0	2,388

Base year freight volumes

Figure 3 – Base case freight volumes, 2009



Growth in freight demand

The growth in freight movements was forecast based on population growth projections and industry growth rates gleaned from the case study consultation. Each industry sector was treated independently: some are constrained by production capacity, some are related to population growth and some to other external factors advised by industry. Figure 4**Error! Reference source not found.** depicts the three types of industries, their growth profiles and total forecast tonnages.

Forecast freight tonnages were converted to truck movements and allocated to routes based again on information gleaned during case study consultation. Figure 5 shows the forecast tonnage and total truck movements for the study area.

Overall, the total tonnage is forecast to grow from about 40 Mtpa in 2009 to about 62 Mtpa by 2031, an increase of about 55 percent. The largest growth is in outbound trips from the study area with an increase of about 65 percent from 9 Mt to 15 Mt. In terms of truck trips, there is forecast to be an increase in total movements of about 51 percent.

This resulted in forecasts of truck movements on each of the strategic roads in the study area network. Figure 7 shows the road network and the annual number of articulated trucks on each road segment for 2009, 2021 and 2031.

Figure 4 – Industry growth assumptions

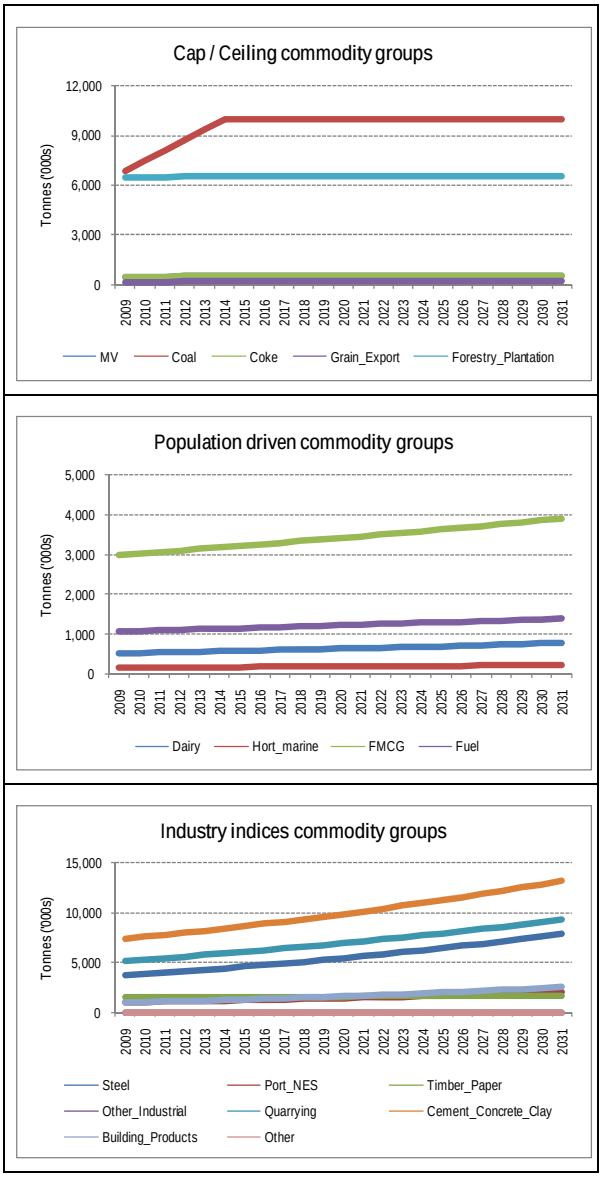


Figure 5 – Freight demand projections

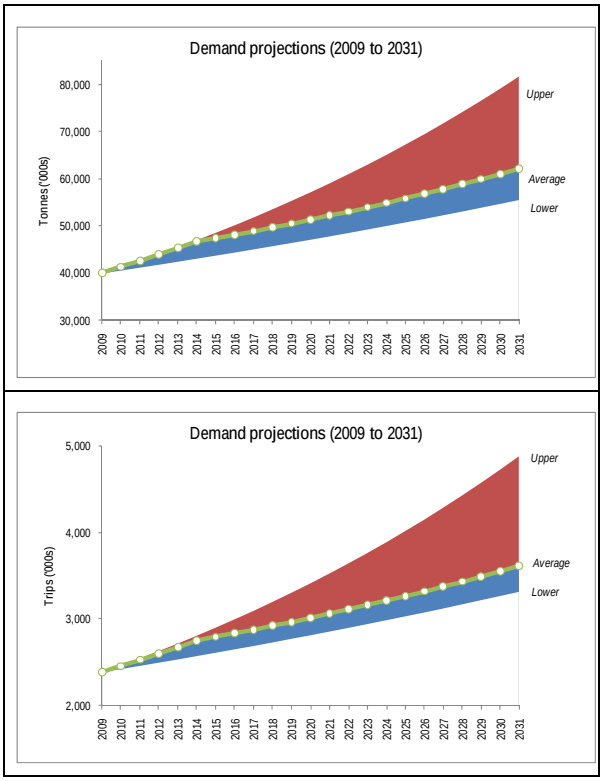
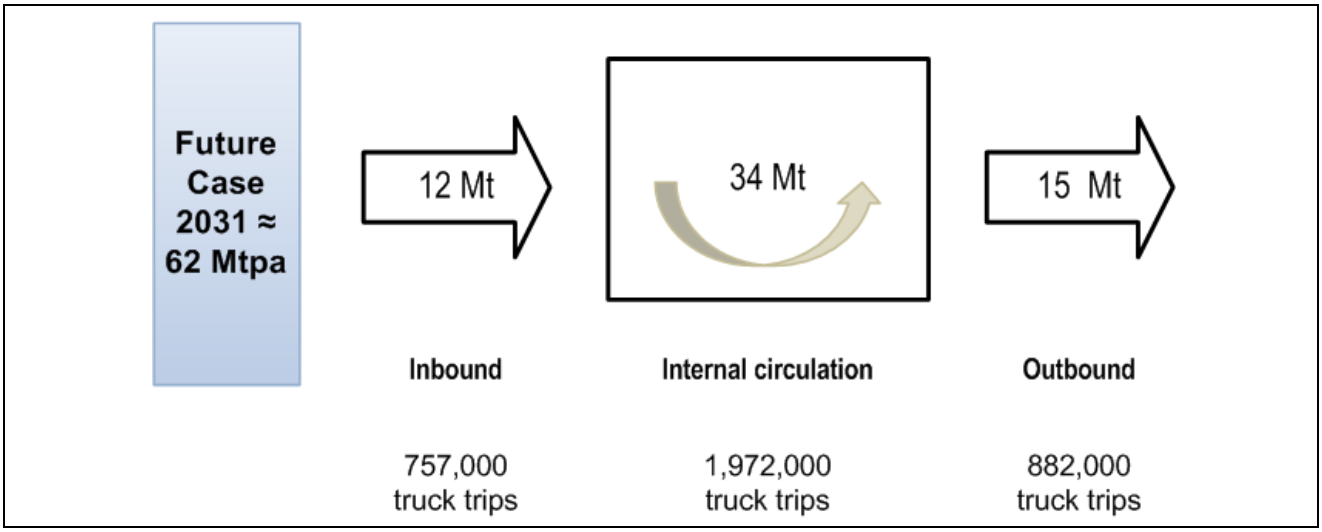
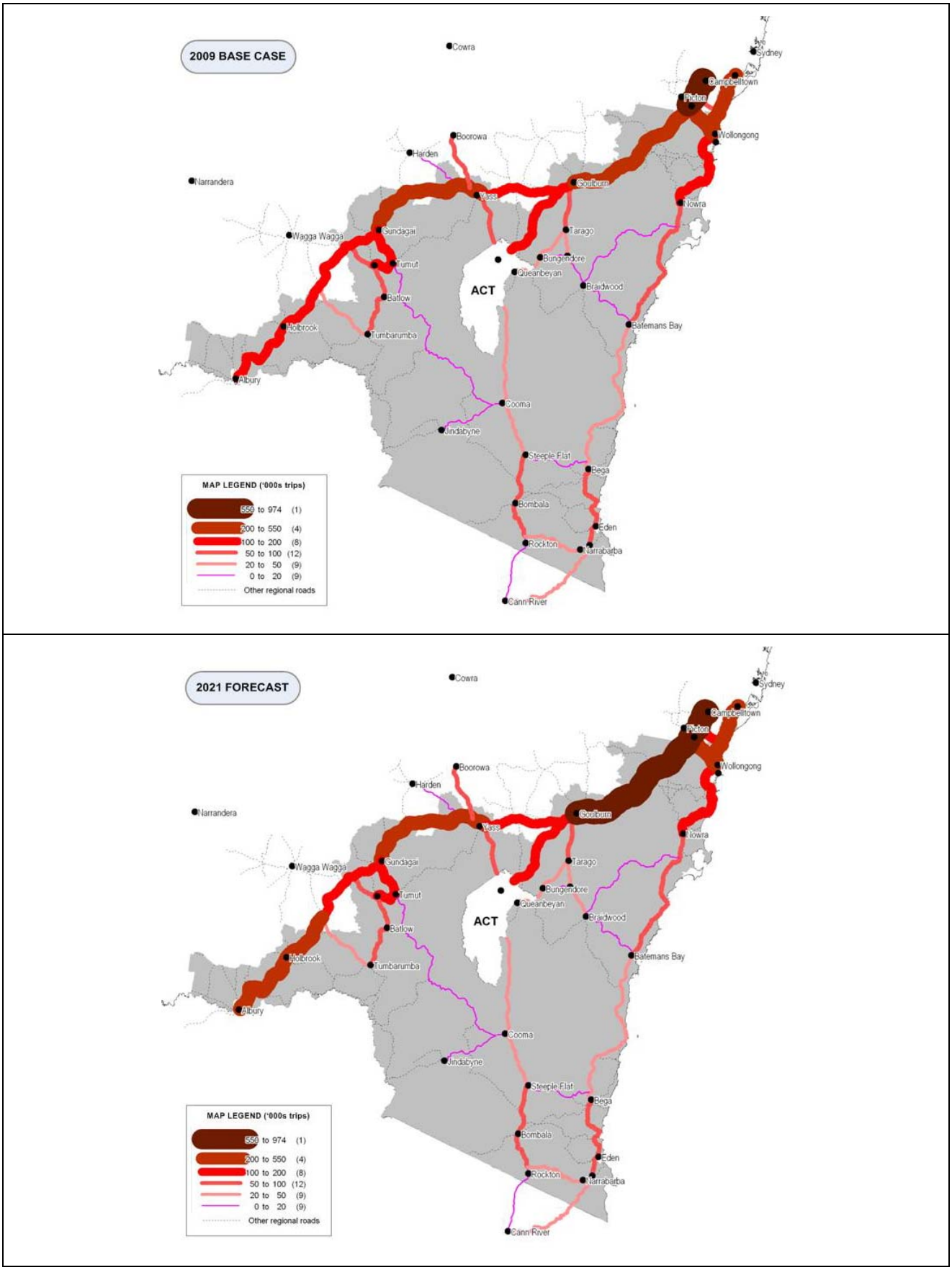


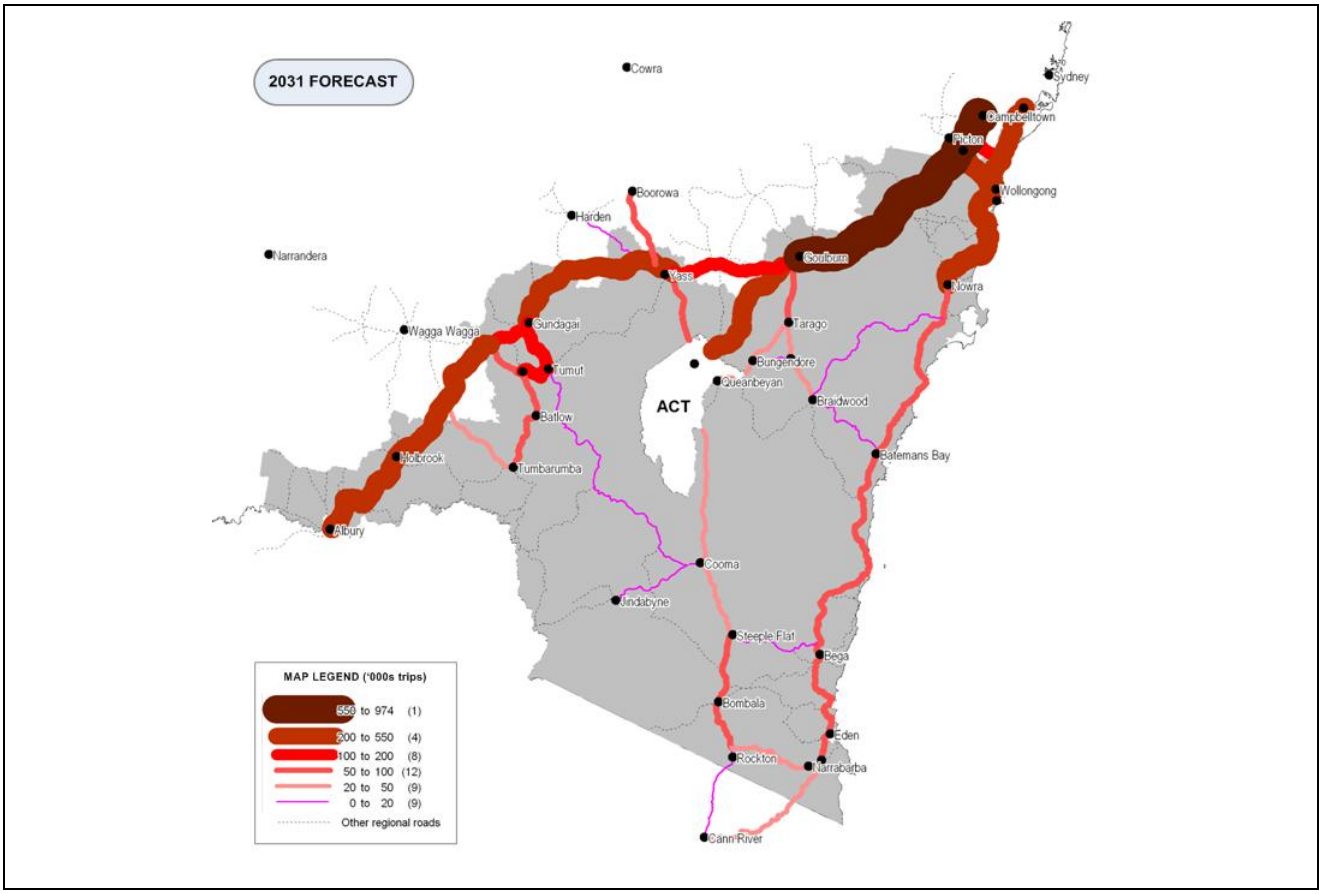
Figure 6 – Forecast case freight volumes, 2031



Note: additional inbound truck trips compared to 2009 are driven by backloads due to the increase in outbound freight.

Figure 7 – Forecast annual truck movements – central case





Conclusions

The purpose of this study was to provide an information resource to the RTA as it develops regional road strategies and identify short and long term needs of the State roads in the study area. The body of the report details not only forecasts of future truck volumes but also the quantity of commodities which in turn determines truck movements.

The process of aligning freight demand with external forecasts of population and industry growth has provided a robust and repeatable set of forecasts for 10 and 20 years into the future. Monitoring trends in population growth throughout the region would enable forecasts to be confirmed or adjusted, especially as the time approaches to commit funds to specific projects.

Within this region, there is limited scope for modal shift away from road transport. However, interstate bulk haulage policies and intermodal strategies could have some influence on Hume Highway traffic and should similarly be monitored.

2. BACKGROUND TO THE STUDY

Study objective

The objective of the study is to describe and quantify the current and future freight logistics including supply chains, to assist the RTA to identify short and long term needs of the State roads in the study area. The RTA will use this information in developing its strategic network strategy for the area.

The significance of freight

The domestic freight task in Australia has doubled in size over the last 20 years with an average growth of 3.5% p.a. The Bureau of Infrastructure, Transport and Regional Economics (BITRE) suggests that this trend is expected to continue with slightly lower growth of around 3% between 2005 and 2030.

Gaining an understanding of the freight task

The last freight study of the area was a national study undertaken by the Australian Bureau of Statistics (ABS) in 2001 entitled Freight Movements (9220.0). The data set was linked to the four-tier ABS area classification and has not been updated.

There have been a small number of other studies in more recent years that have targeted specific corridors or regions that form part of the study area, but no freight demand study that covers the entire area defined as South Eastern New South Wales.

Traffic count data has been collected at various locations within the study area, however whilst this data provides information on the traffic profile, it does not provide any information as to why the vehicles are moving in the first place.

Study Scope

As such, the RTA has commissioned this study for South Eastern New South Wales to:

- Broadly investigate freight flows in key corridors linking the study area to the rest of NSW and Victoria.
- Identify major generators of road freight in the study area
- Identify major destinations of road freight generated in the study area
- Identify the land use context that drive road freight issues in the study area
- Identify the routes used by road freight operators.
- Identify the types of goods and products being carried
- Identify existing and likely future issues for key freight corridors including multi-modal impact.

Freight as a derived demand

The cornerstone of Sd+D's approach to quantifying truck movements is to first understand that freight is a derived demand – goods move in response to the relationship between production and consumption.

Supply chains are a complex set of transport and logistics processes designed to move products in bulk and non-bulk forms through various staging points towards points of consumption. Analysis of freight supply chains requires a comprehensive understanding of the primary purpose of the movement. This understanding starts with the key industries that produce goods and the locations of consumption.

This philosophy fits well with the project brief outlined above and is borne out in the methodology for the project.

Study Methodology

The methodology for the project is based on a bottom-up approach involving industry consultation on a case study basis to map the supply chains of the key industries in the study area. This process includes gathering data from the major freight generators in the region as to the type of freight that is moving, the frequency of movements, origin and destination profiles, truck configurations and the routes travelled. This data is then aligned with broad freight estimates in order to partially explain current heavy vehicle volumes on the road – by relating truck movements to the demand for freight.

The bottom-up nature of this approach enables a partial analysis of freight demand in the area as it is not possible to capture all industries or entire industries within the scope of the study or to capture through traffic. Growth in the demand for freight and consequent changes in truck movements is then forecast ensuring that the forecasts provide a range of possible futures that can be used in determining a network development strategy.

These areas outline the philosophy that Sd+D applies to understanding freight drivers and consequently in forecasting future demand.

3. OVERVIEW OF THE REGION

This section provides an overview of the study region in terms of location, topographical features, land use, regional demographics and economic activity; all of which will serve as a basis for assessing freight demand. The purpose of this section is to provide the reader with a high level insight into the area of South Eastern NSW that forms the subject of this study.

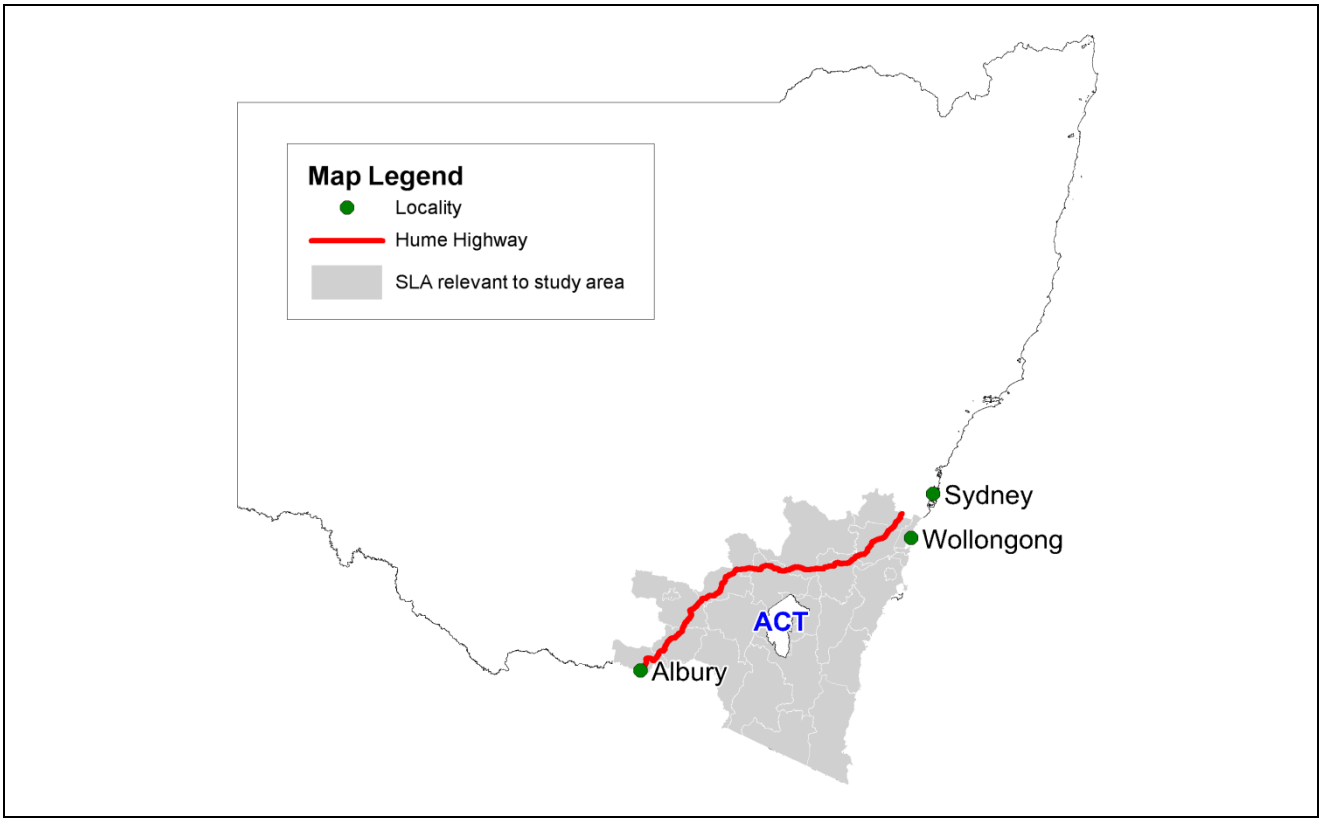
3.1 Description of the area

The study area is bounded by the coastline to the east, the Hume Highway to the west, the NSW-Victorian border to the south and just the northern outskirts of Wollongong to the north.

The study area specifically excludes the Hume Highway and the Australian Capital Territory (ACT). However, road networks in the study area serve as corridors to / from the ACT and, as such, an understanding of the ACT as a significant attractor / generator of freight is required and trucks moving to / from the ACT need to be considered in the freight demand study.

The study area is dominated by four Statistical Divisions (SDs): Illawarra, South Eastern, Murray and Murrumbidgee. However, only the Illawarra is wholly located within the boundaries of the study area. Each SD is then comprised of Statistical Subdivisions (SSD) and Statistical Local Areas (SLA) and these provide a basis for ongoing analysis and classification of economic activity and freight demand. Section 5 – Analytical framework provides a table detailing the statistical classification of the study area as well as a map outlining the SLAs located within the study area. The following map shows the scope of the area under investigation within the context of NSW.

Figure 8 – Study area location map



3.1.1 Key topographical features

The topography and associated climate of the region are diverse. The key topographical features consist of the narrow coastal strip running along the east coast, rising sharply to the Great Dividing Range which encompasses the Snowy Mountains region and the highest mountains on the Australian mainland, as well as the Southern Tablelands, state forests, national parks, marine parks and rivers. Climatic conditions range from very high temperatures in summer to snow and ice in winter. Some areas, notably the south west, are experiencing drought conditions.

The Illawarra and South Coast regions are topographically constrained by the coast to the east and the steep rise of the Illawarra escarpment and coastal range to the west, as illustrated in Figure 9. Consequently, land-use and transport activity is integrated along the Princes Highway on the north-south axis of the narrow coastal strip.

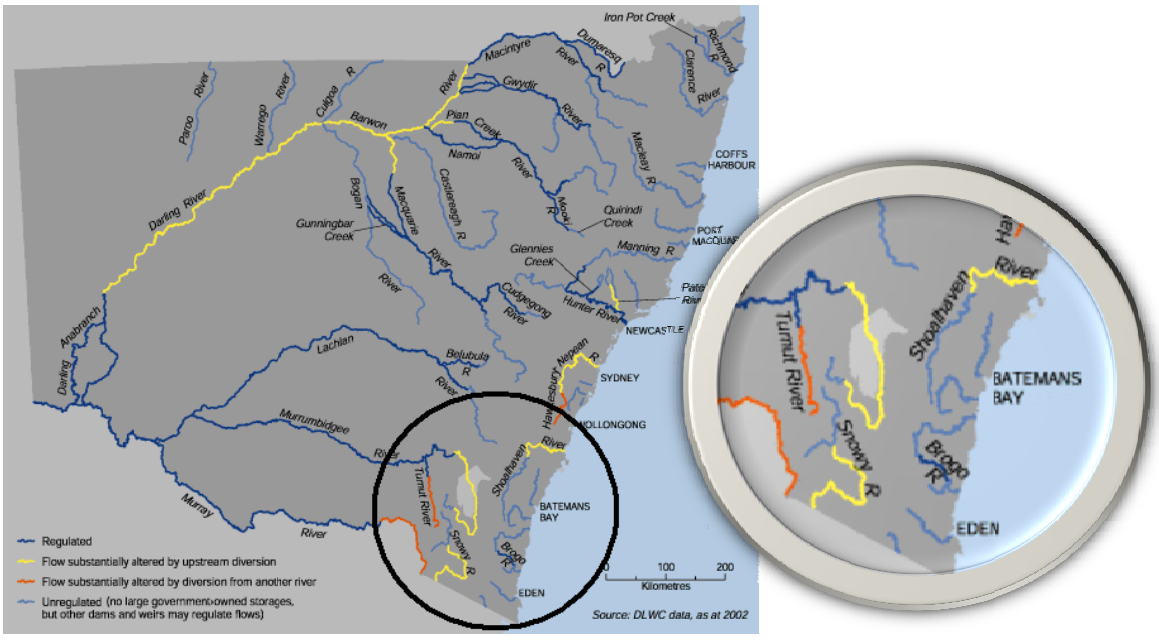
Figure 9 – View from Sublime Point lookout overlooking Thirroul and Wollongong

Source: Wikipedia, http://en.wikipedia.org.

There are few east-west corridor links across the coastal range, creating a barrier to the integration of the coastal region with those communities to the west of the Great Dividing Range.

There are a number of rivers that flow through the region including the Shoalhaven and Snowy Rivers, with some crossings presenting accessibility issues for heavy vehicles.

Figure 10 – NSW rivers



Source: Map 5.1: Regulated and unregulated sections of NSW rivers, DLWC data, as at 2002, NSW State of the Environment 2003, www.environment.nsw.gov.au

3.1.2 Land use

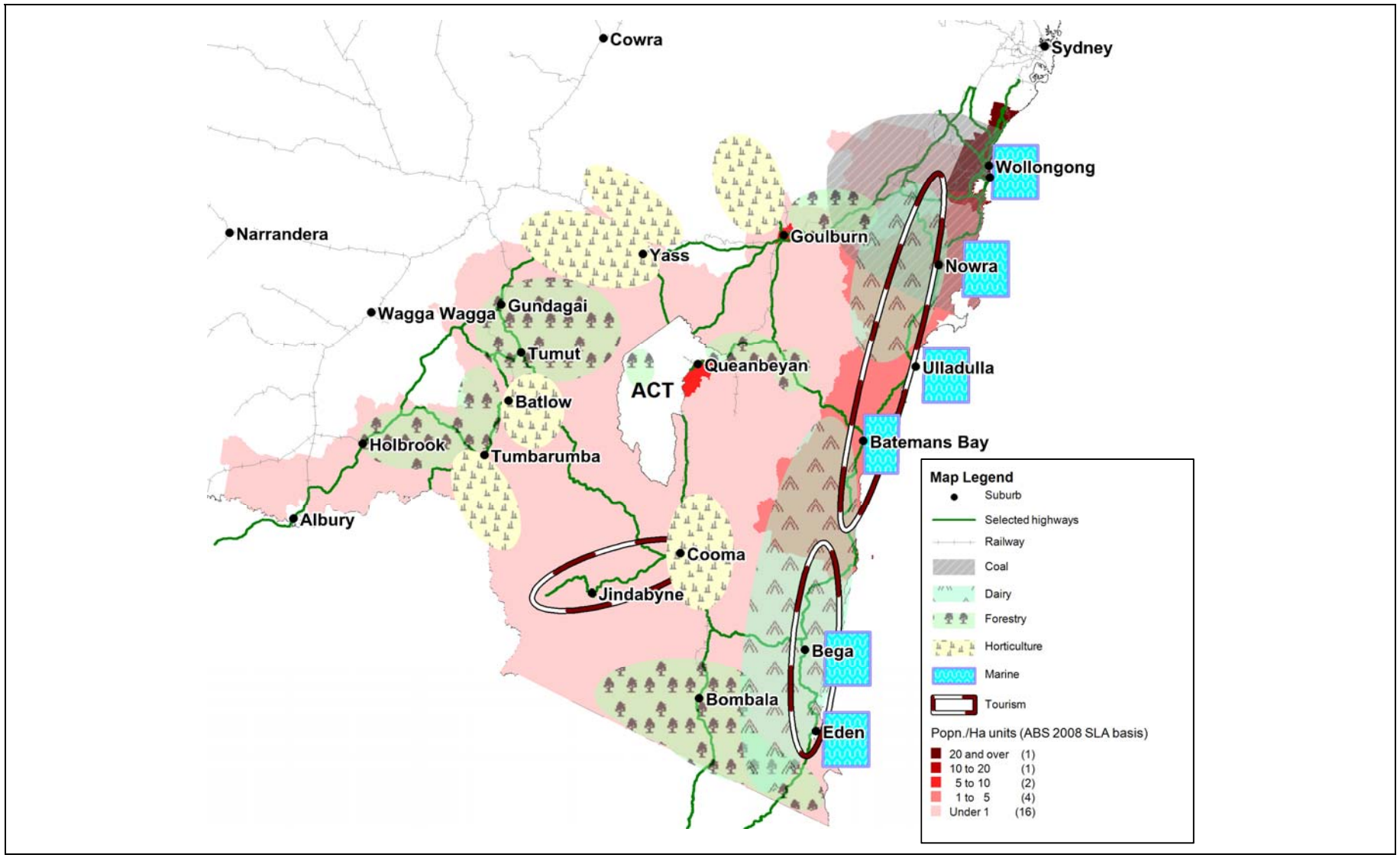
The north east part of the study area includes the city of Wollongong and the port of Port Kembla with both precincts dominated by industrial activities and commercial development in the area.

The port of Port Kembla provides an international gateway to and from the region. The area surrounding the port has grown to house the largest concentration of manufacturing and industrial industries in Australia and is the closest bulk industrial (Roll On Roll Off – RORO) port to Sydney. Port Kembla is NSW's principal vehicle importing hub with the remaining NSW vehicle import trade being relocated to the port from Glebe Island in November 2008. BlueScope Steel also plays a significant role in the study area with the steelworks (located adjacent to Port Kembla), being the largest steel production facility in Australia and producing around 1Mt of product per annum.

The coastal strip from Wollongong to Nowra is also prominent and expanding. It provides the greatest concentration of urban and industrial development, starting at Helensburgh in the north and then a virtually continuous urban strip from Austinmer to Kiama in the south. Further south, the coastal strip of the study area is made up of residential and light industry; south of Kiama, pockets of development are generally aligned with the intersections of the Princes Highway and the east-west links across the coastal range.

The southern end of the coastal strip is dominated by the dairy industry and farming activities. The Southern Highlands area, recognised as being from around Bowral to Goulburn is dominated by pastoral activity, with the southern tablelands dominated by forestry activities.

Figure 11 – Regional industry clusters and population density



3.2 Regional demographics

3.2.1 Population

Table 45 in Section 23.4 of the Appendices – Key statistics and regional demographics, provides a detailed breakdown of the population of the study region by SD, SSD and SLA with actual population figures for 2001, 2006 and 2008 *(Australian Bureau of Statistics (ABS))* as well as population forecasts at 5 year intervals from 2011 to 2031 *(Transport Data Centre (TDC))*. This section summarises current population and growth potential.

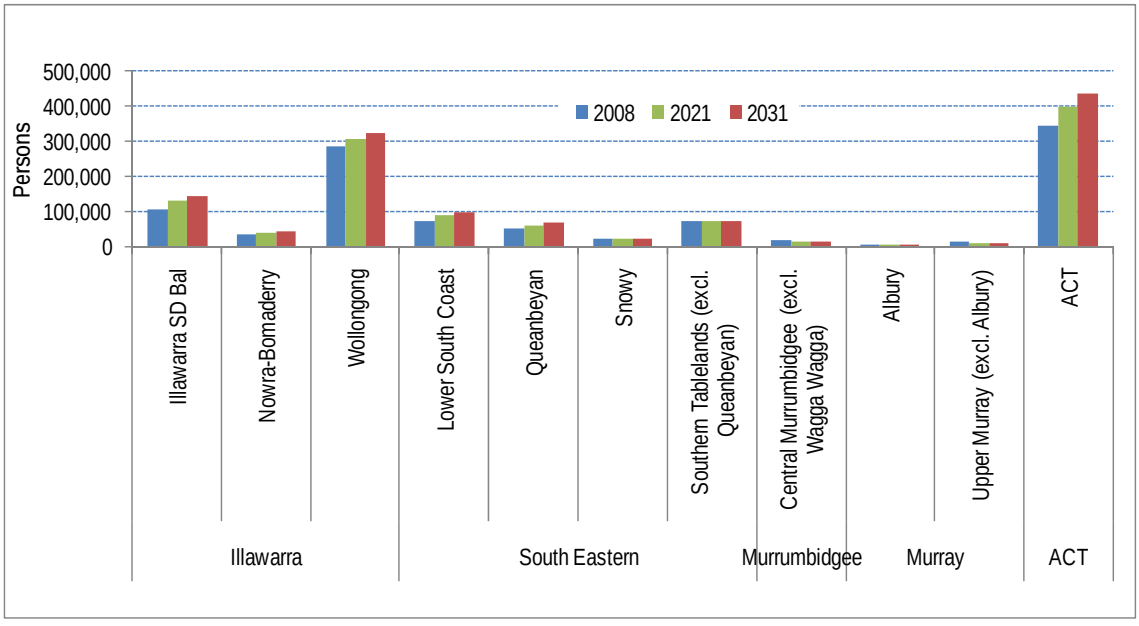
In 2008, the population of the study area totalled 665,000 persons. With the ACT included, the population of the total area in 2008 was just over 1 million persons. The population of the study area is forecast to grow at around 0.9% p.a. in the near future, declining to around 0.6%p.a. growth by 2026.

By the year 2031, the population of the study area is expected to be around 793,000 persons, an overall growth of 19% from 2008 (central forecast). When also including the ACT, the population will exceed 1.2 million persons.

Population projections have also been undertaken using high and low growth scenarios. For the study area itself, the low growth scenario assumes a net population decline. The following diagrams provide the population forecasts for the study area and the ACT.

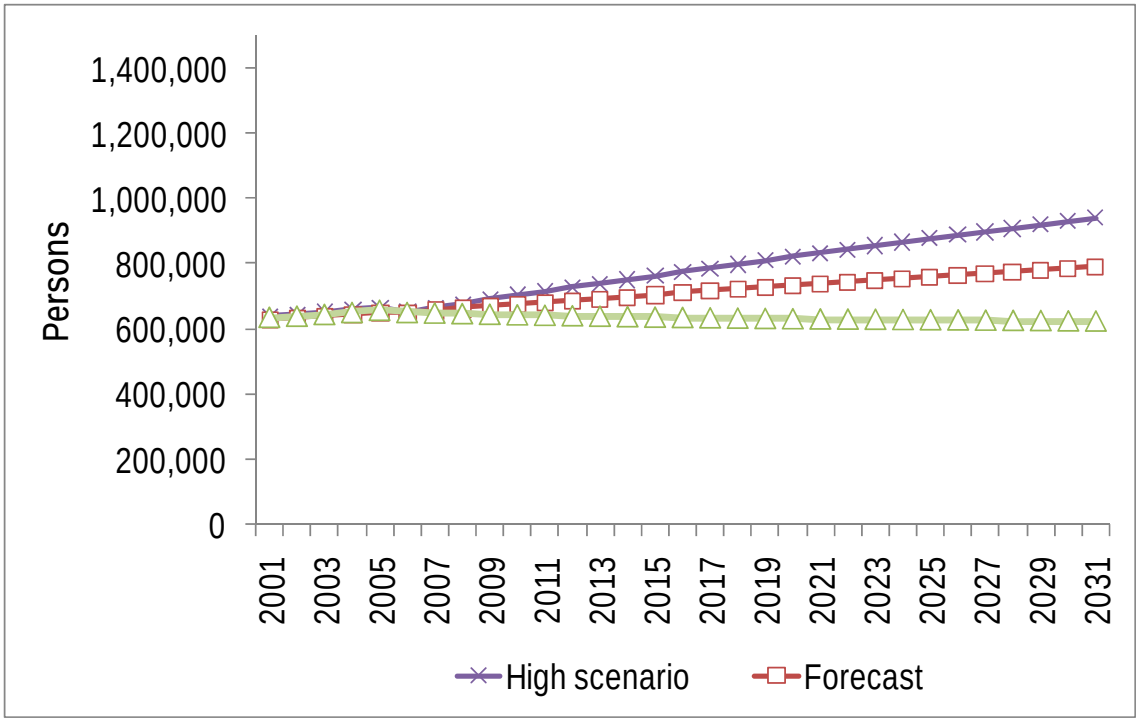
Figure 12 below clearly illustrates that the Wollongong and ACT SSDs represent the most populous regions in the area. The ACT also shows the greatest projected population growth out to 2031. As a result, these two areas represent key drivers for freight demand in the study area.

Figure 12 – Population growth, 2008-2031



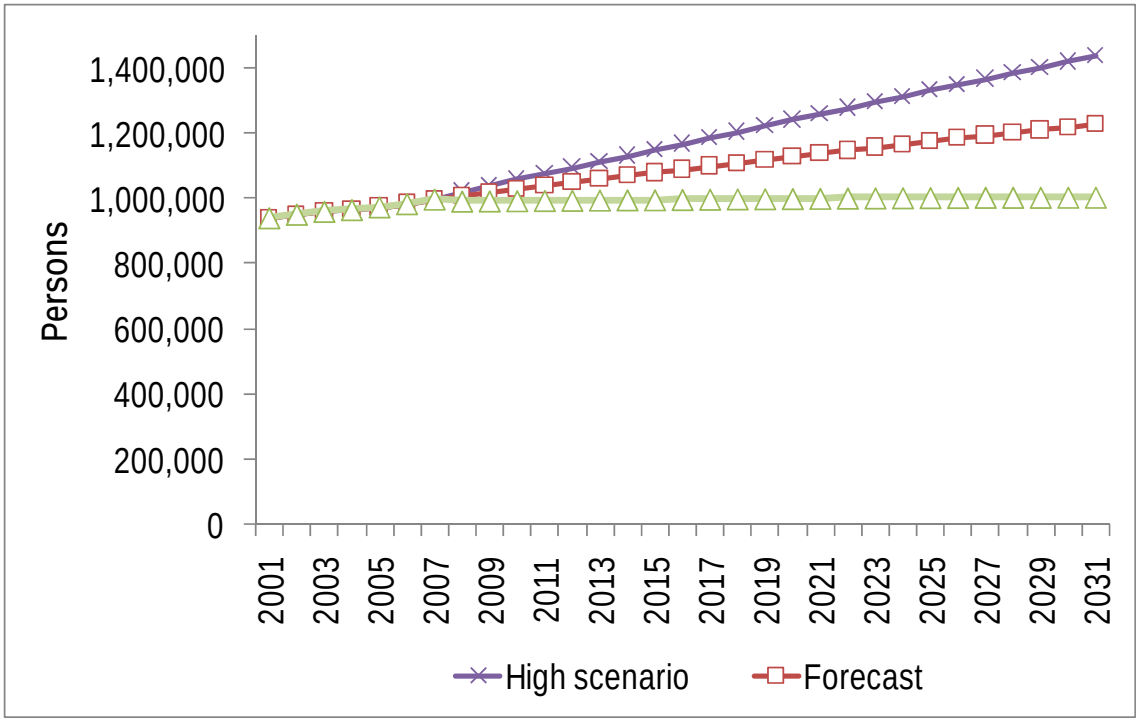
Source: Composite of Australian Bureau of Statistics (ABS) and Transport Data Centre (TDC) data sets.

Figure 13 – Population forecasts for the study area only (excluding ACT)



Source: Composite of ABS and TDC data sets.

Figure 14 – Population forecasts for the study area including the ACT



Source: Composite of ABS and TDC data sets.

The analysis of population *(along with other measures such as households, motor vehicles, etc.)* provides a basis for estimating freight demand within the study area. The population of the study area whilst forecast to grow, is likely to remain constant at around 10% of the population of New South Wales to 2031.

3.2.2 Registered motor vehicles

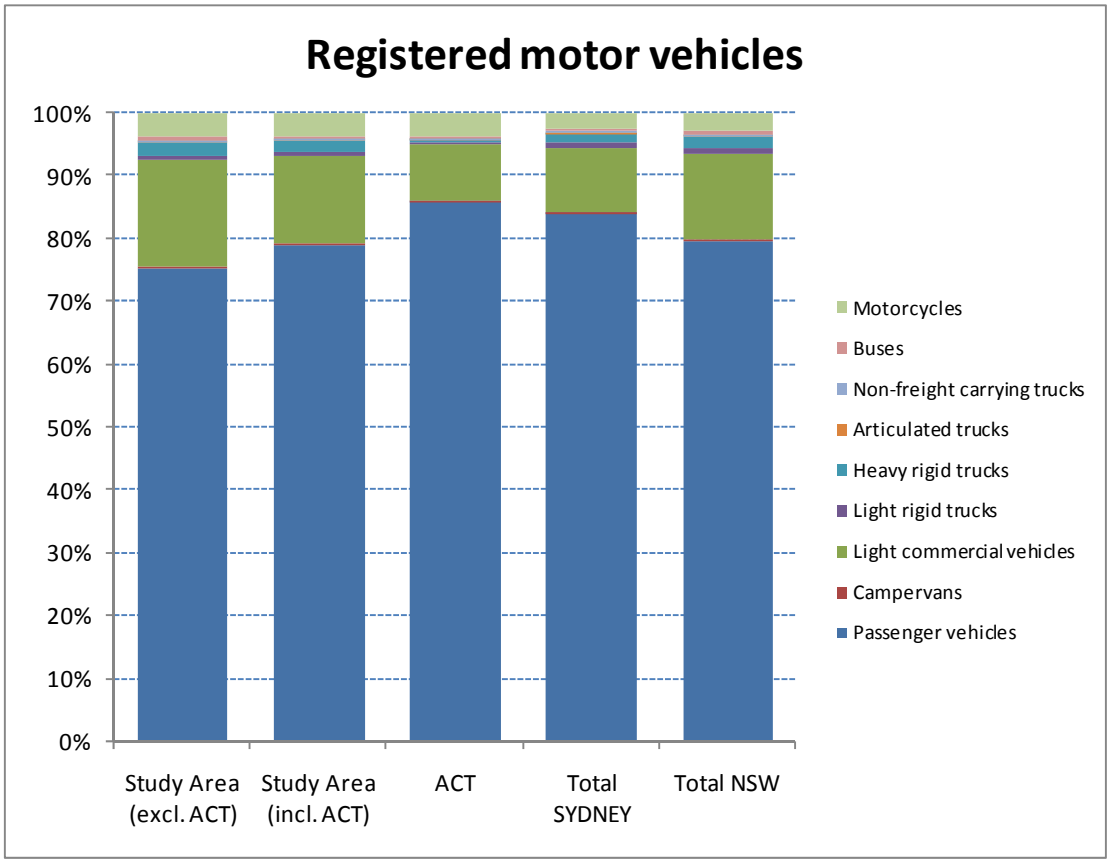
Within the study area, there are approximately 417,000 registered vehicles with an additional 221,000 motor vehicles registered in the ACT. Therefore, the total number of vehicles relevant to the study totals 638,000.

Table 46 in Section 23.4 of the Appendices provides a breakdown of number of vehicles by type and SLA.

The number of motor vehicles in the study area is relevant to Section 8, the Fuel Distribution case study. Regional data on fuel consumption in the study area is not publicly available, and not provided by fuel companies on a "small area" basis, however, estimates can be derived by assessing the level of motor vehicle registration and use, and proportioning this against state-level demand estimates.

Figure 15 below depicts the type of registered vehicles as a percentage of the total vehicles within the study area and compares this with the ACT, Sydney and NSW. The area is dominated by passenger vehicles, which account for 75% of all registered vehicles in the study area, as compared to Sydney and NSW where passenger vehicles account for 84% and 79% of all registered vehicles respectively. The reverse is true though for light commercial vehicles which account for 17% of all registered vehicles in the study area, as compared to Sydney and NSW at 10% and 14% respectively. Therefore the proportion of light commercial vehicles in the study area is notably higher than both Sydney and NSW. The percentage of heavy rigid trucks and articulated trucks in the study area is higher than that of Sydney, though consistent with the NSW as a whole.

Figure 15 – Registered motor vehicles, 2006



Source: Australian Bureau of Statistics, National Regional Profile, 2002 to 2006.

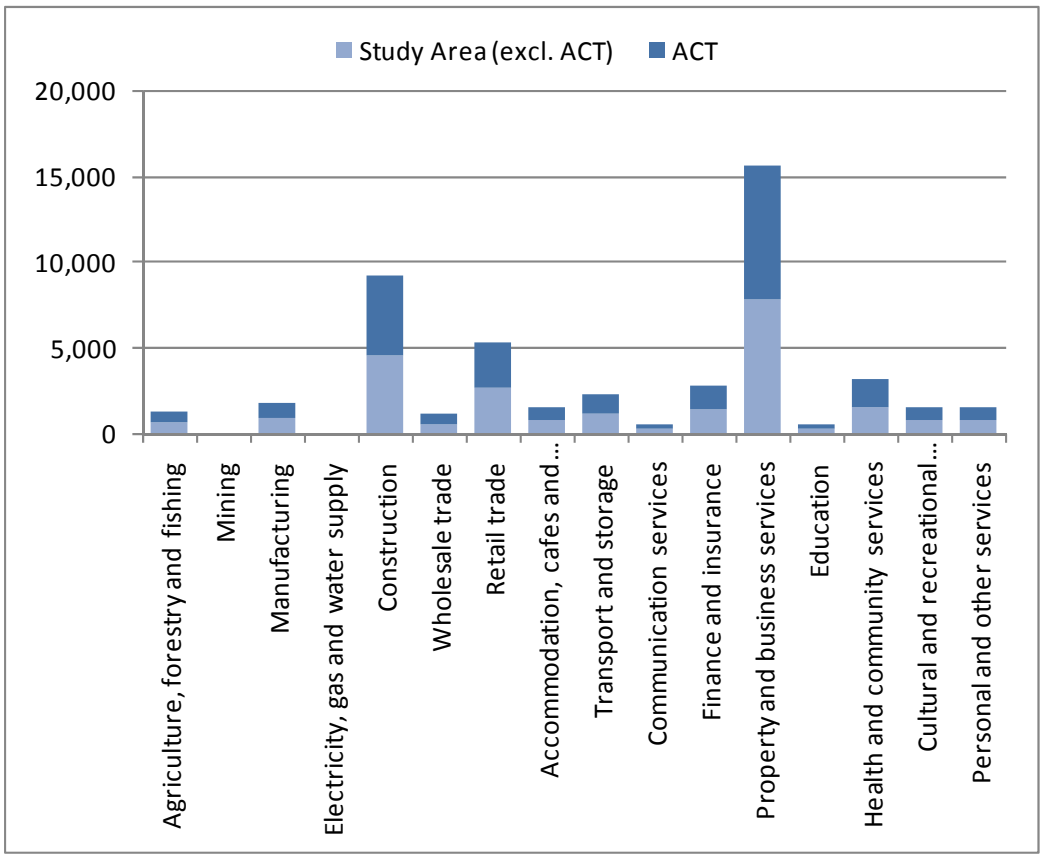
3.3 Economic activity

3.3.1 Businesses by industry

Table 47 in Section 23.4 of the Appendices – Key statistics and regional demographics, provides the number of businesses by type across the study area as at the 2006 Census. Looking at the business profile of the study area provides a picture of commercial activity and potential growth rates. As expected, the Illawarra region has the largest number of businesses in the study area with 28,000 businesses making up 59% of total businesses. The next most significant area is the lower south coast region

comprising Bega Valley and Eurobodalla at 12% of total businesses (excluding the ACT), although these may employ fewer employees per business.

Figure 16 – Businesses by industry, 2006



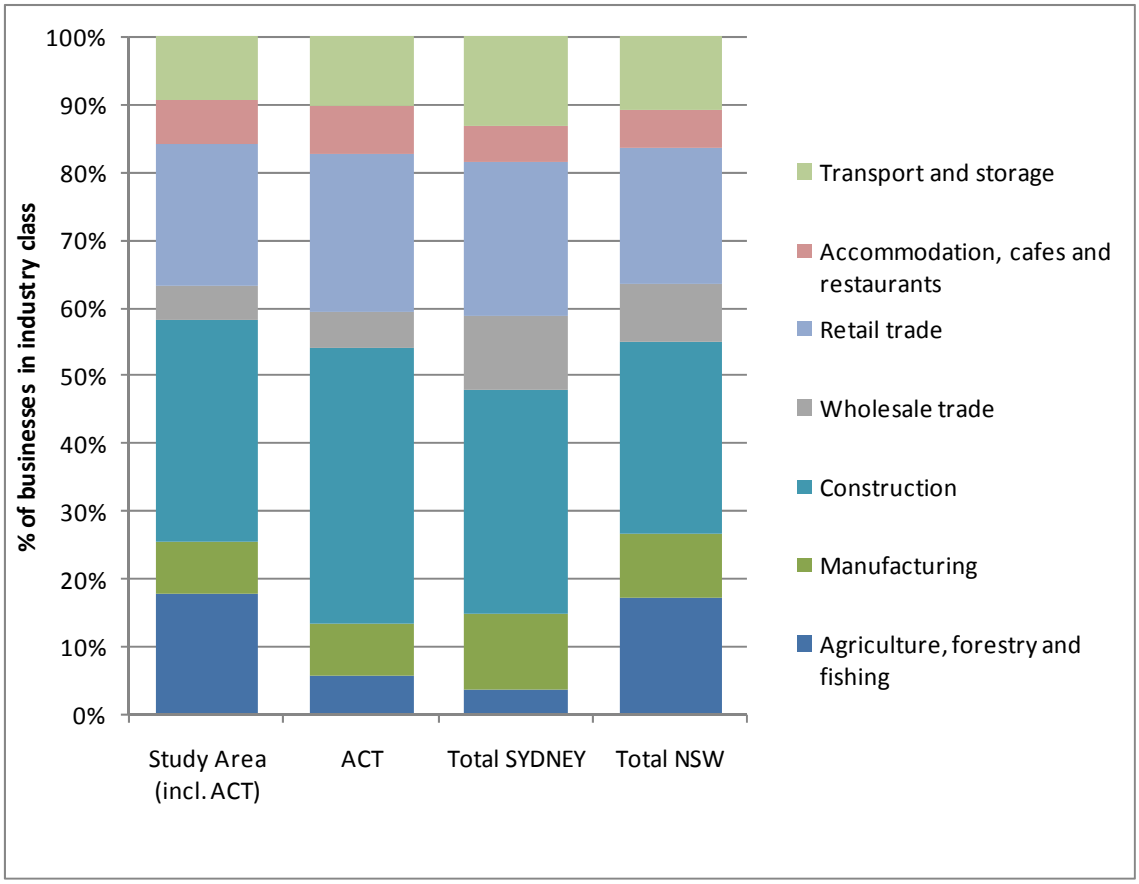
Source: Australian Bureau of Statistics, National Regional Profile, 2002 to 2006.

3.3.2 Building approvals

Consideration of building approvals in the area provides an indication of construction growth and demand for building products

in Section 23.4 of the Appendices shows that in 2006, there were over 6,200 approvals granted for new houses and units which equates to approximately 10 approvals for every 1,000 residents of the study area. When compared to Sydney, where there are 5.5 approvals granted for every 1,000 residents, the scale of urban development and hence population growth in the study area becomes apparent. This is further evidenced by the number of construction businesses in the study area at almost 9,000 businesses representing 18.6% of total businesses and the largest group of freight generating / attracting businesses in the area. Each new dwelling requires around 125 tonnes of building materials; therefore the total amount of building materials required in the study area in 2006 was in the order of 775 kilotonnes.

Figure 17 – Freight generating or attracting businesses



Source: Australian Bureau of Statistics, National Regional Profile, 2002 to 2006.

3.3.3 Tourism

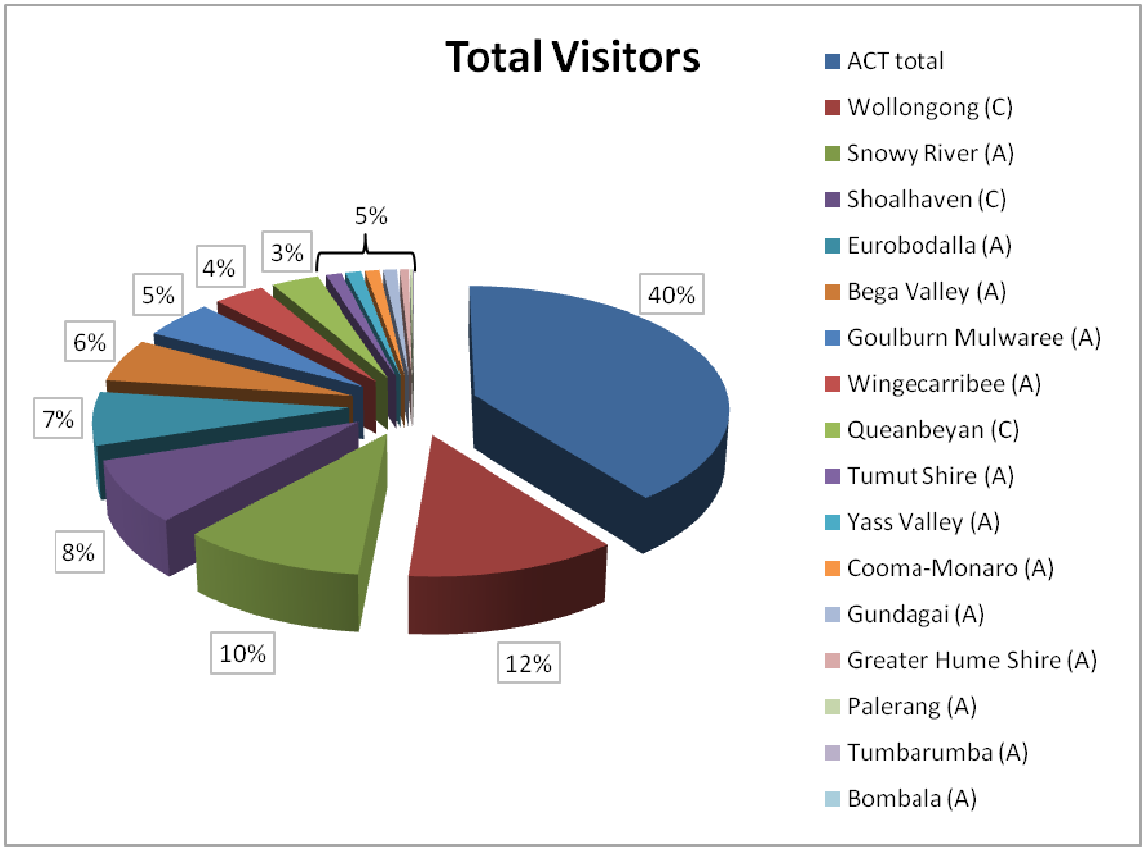
The study area incorporates a number of discrete, popular tourist destinations, namely:

- the Illawarra region including Wollongong and surrounds,
- the South Coast including Kiama, Shellharbour, Jervis Bay, Shoalhaven, Batemans Bay, Eurobodalla, Bega and the Sapphire Coast,
- the Snowy Mountains region including Tumut, Tumbarumba, Jindabyne, Cooma, the Kosciuszko National Park and Bombala, and
- Capital Country including Goulburn and the ACT / Canberra.

In the winter months traffic is extremely heavy on the western side of Cooma, as thousands of tourists make their way from Canberra and Sydney to the snowfields.

During the period October 2008 to September 2009, a total of 10.4 million visitors stayed in the study region (including the ACT). The ACT alone represented 4.1 million (40%) of visitors with Wollongong and the Snowy River regions being the next most popular with a combined total of over one million visitors annually.

Figure 18 – Tourism, 2008-2009

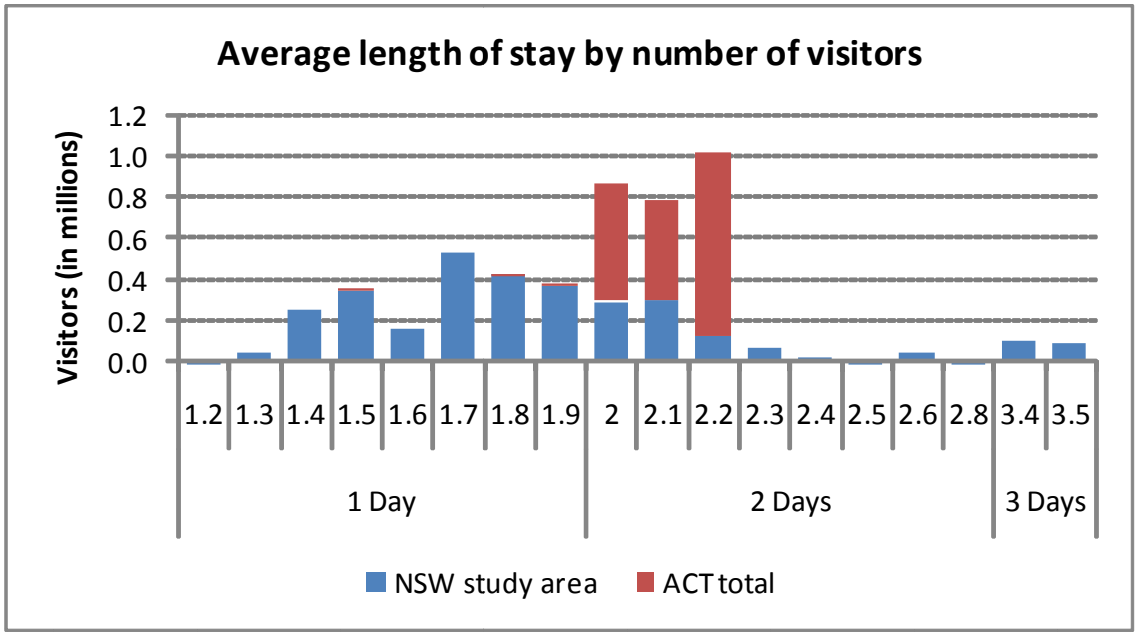


Source: ABS, Tourist Accommodation, Small Area Data, NSW, Dec-2008 quarter to Sep-2009 quarter.

There are only modest variations between seasons – a high of 1.42 million (Dec QTR 2008) and a low of 1.2 million (Mar QTR 2009) visitors which represents an 18% variation.

The average length of stay is about 1.8 days ranging between 1.3 – 3.5 days.

Figure 19 – Average length of visitor stay



Source: ABS, Tourist Accommodation, Small Area Data, NSW, Dec-2008 quarter to Sep-2009 quarter.

Total visitor nights are estimated at 9.6 million which can be compared to the resident nights (about 1 million resident X 364 days) of 367.7 million. Therefore, visitors account for an additional 2.6% of the local population at any given time.

An adjustment of 2.6% is therefore applied in the groceries and fuel case studies to allow for increased demand due to tourism in the area.

Figure 20 – Jervis Bay, South Coast NSW.

Source: Tourism New South Wales, www.visitnsw.com

4. DESCRIPTION OF THE NETWORK

4.1 Overview

The South Eastern region of NSW is generally well served via a number of local and regional roads that connect to principle arterials serving the interstate freight task between NSW, Victoria and the ACT as well as regional industries.

Previous AusLink corridor studies, in particular the Sydney-Adelaide, Sydney-Melbourne and Sydney-Wollongong studies, have provided high level estimates of the freight volumes and the nature of goods travelling in the region. However, these studies were limited in origin-destination details and tended to focus on either the Hume or Princes Highways.

Cross border issues with the ACT which is located at the junction of four major highways, restrict heavy vehicle access, in particular HML harmonisation along the Monaro Highway.

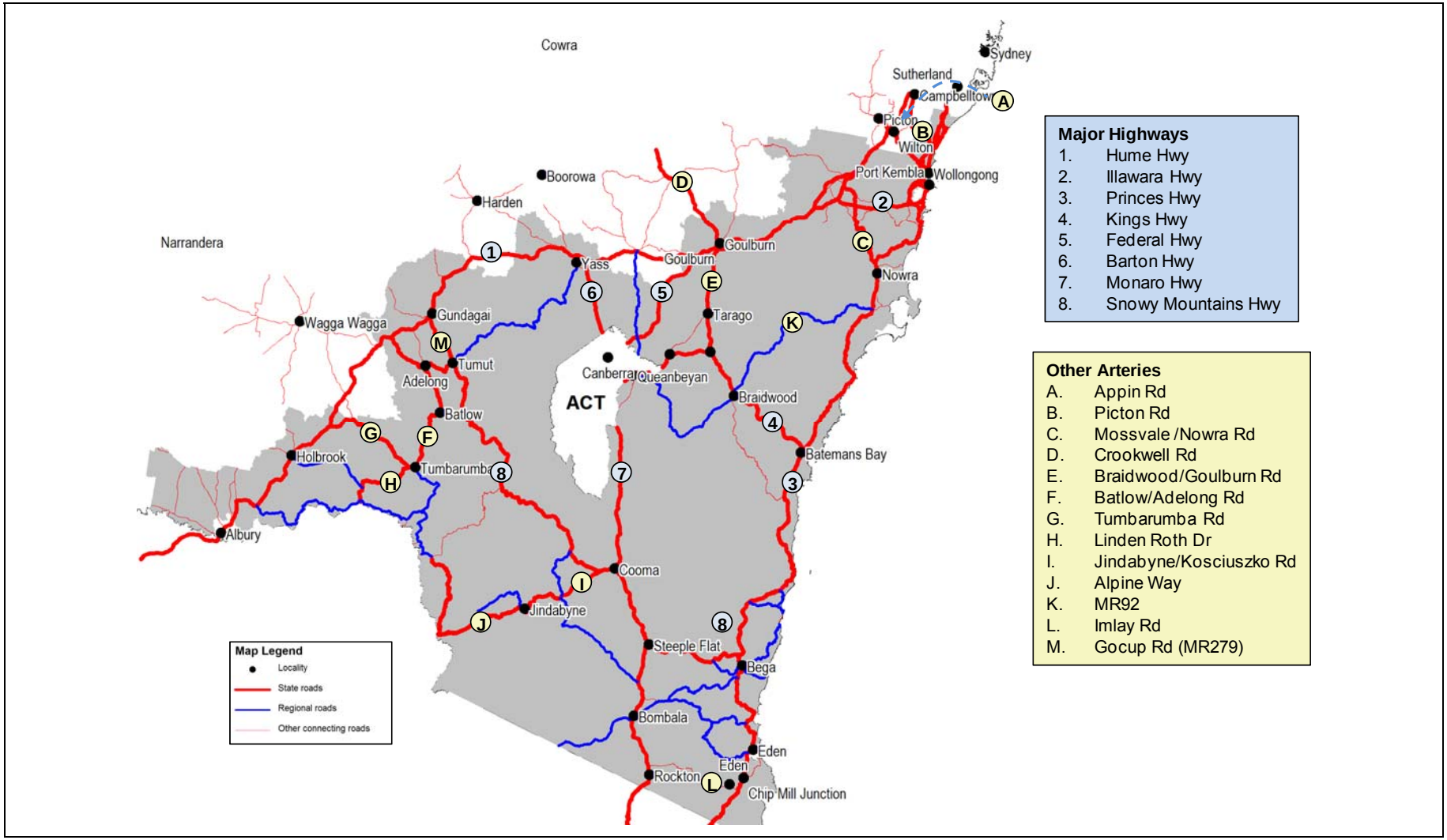
Figure 21 following identifies the nominated transport routes relevant to this study subcategorised into main and secondary arteries.

The existence of the Great Dividing Range with its steep coastal escarpment represents a key challenge for the region as it dictates the placement and accessibility of the east-west corridors in the region, with the main links being the Illawarra, Snowy Mountains and Kings Highways.

Other important local / regional routes include:

- Gocup Road (MR279, Tumut to Gundagai and was reclassified from a Regional to a State Road in June 2010) and Imlay Road (Narrabarba to Rockton) – both especially important to the timber industry, and
- MR92 – a route constantly mentioned by industry that connects Braidwood to Nowra.

Figure 21 – Key road corridors



Note: not all regional roads are shown

4.2 The HML network

There are three categories of mass limits for heavy vehicles in NSW:

- General Mass Limits (GML) apply to all registered vehicles and require no special permits. Limits for standard vehicles are clearly defined and are based on the vehicle's axle configuration.
- Concessional Mass Limits (CML) introduced in 2006, allows increased mass limits for eligible accredited vehicles. Gross vehicle mass limits for vehicles eligible to operate under CML are set at 5% above existing GML, limited to 1 tonne for a vehicles of gross mass not exceeding 55 tonnes and limited to 2 tonnes for larger vehicles.
- Higher Mass Limits (HML) represents the highest level of mass able to be carried on NSW roads other than by special arrangements.

HML access can only be obtained in New South Wales by enrolling under the Intelligent Access Program, which introduces GPS based tracking technology to manage access and compliance.

The types of vehicles that can operate at HML include[1]:

- Short combination vehicles (standard six-axle semi-trailers)
- B-Doubles
- Road-Trains (cannot operate within this study area)
- Car carriers

The HML network provides a significant increase in the productivity of road freight transport vehicles by allowing additional payload to be carried, as shown in Table 2 below.

Table 2 – Payload benefits of Higher Mass Limits

Vehicle Configuration	*Standard (Gross) Mass Limit*	*Higher Mass Limit (HML)*	*Payload Increase (%)*
19 metre (6 axle) semi-trailer	42.5 tonnes	45.5 tonnes	10%
25/26 metre (9 axle) B-Double	62.5 tonnes	68 tonnes	13%
Double Road Train	79 tonnes	85 tonnes	7%

Source: Higher Mass Limits (HML) access in New South Wales, Roads and Traffic Authority of NSW, http://www.rta.nsw.gov.au/heavyvehicles/iap/hml.html

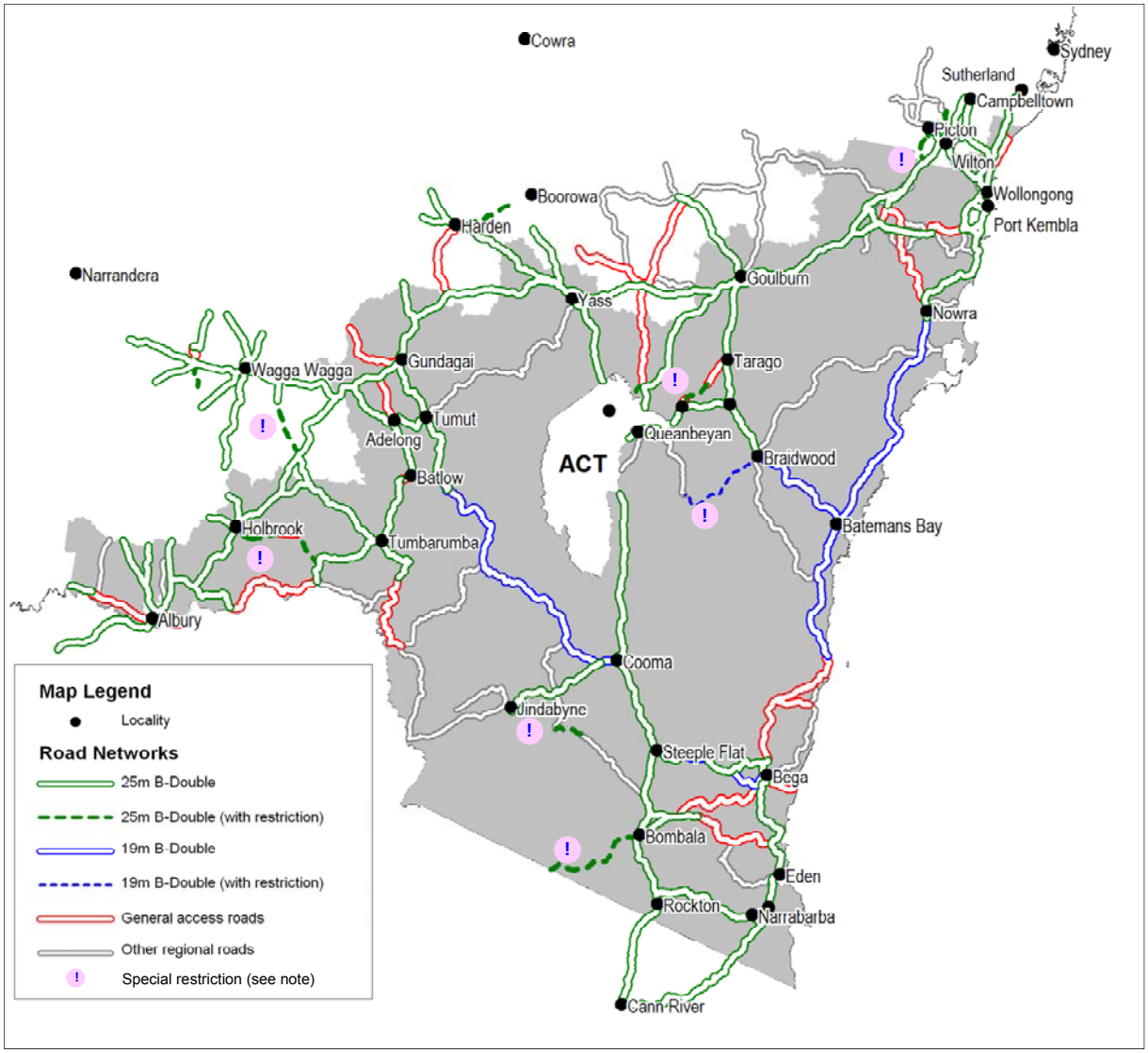
RTA's Restricted Access Vehicle (RAV) maps provide details on the roads and zones approved for:

- 25/26 metre B-Doubles
- 23 metre B-Doubles (no roads in this study area)
- 19 metre B-Doubles
- 4.6 metre high vehicles (permitted on most roads in the study area where RAVs are allowed)
- Road Trains (not permitted in this study area).

[1] List as provided on http://www.rta.nsw.gov.au/heavyvehicles/iap/hml.html includes Car Carriers, although these are strictly speaking not a class of vehicle.

Figure 22 shows the key roads in the study area where B-doubles are permitted to operate. Some operational restrictions exist and these are noted on the map and explained further in Table 3 below.

Figure 22 – Freight network showing vehicle access restrictions



Source: RTA (2009) Restricted Access Vehicles Map, www.rta.nsw.gov.au, Sd+D.

Table 3 – B-Double travel restrictions

Key on map (Figure 22)	***General location***	*Description of operational restrictions*
1	Picton	The only place of access permitted for B-Doubles from Remembrance Dr is Rockford Rd, Tahmoor. Travel north of Rockford Rd through Picton is permitted only as an emergency route if the Hume Highway is closed between Tanderra Interchange and Picton, Mt-Ousley.
2	Bungendore	No travel permitted 7:30-9:00am and 3:00-4:30pm on school days.
3	Braidwood	No travel permitted 7:30-9:00am and 3:00-4:30pm on school days.
4	Bombala	Vehicles exceeding 30 tonnes must use low level crossing at Delegate River.
5	Holbrook	No travel permitted 8:00-9:00am and 3:30-4:30pm on school days (Hume Hwy junction) and no travel permitted 7:30-8:30am and 3:30-4:30pm on school days (Tumbarumba Rd junction).
6	Wagga Wagga	Travel permitted in northbound direction only between Hume Hwy and Tywong St, Ladysmith

Source: RTA (2009) Restricted Access Vehicles Travel Restrictions, www.rta.nsw.gov.au

Note: only restrictions relevant to key routes in the study area are listed. Refer to RTA for full details.

4.2.1 Recent developments in ACT heavy vehicle restrictions

HML restrictions in place in the ACT mean that there is no HML-approved route through the ACT joining the Monaro Highway to the south with the other major cross-border highways, specifically the Federal and Barton Highways to the north, and the Kings Highway to the east. As a result, vehicles wishing to pass to/from the Monaro through the ACT either cannot operate at HML load or are obliged to use alternative, longer routes, with a direct impact on the efficiency of freight movements from this sub-area within the study area.

In spite of this impediment, there has been some recent easing on heavy vehicle restrictions in the ACT with a series of new regulations released in March 2010[2]. These regulations include approval for a single HML route serving the Mitchell Industrial Estate at the junction of the Barton and Federal Highways in the north of the ACT, as shown in Figure 23 below *(additional detail is provided at Table 50 in Section 23.1 of the Appendices – Heavy Vehicles)*. The HML restrictions south to the Monaro Highway, however, remain in place.

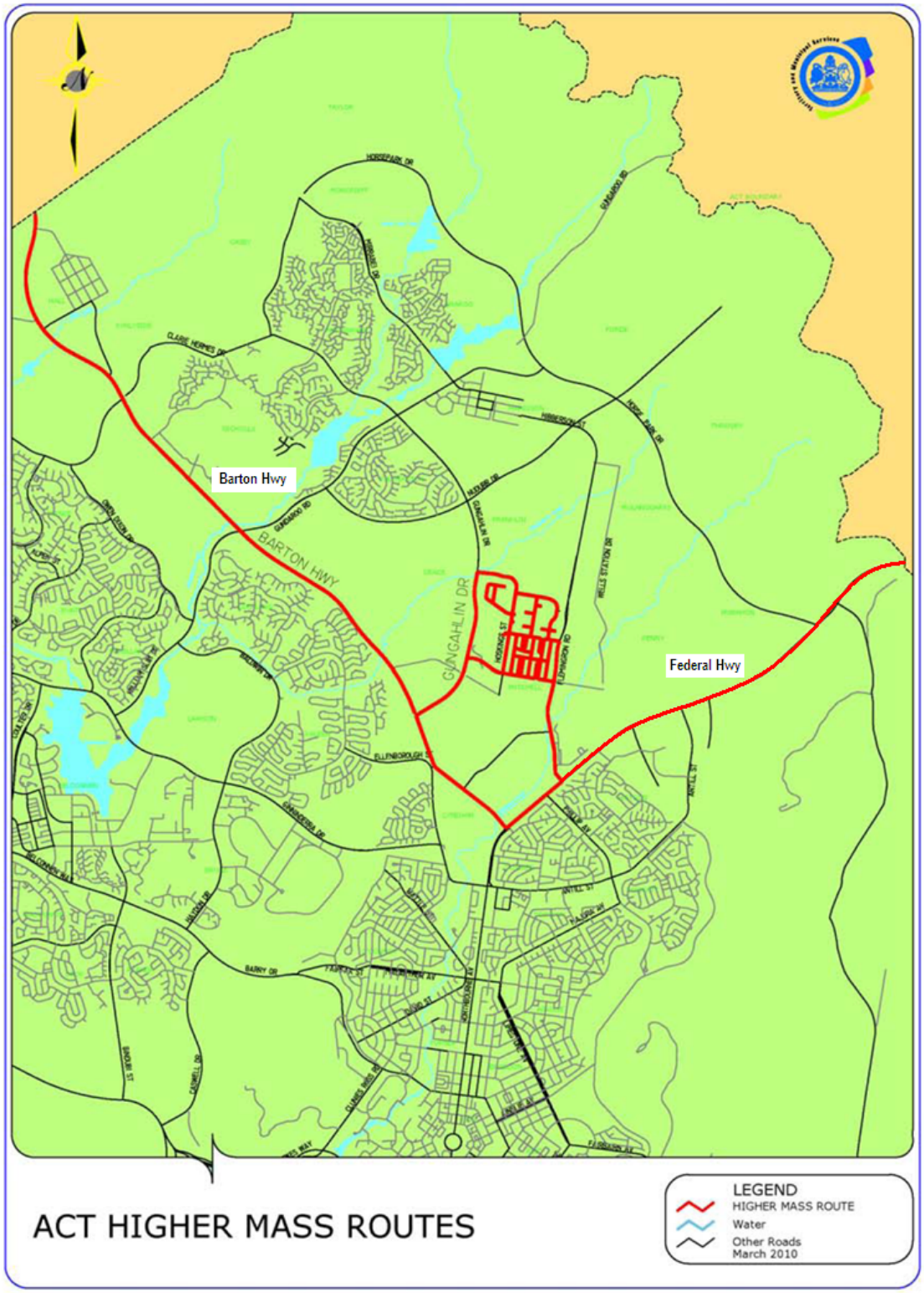
Approval has also been granted to a route linking the major cross-border highways for use by 26m 62.5 tonne B-Doubles as indicated by the heavy black line in Figure 24 below. Whilst this route is not approved for B-Doubles operating at HML *(up to 68 tonnes),* this development does ease prior restrictions *(additional detail is provided at Table 51 in Section 23.1 of the Appendices – Heavy Vehicles)*.

To take advantage of these very recent developments, there is a requirement for the relevant authorities to ensure these newly approved routes are communicated to appropriate industry bodies and transport operators.

Further, it is plausible, given the newly approved north-south B-Double route through the ACT, that the Monaro Highway will experience greater utilisation and this should be taken into consideration in any future network planning in the area. Please note that notification of changes post-dated the modelling and analysis undertaken for this study and therefore have not been taken into account.

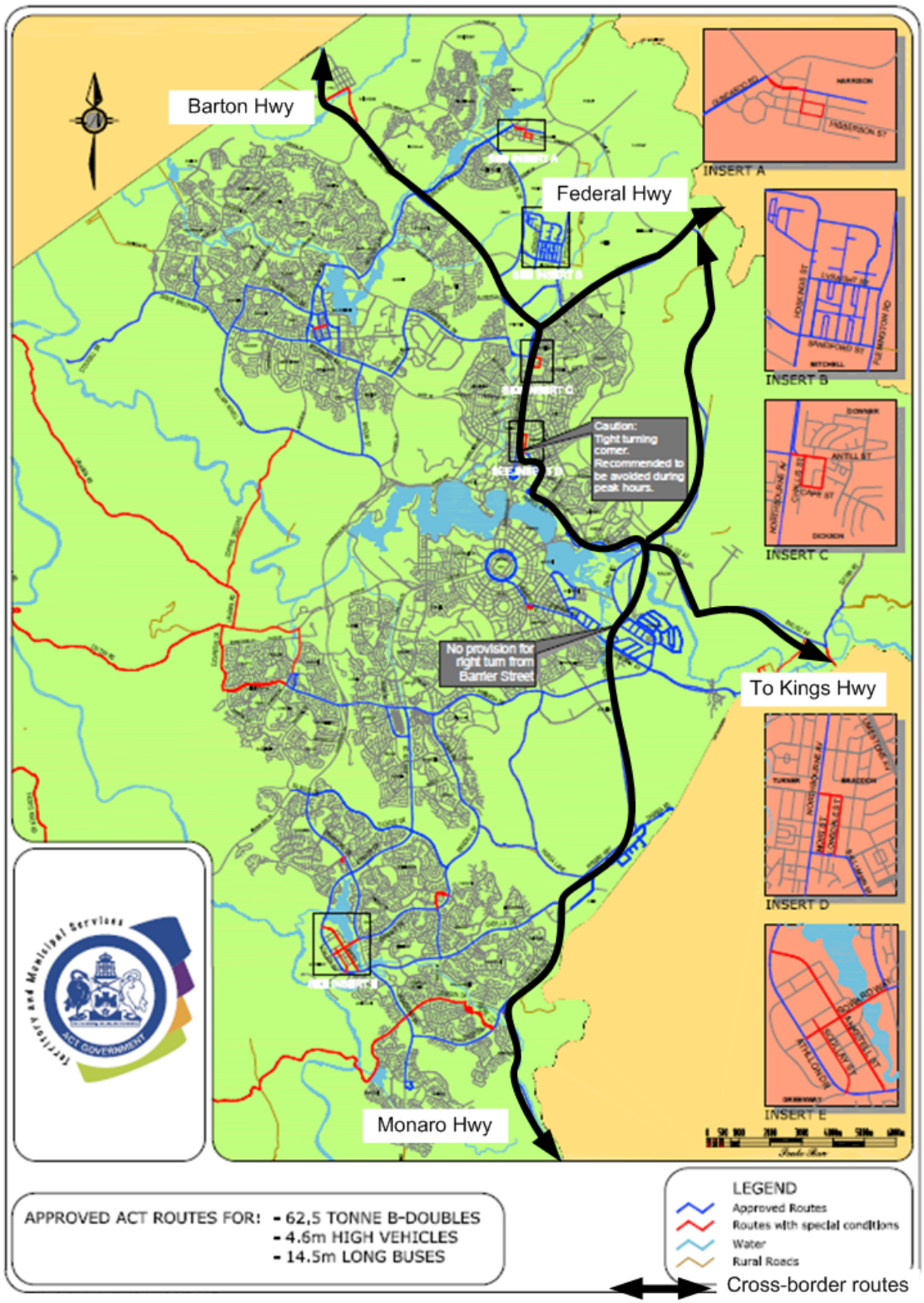
[2] Notices NI2010-94 to NI2010-102 Road Transport (Mass, Dimensions and Loading) (No 1). Research indicates these notices are the first full release of defined approved ACT routes.

Figure 23 – Map of ACT Higher Mass Limit (HML) approved routes



Source: Modified from the Road Transport (Mass, Dimensions and Loading) Higher Mass Limits (HML) Exemption Notice 2010 (No 1), Department of Territory and Municipal Services, ACT, www.tams.act.gov.au

Figure 24 – Cross border links in the ACT for 26m 62.5 tonne B-Doubles



Source: Modified from the Road Transport (Mass, Dimensions and Loading) General B-Double Exemption Notice 2010 (No. 1), Department of Territory and Municipal Services, ACT, www.tams.act.gov.au

4.3 Absence of efficient east-west corridors

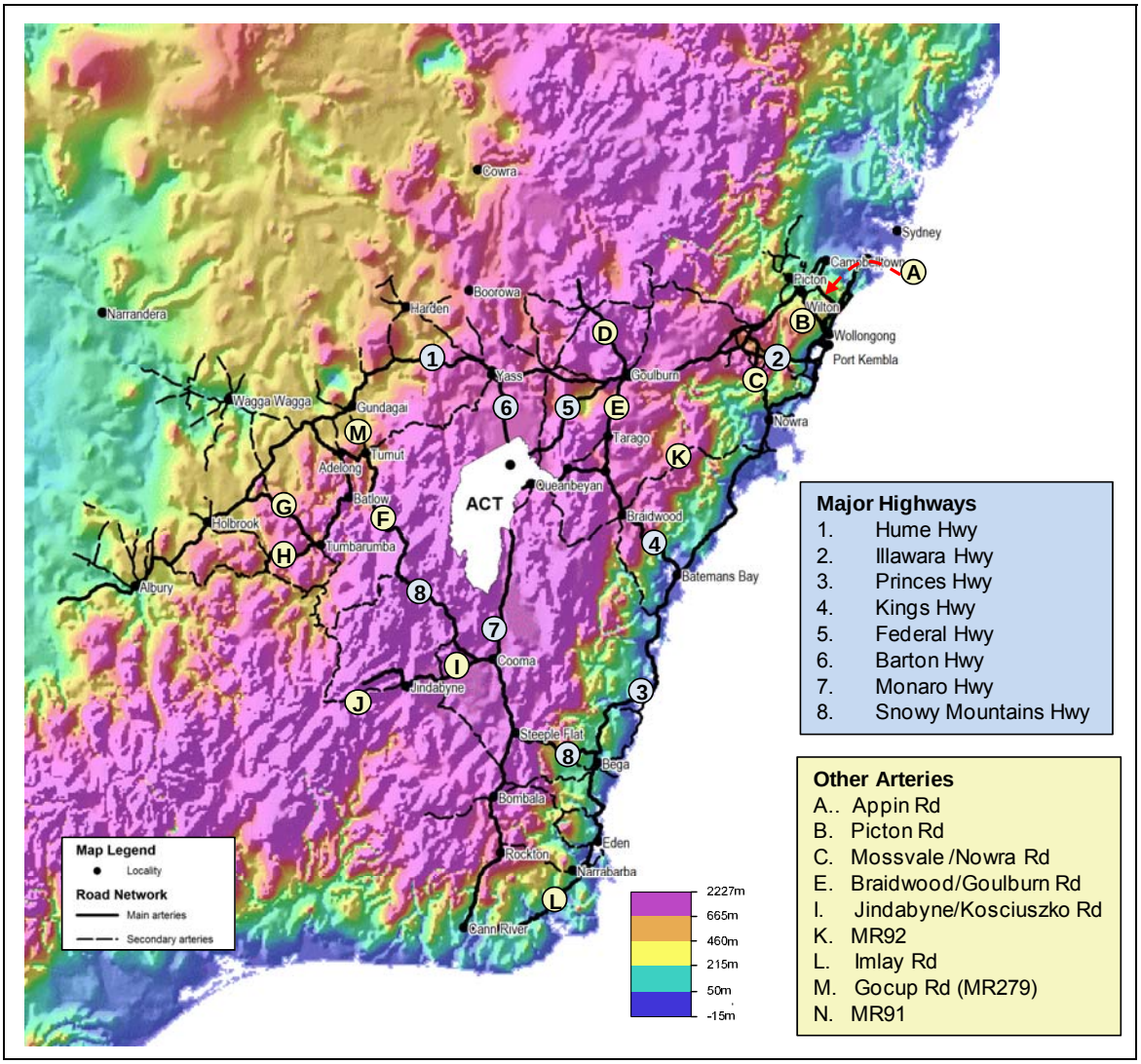
The study area is well served by a number of north-south corridors, namely:

- the Princes Highway running along the eastern coastal strip,
- the Monaro Highway running through the centre of the study area, in conjunction with the Federal and Barton Highways emerging north from the ACT, and
- the Hume Highway bordering the study area to the west.

The Princes Highway however, is restricted between South Nowra and Bega in terms of heavy vehicle access, with 25m B-Doubles prohibited *(as shown above in Figure 22 on page 35).* North-south heavy vehicle freight is directed onto the inland highways. The Hume, Federal, Barton and Monaro Highways are all HML approved routes in or bordering the study area, with the exception of the Monaro Highway from Cooma to the ACT *(as described above in Section 4.2 – The HML network).*

This means that heavy freight vehicles requiring access to or originating from the South Coast region must utilise east-west corridors to access the inland north-south highways. The number of east-west corridors is limited however, due to accessibility and gradient issues associated with the Illawarra escarpment and the Great Dividing Range, as indicated on the map below.

Figure 25 – Impact of Great Dividing Range on east-west corridors



As a result, the main east-west linkages in the study area are limited to the following roads (with references to the map above in brackets):

- Picton Road (and Mount Ousley Road as a feeder) at the northern extremity of the study area [B],
- the Illawarra Highway connecting the Illawarra coastal plain at the Princes Highway and the Southern Highlands with the Hume Highway west of Moss Vale [2],
- the Kings Highway connecting Batemans Bay, the Princes Highway and New South Wales south coast with the southern tablelands and the ACT [4], and
- the Snowy Mountains Highway connecting the coast 5km north of Bega with the Monaro plains, the snowfields and Kosciuszko National Park, and joining the Hume Highway 26km southwest of Gundagai in the Riverina [8].

Each of these main east-west linkages faces its own set of issues in terms of carrying heavy vehicle freight:

- Picton Road is already carries a substantial number of trucks, largely carrying coal. It is generally suitable for heavy vehicles, with speed restrictions in the downhill direction on Mount Ousley. Its location at the northern edge of the study area limits its attractiveness to areas south of the Wollongong urban area.
- The Illawarra Highway features the Macquarie Pass which is a narrow, steep and winding road ascending the Illawarra escarpment. Many heavy vehicles are forced to use Picton Road and Mt. Ousley / Appin Roads instead due to the gradients.
- The Kings Highway crosses the escarpment at Clyde Mountain impeding access for B-doubles which are approved for travel only between Queanbeyan and Braidwood. This highway is currently the subject of the RTA's Queanbeyan to Batemans Bay Corridor Strategy, Sep-2009.
- The western part of the Snowy Mountains Highway in the alpine region is often subject to heavy snow and black ice in the winter months at a time when traffic is extremely heavy as thousands of tourists make their way from Canberra and Sydney to the snowfields. The highway is restricted to general access only between Talbingo Mountain and Cooma. It also features restricted access at Brown Mountain west of Bega, with 25m B-Doubles required to use uncoupling bays either side of Brown Mountain.

Whilst secondary east-west linkages exist, they are generally unable to handle heavy vehicles; either as a result of the surrounding topography resulting in steep gradients or as a result of the road condition itself. Other secondary east-west linkages include:

- Main Road 92 (MR92), a regional road from Nowra on the coast and joining the Kings Highway at Braidwood. MR92 is currently undergoing upgrade works between Nowra and Nerriga with stage three due for completion in late 2010. However, the route from Nerriga to Braidwood remains unsuitable for B-doubles thereby preventing them from traversing the entire length of the road
- Main Road 91 (MR91), connecting the Princes Highway at Pambula with the Monaro Highway at Bombala.
- Main Road 261 (MR261), connecting the Princes Highway north of Nowra to Bowral via Kangaroo Valley and Moss Vale.
- Imlay Road, a forestry road, connecting the Princes Highway near Narrabarba with the Monaro Highway north of Rockton.

.

The lack of suitable east-west corridors leads trucks to take indirect routes, resulting in potentially inefficient freight movements through the study area. An evaluation however of the demand for freight traversing the escarpment, demonstrates that this is in fact, not a major issue *(refer Table 40 in Section 22 – Freight Demand* – The Future Case*)*.

These two facts, however, are not unrelated and it is likely that inaccessibility across the escarpment and the lack of current demand go hand in hand. While demand does not warrant action, the potential upgrading of links may be worthy of consideration in order to reduce overall vehicle travel and to improve accessibility between the coast and the tablelands. The demand forecasts presented in the report have not assumed major upgrades of these escarpment crossings.

4.4 Network use

The RTA provided a series of Weigh-In-Motion System (WIMS) data to assist with the conduct of the study, of which two sites were relevant to the study area.

It is estimated that approximately 38,000 freight vehicles travel on the Monaro Highway per annum through Michelago *(both directions)* and 45,000 vehicles per annum travel on the Princes Highway through Batemans Bay. Table 4 below summarises the WIMS data at these locations.

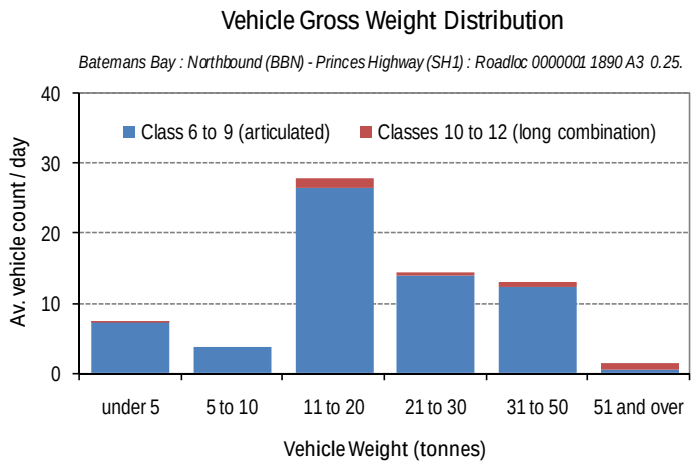
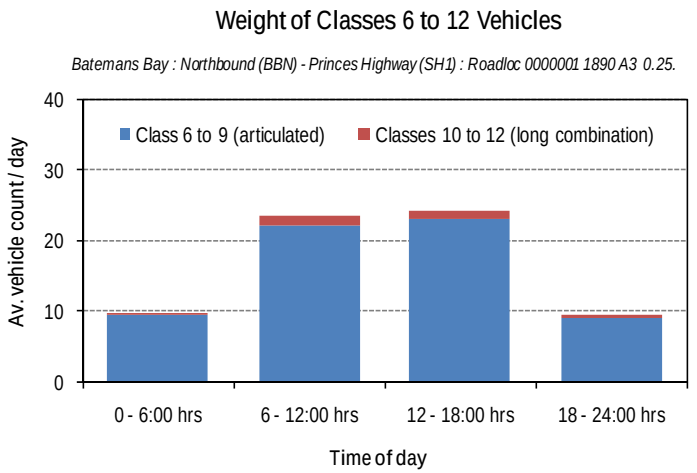
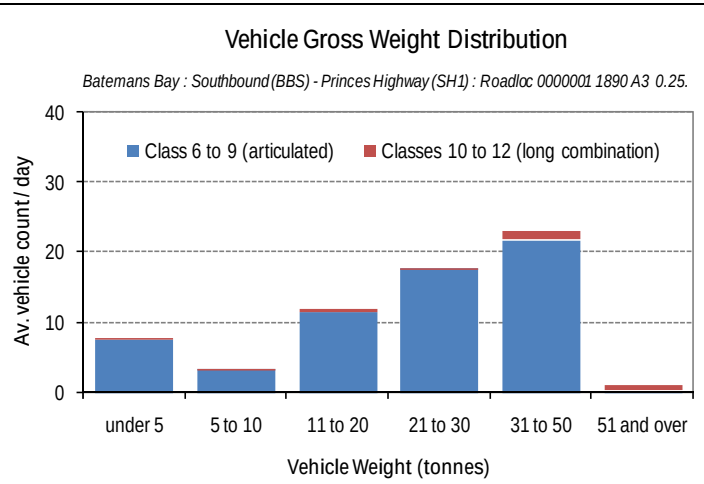
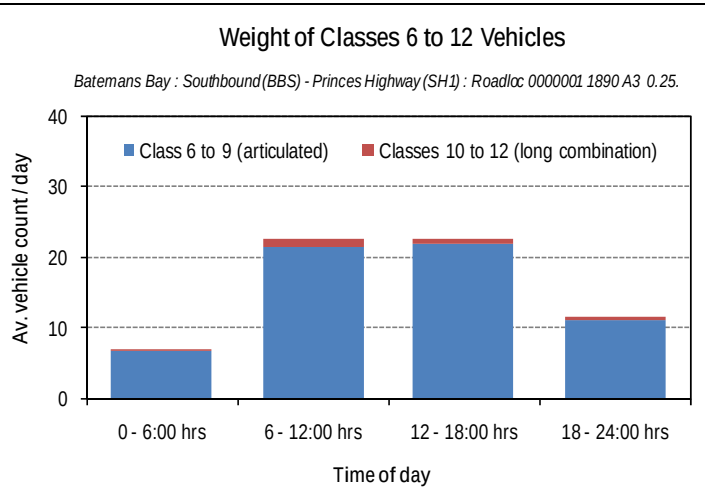
Table 4 – WIMS data summary, 2009

Data fields	*Michelago (MI)*		*Batemans Bay (BBS)*	
Site description	Monaro Highway (SH19)		Princes Highway (SH1)	
Data coverage	1/01/2009	31/01/2009	1/01/2009	30/06/2009
Direction	Northbound	Southbound	Northbound	Southbound
Total operative days	21	20	168	172
Total vehicles weighed (all classes)	48,737	41,706	678,773	681,302
Total freight vehicles (Classes 6 – 12)	1,740	1,423	11,279	11,121
Annualised total freight vehicles	20,880	17,076	22,558	22,242
Average daily freight vehicles	82	71	67	64

Source: RTA (2009).

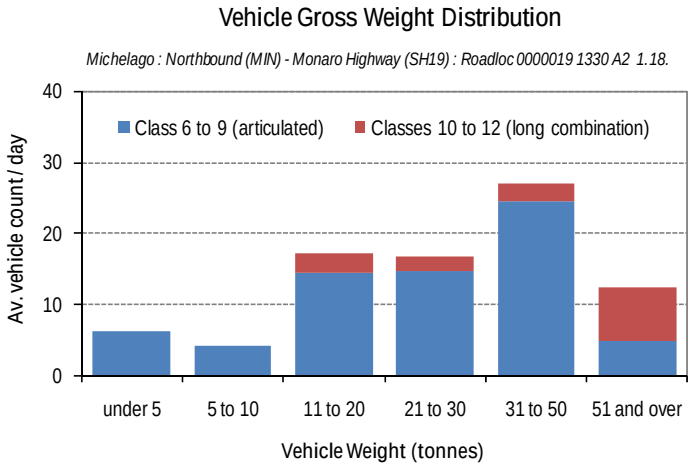
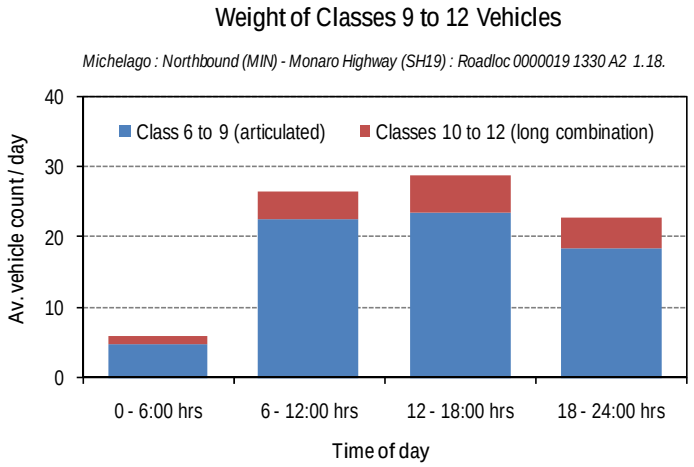
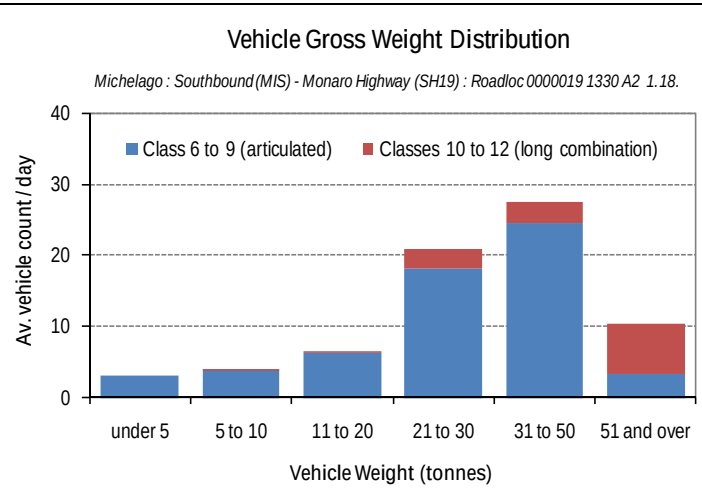
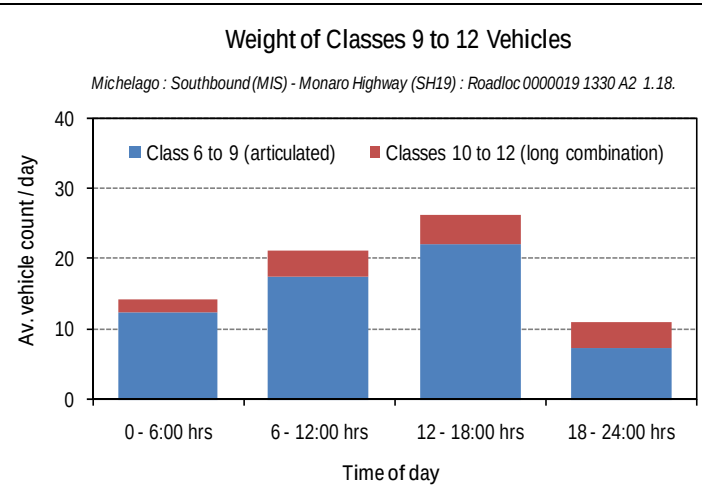
The Austroads vehicle classification system is provided at Table 49 in Section 23.1 of the Appendices – Heavy Vehicles, for reference purposes.

Figure 26 – Truck profile – Princes Highway Batemans Bay

	Gross Weight Distribution (classes 6-12)	Time of day distribution (classes 6-12)
Northbound		
Southbound		

Source: WIM Classified Vehicle Summaries, Roads and Traffic Authority of NSW, 12/08/2009.

Figure 27 – Truck profile – Monaro Highway Michelago

	Gross Weight Distribution (classes 6-12)	Time of day distribution (classes 6-12)
Northbound		
Southbound		

Source: WIM Classified Vehicle Summaries, Roads and Traffic Authority of NSW, 12/08/2009.

Average Annual Daily Traffic (AADT) counts were also sourced for the east-west corridors in the RTA Southern Region (described in the preceding Section 4.3).

Table 5 – AADT counts on east-west corridors

Road No	*Road Name*	*Vehicles per day*	*Heavy Vehicles*	*Comments*
Wollongong				
MR95	Picton Road	14,000	20%	
MR177	Appin Road	11,000	14%	
MR95	Mt Ousley	40,000		
SH1	Bulli Pass	12,000		
Shellharbour / Shoalhaven				
SH25	Illawarra Highway	3,000	7%	General access vehicles only
MR264	Jamberoo Mountain Road	4,000	4%	10 tonne limit on part
MR261	Nowra to Bowral	3,000	6%	General access vehicles only and 42.5 tonne bridge limit
Eurobodalla				
MR51	Kings Highway	4,000	6%	
Bega Valley				
SH4	Snowy Mountains Highway	2,000	12%	
MR91	Pambula to Bombala	1,500	8%	General access vehicles only
Forestry	Imlay Road	300	15%	

Source: East-West Corridors, RTA Southern Region, April 2007.

5. ANALYTICAL FRAMEWORK

The purpose of this section is to outline the methodological approach to the project including the analysis of freight demand and network segmentation.

5.1 Methodology to guide the project

The project analysis is broadly defined in three phases shown following in Figure 28 and described as follows:

- Phase 1: define the study area within the Australian Bureau of Statistics (ABS) area classifications, identifying relevant division, subdivisions and local areas; source relevant freight and economic data and extrapolate data to 2009 for comparison against the case study approach described later in the report.
- Phase 2: undertake a series of industry and sector case studies; account for any unexplained demand to assemble a Base Case (as at 2009), using industry knowledge from stakeholders and / or reference to industry forecasts; derive a set of escalation factors to extrapolate the Base Case to develop forecasts for years 2021 and 2031.
- Phase 3: define and segment the freight network and explain origin-destination traffic in terms of tonnage and trips, accounting for the nature of the transport fleet and any practices affecting vehicle utilisation e.g. back loading.

5.2 Area classification of the study area

For this study we have made use of data expressed in four tiers of the Australian Standard Geographic Classification (ASGC)[3].

Our primary unit of geography is Statistical Local Area (SLA) as this allows us to allocate vehicles onto the road system at a reasonably fine level. The western and northern extent of the study area is formally the Hume Highway. A number of SLAs extend beyond this boundary and are included for completeness.

Some ABS data, and most importantly the Freight Movements data (see description in Section 6.1.1) are available for larger areas, either SD or SSD. Apart from the ACT, only one SD, Illawarra is located wholly within the study area. It is therefore necessary to analyse freight movements and case studies at the SSD or SLA level. Table 6 provides a summary of the SSDs and SLAs which fall within the study area and are included in the analysis. Figure 29 below shows the relationship between SLAs and the road system relevant to the study area and also shows the outer boundary of the SDs included in analysis.

The study area sits within four (SDs): Illawarra, South Eastern, Murray and Murrumbidgee and also contains the ACT which is included in the analysis even though its road network is not in the study scope. Freight moves between NSW and the ACT across the freight network and it is therefore important to understand the total freight task. This is particularly relevant for the Federal, Barton and Monaro Highways.

[3] (i)State; (ii) Statistical Divisions (SDs); (iii) Statistical Subdivisions (SSDs); (iv) Statistical Local Areas (SLAs).

Figure 28 – Study methodology overview

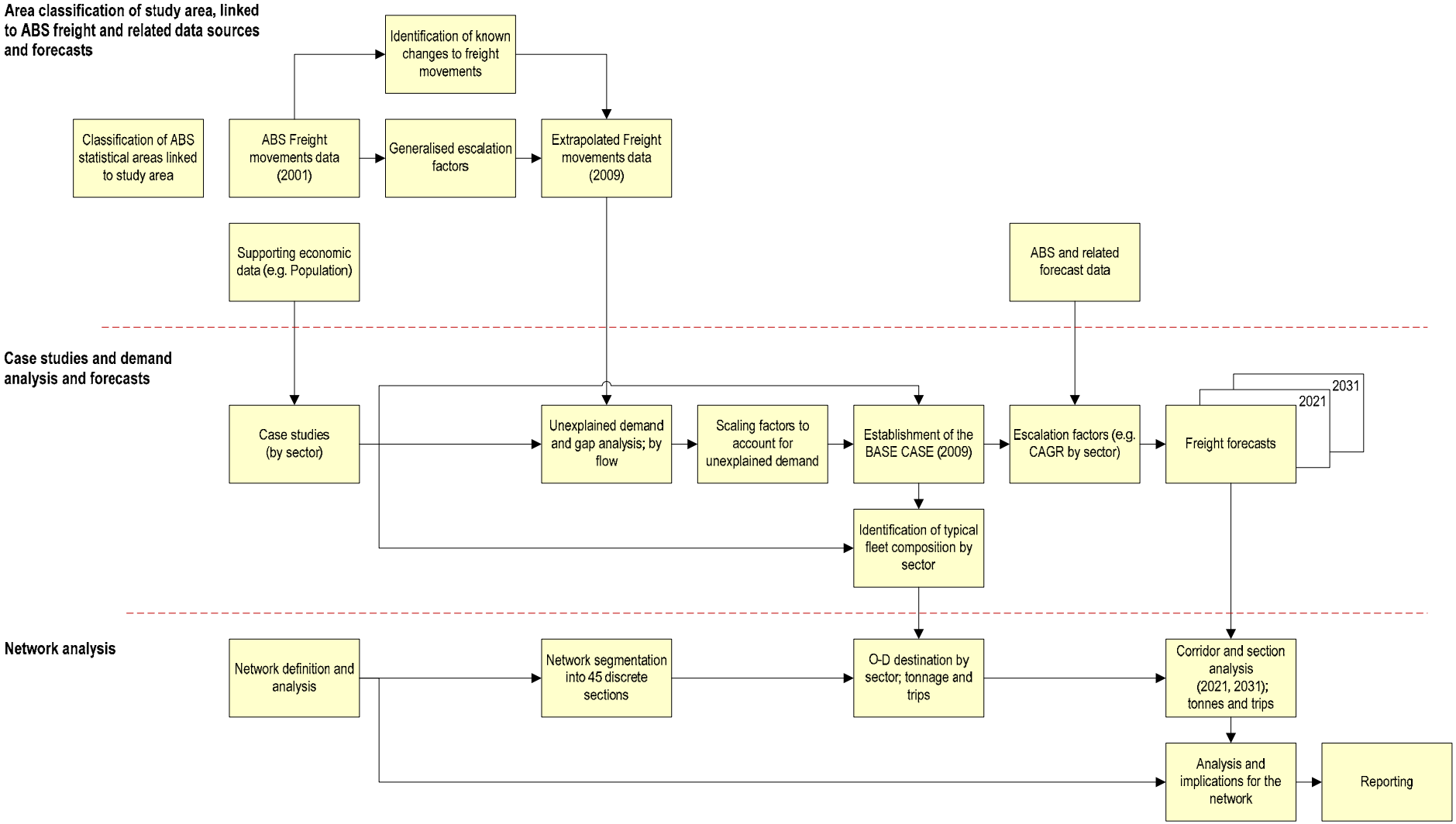


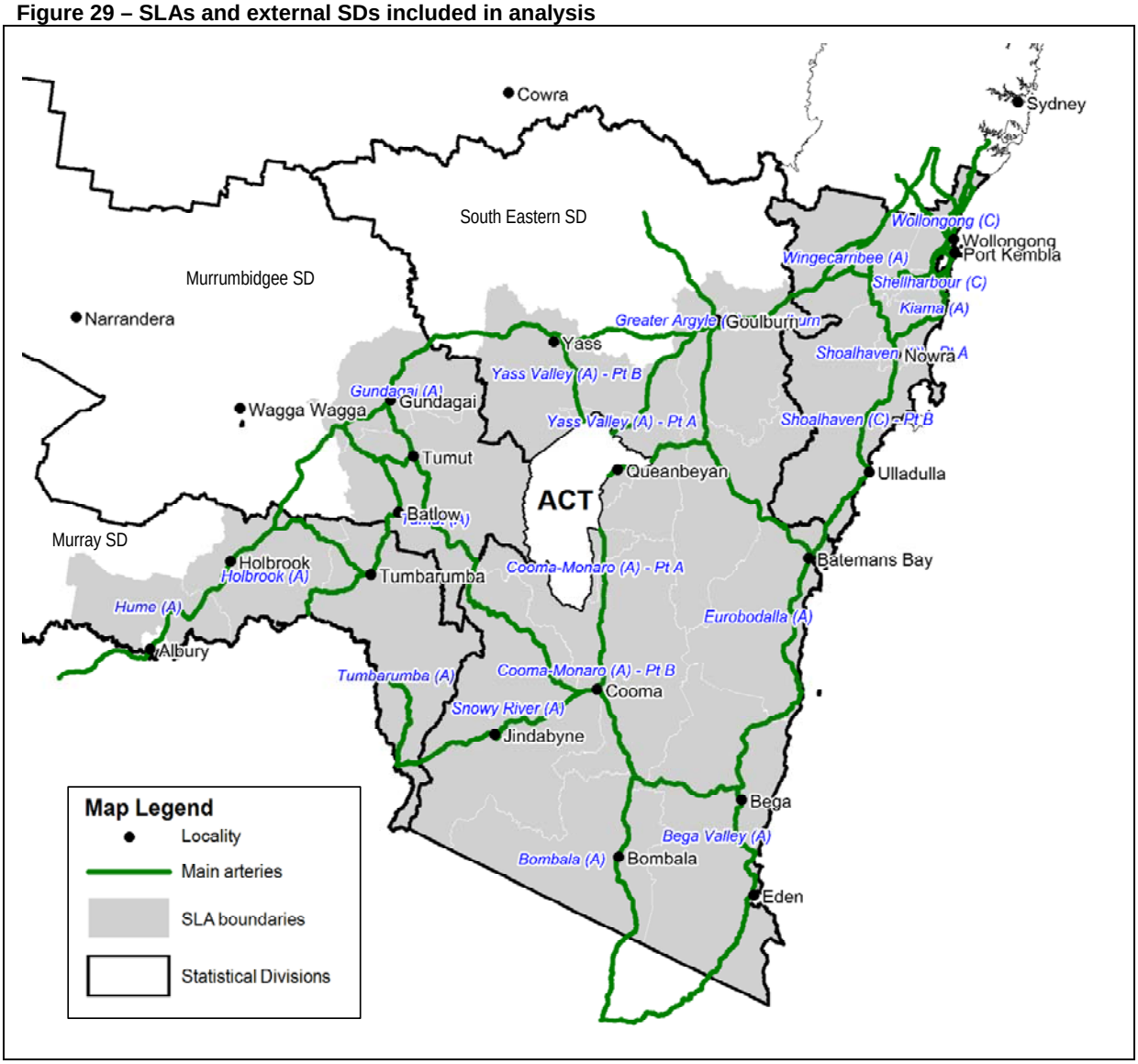
Table 6 – Geographical classification of the study area

SD	*SSD*	*SLA*	*INCLUDED*	*EXCLUDED*
Illawarra	Wollongong	Kiama (A)	✓	
		Shellharbour (C)	✓	
		Wollongong (C) – Inner	✓	
		Wollongong (C) Bal	✓	
	Nowra-Bomaderry	Shoalhaven (C) – Pt A	✓	
	Illawarra Statistical Division Bal	Shoalhaven (C) – Pt B	✓	
		Wingecarribee (A)	✓	
South Eastern	Queanbeyan	Palerang (A) – Pt A	✓	
		Queanbeyan (C)	✓	
	Southern Tablelands (Excl. Queanbeyan)	Boorowa (A)		✗
		Goulburn (A)	✓	
		Goulburn (A) Bal	✓	
		Harden (A)		✗
		Palerang (A) – Pt B	✓	
		Upper Lachlan (A)		✗
		Yass Valley (A)	✓	
		Young (A)		✗
	Lower South Coast	Bega Valley (A)	✓	
		Eurobodalla (A)	✓	
	Snowy	Bombala (A)	✓	
		Cooma-Monaro (A)	✓	
		Snowy River (A)	✓	
Murray	Albury	Albury (C)		✗
		Greater Hume Shire (A) – Pt A	✓	
	Upper Murray (Excl. Albury)	Corowa Shire (A)		✗
		Greater Hume Shire (A) – Pt B	✓	
		Tumbarumba (A)	✓	
		Urana (A)		✗
	Central Murray	Berrigan (A)		✗
		Conargo (A)		✗
		Deniliquin (A)		✗
		Jerilderie (A)		✗

SD	*SSD*	*SLA*	*INCLUDED*	*EXCLUDED*
		Murray (A)		✖
		Wakool (A)		✖
	Murray-Darling	Balranald (A)		✖
		Wentworth (A)		✖
Murrumbidgee	Wagga Wagga	Wagga Wagga (C) – Pt A		✖
	Central Murrumbidgee (Excl. Wagga Wagga)	Coolamon (A)		✖
		Cootamundra (A)		✖
		Gundagai (A)	✓	
		Junee (A)		✖
		Lockhart (A)		✖
		Narrandera (A)		✖
		Temora (A)		✖
		Tumut Shire (A)	✓	
		Wagga Wagga (C) – Pt B		✖
	Lower Murrumbidgee	Carrathool (A)		✖
		Griffith (C)		✖
		Hay (A)		✖
		Leeton (A)		✖
		Murrumbidgee (A)		✖
Canberra and ACT Balance	ALL	ALL	✓	

Source: Australian Standard Geographical Classification (ASGC)

Figure 29 – SLAs and external SDs included in analysis



5.1 Overview of truck forecasting process

The forecasting of truck movements for this study has focussed on vehicles undertaking the majority of the medium to long haul freight task. Localised movements near and within towns have not been forecast and would need to be considered in detail as part of localised planning and road improvement studies.

Following evaluation of available data sources and after discussion with the RTA project review group, it was agreed that the study would focus on the movement of goods in articulated vehicles. There is ample evidence that in urban areas the vast bulk of long-haul freight is moved in articulated vehicles and rigid vehicles are predominantly used for localised distribution of goods. For example, from WIM data obtained within the study area, near the township of Batemans Bay, rigid trucks account for 75% of the heavy vehicles, but carry 30% of the total freight. On the open road, the Monaro Highway, the fleet is about evenly distributed between rigid and articulated vehicles, but the latter carry 86% of the freight.

The forecasts contained in this study, therefore, provide a reasonable estimate of articulated vehicles undertaking inter-and intra-regional haulage tasks, but do not include localised rigid truck movements.

An overview of the demand analysis process is as follows, with details in ensuing sections of this report:

- A "top down" view of freight volumes observed in 2001 was developed making use of ABS's Freight Movements Study (FMS), which is described in Section 6.1.1. This analysis was undertaken at the SSD level and provided an upper level control of the origins, destinations and freight volumes carried by articulated vehicles.
- This 2001 estimate was grown to represent the study base year of 2009.
- A "bottom up" view of the freight volumes is achieved through the case studies which are generally undertaken at the SLA level and can be more easily aligned with the road network used by freight vehicles. The case studies focus on the key sectors and movements and are defined in more detail in Section 6.
- The freight studies do not capture 100% of the freight in each industry. Expansion factors were derived for each industry to account for this under-representation.
- For each industry, a factor was derived to convert tonnes of goods to truck movements, taking into account the density of goods and loading patterns for each industry group.
- Trucks were assigned to routes within the road network based on information gleaned from the case study interviews.
- Backload trips were added to complete the quantification of truck movements.

It is important to note that the most logical route for a typical origin-destination pairing is not always the pathway taken. In many cases, operators may choose to change a designated route based on their knowledge of network restrictions and accessibility issues, climatic conditions, backloading consolidation, co-operative supply chains, traffic considerations and other market factors.

It is also important to note that the routes chosen in forecast years essentially reflect routes taken today. They assume that no major upgrades are made that would impact on overall network accessibility for freight vehicles.

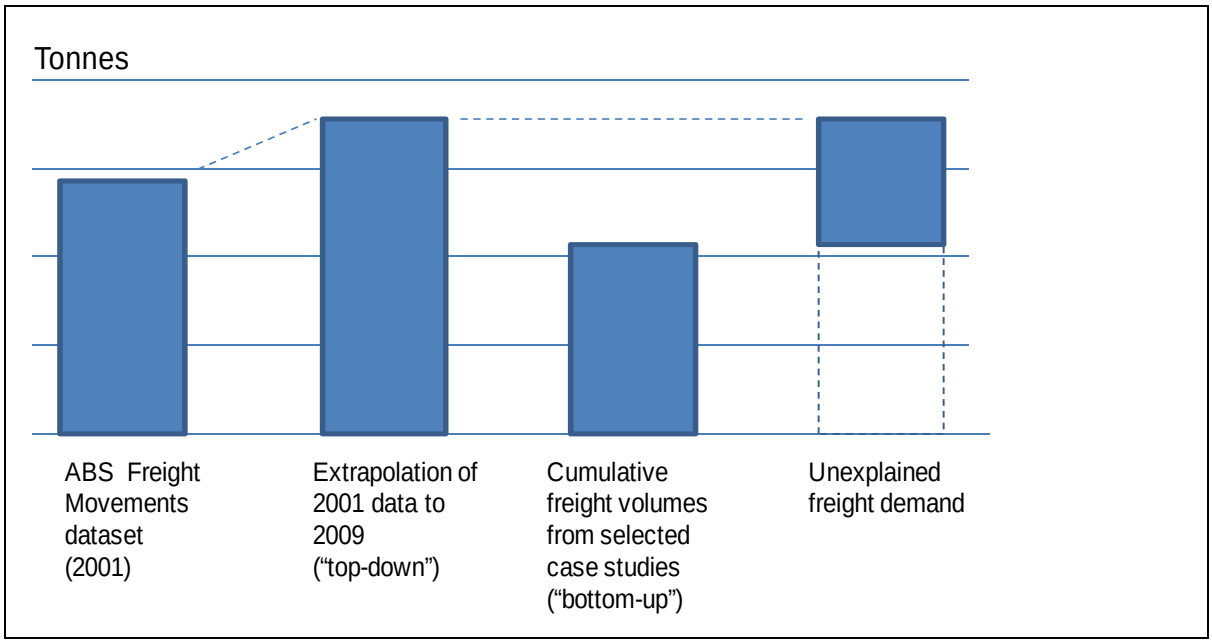
The difference between the "top down" and bottom up" perspectives can be viewed as *unexplained* demand[4] which may be as a result of:

- Over-estimation of the freight volumes in the initial dataset;
- Under-estimation of freight volumes in the selected case studies;
- High proportion of freight movements which are highly fragmented across many markets, origins and destinations and therefore difficult to identify and estimate; or
- All of the above.

The following diagram provides a conceptual framework for aligning the approach, datasets and case studies.

[4] For highly concentrated freight corridors (e.g. Hume Highway), unexplained demand may be relatively low; for example lower than 20%; however for regional freight studies across a number of possible pathways, unexplained demand may be as high as 60%, but generally significantly lower in overall volume.

Figure 30 – Freight demand, analytical framework



5.2 Network adopted for study analysis

The objective of the study is to produce forecasts of truck movements on the State road network:

> *"Describe and quantify the current and future freight logistics including supply chains in relation to the existing road transport networks in South Eastern NSW; in order to assist the RTA to identify short and long term needs of the State roads in the study area."*

Figure 21 shows the State and Regional roads in the study area, along with other connecting roads; Figure 22 shows roads which permit various classes of freight vehicles.

The network adopted for analysis has been determined by the following criteria:

- it includes both State and Regional roads, but not necessarily all of these roads, with filters applied as outlined in following dot points;
- within the forecasting framework it has been divided into three major corridors, within which the major corridor roads and their feeders are identified;
- roads that carry extremely low volumes of trucks were discussed with RTA regarding their inclusion in the analysis;
- roads which are not corridor feeder roads, cannot carry heavy vehicle through movements (because of prohibitions or gradients or both), or which are not State or Regional roads were excluded from the analytic framework.

On this basis, only a selected number of roads traversing the escarpment were included in the analysis. Illawarra Highway (SH25), Jamberoo Mountain Road (MR264) and Kangaroo Valley Road (MR261) were specifically excluded from the analysis. Any freight movements carried on these roads are either local in nature or are leakage from the designated routes and are not able to be further forecast within the scope of this study.

As mentioned in Section 3, the South Eastern NSW region contains several critical arterial roads which connect in a broad north-south direction, supplemented by the east-west corridors. For analytic and reporting

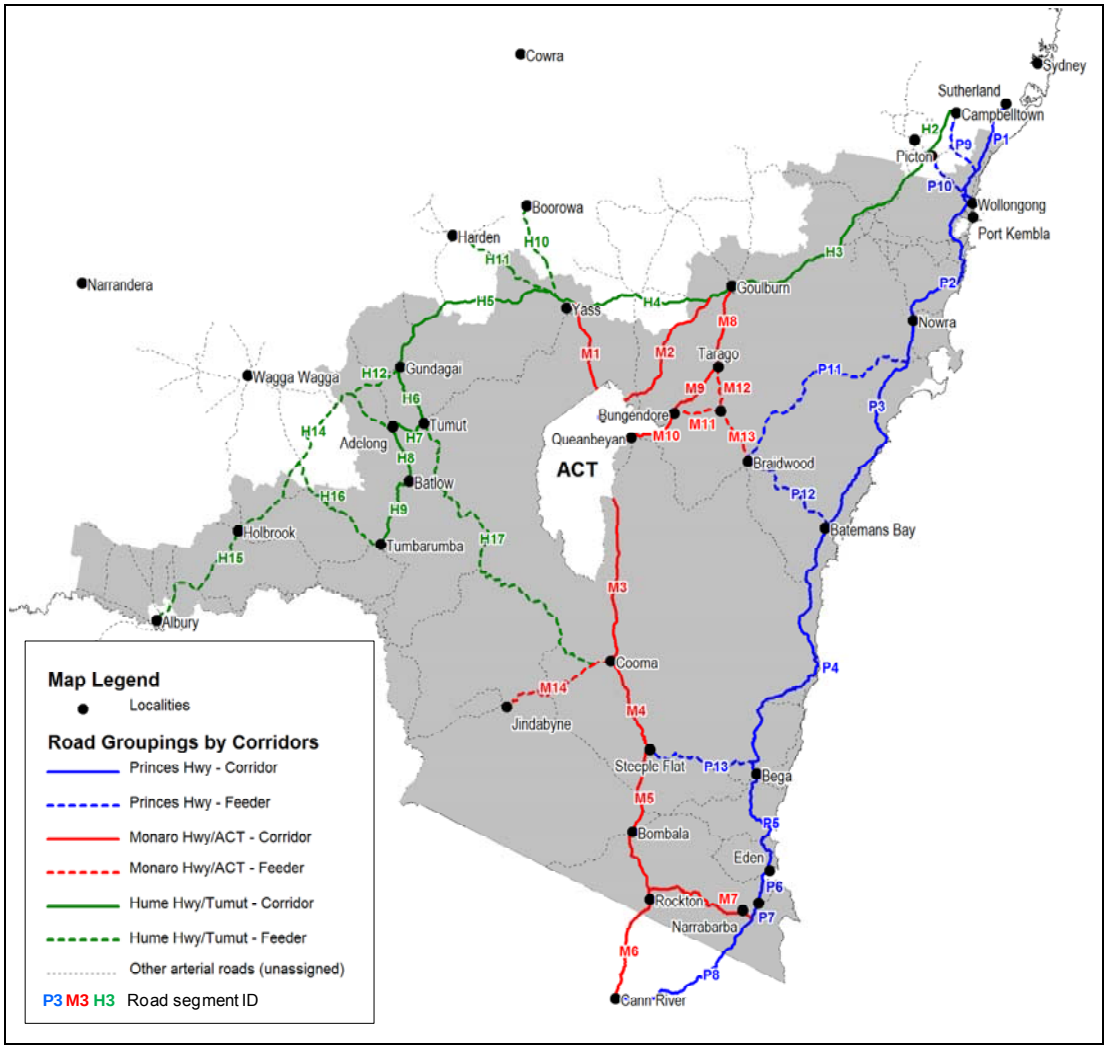
convenience, we have identified three primary road groupings or corridors. Note that each corridor is also connected by a number of feeder roads.

- Princes Highway corridor joins Sydney to Eden via Wollongong and continues across the Victorian border to Cann River. Key feeder roads join it at Wollongong, Nowra, Batemans Bay, Bega and Eden.
- Hume Highway/Tumut corridor connects the AusLink classified Hume Highway corridor between Sydney-Albury as well as the central west feeders (via Boorowa or Harden) and links to the Tumut-Tumbarumba region.
- Monaro Highway and ACT corridor encompasses the whole length of the Monaro Highway and the associated feeder roads into the ACT via Queanbeyan. This corridor is linked to the Princes Highway corridor via several escarpment routes at Bega and south Eden and to the Hume Highway/Tumut corridor at Yass, Goulburn and Cooma.

For the purpose of reporting, the forty-three (43) identified road segments are logically assigned to the three corridors based on discussions with stakeholders.

Figure 31 illustrates the road segments assigned in each corridor.

Figure 31 – Roads included in truck forecasting process



Note: some escarpment routes unable to be traversed by articulated vehicles are not included in analysis and are not shown

6. OVERVIEW OF FREIGHT DEMAND IN THE STUDY AREA

As outlined in the preceding section, the methodology that has been adopted for determining freight demand in the study area, involves both a *top-down* approach based on the ABS Freight Movements dataset and a *bottom-up* approach based on case study research incorporating stakeholder consultation and supply chain mapping. This section provides further detail on how both of these approaches combine to provide an overview of freight demand in the study area.

6.1 Analysing freight movements data (top-down view)

6.1.1 Analysis of 2001 Freight Movements data

In 2001, the Australian Bureau of Statistics (ABS) produced a data set entitled Freight Movements (9220.0) which estimated the freight movements across Australia.

This survey (FMS) and provides estimates of freight moved by road, rail, sea and air for the period 1 April 2000 to 31 March 2001. The statistics for the road component of the collection were based on a sample survey of articulated vehicles that were registered with a motor vehicle registry. Rigid trucks and other commercial vehicles were excluded from the scope of the survey. Articulated vehicles account for approximately 77% of total tonne-kilometres travelled and approximately 46% of total tonnes moved by road within Australia.

The data set has not been updated since its last collection in 2001, however in areas such as the southeast of NSW, industrial and commercial growth has been reasonably steady and a degree of analytical confidence can be applied.

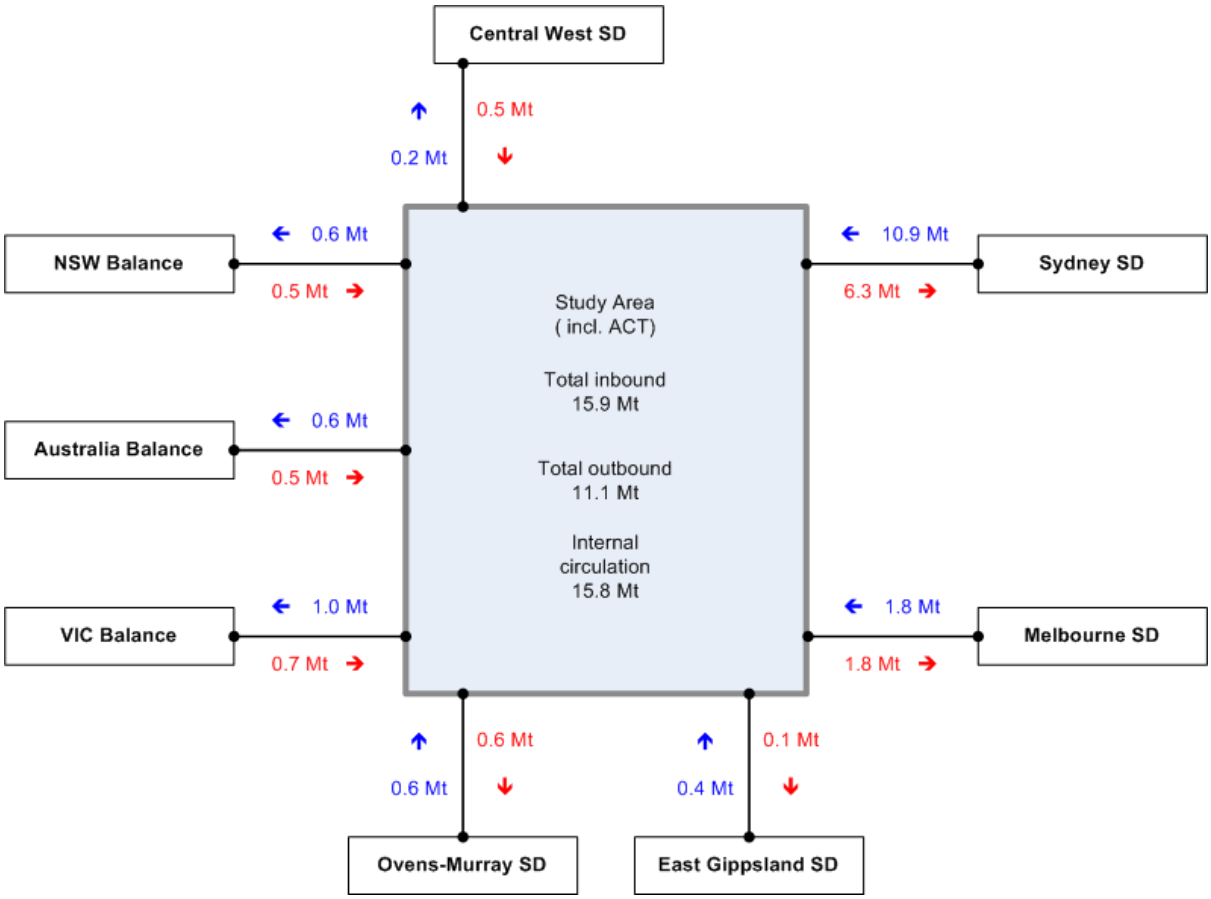
FMS produces several profiles containing more detailed commodity and vehicle data for large areas (State and SD) and broader freight data for smaller areas (SSD). The best quality data for this study area was expressed at the SD level.

A summary of the 2001 freight movements' data relevant to the study area is provided in Figure 32 below and in Table 7 on page 56. The freight task was estimated to total around 43 Mtpa for freight moving into, out of, and within the study area.

This estimate included the movement of around 5 Mtpa of coal from the Sydney SD (from Campbelltown and Mt. Victoria) which is now known to have ceased. This tonnage is included in the diagram on Figure 32 but is excluded from Table 7Table 7 – ABS Freight Movements volumes for study area, 2001, and will be omitted from further analysis.

In addition to the analysis shown, around 250,000 tonnes p.a. moves from the Gippsland area to / from Sydney. Much of this freight moves along the Monaro and Hume Highways. This is the only freight travelling through the study area as the Hume Highway trade between Sydney and Melbourne is not included in the study area network.

Figure 32 – Summary of tonnages to, from and within study area, 2001



Source: ABS Freight Movements 2001 (9220.0)

Table 7 – ABS Freight Movements volumes for study area, 2001

Yr 2001 Original ('000 tonnes) ABS FMS 2001	*Wollongong*	*Illawarra Bal*	*Queanbeyan*	*Sthn Tablelands (excl. Q'byn)*	*Lower South Coast*	*Snowy*	*Central Murrumbidgee*	*Albury*	*Upper Murray (excl. Albury)*	*ACT*	*Subtotal*	*Central West*	*Ovens-Murray*	*East Gippsland*	*Sydney*	*Melbourne*	*Bal. NSW*	*Bal. VIC*	*Bal. Aust*	*Subtotal*
	INTERNAL CIRCULATION OF FREIGHT WITHIN STUDY AREA											FREIGHT OUTBOUND FROM THE STUDY AREA								
Wollongong	*5,438*	*258*	*1*	*26*	*0*	*0*	*89*	*0*	*1*	*82*	5,894	*48*	*2*	*0*	*2,905*	*192*	*322*	*0*	*106*	*3,575*
Illawarra Statistical Division Bal	*162*	*867*	*0*	*50*	*33*	*4*	*57*	*16*	*47*	*44*	1,280	*11*	*23*	*0*	*603*	*39*	*58*	*10*	*49*	*792*
Queanbeyan	*1*	*6*	*145*	*5*	*1*	*0*	*6*	*0*	*0*	*149*	314	*2*	*0*	*0*	*76*	*11*	*5*	*0*	*5*	*99*
Southern Tablelands (excl. Queanbeyan)	*77*	*200*	*6*	*572*	*7*	*2*	*130*	*22*	*13*	*64*	1,092	*59*	*25*	*6*	*585*	*102*	*68*	*16*	*39*	*899*
Lower South Coast	*4*	*81*	*6*	*0*	*445*	*118*	*34*	*0*	*0*	*29*	717	*5*	*0*	*69*	*49*	*9*	*0*	*0*	*8*	*139*
Snowy	*0*	*0*	*21*	*3*	*32*	*568*	*5*	*0*	*1*	*26*	656	*0*	*4*	*5*	*35*	*2*	*4*	*6*	*1*	*57*
Central Murrumbidgee	*28*	*43*	*5*	*82*	*36*	*9*	*3,005*	*169*	*245*	*29*	3,652	*39*	*72*	*12*	*789*	*787*	*86*	*387*	*211*	*2,382*
Albury	*0*	*6*	*0*	*15*	*0*	*0*	*195*	*0*	*303*	*32*	551	*14*	*244*	*0*	*397*	*416*	*17*	*96*	*52*	*1,236*
Upper Murray (excl. Albury)	*4*	*11*	*0*	*17*	*0*	*0*	*404*	*214*	*512*	*5*	1,166	*17*	*185*	*13*	*164*	*186*	*13*	*453*	*25*	*1,056*
ACT	19	0	150	175	25	33	57	21	0	0	481	10	5	7	671	43	54	32	59	879
Subtotal	5,733	1,471	335	945	579	734	3,981	443	1,122	461	15,803	203	559	111	6,273	1,786	629	999	555	11,114
	FREIGHT INBOUND TO THE STUDY AREA																			
Central West	119	54	3	127	1	10	131	4	26	29	504									
Ovens-Murray	3	0	0	5	0	13	62	285	211	5	584									
East Gippsland	0	0	3	0	412	11	2	0	0	7	434									
Sydney	2,168 *	677	140	336	113	63	960	242	115	1,141	5,955*									
Melbourne	92	22	20	102	24	12	918	363	161	64	1,778									
Bal. NSW	164	54	9	111	25	2	89	16	35	41	545									
Bal. VIC	33	7	0	7	5	0	261	53	270	16	652									
Bal. Aust	106	29	2	42	0	0	158	44	28	69	478									
Subtotal	2,686	842	176	730	580	109	2,581	1,007	847	1,371	10,930									

* Excludes 5 Mt of coal from Sydney to Wollongong, see text.

Source: ABS Freight Movements 2001 (9220.0)

6.1.2 Extrapolating the 2001 demand to 2009

The case study approach analyses freight movements on a sector by sector basis and therefore does not account for the entire freight demand across the study area. It is however important to assess the degree to which the case studies are indicative of current demand as at 2009.

A generalised estimate for 2009 freight demand is therefore derived by extrapolating the 2001 ABS freight movements' data to 2009, as follows:

- Applying an annual growth rate of 2.5% for movements between Sydney and the Illawarra, and within the Illawarra
- Applying an annual growth rate of 1.0% for movement to, from and within the remainder of the region
- Adjusting the freight volumes downwards to reflect the fact that around 5 Mtpa of coal movements from Sydney to the Illawarra by road have ceased since 2001.

Figure 33 below summarises the extrapolated headline freight demand estimates for 2009.

Figure 33 – Summary of freight tonnage for study area including ACT, 2009

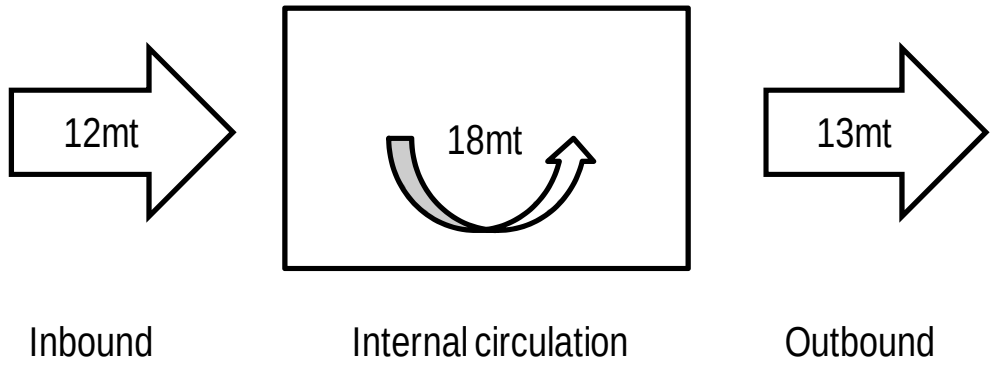
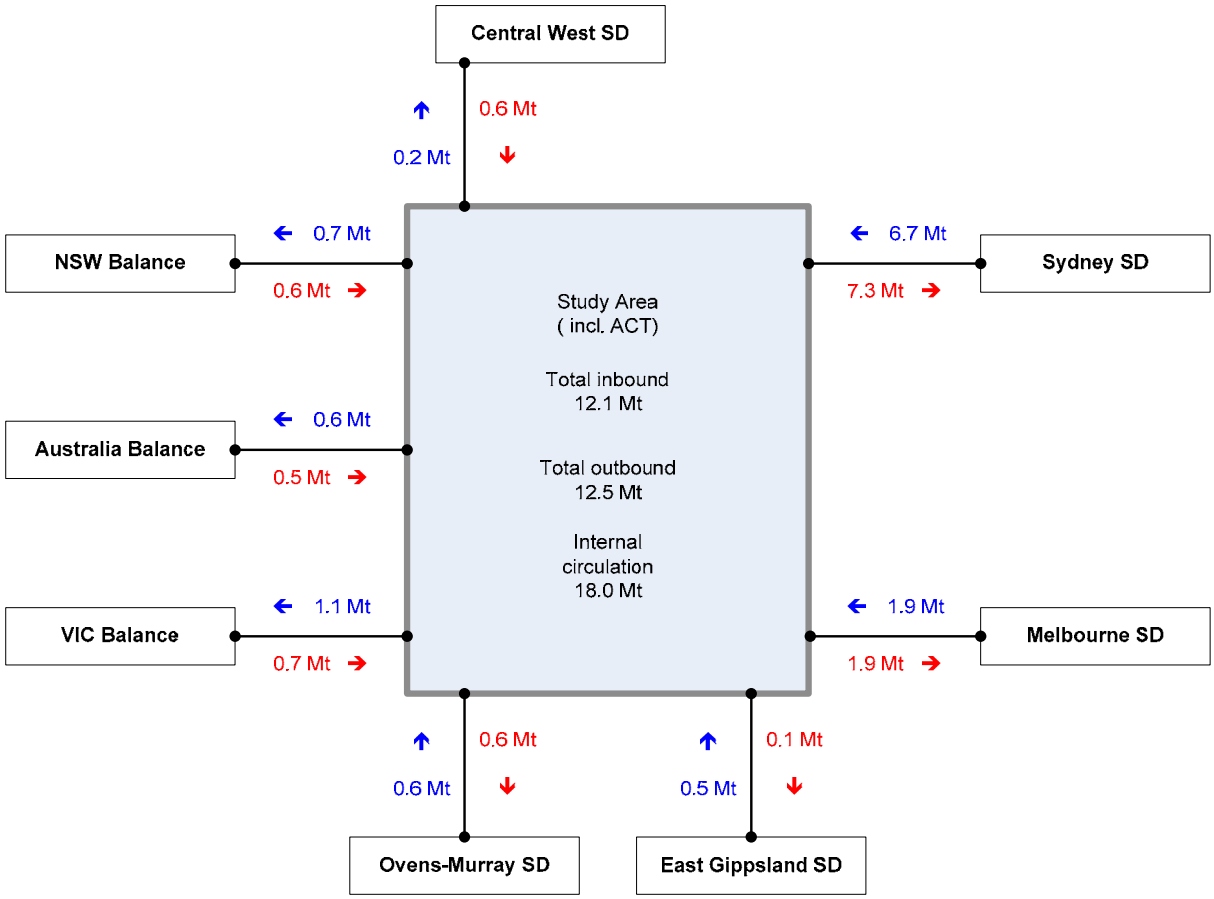


Figure 34 on page 58 summarises the 2009 estimates for volumes moving into, from and within the study area. Table 8 on page 59 shows the same estimates in more detail. The following points are drawn from the analysis.

- Of the just under 43 Mtpa of freight moving to, from and within the area, around 14mtpa (33%) relates Sydney as an origin or destination
- Around 8 Mtpa of freight moves within the immediate proximity of Wollongong and Illawarra, being around 19% of the tonnage in the study area
- Around 3 Mt of freight is within the Central Murrumbidgee area, focused on Tumut, ostensibly associated with the forestry industry.
- The remaining tonnage, being around 17 Mt is widely dispersed across the study area and the ACT.

Figure 34 – Estimate of tonnages to, from and within study area, 2009



Source: Sd+D based on forecasts from ABS Freight Movements 2001 (9220.0).

Note: The decrease Sydney SD to Study Area is due to the inclusion in 2001 of the movement of around 5 Mtpa of coal from the Sydney SD (from Campbelltown and Mt. Victoria) which is now known to have ceased.

Table 8 – ABS Freight Movements volumes for study area for 2001 extrapolated to 2009

Yr 2009 Projected ('000 tonnes) *Extrapolated from ABS FMS 2001 at 1.5%p.a.*	*Wollongong*	*Illawarra Bal*	*Queanbeyan*	*Southern Tablelands (excl. Queanbeyan)*	*Lower South Coast*	*Snowy*	*Central Murrumbidgee*	*Albury*	*Upper Murray (excl. Albury)*	*ACT*	*Subtotal*	*Central West*	*Ovens-Murray*	*East Gippsland*	*Sydney*	*Melbourne*	*Bal. NSW*	*Bal. VIC*	*Bal Aust*	*Subtotal*
	INTERNAL CIRCULATION OF FREIGHT WITHIN STUDY AREA											FREIGHT OUTBOUND FROM THE STUDY AREA								
Wollongong	*6,625*	*314*	*1*	*28*	*0*	*0*	*96*	*0*	*1*	*88*	*7,155*	*51*	*3*	*0*	*3,539*	*208*	*349*	*0*	*115*	*4,265*
Illawarra Statistical Division Bal	*198*	*1,056*	*0*	*54*	*36*	*4*	*61*	*18*	*51*	*48*	*1,525*	*12*	*25*	*0*	*734*	*42*	*63*	*11*	*53*	*940*
Queanbeyan	*1*	*6*	*157*	*6*	*2*	*0*	*6*	*0*	*0*	*162*	*340*	*2*	*0*	*0*	*82*	*12*	*6*	*0*	*6*	*107*
Southern Tablelands (excl. Queanbeyan)	*83*	*217*	*7*	*619*	*8*	*2*	*141*	*23*	*14*	*69*	*1,182*	*64*	*27*	*6*	*633*	*110*	*74*	*17*	*42*	*974*
Lower South Coast	*5*	*88*	*7*	*0*	*481*	*128*	*37*	*0*	*0*	*31*	*776*	*5*	*0*	*74*	*53*	*10*	*0*	*0*	*8*	*151*
Snowy	*0*	*0*	*22*	*3*	*35*	*615*	*5*	*0*	*1*	*29*	*710*	*0*	*4*	*6*	*38*	*2*	*4*	*6*	*1*	*62*
Central Murrumbidgee	*31*	*47*	*6*	*88*	*38*	*10*	*3,254*	*183*	*265*	*32*	*3,955*	*42*	*78*	*13*	*854*	*852*	*93*	*419*	*228*	*2,580*
Albury	*0*	*6*	*0*	*17*	*0*	*0*	*211*	*0*	*328*	*35*	*597*	*15*	*264*	*0*	*430*	*451*	*18*	*104*	*56*	*1,338*
Upper Murray (excl. Albury)	*4*	*12*	*0*	*19*	*0*	*0*	*437*	*232*	*554*	*5*	*1,263*	*18*	*200*	*14*	*177*	*202*	*14*	*490*	*27*	*1,143*
ACT	*21*	*0*	*163*	*190*	*27*	*36*	*62*	*23*	*0*	*0*	*521*	*10*	*5*	*7*	*727*	*46*	*58*	*34*	*63*	*952*
Subtotal	6,968	1,746	363	1,023	627	795	4,310	479	1,214	499	*18,024*	219	605	120	7,268	1,934	681	1,082	600	12,510
	FREIGHT INBOUND TO THE STUDY AREA																			
Central West	129	58	3	137	1	10	142	5	28	31	546									
Ovens-Murray	3	0	0	6	0	14	67	308	229	6	632									
East Gippsland	0	0	3	0	447	11	2	0	0	8	470									
Sydney	2,642	733	151	364	122	68	1,040	262	125	1,236	6,742									
Melbourne	100	23	22	110	27	13	994	393	174	69	1,926									
Bal. NSW	178	58	9	120	27	2	97	17	37	45	590									
Bal. VIC	35	7	0	8	5	0	283	57	293	17	706									
Bal. Aust	115	31	2	46	0	0	171	48	31	74	517									
Subtotal	3,202	912	190	791	628	118	2,795	1,090	917	1,485	12,129									

Source: Sd+D based on forecasts from ABS Freight Movements 2001 (9220.0).

6.1 The case study approach (bottom-up view)

6.1.1 Assessment of the major freight generating / attracting industries

The case study approach, or the bottom-up view, involves an assessment of the major freight generating / attracting industries in the study area. In order to make this assessment, Sd+D primarily draws on knowledge it has acquired in undertaking other studies in the region. In addition to this, the information presented in Section 2 which provides an overview of the region is useful in identifying drivers of freight demand in the area. Finally, the area is well known to many as a tourist destination and also as a result of its proximity to the major centres of Sydney, Melbourne and Canberra.

The following industries represent the major freight generating / attracting industries in the study area and form the subject of the case studies and supply chain analysis reported later in Sections 7 to 19:

- Wholesale and retail activities
- Bulk liquid storage and distribution (predominantly fuel)
- Forestry plantation and timber and paper manufacturing
- Coal, mining and export
- Grain exports
- Horticulture and commercial fishing
- Dairy production and processing
- Steel products
- Production of starches and ethanol from grain.
- Quarry products
- Motor vehicle imports
- Tourism and
- Other uses of Port Kembla port.

Having identified these industries, the case study process involves desktop research on each industry and consultation with key industry players including site visits. An understanding of how each industry operates in the study area as well as mapping the various supply chains is garnered first-hand. This undertaking is truly valuable in gaining an insight into what is actually happening 'on the ground', in terms of:

- what freight is being moved and why,
- from which origin to which destination,
- the quantity of freight that is being moved,
- the frequency and configuration of freight movements, and
- the corridors travelled.

This approach provides irrefutable data from the ground up *(or the bottom-up)*, and is very powerful in elucidating freight demand in the study area, particularly with regard to supply chains being driven by factors other than transport efficiencies.

6.1.2 Unexplained demand and gap analysis

The case study approach, whilst invaluable, is not all-encompassing. It is simply not possible to capture entire industries. It is for this reason that uplift factors are required to adjust each sector. In each case, an assessment is made as to the extent of the industry captured via the case study process. Based on this

and all other known information about the industry in question, an uplift factor is applied to the total derived freight task in terms of tonnes – in order to account for the unknown freight task pertaining to that industry.

Section 20.3 on page 142, Accounting for unexplained demand in the base case, provides further detail on this process including the uplift factors applied to each case study. It is here that the extrapolated ABS freight movements data from the top-down approach provides a useful yardstick in providing confidence as to the comprehensiveness of the case study work in arriving at the 2009 Base Case for the freight task in the study area.

6.1.3 Freight forecasts and corridor / section analysis

Having arrived at the base case for 2009, the network segmentation into 43 distinct road sections allows tonnages and trips for each origin-destination pairing to be applied to the road network in the study area; as described above in Section 5.2 – Network adopted for study analysis. The base case data is depicted graphically for each corridor / feeder grouping in Section 20.6 – Segment analysis.

Freight forecasts are then calculated out to years 2021 and 2031 quantifying implications for the network in the future, with the results shown in Section 21 – Economic forecasts. This process involves the application of relevant growth rates to the base case numbers for each industry sector independently. In deciding these, the consideration of three causal factors has been undertaken:

- Sectors where production capacity limits exist and further growth will be constrained into the future.
- Sectors where growth is driven by population growth in the study area, or the wider Australian population.
- Other factors specific to the industry.

In addition to the application of the relevant compound annual growth rates, sensitivity analysis has been applied on a high-low scenario basis. The results of this sensitivity analysis are dealt with in Section 22 – Freight Demand – The Future Case.

7. CASE STUDY – CONSUMER GOODS

7.1 Overview of the sector

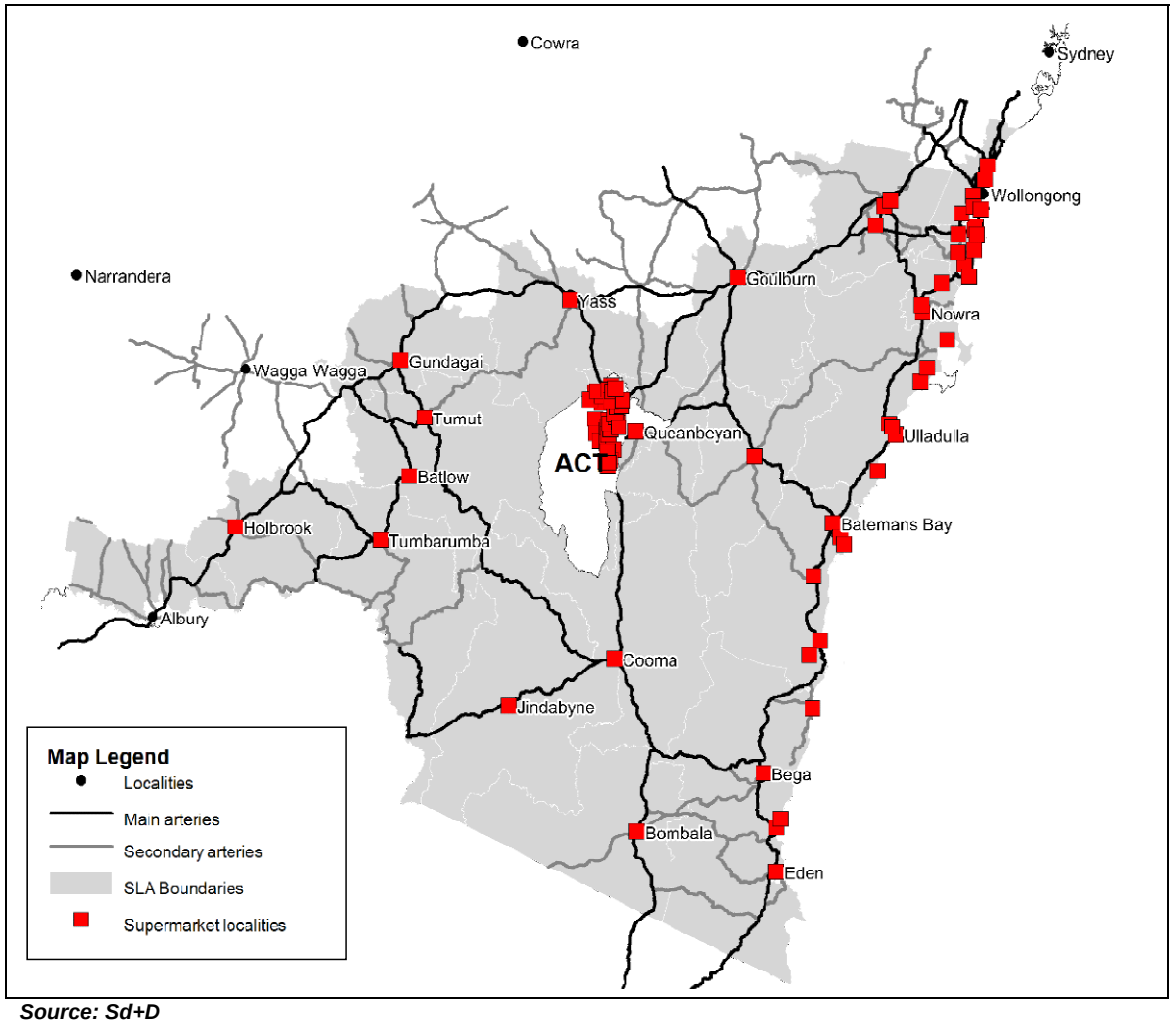
This case study provides an overview of the supply chains operating to distribute food and other consumer goods into the study area. Food distribution dominates the sector and is the focus of this case study. Volumes and transport flows relating to the distribution of merchandised goods (clothing, footwear, etc) and convenience foods are also relevant and can be assumed to mimic the patterns for food distribution.

The end markets can also be assessed in terms of the size and distribution of population patterns.

Figure 35 shows the major store locations within the study area and Figure 36 on page 63 provides a generic framework of the supply chain serving this sector.

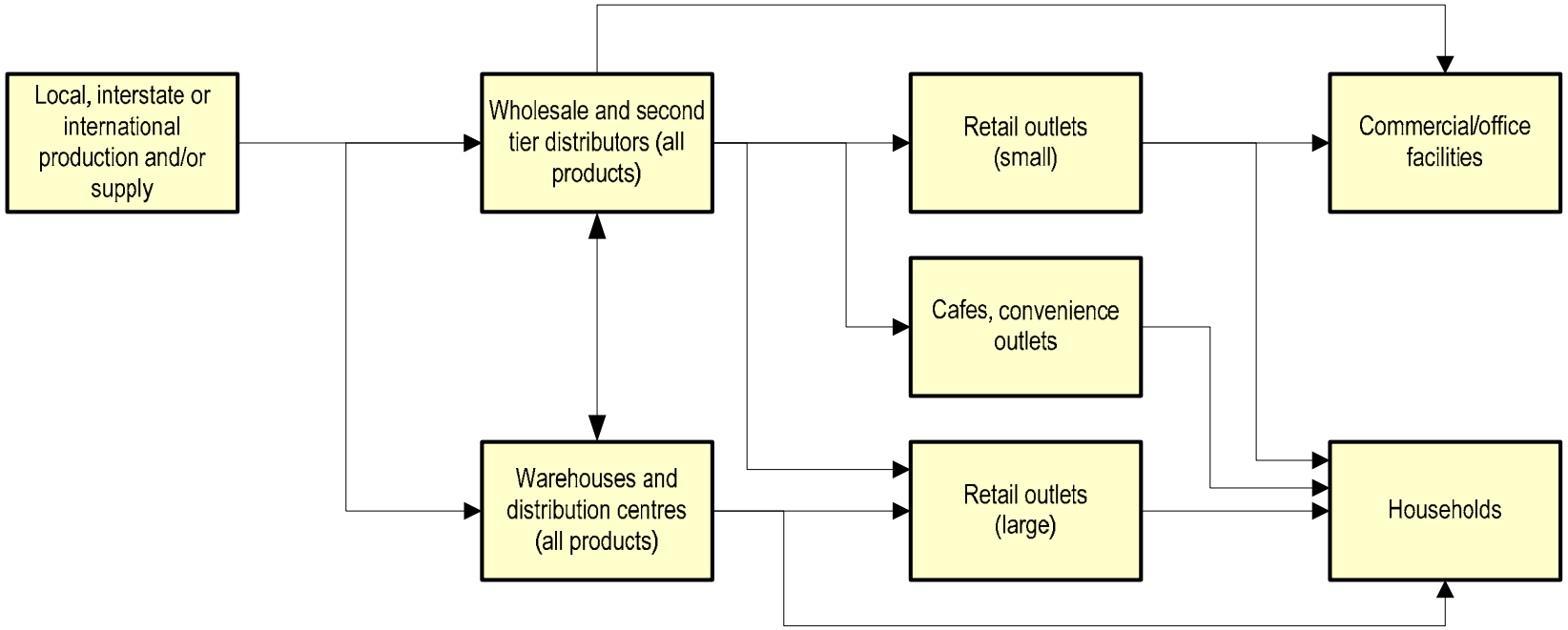
The supply chain characteristics have changed significantly over the last 25 years, with the sector largely leading efficiency reforms and comparative benchmarks for outsourcing to third party logistics providers. The number of retailers has largely consolidated to the dominant three of Woolworths, Coles Supermarkets and Metcash/IGA Group. Aldi also has a presence in the study area with around 20 stores in total including within the ACT. The remainder of the sector is made up of small proprietors and convenience store operators serviced through a myriad of small and difficult-to-measure supply chains.

Figure 35 – Major grocery retail stores



Source: Sd+D

Figure 36 – Typical supply chain – groceries and consumer goods



Changes in the grocery sector have been driven by distinct supply chain strategies, being:

- Centralisation of store deliveries at regional distribution centres (RDCs) rather than the high level of direct store deliveries that occurred in the past when, typically, fresh products (vegetables, seafood, etc), bakery, and chilled products were direct store delivered.
- Different management strategies of inventory into fast and slow moving goods, with transport and storage arrangements varying to optimise stock rotation and minimise stock redundancy
- The reduction of costly "back of shop" storage areas, in favour of larger retail space; more frequent just-in-time deliveries are occurring, which has also reduced the value of inventory within the chain
- Transition to "store-ready" packaging and presentation, to necessitate a faster flow of product from store back-dock to shelf; greater awareness of reverse logistics with recyclable product bins has been a desirable development
- The advent of "factory-gate pricing" where the retailer takes ownership of the products at the vendor's gate, rather than requiring the vendor to deliver to the retailers distribution centre.

Retailers manage their sales, inventory and transport information with a high degree of confidentiality.

The pattern of consumption of foods and related consumer products can be assumed to be reasonably uniform across Australia, and regularly measured through the National Accounts. Primary economic data can be correlated with industry transport benchmarks to arrive at reasonable estimate for freight demand.

The analysis in this case study therefore adopts a top-down approach using macro data based on population distribution and mature estimates for household consumption, which is then compared with "bottom-up" data by analysing the spatial analyses of store locations and service frequency. This analysis has been discussed with the key retailers and a number of key assumptions have been validated.

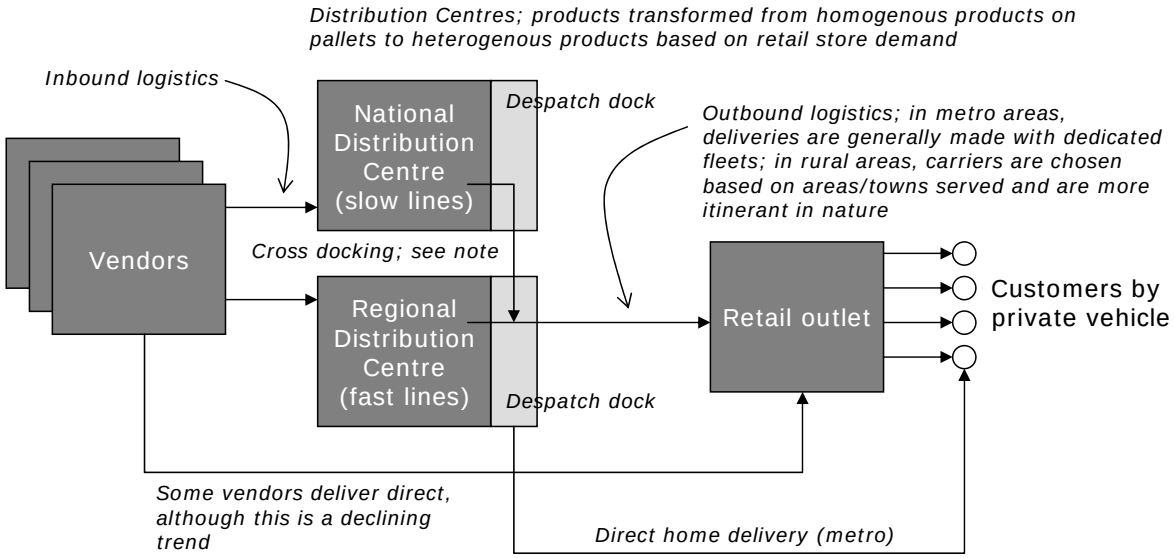
7.2 Supply chain structure – groceries and consumer goods

The generic structure of the food and grocery supply chain comprises the supply vendors and inbound logistics, the Distribution Centres, the outbound logistics, and the retail outlets. With the growth in demand over the last 25 years, distribution centre managers are demarking their inventories into fast and slow moving product lines, based on product velocity (being a function of stock turn, unit-cubic volume, product characteristics, shelf life, and intrinsic value). Slower lines are centralised to optimise inventory working capital, whereas faster lines are decentralised to avoid "out-of-stock" situations at the store.

Supply chain structures have changed with the trend for abolition of state-based warehouses, with the exception of Perth. Historically, product was manufactured and "pushed" to state warehouses, and upon receipt of a purchase order from the retailer, goods were then sent to the local RDC. Today, manufacturers/vendors typically have a single warehouse adjacent to their manufacturing facility and make interstate direct RDC deliveries.

Figure 37 presents the emerging supply chain structure and elements for food and grocery distribution.

Figure 37 – Detail of chain structure – groceries and consumer goods



Cross docking
Orders for slow moving lines, (e.g. once per week) are despatched to the RDC for cross docking and consolidation with fast moving lines (e.g. 2-4 times per week)

7.3 Freight flows and volumes – groceries and consumer goods

Freight flows within the food and grocery sector must be considered as:

- primary flows for the movement from the vendor/manufacturer to the retailer's distribution centre, and
- secondary freight, outbound from the distribution centre to the retail outlet.

The following data sources and assumptions are used to estimate end market demand and the freight task:

- The selected food and groceries retail industry groups for the purpose of this analysis consist of food, household goods, clothes, footwear and personal accessory, department stores, other retailing and cafes, restaurants and takeaway food services.
- National retail turnover of the food and groceries sector (2006-07) – $206 billion
- Population (2006-07) – 20.7million (Australia) and about 1.0million (study area)
- Total number of households (2006-07) – 7.1million (Australia) and 0.3million (study area)
- $ / tonne conversion using market rates (2009) – $2,500 / tonne for food, $5,000 / tonne for household goods and other retailing as well as café, restaurants and takeaway food services and $10,000 / tonne for the remainder.
- Assume that the rate of food and groceries consumption is constant and independent of location

Table 9 below shows the results of the top down demand analysis.

Table 9 – Freight movements – groceries and consumer goods, 2007

Retail turnover, By industry group (2006-07 data)	*Food retailing*	*Household goods retailing*	*Clothing, footwear and personal accessory retailing*	*Department stores*	*Other retailing*	*Cafes, restaurants and takeaway food services*	*Total*
Australia							
2006-2007 turnover ($mil)	$79,098	$39,837	$17,159	$17,254	$27,757	$25,262	$206,367
Population (million)	20.7	20.7	20.7	20.7	20.7	20.7	20.7
Households (million)	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Working weeks	50	50	50	50	50	50	50
Working days	250	250	250	250	250	250	250
Per capita							
Annual	$3,821	$1,924	$829	$833	$1,341	$1,220	$9,969
Weekly	$76	$38	$17	$17	$27	$24	$199
Per households							
Annual	$11,072	$5,576	$2,402	$2,415	$3,885	$3,536	$28,886
Weekly	$221	$112	$48	$48	$78	$71	$578
Demand							
$/tonne (market rates)	$2,500	$5,000	$10,000	$10,000	$5,000	$5,000	-
Annual tonnes total task (Mt)	31.6	8.0	1.7	1.7	5.6	5.1	53.7
Annual tonnes per person	1.5	0.4	0.1	0.1	0.3	0.2	2.6
Weekly kg per household	88.6	22.3	4.8	4.8	15.5	14.1	150.2
Study area							
Population (million)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Households (million)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Annual volume (Mt)	1.5	0.4	0.1	0.1	0.3	0.2	2.5
Annual movements ('000s)	53.3	13.4	2.9	2.9	9.4	8.5	90.5
Average truck load	28	28	28	28	28	28	28
Daily movements	213	54	12	12	37	34	362

Source: ABS (2009) Australian economic indicators Cat. No. 1350.0, Sd+D

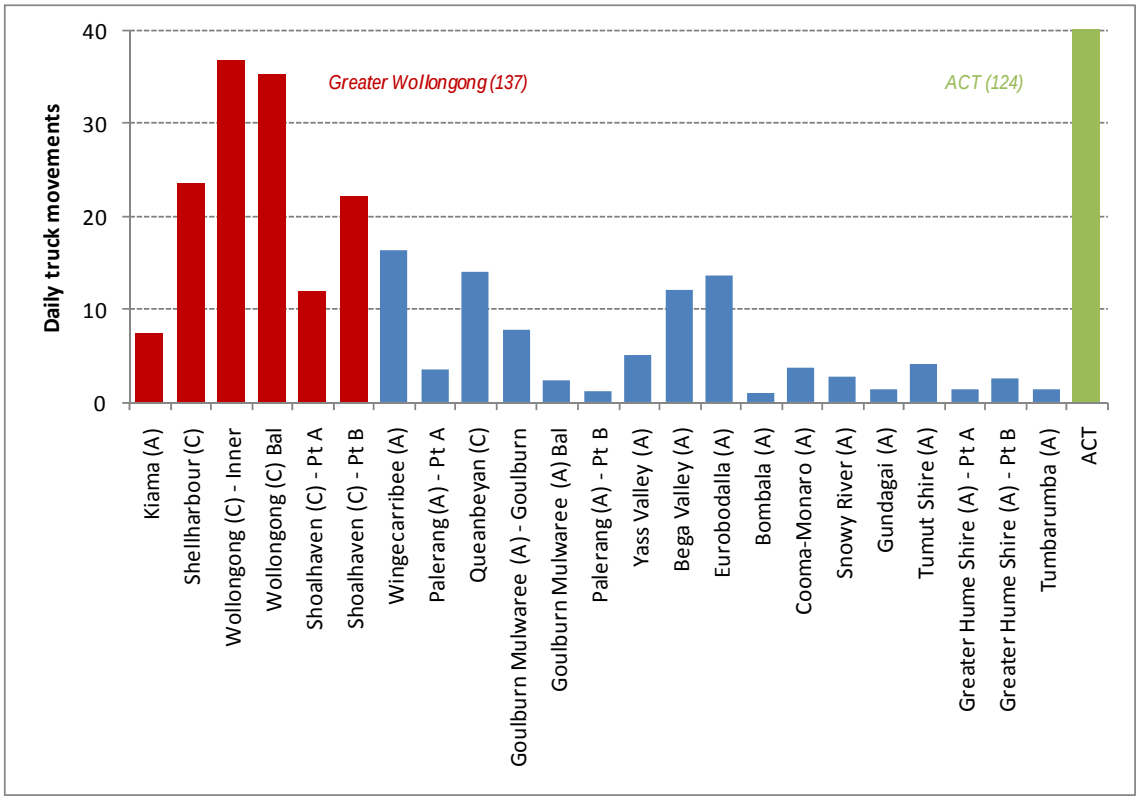
The estimated total demand for food and grocery products in the study region is 2.5 Mt and generates around 91,000 truck movements per annum, or 362 trucks per day. Placed in a broader context, the region handles almost 5% of the national food and groceries task (53.7Mt).

The analysis results also highlighted a number of useful metrics as follows:

- In Australia, an average person consumes 2.6tonne per annum or spends about $200 a week on food and groceries with food contributing to more than 60% of this total (1.5Mt).
- Proportionally, an average household of about 3 people consumes 150.2kg or $578 a week equating to $292 in food (groceries and eating out), $112 in household goods and $174 on consumables such as clothing/footwear, personal accessories, shopping and others.

Reflecting on the top down analysis by SLA, ACT and the Greater Wollongong area appears to be the node of greatest concentration of truck movements in the region. Figure 38 shows the range of daily truck movements through each of the SLAs in the study area. Note that the same input and assumptions used above (working days, truck utilisation, etc…) also applies at the SLA level.

Figure 38 – Daily truck movements – groceries and consumer goods, 2007



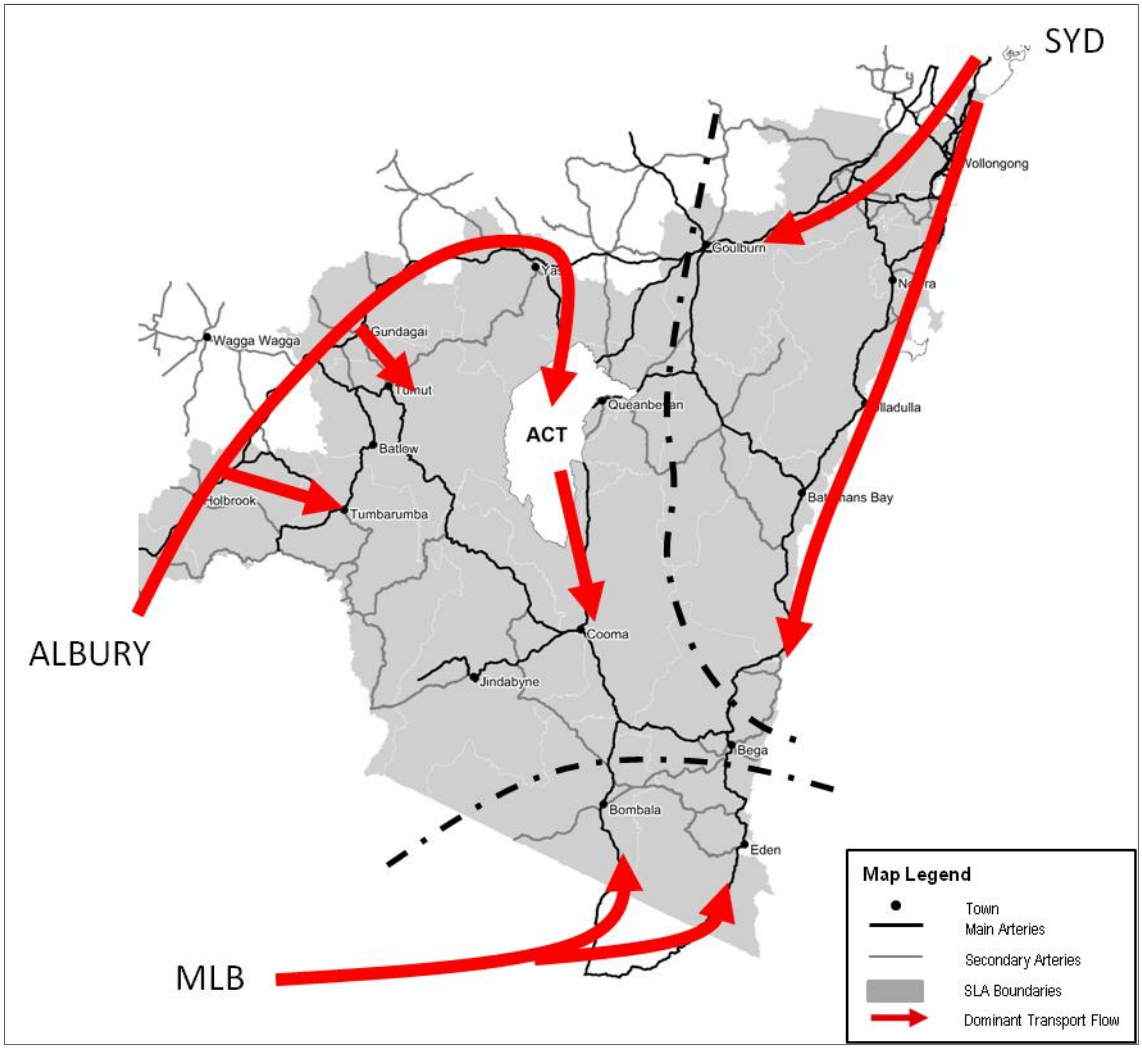
Source: ABS (2009) National regional profiles Cat. No. 1379.0, Sd+D

As expected, similar distribution trends (i.e. concentration around ACT and Wollongong) is observed for population, households, freight volume moved and annual truck movements but differs somewhat in scale.

Analysis of the secondary flows for the three main retailers, Woolworths, Coles and Metcash/IGA indicates similar approaches to their secondary distributions strategies and areas serviced. Limitations to the extensive distribution network of supermarkets include the direct deliveries of bread and milk which is sourced locally. For Coles and IGA, meat, frozen goods and chips are also delivered separate to ambient goods.

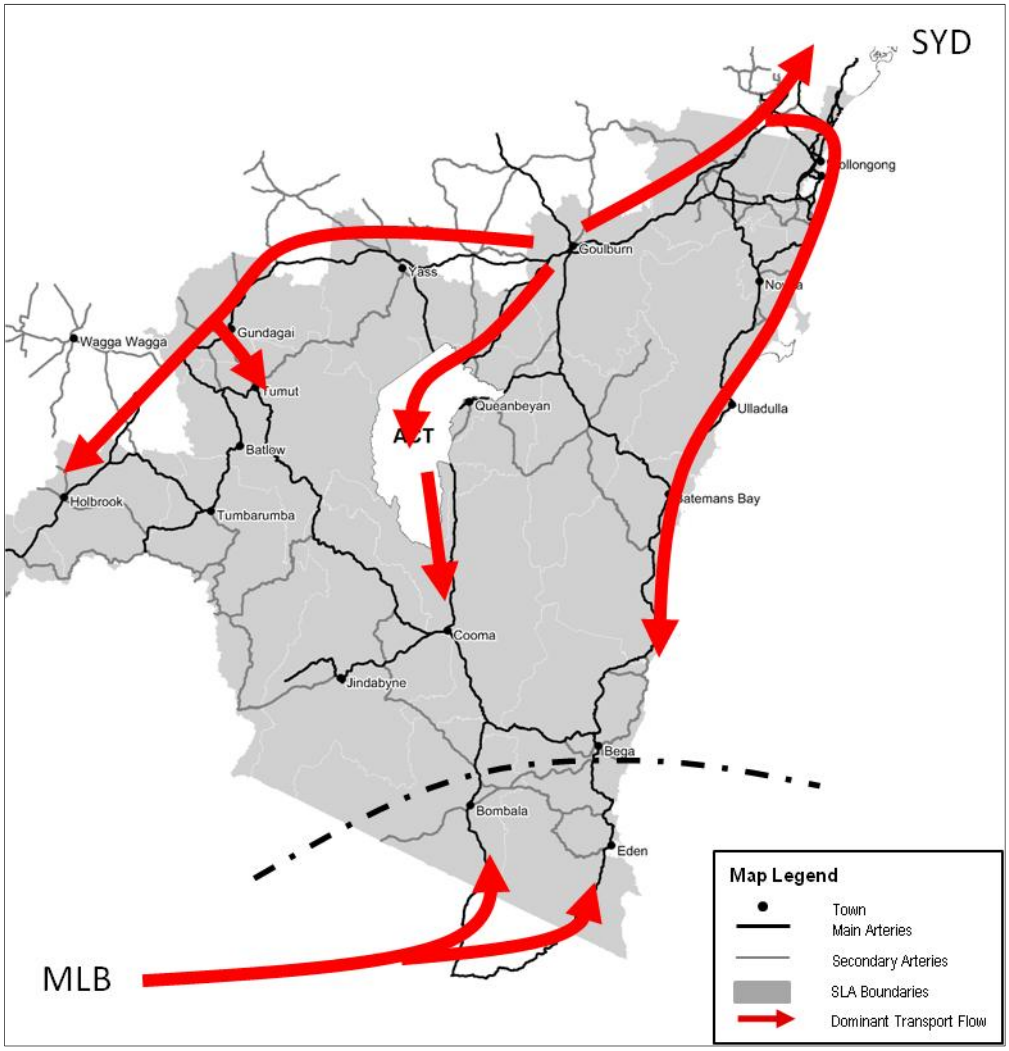
Figure 39 below shows the nominal distribution patterns for secondary freight movements to retail outlets along or near to the corridor for Woolworths, from their facilities in Sydney, Melbourne, Adelaide and Wodonga.

Figure 39 – Woolworths demand and distribution pattern (nominal)



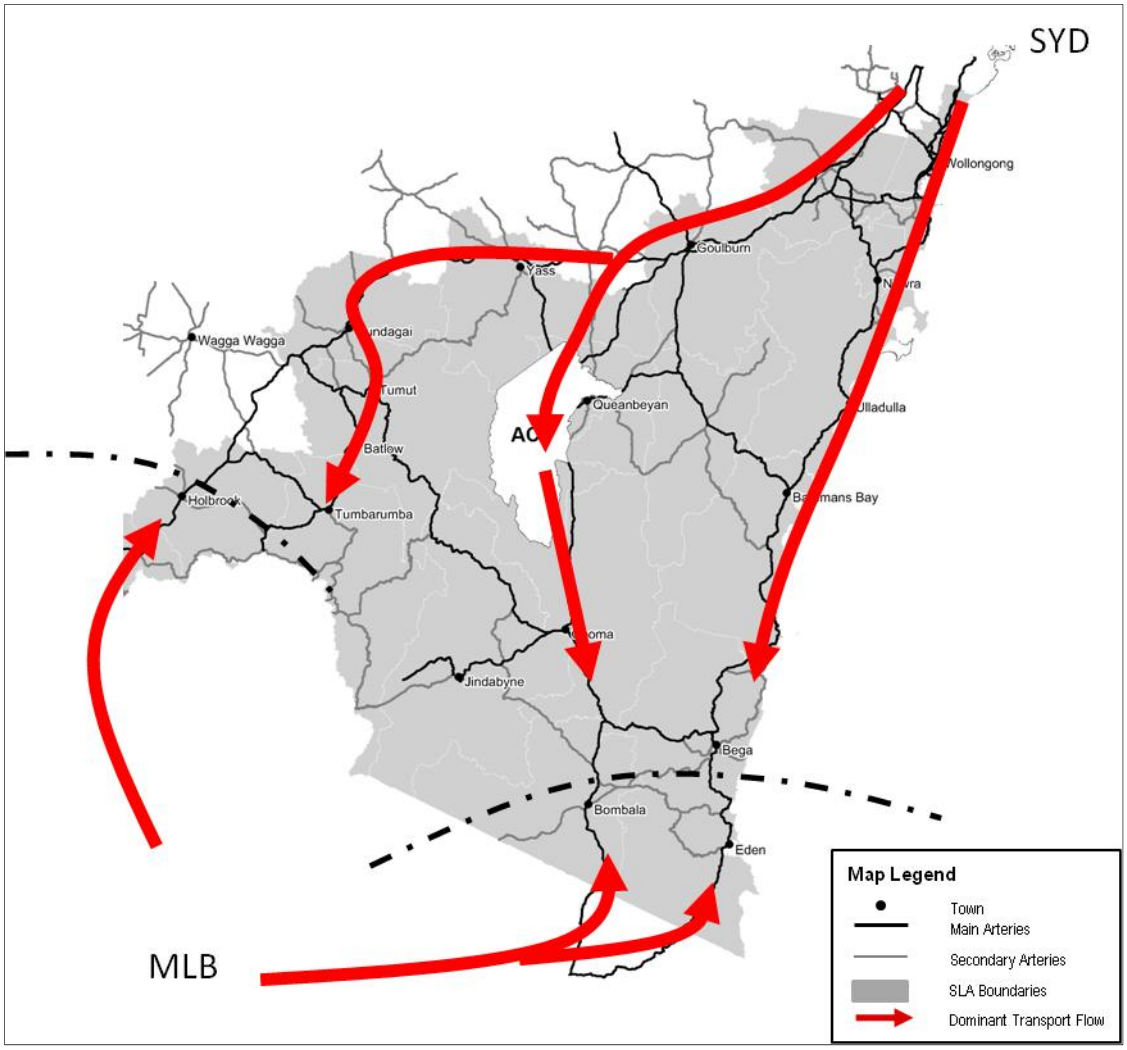
Coles has RDCs at Smithfield, Gosford and Goulburn in NSW, Hampden Park in Melbourne, and in Adelaide (see Figure 40). Presently, there are plans to establish a RDC in the Albury/Wodonga area and the Coles distribution model will mimic Woolworths in 12-18 months time.

Figure 40 – Coles/Bi-Lo demand and distribution patterns (nominal)



Metcash has RDCs at Blacktown and Silverwater in Sydney, Laverton in Victoria and Kidman Park in Adelaide as shown in Figure 41 on page 70.

Figure 41 – Metcash/IGA demand and distribution patterns (nominal)



7.4 Industry and stakeholder perspectives

Distribution patterns for grocery and related consumer products closely align with the distribution of population, and for the study region, demand is more heavily concentrated along the coastal fringe. Consumer preferences and retail management practices typically require more frequent delivery cycles and the need for larger vehicles such a B-Doubles is generally minimal. Moreover, semi-trailers undertake more than one delivery to the smaller regional centres.

The most significant issue remains access to retail centres for large vehicles. All retailers have expressed a strong commitment to safety and the need for adequate road corridors to accommodate their trucks.

7.5 Implications for South Eastern NSW road network

Grocery delivery patters typically follow the major highway corridors from Sydney, Melbourne and Canberra. While most of the corridors in the study region are considered adequate, a number of roads are not considered adequate for efficient delivery operations.

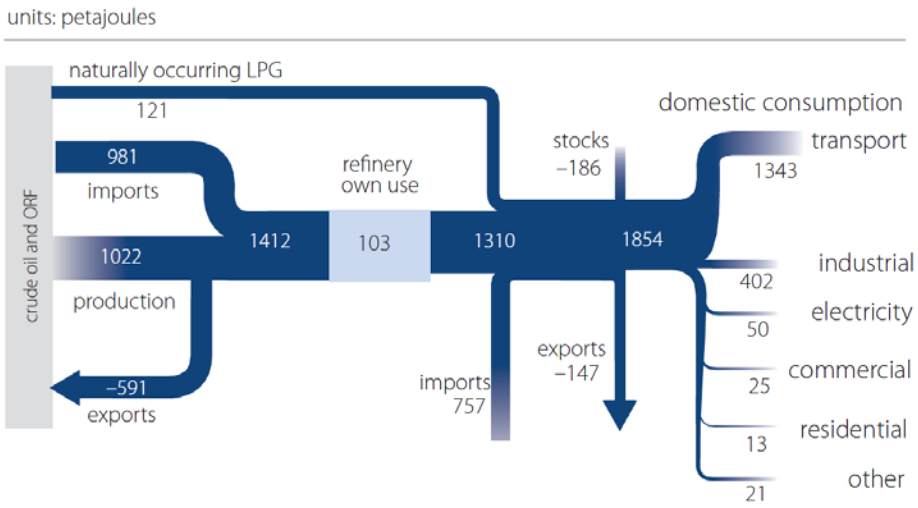
Connectivity and surety of access are critical for the distribution of grocery and consumer goods, more so than being able to accommodate larger vehicles.

8. CASE STUDY – FUEL DISTRIBUTION

8.1 Overview of the fuel sector

The production and distribution of fuel products in Australia relates to the supply of energy to the transport, industrial, electricity, commercial and residential markets, with transport accounting for around 70% of total Australian refinery output[5].

Figure 42 – Australian oil and LPG flows, 2006-7

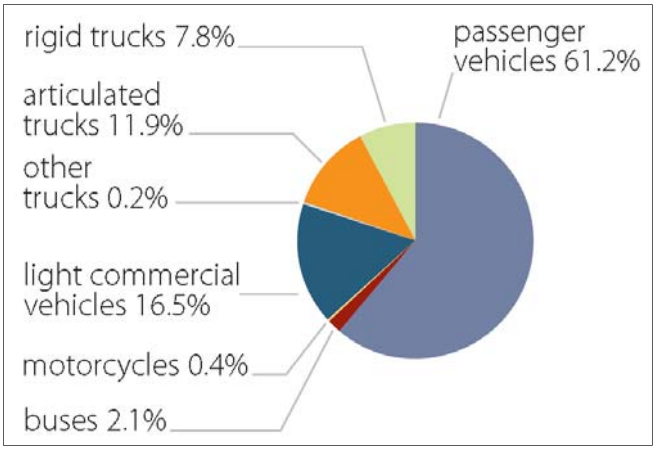


Source: ABARE (2009) Energy in Australia 2009

Nationally, energy consumption in the transport sector is dominated by road transport, totalling more than 1 million petajoules per annum (2006-7), or 75% of the energy supplied to the transport sector. The balance relates to energy consumed for rail, air and sea transport.

For road transport, 20% of Australian fuel consumption is attributed to heavy vehicles (rigid and articulated) and 36% with the addition of LCVs. Figure 43 summarises the breakdown of road transport by vehicle types.

Figure 43 – Australian road fuel consumption by vehicle type, 2005-6



Source: ABARE (2009) Energy in Australia 2009 and Apelbaum Consulting Group, Australian Transport Facts

[5] ABARE; Energy in Australia 2009

Transport in the study area of south eastern NSW is almost exclusively associated with road transport, with:

- Rail refuelling points located outside the study area
- Regional airports exist inside the study area however are relatively small
- Fuel for water transport in the region is associated with naval operations and fishing fleets.

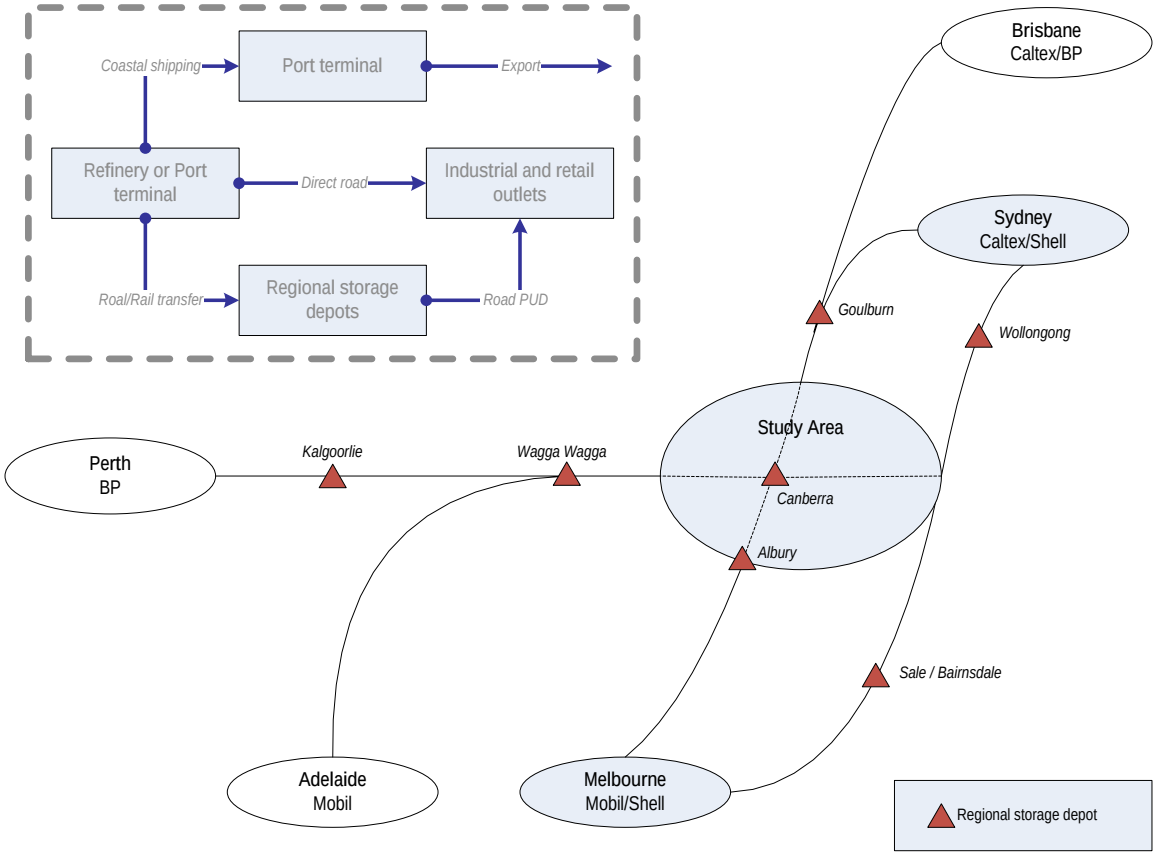
8.2 Supply chain structure – fuel distribution

The structure of the fuel supply chain has changed markedly over the last decade, with a transition to refinery gate supply and pricing, and the outsourcing of transport to third party logistics operators and distributors, many of whom are located in regional areas.

This change in the transactional arrangements has tended to fragment the logistics task across many operators. Moreover, the competitive nature of the industry as a whole and of regional distributors means that access to quantitative data for demand and supply is problematic.

Figure 44 below illustrates the generic fuel supply chain (inset) and the simplified fuel distribution network to/through the study region. Note that this figure is not to scale and logistics pattern may be subject to seasonal variations.

Figure 44 – Generic supply chain and distribution network – fuel distribution



Source: Caltex, Cootes Transport, Sd+D

Historically, considerable volumes of fuel were transported to regional storage locations in NSW by rail however a lack of investment in rail technology and the high cost of double handling product through the regional terminals has seen a substantial decline in the share undertaken by rail. In the study region, a rail terminal was operated at Canberra for supply to the immediate market however increasingly, supply to retail and industrial customers is from refineries in Sydney and Melbourne.

8.3 Supply and demand of the regional fuel task

Regional data of fuel consumption in the study area is not publicly available, and not provided by fuel companies on a "small area" basis[6]. Estimates however can be derived by assessing the level of motor vehicle registration and use and proportioning against state-level demand estimates to provide reasonable estimates of demand in the study area.

Bearing in mind the aggregated nature of state-level demand, the following economic indicators including the ACT (sourced from the Australian Bureau of Statistics, National Regional Profile, 2002 to 2006) are utilised to derive the study region's fuel task:

- Population: 959,000[7] (14% of NSW)
- Number of registered motor vehicles: 638,000 (15% of NSW)
- Number of businesses: 72,000 (11% of NSW).

These factors suggest that the study region is responsible for approximately 10-15% of the state's pool of supply and demand economic drivers and consequently fuel consumption.

8.4 Freight flows and volumes – fuel distribution

In 2007, fuel consumption in NSW from all sources (including coal) amounted to 1,512 PJ of which 421 PJ (28%) are crude oil sources[8] relevant for transport and industrial activities of the region. Conversion[9] estimates corresponds 421PJ to about 12 billion litres or 9.1million tonnes.

Table 10 on page 74 shows the comparative state-wide and regional consumption of fuel by industry type. Overall, the key observations of fuel demand in the region are listed below and highlighted in Figure 45.

- An assumption is made that the percentage share of businesses and motor vehicles in the study area is 10%-15% relative to the state and therefore the same proportion is allocated to fuel demand.
- Automotive gasoline (unleaded petrol) and diesel are the most commonly consumed fuel source in the region with about 50% and 36% of the total volume respectively. Other sources included in the analysis are LPG, fuel oil and lubricants and grease occupying the balance (14%).
- Division I, transport and storage, accounts for 80% of the regional fuel demand of which the road transport task hold the vast majority with about 5% attributed to water transport (may includes Navy and tugboats movements noted along Eden-Batemans Bay area).
- Division A (agriculture, forestry and fishing) and Division B (mining) report almost exclusive use of diesel fuel consumptions in their sectors while LPG consumption is dominated by Division C (manufacturing).

[6] Data collection surveys from ABARE (2009) use the term "included in total' to mean activities recorded but has been made confidential via aggregation at a higher level.

[7] Population figures from the Australian Bureau of Statistics, National Regional Profile, 2002 to 2006 have been used in this case study to ensure consistency with the number of registered motor vehicles and the number of businesses, also sourced from that dataset.

[8] Fuel sources in included in the analysis are (i) automotive gasoline-unleaded, (ii) automotive diesel oil, (iii) LPG, (iv) fuel oil and (v) and Lubricants and greases.

[9] Energy content conversion between volume, specific volume and weight varies depending on fuel type but typically range (i) 26.5-40.8MJ/L, (ii) 1,050-1,866L/t or (iii) 42.9-49.4GJ/t.

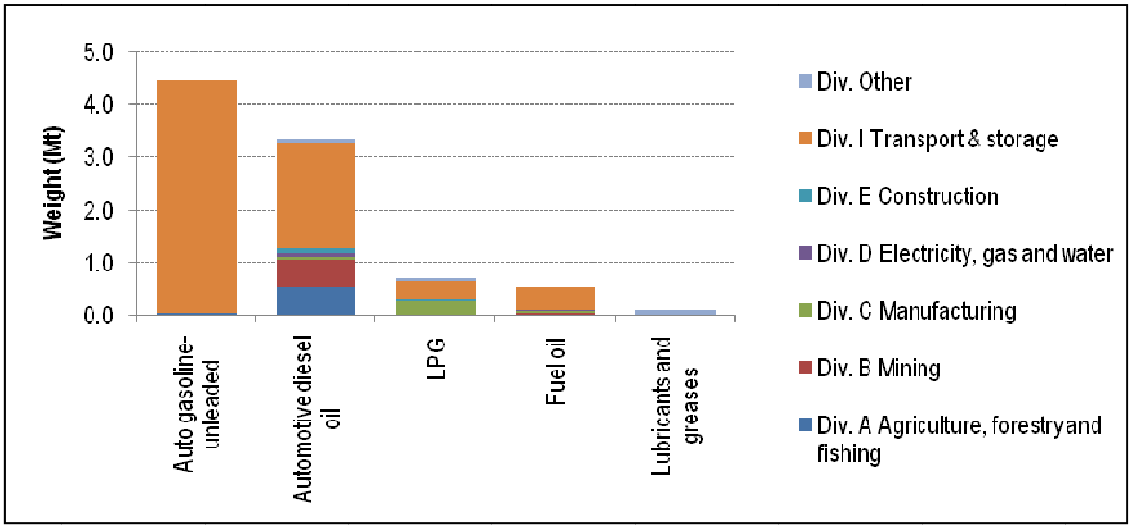
Table 11 summarises the region further by establishing the basis for fuel consumption by each SLA and Figure 45 summarises the total regional demand.

Table 10 – Fuel consumption in NSW for key industries, 2009

Industry Divisions	*NSW consumption (Mt)*						*Study area consumption (Mt)*						*% share*	
	Auto gasoline-unleaded	Automotive diesel oil	LPG	Fuel oil	Lubricants and greases	Subtotal	Auto gasoline-unleaded	Automotive diesel oil	LPG	Fuel oil	Lubricants and greases	Subtotal	% of businesses in study area relative to NSW	% of vehicles in study area relative to NSW
Div. A Agriculture, forestry and fishing	0.0	0.5	0.0	-	-	0.6	0.0	0.1	0.0	-	-	0.1	12%	-
Div. B Mining	-	0.5	0.0	0.0	-	0.6	-	0.0	0.0	0.0	-	0.0	9%	-
Div. C Manufacturing	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	10%	-
Div. D Electricity, gas and water	0.0	0.1	0.0	0.0	-	0.1	0.0	0.0	0.0	0.0	-	0.0	10%	-
Div. E Construction	0.0	0.1	0.0	0.0	-	0.1	0.0	0.0	0.0	0.0	-	0.0	13%	-
Div. I Transport & storage	4.4	2.0	0.3	0.4	0.0	7.2	0.4	0.2	0.0	0.0	0.0	0.7	10%	-
Div. Other	-	0.1	0.1	0.0	0.1	0.2	-	0.0	0.0	0.0	0.0	0.0	10%	-
Total	*4.5*	*3.3*	*0.7*	*0.5*	*0.1*	*9.1*	*0.4*	*0.3*	*0.1*	*0.1*	*0.0*	*0.9*	*11%*	*15%*

Source: ABARE (2009) Energy in Australia 2009

Figure 45 – Study region fuel demand, 2009



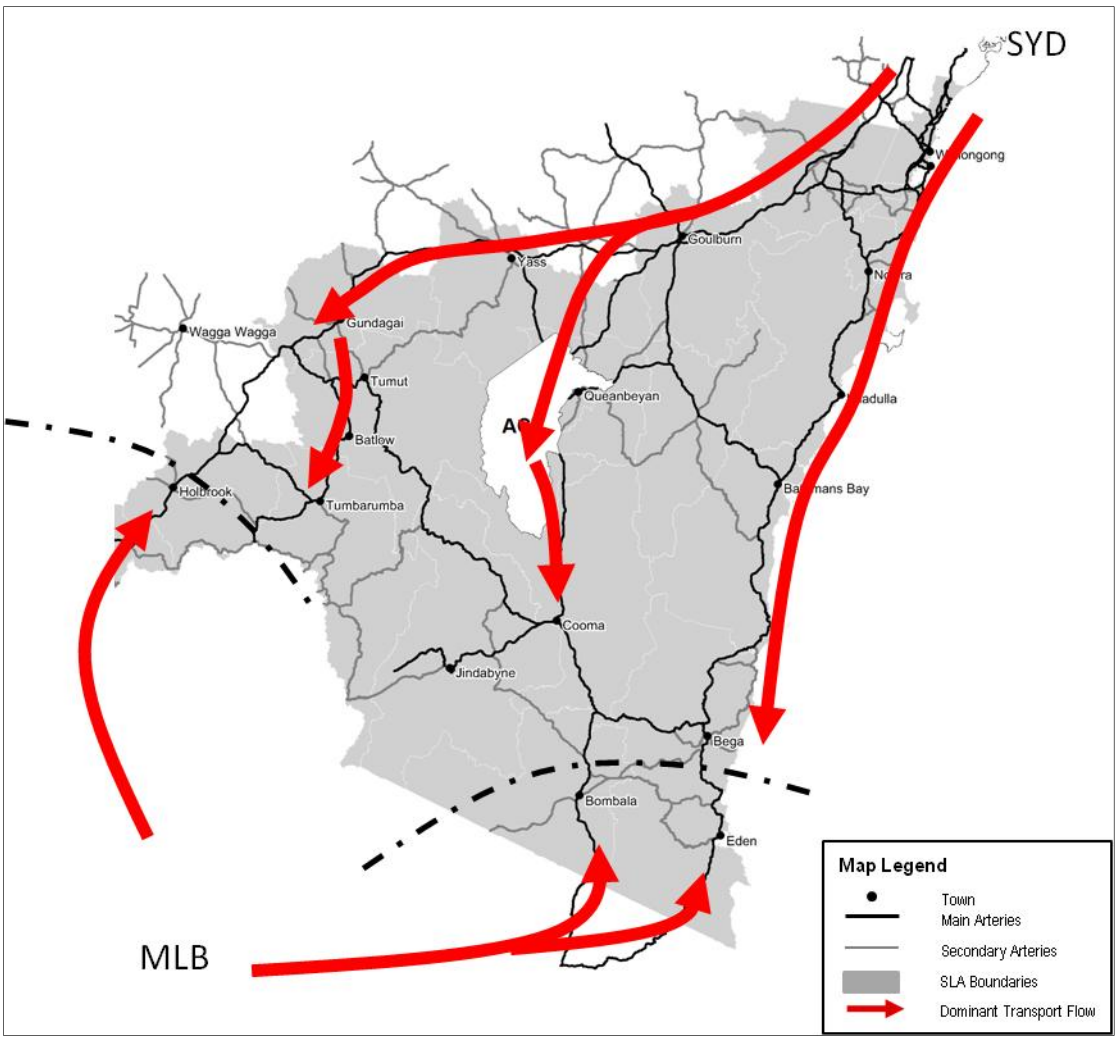
Source: ABARE (2009) Energy in Australia 2009, SD+D

Table 11 – SLA fuel consumption contribution (2006)

State / SD	*SLA*	*Population ('000s)*	*Motor vehicles ('000s)*	*Industries ('000s)*	*Fuel consumption ('000 tonnes)*
Illawarra	Kiama (A)	20	14	2	19
	Shellharbour (C)	63	40	3	57
	Wollongong (C) – Inner	99	56	7	78
	Wollongong (C) Bal	95	57	5	80
	Shoalhaven (C) – Pt A	32	24	2	33
	Shoalhaven (C) – Pt B	60	41	4	58
	Wingecarribee (A)	44	33	5	46
South Eastern	Palerang (A) – Pt A	10	6	1	8
	Queanbeyan (C)	38	28	2	39
	Goulburn Mulwaree (A) – Goulburn	21	16	2	22
	Goulburn Mulwaree (A) Bal	6	4	1	6
	Palerang (A) – Pt B	3	3	1	4
	Yass Valley (A)	14	10	2	14
	Bega Valley (A)	32	23	3	33
	Eurobodalla (A)	37	27	3	37
	Bombala (A)	3	2	0	3
	Cooma-Monaro (A)	10	7	1	10
	Snowy River (A)	8	6	1	8
Murrumbidgee	Gundagai (A)	4	3	0	4
	Tumut Shire (A)	11	9	1	12
Murray	Greater Hume Shire (A) – Pt A	4	3	0	4
	Greater Hume Shire (A) – Pt B	7	5	1	7
	Tumbarumba (A)	4	3	0	4
ACT		334	221	24	311
Study Region	Subtotal (excluding ACT)	625	417	48	587
	Subtotal (including ACT)	959	638	72	898
	Study area % of NSW	14%	15%	11%	10%
NSW	Total NSW	6,817	4,227	672	9,133

Source: ABARE, Energy in Australia 2009 and ABS NRP regional profiles Cat. No. 1379.0

Figure 46 – Freight flows for fuel distribution



8.5 Implications for South Eastern NSW road network

Generally, Melbourne supplies Eden volume along the Princes Highway while Sydney supplies Tumut along the Hume Highway.

The distribution activity fort fuel products is aligned with the population patterns and consequently supply from Sydney and Melbourne follows the main corridors of Hume and Princes Highway. There is little requirement for east-west distribution patterns.

8.6 Conclusion

Fuel demand is linked to population and industrial growth and is considered to have relatively low growth forecasts over time in the study region.

9. CASE STUDY – FORESTRY, TIMBER AND PAPER

9.1 Overview of the forestry, timber and paper sector

Forests form a sustainable resource base for industries that employ a significant number of people across Australia, particularly in rural and regional areas. Ensuring these industries remain vibrant and strong in a continually evolving global economy is a priority clearly stated by the Australian Government[10].

Contributing to 0.6% of GDP annually, the national reserve of wood products is extensive with almost 20% of the country classified as forests. According to latest statistics from DAFF (2009), there are 147.4 million hectares of native and 1.97 million hectares of plantation forest in Australia. Of this total, 48% of the plantations are hardwood (mainly eucalypts, including Eucalyptus and Corymbia species) and 52% are softwood (mainly pine species).

The primary purpose of plantation forestry is wood production. Plantations also contribute to a range of environmental values and services, including water quality improvement, dryland salinity mitigation, carbon sequestration and habitation for native animals and plants.

Australia's plantations currently produce about two-thirds of the logs harvested in Australia each year yet comprise only a little over 1% of the forest area. These, together with logs harvested from native forests and imported material, are used to manufacture the 21 million cubic metres of timber products consumed in Australia each year[10].

Looking towards the future, the potential supply of softwood plantation sawlogs and pulpwood is forecast to remain fairly stable over the period to 2050 while hardwood sawlog supply from plantations is estimated to rise slowly to 2030 then stabilise at a low level or even decline to 2050. The potential log supply from hardwood plantations will rise rapidly in the next few years because the large areas established from the mid-1990s will be reaching rotation age. The vast majority of those plantations are managed to produce pulpwood for pulp and paper manufacturing.

One of the key indicators of domestic demand for structural wood products, housing commencements, fell by 17 per cent in 2008-09, which affected wood-based panel consumption and production in Australia.

This case study has been informed by the timely release of an update of earlier timber haulage studies, released Dec-2009.[11]

9.2 Plantations

Geographically, the National Plantation Inventory (NPI) identifies the study area as comprising three NPI regions:

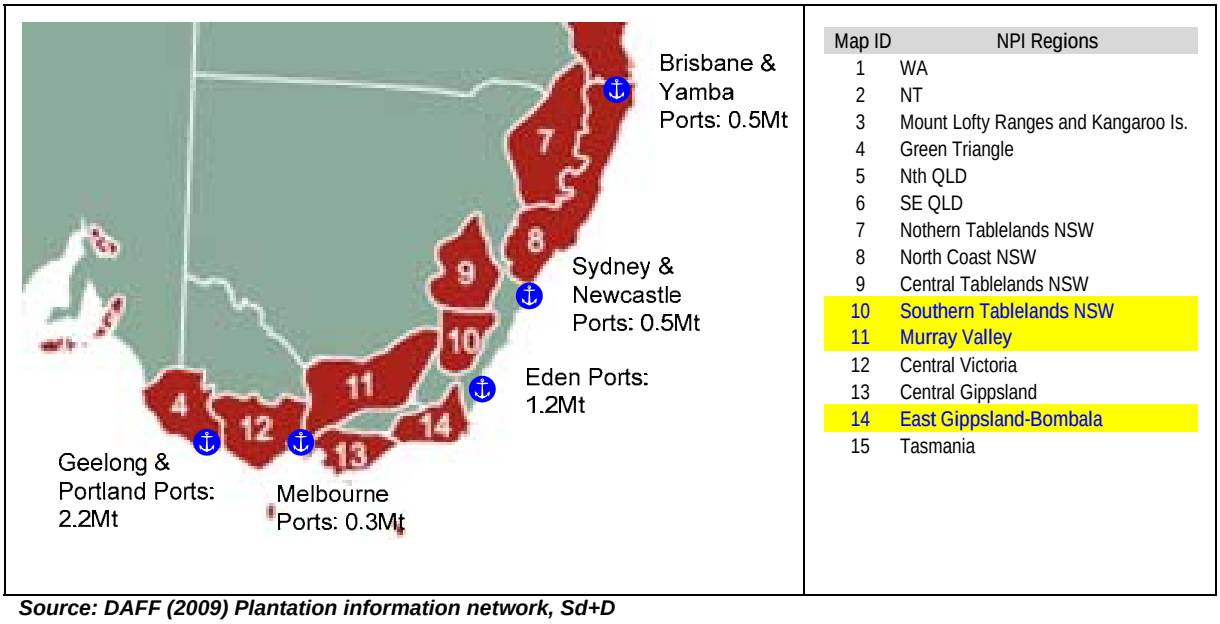
- Southern Tablelands NSW (incl. Moss Vale, Batemans Bay) – 22,000 Ha of which 98% is softwood
- Murray Valley (incl. Tumut, Tumbarumba, Vic. forest) – 195,000 Ha of which 96% is softwood
- East Gippsland-Bombala (incl. Bombala, Eden, Vic. forest) – 47,000 Ha of which 90% is softwood.

[10] DAFF (2009) Australia's forests at a glance 2009, forward by The Hon. Tony Burke MP, Minister for Agriculture, Fisheries and Forestry

[11] Professional Engineering Services Pty Ltd, *TIMBER Industry Haulage Study for the South West Slopes of New South Wales, 2009 update of 2001 Study for Softwoods Working Group*, prepared for Softwoods Working Group associated road authorities: RTA, Gundagai, Greater Hume, Tumbarumba and Tumut Shire Councils and Forests NSW, December 2009.

Figure 47 below, shows the spatial placement of plantation areas and their ports of call along the eastern seaboard.

Figure 47 – Major plantation areas and adjacent ports



Source: DAFF (2009) Plantation information network, Sd+D

Generally, the concentration of hardwood production is located near Eden (and along the southern corridor up to Batemans Bay) while softwood is processed across a broader area through Tumut, Tumbarumba, Wagga Wagga, Albury and out to Bombala.

9.3 The export trade task – forestry, timber and paper

The global financial crisis has resulted in a downturn in demand and subsequent fall in global trade of forest products, affecting the volume of Australia's imports and exports.

In 2008-09, the value of Australia's forest product exports fell by 5.2 per cent to $2.3 billion while imports increased by 1.1 per cent to $4.5 billion[12]. Despite the fall in the import volume of sawnwood (20%), wood-based panels (15%) and paper and paperboard (10%), the trade deficit remains.

Lower demand from Japanese paper producers, the largest market for Australia's woodchip exports, contributed to the fall in export volumes. This was partly offset by higher woodchip export prices, a rise in the import unit value of paper as well as a large jump in the value of imports of miscellaneous forest products.

Despite changing demand patterns, woodchip remains the dominant product exported through Australian ports as shown in Table 52 in Section 23.2 of the Appendices – Supplementary case studies data.

Nationally, Australia exported 12 Mt with the Port of Eden representing around 10% of the national volume. Most of the chip from SEFE chip mill at Port of Eden is exported to Japan as SEFE is a joint venture operation with a Japanese organisation however over the last eight months the market for woodchip in Japan has halved and China has picked up some of the slack.

Chip exports from pulpwood out of the native forests are predicted to remain steady.

[12] Abare (2009) Australian forest and wood products statistics

Figure 48 – Logs from Bombala, for export to China and Korea through port of Eden

Source: Industry & Investment NSW, Photo by Jason Molkentin.

9.4 Forestry products – timber and paper

The output from forestry plantations in used as input for timber milling and paper production both within and outside the region. Figure 49 on page 80 highlights the main timber processing locations in the study region.

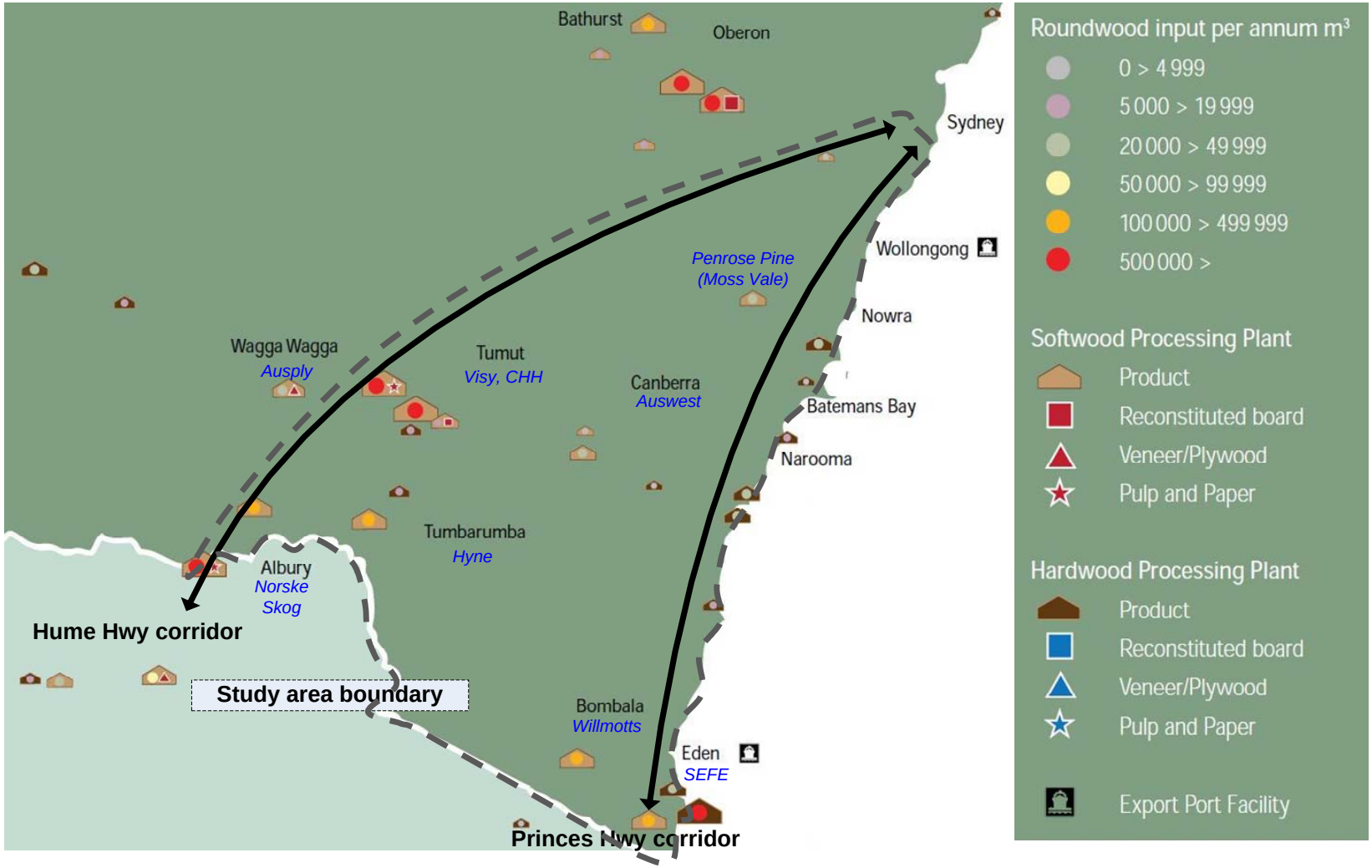
Table 12 below, summarises the key processing firms by products type.

Table 12 – Main forestry processors in NSW

Manufacture area	*Customer*	*Products / Services*
Plywood	Ausply, Big River Timbers, Carter Holt Harvey (CHH)	Plywood flooring & stairs, structural bracing, formply (concrete construction) and external cladding
Major softwood sawmillers	Auswest, CHH, Colenden, Dale & Mayers, Highland Pine, Hyne & Sons, Penrose Pine, Tarmac and Wilmott Forest Products	Structural softwood timber for dwelling construction and renovation markets, internal joinery, furniture timbers, landscape timbers, treated softwood poles and treated decking
MDF and particleboard	CHH and Monsbent	Medium density flooring and particleboard products such as flooring, cabinets, bench tops and furniture
Softwood preservation	Pacpine, Penrose Pine and Wilmott Timbers	Treated timber for outdoor applications such as decks, pergolas and landscape timbers
Pulp and paper	Midway, Sawmillers Export Pty. Ltd., Norske Skog, Pentarch, Queensland Commodity Exports, South East Fibre Exports and Visy	Newsprint, writing paper, cardboard, tissues and paper towels
Major hardwood sawmillers	Australian Solar Timbers, Big River Timbers, Blue Ridge Hardwoods, Boral, Coffs Harbour Hardwoods, Davis & Herbert, Gunnedah Timbers, Grants Holdings, Gulpa Sawmill, Hurfords, ITC Timber, Koppers, Notaras J & Sons and Thora	Kiln dried and green structural timber, strip flooring, furniture and joinery timber, bridge and engineering timber products, power poles, plywood products and external cladding decking

Source: Forests NSW (2009) Annual Report 2008-09, Sd+D

Figure 49 – Forestry freight demand points within the study region



Source: Forests NSW (2009) Annual Report 2008-09, Sd+D

9.5 Supply chain structure – forestry, timber and paper

The supply chain structure for forestry, timber and paper products needs to be considered in two segments, namely, the primary flows for plantation inbound to processing centres such as timber mills and paper manufacturing plants, and the secondary flow outbound from these processing centres.

Figure 50 on page 82, shows the chain structure relevant to the study area.

Key points regarding the forestry supply chain are as follows:

- Harvesting machines put logs on trucks which are transported to the mills. Most sawn timber is used for housing. Mill waste is converted to pulp logs to produce paper.
- Plantation harvesting occurs all year. The area of the forest harvested may change but the truck route to the mill will remain largely unchanged.
- The vast majority of plantation extraction is of the softwood species accounting for 5.43 Mt or 92% of total.
- Hardwood is predominantly grown (and subsequently processed) in the Batemans Bay and Eden region with some activities also noted in Tumut / Tumbarumba.
- About 5.9Mt of sawlogs, pulp and paper and woodchips is moved through the region's transport network to reach export or domestic (mill) markets.
- Of this total, 2.17 Mt (37%) is associated with paper production by Visy and Norske Skog. The remaining balance of 3.73 Mt (63%) is brought in as sawlogs for timber production or woodchips for export purpose. CHH, Hyne, Ausply, Willmotts are identified as the main players involved in timber while Port of Eden serves as the primary gateway for export in the region (approx. 1.17 Mt of forestry products moved in 2008-09).
- Downstream of the mills, finished paper (54%) and structural timber (46%) aggregating to a total production of 1.57 Mt is distributed to Sydney, Melbourne or some other end market.

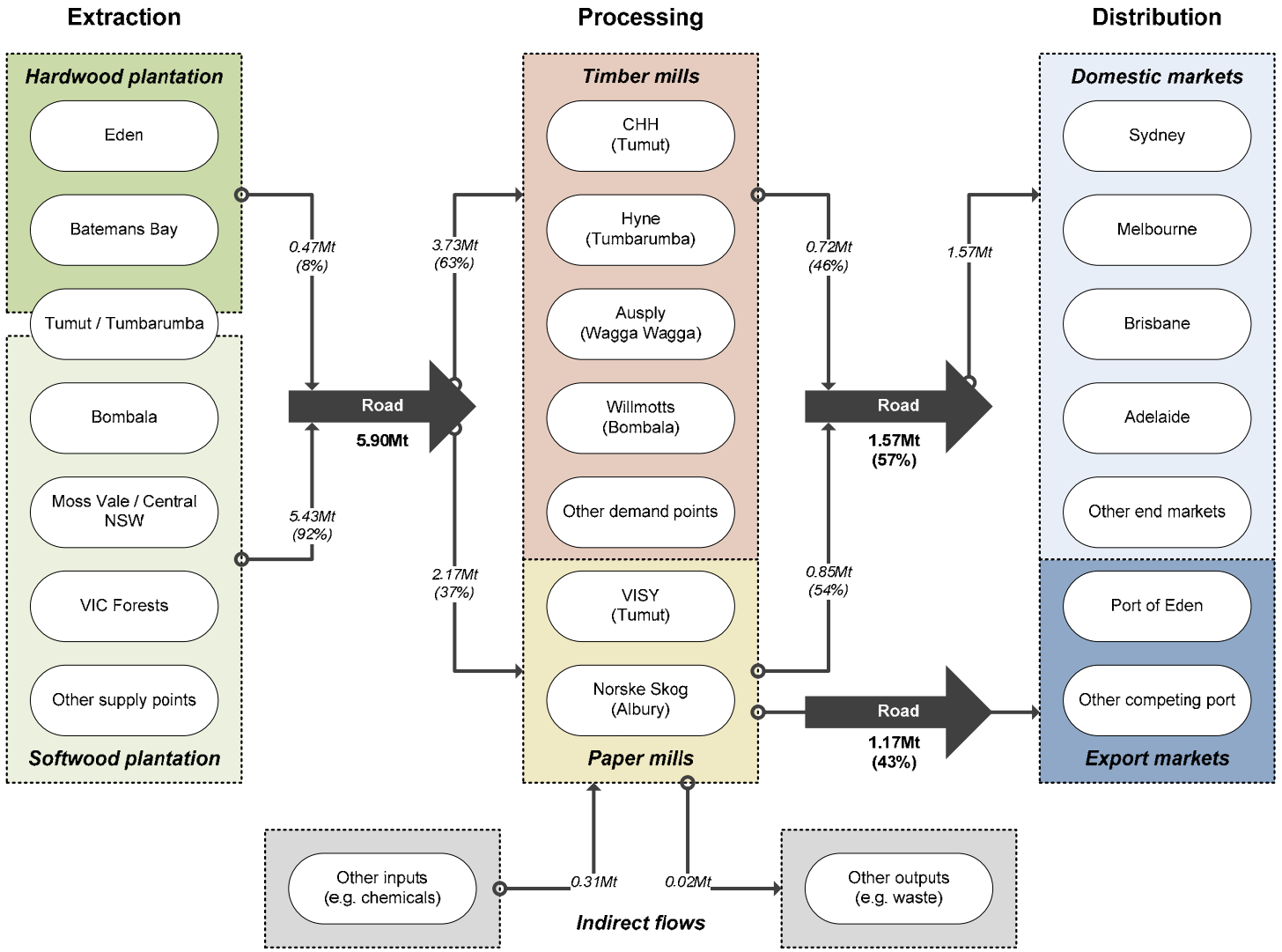
Also included in the following pages are volume estimates for primary and secondary flows by key node / location shown in:

- Table 13 – Source of timber flows to mills, 2009
- Table 14 – Destination of secondary flows – timber and paper, 2009

The key transport movements for the primary and secondary flows shown in:

- Figure 51 – Transport routes for logs to mills and export
- Figure 52 – Outbound flows from mills.

Figure 50 – Supply chain of the forestry sector



Source: PES (2009) Timber industry haulage study for the south west slopes of NSW, industry consultation, Sd+D.

Table 13 – Source of timber flows to mills, 2009

Timber source	*Annual volume to mill ('000 tonnes)*										
	Visy Tumut	*CHH Tumut*	*Hyne Tumbarumba*	*Ausply Wagga W agga*	*Norske Skog Albury*	*Willmotts Bombala*	*Port of Eden Eden*	*Other demand points*	*Subtotal Hardwood*	*Subtotal Softwood*	*Total*
Sawlogs / pulplogs / woodchips											
ex. Eden area	0	0	0	0	0	0	240	35	250	25	*275*
ex. Bombala	120	20	0	0	0	100	340	80	0	660	*660*
ex. Tumut / Tumbarumba	638	648	705	60	130	0	30	0	65	2,145	*2,210*
ex. Moss Vale / Central NSW	0	0	0	0	0	0	20	0	0	20	*20*
ex. Batemans Bay	0	0	0	0	0	0	60	90	150	0	*150*
ex. Vic. forests	0	0	150	0	0	0	280	0	0	430	*430*
ex. Other / unknown	1,356	0	0	0	280	0	200	0	0	1,836	*1,836*
Total sawlogs / pulplogs / woodchips	2,113	668	855	60	410	100	1,170	205	465	5,116	*5,581*
Other inputs	290	25	0	0	0	0	0	0	0	315	*315*
Total inbound	*2,403*	*693*	*855*	*60*	*410*	*100*	*1,170*	*205*	*465*	*5,430*	*5,895*

Source: PES (2009) Timber industry haulage study for the south west slopes of NSW, industry consultation, Sd+D.

Table 14 – Destination of secondary flows – timber and paper, 2009

Product destination	*Annual volume from mill ('000 tonnes)*								
	Visy Tumut	*CHH Tumut*	*Hyne Tumbarumba*	*Ausply Wagga Wagga*	*Norske Skog Albury*	*Willmotts Bombala*	*Port of Eden Eden*	*Other demand points*	*Total*
Structural timber / paper	700	396	299	30	150	0	0	0	*1,574*
to Sydney		115		N/A	N/A				*115*
to Melbourne		111		N/A	N/A				*111*
to Brisbane		36		N/A	N/A				*36*
to other		135		N/A	N/A				*135*
Other outputs (waste)	24	0	0	0	0	0	0	0	*24*
Total outbound	*724*	*396*	*299*	*30*	*150*	*0*	*0*	*0*	*1,599*

Source: PES (2009) Timber industry haulage study for the south west slopes of NSW, industry consultation, Sd+D.

Figure 51 – Transport routes for logs to mills and export – forestry, timber and paper

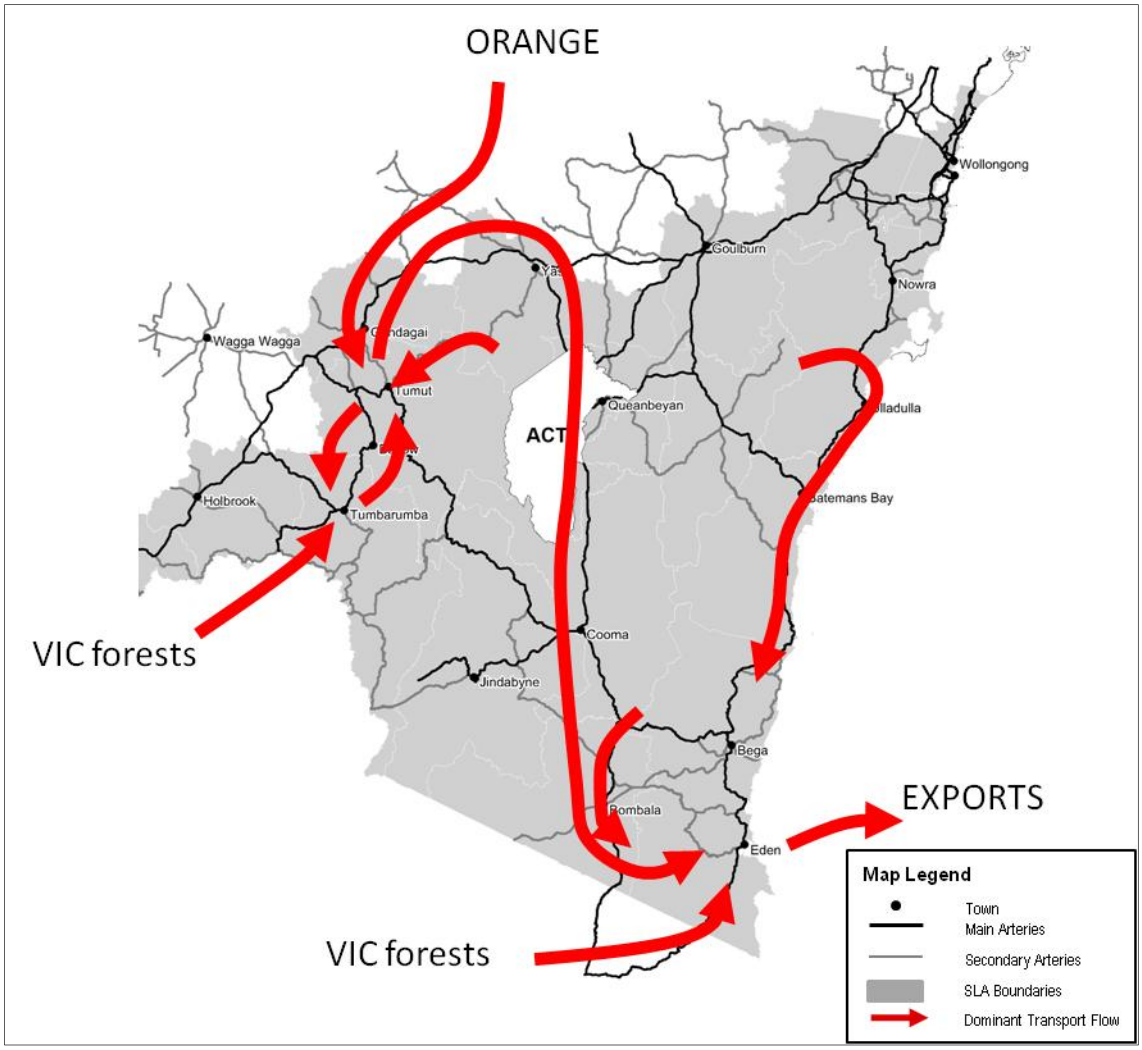
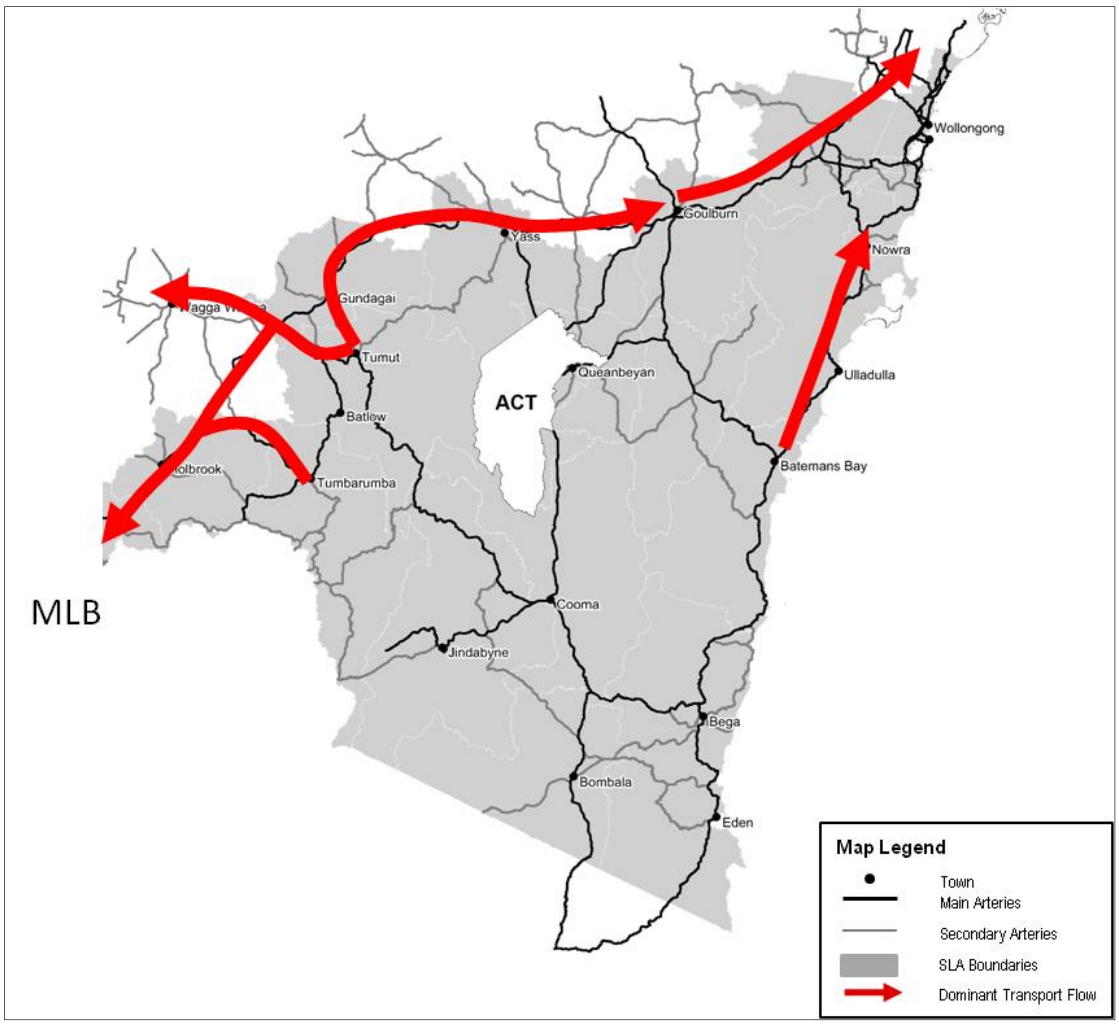


Figure 52 – Outbound flows from mills



9.6 Estimate of truck movements – forestry, timber and paper

It is estimated that about 180,000 truck movements occur annually which is equivalent to around 600 loaded movements travelling in the region each day.

From stakeholder consultations, broad estimates of trucking activity can be derived as shown below.

Plantation log truck configurations:

- B-Doubles (26 m in length) carry 40-42 tonne payload and represent 80% of truck movements.
- Mini Bs (19 m in length) carry 38 tonne payload and represent about 20% of truck movements.

Native forest truck configurations:

- Skeletals – Tri axle semi trailers carry 30 tonne payload and represent about 60-70% of truck movements.
- Mini Bs (19 m in length) carry 38 t payloads and represent about 30-40% of truck movements.

The estimated number of movements for primary inbound and secondary outbound flows is estimated below in Table 15.

Table 15 – Derivation of truck movements – forestry, timber and paper, 2009

Description	*Value*	*Unit*	*Description*	*Value*	*Unit*
Inbound volume to mills	5,895	1000 tonnes p.a.	Outbound volume from mills	1,599	1000 tonnes p.a.
Truck movement assumptions			Truck movement assumptions		
B-Doubles utilisation	42	tonnes/truck	B-Doubles utilisation	42	tonnes/truck
% share of transport task	80%	%	% share of transport task	80%	%
Volume moved	112,286	Movements	Volume moved	30,448	Movements
Mini B utilisation	38	tonnes/truck	Mini B utilisation	38	tonnes/truck
% share of transport task	20%	%	% share of transport task	20%	%
Volume moved	31,026	Movements	Volume moved	8,413	Movements
Annual inbound movements	*143,313*	*Movements*	*Annual inbound movements*	*38,862*	*Movements*
Working days	300	Days	Working days	300	Days
Daily inbound movements	*478*	*Movements*	*Daily inbound movements*	*130*	*Movements*

Source: PES (2009) Timber industry haulage study for the south west slopes of NSW, industry consultation, Sd+D.

9.7 Implications for road network – observations from the 2009 Timber haulage study

This section does not seek to duplicate the findings of the TIMBER Industry Haulage Study. The 2009 report is the last in a series which have built on original analysis of roads to support the timber industry, first undertaken in 1990 and updated in 1993, 1995, 1997, 1998 and 2001. It discusses the condition of all roads, State, Regional and local, used in the haulage of logs and timber products.

The study identifies three types of haulage road: "backbone" which are predominantly State and Regional roads, "primary network" and "identified timber routes", listed in Table 53.

Below are provided selected quotes from the study regarding its purpose, and more importantly, the perceived state of the road network to support growth in timber haulage. These quotes relating to "network" do not specifically refer to the State road network.

> *"The study shows current and future product movements and highlights the necessity for all levels of government and industry to expeditiously address the deficiencies in the road network so that it remains available and is able to provide for efficient transport of logs, sawmill chips, residues and finished timber and paper products. ": p3*
>
> *"Investment in plantation growth leads to increased demand on the transport infrastructure. The Government's commitment to timber industries of additional softwood plantations is of little benefit if the timber cannot be cost effectively harvested and transported to the mills. A cost effective balance in provision of infrastructure improvement occurs when the benefits of reduced haulage costs equals the costs for road works." P11*
>
> *"Since the 2001 report there has been significant industry growth and there is projected ongoing growth in production and processing. There has also been a major change in road use needs. With the commissioning of Visy Stage 2, traffic volumes on Gocup Road are starting to increase markedly making this road the most critical in terms of upgrade and maintenance requirements." p3*
>
> *"Horticulture and tourism would also be major beneficiaries of any work that is done on this strategic road network that accesses major tourism venues and attractions on the Western Side of the Great*

Dividing Range.
The primary network roads are of vital importance to the growing of cool climate wines, apple and stone fruit markets, with current production more than $100 million per annum. This combined with the existing traditional grazing and wool production of more than $150 million per annum provides a substantial argument for road reconstruction to reduce transport costs."p5

"The road network carrying forest products is aging and the older pavements are carrying loads in excess of their original design capacities. …. Cartage by the industry employs a broad variety of truck configurations with up to 42 tonne payloads. The network's condition is now generally poor, and rapidly deteriorating, illustrating that it is not coping adequately with the existing haulage volumes which are less than the volumes that will result from the projected increased forest outputs." p6

"Timber processing industries now have the capacity to and provide the best economic return by operating continuously 24 hours a day, 7 days a week throughout the year. This generates demand for year round haulage. Historically, logging equipment could only work in dry times – wet conditions bogged the plant. Now the plant can work in all seasons. Haulage of small quantities over low standard roads in wet conditions will have significant adverse effects." p6

"With larger axle load limits and the continued expansion of softwood plantations, illustrated by the enlarged Visy pulp and paper mill project (now completed), the factors of increasing total volumes, increasing unit loads and continuous activity will place an excessive burden on the road network. Currently planned road funding cannot meet future loading levels because of accelerating tonnages throughout the network.
The road structures in the network servicing the industry are not adequate to cope with the existing and increasing haulage volumes projected from increased forest outputs and mill consumption. The most heavily trafficked routes, the preferred primary network, have recently been targeted for restoration works and condition has improved. However, much work still needs to be done. Other timber carrying roads are exhibiting extensive areas of serious cracking and rutting.
In addition to the need for upgrading the network there is a continuing need for the recurring maintenance activities." p7

It is worth noting that a condition of consent for the Visy Stage 2 extension to mitigate urban noise intrusion is:

"The proponent shall ensure that there will be no night-time (10[m to 7am) semi-trailer, super B-Double or B-Double movements to and from the plant via the Snowy Mountains Highway through Adelong or to and from the plant via MR280 (Wondalga-Tumblong Rd) north of Adelong. "

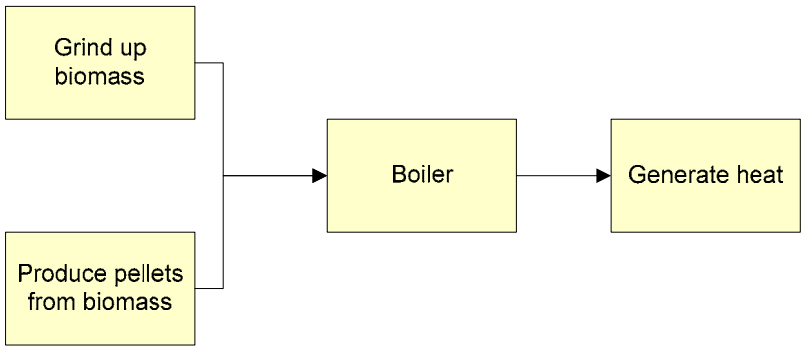
Night-time access to the Hume Highway is gained using Gocup Road.

Figure 104 in Section 23.2 of the Appendices – Supplementary case studies data depicts the Softwoods Working Group Haulage Routes.

9.8 Biofuel industry; a new direction

During harvesting, smaller branches are left in the forest to act as second generation fertiliser however the biofuel industry is emerging in NSW to make better use of the biomass. Visy Tumut is interested in biofuels to fire its boilers and SEFE Eden is interested in developing a co-gen and pelletising plant next to its chipmill. There are two types of biofuel production.

Figure 53 – Two types of biofuel production



Source: Stakeholder consultation.

There is a large biofuels market in Europe and some export is currently occurring out of Western Australia. Clearing biomass makes replanting easier but does take second generation fertilizer off the ground, so research and development is currently underway assessing these implications. It is estimated that the development of the biofuel industry in NSW is between 3-8 years away.

9.9 Conclusion – forestry, timber and paper

This sector accounts for 8 Mt of freight moving within and from the region. Many stakeholders commented that the sector has not received the attention it deserves from a network perspective, given its contribution to the economy. They observe that the increasing volume of product and increased vehicle mass limits place the road network under pressure, in particular connections between mills and the Hume Highway.

Softwood outputs from the Tumut and Tumbarumba region need to travel to Eden for export via Canberra and the Monaro Highway due to the gradient limitations of the Snowy Mountain Highway up the escarpment at Talbingo.

While it does not impinge directly on the state road network, many local forest haul roads feeding timber to mills are exhibiting localised pavement stress. While many of the locations are not on State Roads, the recently reviewed TIMBER haulage study for the region details roads which the industry considers require upgrading.

10. CASE STUDY – COAL

10.1 Overview of the coal sector

Port Kembla Coal Terminal (PKCT) is a key coal exporting facility located within the study area. It services two of the nation's richest coal reserves, the Southern and Western coalfields of New South Wales, exporting high quality coking (metallurgical) and steaming coal (thermal) to customers around the world.

The Southern coalfield produces coking coal prized by steelmakers worldwide for its excellent metallurgical properties. The Western coalfield produces steaming coal highly regarded by energy producers.

Domestic coal consumption in NSW is predominantly divided between the needs of the power generation industry and the steel making industry. Domestic coal consumption can be further broken down into:

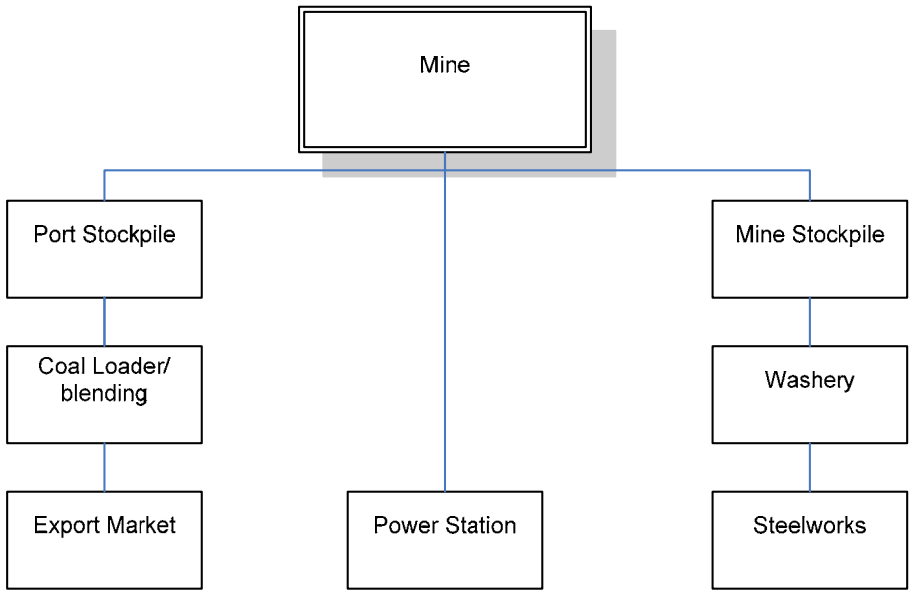
- Seven coal fired power stations in NSW, located near Lithgow (Mount Piper and Wallerawang), on the Central Coast (Vales Point, Eraring and Munmorah), and in the Hunter Valley (Liddell and Bayswater),
- Five steel works located at Waratah, Laverton, Rooty Hill, Whyalla, and Port Kembla, and
- A number of smaller volume consumers such as the Berrima cement works, Manildra starch plant and Shoalhaven paper mill.

The NSW coalfields are represented in Figure 55 and comprise three basins, with the Western coalfields and Southern coalfields moving mine output through the study area by road and rail to Port Kembla

10.2 Supply chain structure – coal

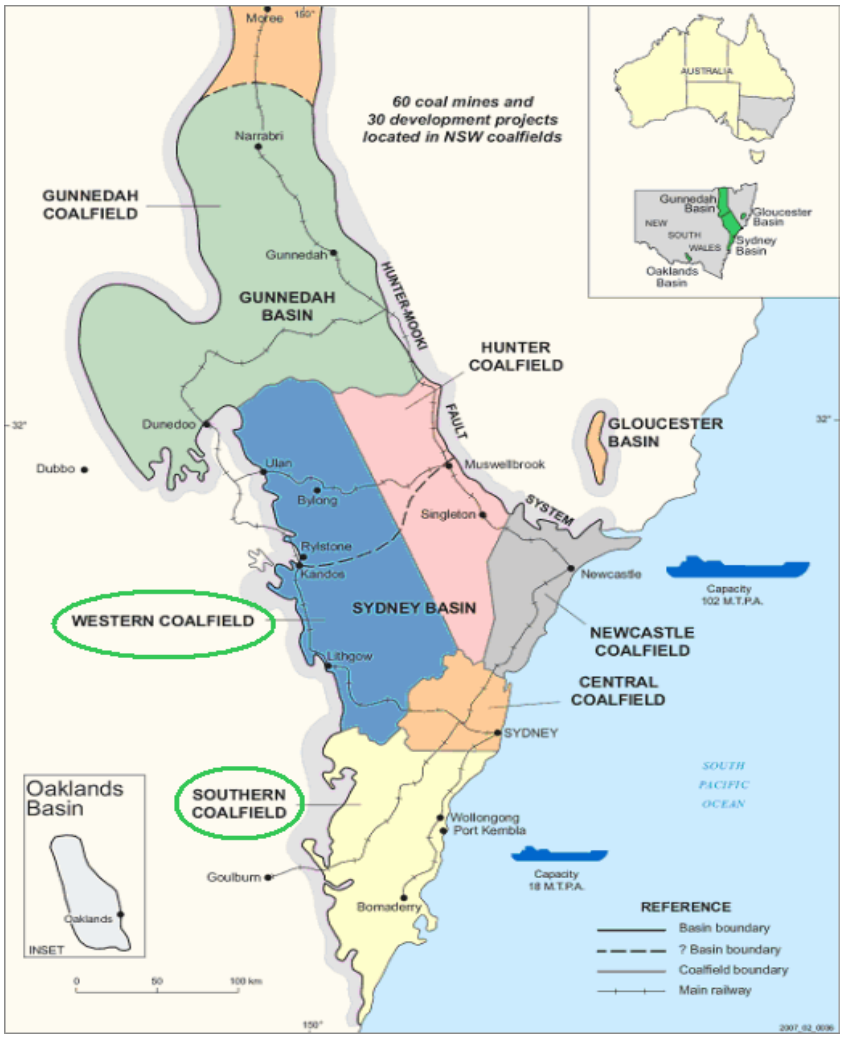
The coal supply chain services two markets; the export market and the domestic market, as shown in the generic supply chain representation of the industry in Figure 54 below.

Figure 54 – Generic supply chain for the coal industry



Source: Sd+D industry knowledge.

Figure 55 – Map of NSW Coalfields



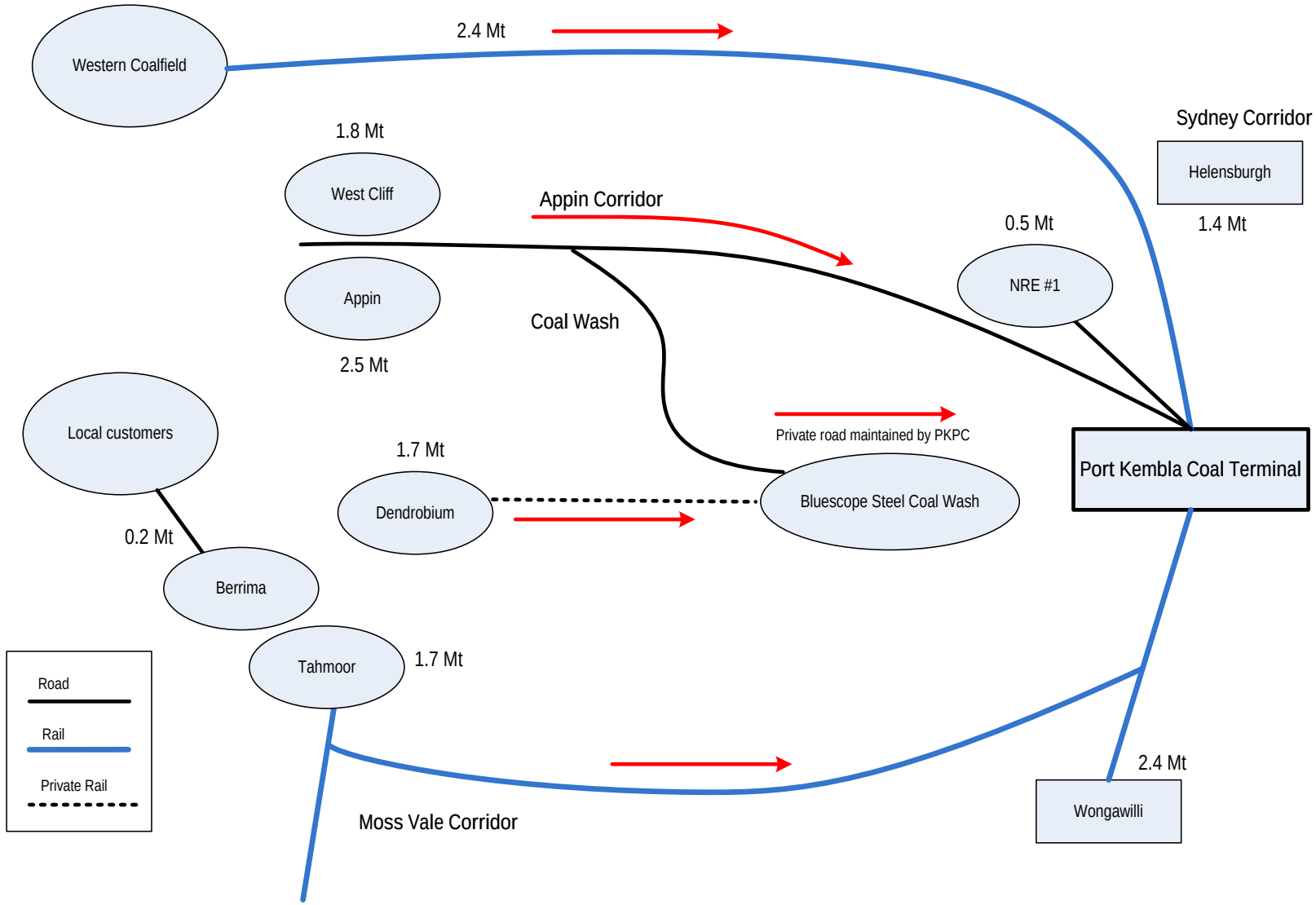
Source: Primary Industries, Minerals and Petroleum, NSW Government Industry & Investment, www.dpi.nsw.gov.au/minerals/resources/coal/coalfields.

The Port Kembla coal supply chain uses both rail and road transport for the movement of thermal and metallurgical coal to port for export and to domestic markets such as power generators and manufacturing (e.g. steel or cement production), as follows:

- Rail transport is used where the haulage distances are favourable and where the mine site is in proximity to the rail network.; the majority of coal from the Western Coalfields travels to Port Kembla by rail
- Road transport is used where the distances from mine to port are relatively short, and where domestic consumption points (particularly power stations) are in relatively close proximity to mines.
- Road transport is used where the access to rail loading infrastructure is not available or where the capital cost of building that infrastructure is excessive.
- Conveyor transport is used for short distances within mine leases and between mines and stockpiles at local power stations.
- The flow of coal through the supply chain in southern NSW is represented in Figure 56 on page 93. While a significant volume of coal is moved by rail to PKCT for export, there is also coal moved by road for both export and domestic markets.

- Mine sites within 20-40 km of the port are serviced by road transport, and these include Appin, NRE No.1 in Wollongong, and West Cliff. Each of these sites is not located near the existing rail network so road movements from the mine site to a potential rail loading point would involve additional inefficient movements and additional cost.
- Total Port Kembla Coal Terminal throughput is expected to grow to more than 20 Mtpa, of which road throughput will represent around 40% of tonnage.

Figure 56 – Coal chain flows in Southern NSW



10.3 Freight flows and volumes – coal

Port Kembla Coal Terminal is the preferred loading point for export coal originating from the Western and Southern coalfields. While 60% of coal for export is transported by rail, road freight is the focus of this study and as a result it is the road freight flows and volumes which are further described here. Southern coalfield mines, Appin, Berrima, NRE No. 1 and West Cliff currently utilise road pathways.

It should also be noted that the ABS 2001 freight movements data reflected the fact that around 6 Mt of coal moved from the Sydney SD from mine sites at Mt Victoria and Campbelltown to Port Kembla. These mines have closed and these movements no longer exist. As a result these estimates have been removed from the ABS Freight Movements Study 2001 figures.

Table 16 below provides a summary of the approximate road volumes from the Southern coalfields, split into volumes for domestic and export sale.

Table 16 – Freight volumes and market destination by road – coal, 2008

Mine Name	Production (Mt)		Domestic markets (Mt)		Export markets (Mt)		*Total Volume (Mt)*
	Total	Saleable	*Road*	*Total*	*Road*	*Total*	
Appin	3.1	2.5	1.6	1.6	0.9	0.9	2.5
Berrima	0.2	0.2	0.2	0.2		0.0	0.2
NRE No. 1	0.5	0.5	0.3	0.3	0.2	0.2	0.5
West Cliff	2.3	1.8		0.0	1.8	1.8	1.8
Total by Road	6.1	5.0	2.1	2.1	2.9	2.9	5.0

Source: Sd+D (2009) Maldon-Dombarton Prefeasibility Study.

Road transport from several mine and related despatch points to Port Kembla has reached around 5Mtpa in recent years however is forecast to grow substantially up to 2014. Forecasting freight volume growth is linked to the timing and scale of future mining ventures relevant to the Port Kembla freight corridors.

Around 420 truck movements a day, most of them B-Doubles, deliver 40 tonnes of coal on each trip. Prior research has indicated that nominal road movements will double from 450 to 900 per day[13]. PKCT has recently undertaken a comprehensive process to gain approval for 24 hour operations for road receivals to meet the future demand. For the road task, throughput capacity is a function of truck productivity and daily operating hours.

Road receivals presently range in the vicinity of 15,000 to 20,000 tonnes per day using a combination of semi trailer (26 tonne) and B-Double (42 tonne) configurations. Road receivals have mostly occurred from 7am to 8pm on weekdays and reflect operating curfews which have been in place. Road receivals will increase to more than 30,000 tonnes per day by 2014, equivalent to around 295,000 trucks per annum.

[13] Sd+D 2009 study for the Port Kembla Coal Cain

10.4 Implications for road network – coal

With the new operating regime at PKCT allowing 24 hour receivals, there is a greater opportunity to smooth demand; this is critical given the forecast growth of both road and rail throughput at PKCT to double by 2014.

Road movements, concentrated within a radius of 20-40 km from Port Kembla, have implications for Mount Ousley and Picton Roads. Growth in capacity and volume through PKCT will only serve to increase the pressure on the road system from increasing numbers of semi trailers and B Doubles. The increased pressure will take the form of increased maintenance and reduced capacity to effectively manage the increased volume of movements.

Pressure from community groups and other road users in recent years has highlighted increasing road freight movements on Mount Ousley and Picton Roads, and this trend can be expected to continue into the future. While the extension of operating hours at PKCT will reduce peak hours for truck movements, the increased overall volume of movements will ensure that tension exists between non-freight users of the key road systems servicing the Port Kembla area from the coal fields.

10.5 Conclusion – coal

Forecasting future coal volumes involves consideration of a range of local and global factors. Global factors relate mostly to international demand and pricing, while the local factors centre on the life of the existing mines, the future development prospects, and the feasibility and costs of logistics chains. Despite the inability to provide absolute accuracy in forecasts, the outlook for the export and local markets is strong.

The strong outlook, coupled with the increasing capacity at PKCT, will increase the volume of coal movements by road through the major access corridors of Mt Ousley Rd and Picton Rd. The increased movements will most probably lead to reduced road capacity, increased maintenance costs, and increased community lobbying against freight vehicles on those key access corridors.

11. CASE STUDY – EXPORT GRAIN

11.1 Overview of the export grain sector

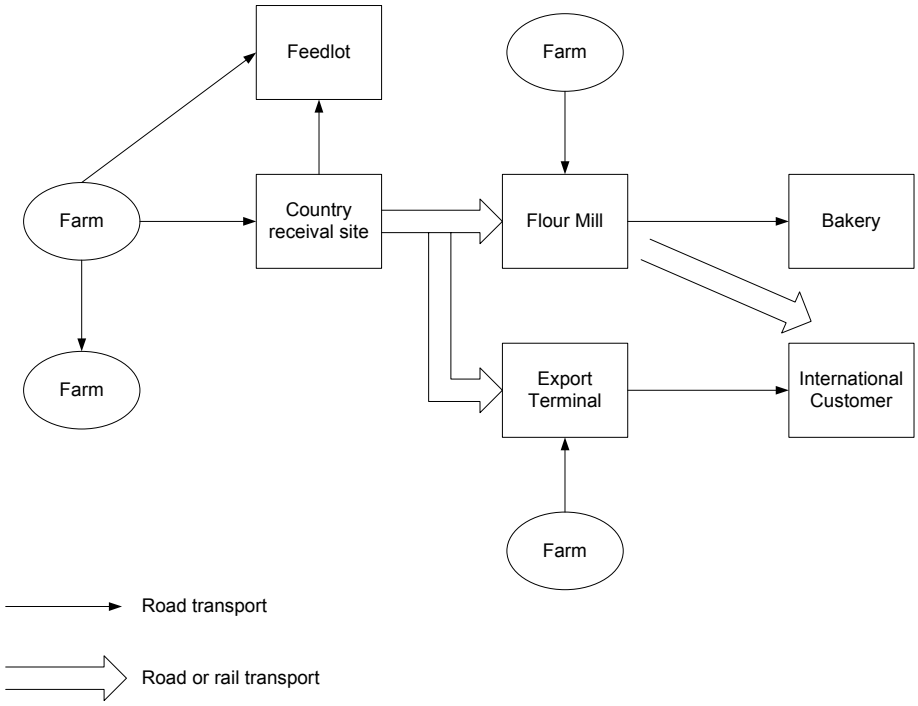
The NSW grain sector is an important contributor to the state's economy and is a major exporter through NSW ports. Grain is grown in a broad band running from the Queensland to the Victorian border, and from the Western Slopes to deep in the Western Plains, with most recent growth coming from west of the Newell Highway. In season 2008/09, NSW grain growers harvested 6.5 million tonnes of winter crop from 4.4 million hectares, a 90% increase from the drought-stricken previous season.

NSW grain is consumed increasingly by the domestic market, which now requires up to 6 million tonnes per year. This figure is made up of human consumption (milled wheat, malt barley for beer etc, and canola for vegetable oil) and livestock feed (lower grade wheat, barley and oats etc).

A growing fraction is also used for industrial products such as ethanol and starch and is the subject of a separate case study at Section 16 – case study – Manildra Starches and Ethanol plant.

11.2 Supply chain structure – export grain

Figure 57 – Generic supply chain for grain



The grain logistics and marketing system has undergone substantial structural change in the last decade, and is now fully deregulated. The dismantling of the export wheat "single desk" has simplified the logistics chains, although the market is now more volatile in terms of price fluctuations. AWB formerly operated large pool systems which protected growers from international price volatility by averaging sale prices over a period of 12 months or so for all pool contributors. Some exporters still operate pools, but smaller and over shorter periods. Growers may now choose between several export traders at harvest time, or have their grain stored under interim 'warehousing' arrangements before selling at some stage post-harvest.

Growers may deliver grain to silos operated by bulk handling companies (BHCs), of which GrainCorp is the dominant east coast company. Other NSW country sites are owned by AWB GrainFlow, Australian Bulk Alliance (ABA) and smaller players. Some growers are also using on-farm storage options which minimise interruptions to harvesting and offer the grower more control of marketing options post-harvest. These

options include field bins and storage bags. Post-harvest, these growers can deliver grain directly to consumers (typically local mills or livestock producers) by truck, or deliver to BHC silos for sale to a range of traders when trucking costs are lower. The on-farm storage sector remains fairly small and is oriented towards nearby domestic consumers, rather than export.

Once grain has been delivered to the silo, the eventual buyer of the grain makes arrangements to hold and transport it to domestic user or export locations, either by road or rail. Rail is the dominant mode of transport for export grain, and most of the larger NSW mills. Road transport is used for delivery to the feedlot sector and the smaller mills and maltsters.

Port Kembla has the largest and most modern of GrainCorp's NSW terminals, with storage capacity of over 200,000 tonnes, and the ability to export around 3 Mt per year.

GrainCorp has a contract with Asciano for the rail haulage of export grain to port from its sites, while AWB GrainFlow has a similar contract with niche operator El Zorro. Traders buying grain at these silos make use of the long term rail freight contracts held by the owners.

When ships are nominated to arrive at a port terminal, GrainCorp and the other BHCs work together to assemble cargoes from grain held throughout the networks, using the rail contracts. There are now fewer trains available to the export trade, due to the extreme demand volatility. This means that trains alone cannot meet export demand at peak periods. Increasing volumes will be moved by truck to port on occasion, where there is a price premium on early season exports. This is likely to result in heavier use of trucking to port if heavy export seasons eventuate in future, but the current train fleet has been adequate for the reduced task of late.

11.3 Freight flows and volumes – export grain

NSW grain production is highly variable due largely to inconsistent rainfall, and this has been exacerbated by climate change.

NSW average winter crop production has fallen from around 8 Mt in the late 1990s, to about 5 Mt at present, after several poor seasons since 2000. Continuing underlying agronomic improvements have been outweighed by the frequent absence of rain during the late growing season, further exacerbated by the increase in spring temperatures. The area that has felt this most has been the southern half of the state. Some of the most significant global impacts of climate change are likely to be felt in south-eastern Australia. For the foreseeable future, it is reasonable to assume that production volumes in the southern NSW grain belt will remain depressed as a result of this.

Climate change will have less well-defined impacts in the northern region, as rainfall models indicate more volatility, but less decline. Northern regions have heavier soils and can withstand some drought events more readily than the south. Northern growers can also supplement winter crops (wheat, barley, canola etc) with summer plantings (mostly sorghum). Heavy summer rain events, which are common, can hurt winter crop quality, but often provide the springboard for heavy summer crops. Overall, volume predictions for the northern area are relatively positive.

Grain prices are currently quite low, due to increased grain production, good northern hemisphere seasons and the strong Australian dollar. The current long term price forecast, however, is for an increasing trend, driven by predictions of food security problems for the growing global population. There is also plenty of corporate interest in quality cropping land, despite the climate problems.

NSW grain is purchased by domestic buyers on behalf of six major flour mills and a strong livestock sector. Flour milling and other human consumption, accounts for around 2.5 Mt each year; contrastingly the livestock sector has grown to around 3 Mt. The major mills are located in Sydney, Manildra, Newcastle and Tamworth, with two new facilities in the Southern Highlands. The livestock sector includes farms throughout the Highlands, northern slopes and southern plains. Cattle feedlots in the North West and southern border regions are among the largest consumers.

Table 17 – Winter crop production NSW – export grain

Year	*Area sown ('000ha)*	*Grain production ('000t)*
2000-01	3,174	9,956
2001-02	3,425	10,140
2002-03	4,809	3,109
2003-04	4,645	9,681
2004-05	4,122	9,766
2005-06	5,300	10,393
2006-07	5,713	2,680
2007-08	4,678	3,391
2008-09	4,430	6,500
2009-10	4,370	6,590

Source: ABARE.

The notional production capability of major mills is summarised in Table 18 below.

Table 18 – Capacity of major domestic milling/processing facilities NSW

Miller/Processor	*Location*	*Grain Type*	*Notional production capacity (tonnes p.a.)*
Manildra	Manildra	Wheat	750,000
	Gunnedah	Wheat	200,000
	Narrandera	Wheat	100,000
	Nowra	Feedgrain	100,000
Allied	Maldon	Wheat	200,000
	Tamworth	Wheat	70,000
Weston Milling	Enfield	Wheat	200,000
Cargill	Newcastle	Canola	180,000
Ingham Enterprises	Berrima	Feedgrain	150,000
	Newcastle	Feedgrain	100,000
Joe White Maltings	Tamworth	Barley	150,000
	Thornleigh	Barley	100,000
Total			*2,300,000*

Source: Sd+D industry knowledge.

Once domestic demand has been accounted for, the annual surplus can be exported. Grain marketing is now fully deregulated in Australia, with the abolition of the AWB wheat "single desk". This means that there is no buyer of last resort, and no agency responsible for stocking grain for next year's domestic use in the event of harvest failure. Thus annual carryover stocks are far less predictable than in the past, and there is a greater chance of importing (either from overseas or interstate) in the event of serious droughts.

The domestic market in Sydney and the Southern Highlands has become increasingly important, and now dominates the diminishing southern area production. The surplus available for export from the region has diminished markedly in recent times.

11.4 Export grain

Average NSW export volumes have fallen over the last decade from around three million tonnes to less than two million tonnes and are extremely volatile, ranging from virtually nil to five million tonnes (1997). This decline is primarily a function of frequent recent drought events, as well as increasing domestic demand. The decline is particularly noticeable at Port Kembla, whose terminal is greatly underutilised. Exports through Port Kembla are now well below 1 Mtpa on average, down from its peak of 3 Mtpa in 1997. Competition from the southern export chain via Melbourne has also hit Port Kembla volumes.

Recent export volumes from Port Kembla are shown in Table 19 below.

Table 19 – Grain exports – Port Kembla, 2007/08 – present

Financial year	*Export grain volume*
2007/08	27,000
2008/09	828,000
2009/10	472,000 – Year to date (Jan 2010)

Source: Port Kembla Port Corporation.

The diminishing volume is largely delivered to Port Kembla by rail, as per the design of the terminal. The haul distance averages over 400km, from the region bounded by Parkes, Hillston and Griffith, as well as closer areas such as Cootamundra. A branch line to the Cowra area was recently closed by the NSW government, resulting in the use of road transport for this area, but its production is largely purchased by the Sydney and Southern Highlands mills. Very little grain is transported by road into Port Kembla or elsewhere in the subject area of this study.

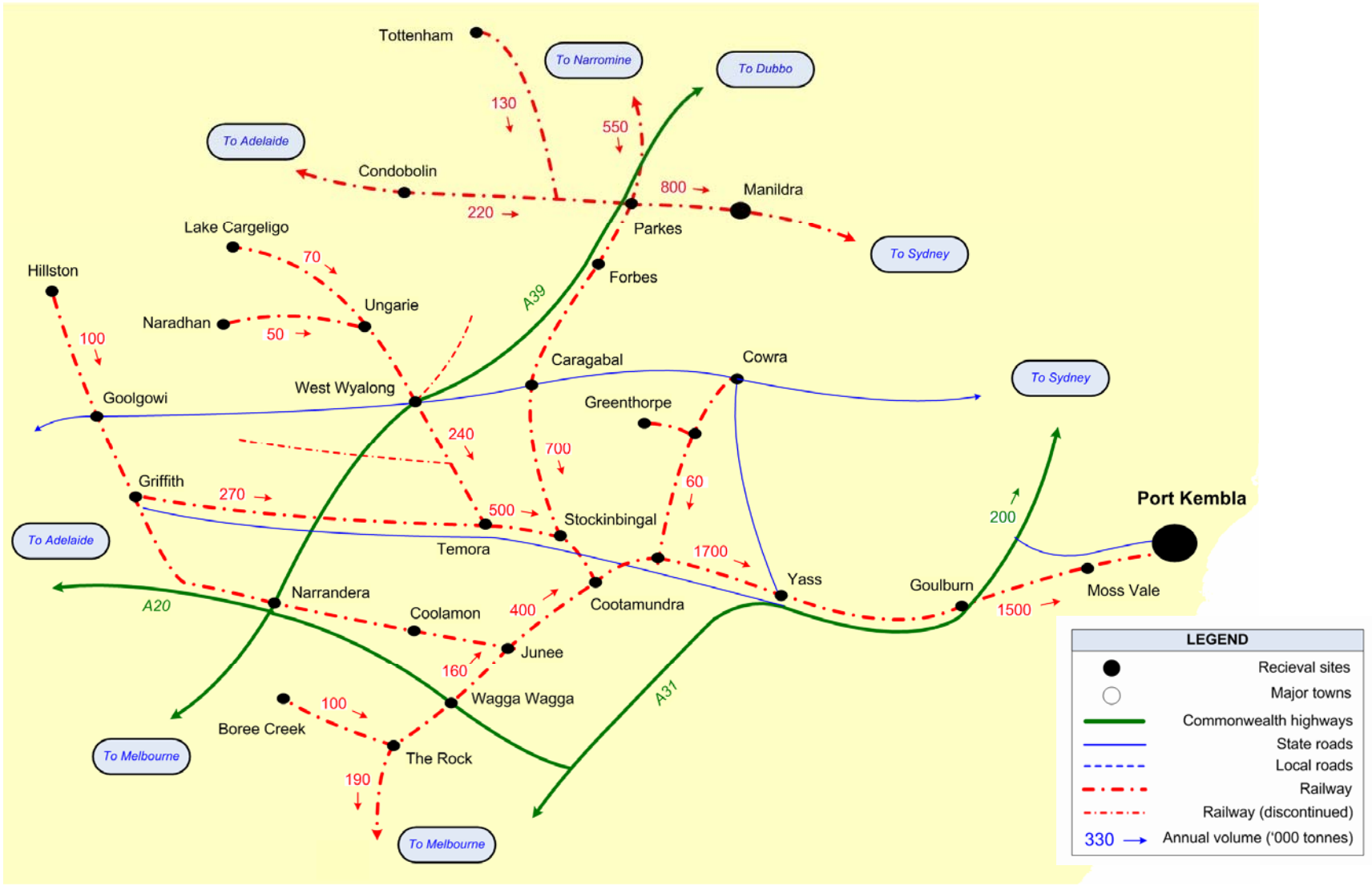
The only notable grain movements on road occur when grain is delivered as a backload for fertiliser moving out from Port Kembla to the production areas in the January-April period. Since the establishment of the Allied flour mill at Maldon, however, triangulation of fertiliser freight ex-port, with grain deliveries to the mill has been more common than export grain delivery.

Total fertiliser road freight volumes are less than 50,000 tonnes per year from Port Kembla. Total grain volumes on road would be well below this number in an average season.

The future for grain export volumes through Port Kembla is limited. Increasing prices should ensure long term stability of growing areas, but yield increases cannot be predicted due to the declining productivity of some western lands and, primarily, the increasing likelihood of rainfall shortage during the growing season. The only potential defence against this trend is genetic modification (GM) – research into genetic traits that could improve drought resistance is continuing. However, there is huge global market resistance to the introduction of GM foods, and commercialisation of any such varieties cannot be predicted for the medium term. In the longer term, however, as global food security becomes a greater problem, many experts suggest that the use of GM foods is inevitable.

On balance, a steady decline in average NSW export volumes is the most likely outcome for the next 10-20 years, punctuated by occasional strong years. Annual volumes will be lower, but the variability of demand throughout any given year may reduce, due to logistics factors as outlined in the section below.

Figure 58 – Port Kembla zone map – export grain



Source: Sd+D, Grain Supply Chain Pilot Study, Stage One Final Report prepared for the National Transport Commission, December 2008.

11.5 Industry and stakeholder perspectives – export grain

Most domestic volume movements do not involve usage of Illawarra transport corridors. The exception is grain and flour movements into the Manildra Group processing facility at Nowra. This plant produces ethanol and starches from flour and grain inputs. Flour is produced at the company's mills at Gunnedah and Manildra, while grain is sourced from silos throughout the state. Flour is delivered by daily trains running on well-defined timetables through the metropolitan area, while grain trains (usually 1-2 per week) use the Moss Vale-Unanderra corridor.

There is very little likelihood of this freight moving to road transport in the foreseeable future.

Rail volume growth depends somewhat on the ethanol issue. If NSW moves towards greater mandated use of ethanol in fuel, grain freight flows will be affected by the location of new ethanol plants. Manildra Group would probably expand production at Nowra, and other plants are mooted for Newcastle and the Riverina area. This might increase the flow of grain by rail to Nowra, but this growth would come at the cost of export grain traffic.

There is some chance that more southern NSW rail sections will be closed as export production declines over time. This would lead to increased use of road freight in some areas, but would be unlikely to result in significant road freight volumes into Port Kembla via the Illawarra Highway. Most export volumes would be captured at key centres like Cootamundra on the Main Southern (Sydney-Melbourne) Railway, which is certain to continue operating.

11.6 Implications for road network – export grain

There is very little grain moved by road east of the Hume Highway in the subject region. This is unlikely to change in the foreseeable future. The grain freight movements by roads occur mostly along Picton Road or Illawarra Highway to Port Kembla port.

11.7 Conclusion – export grain

Average grain production in the southern NSW area is falling due to climate change, and there is little indication of any initiatives that would increase yields in response to this trend.

Domestic consumption of grain in Sydney and the southern Highlands is increasing, leaving relatively little annual surplus for export via Port Kembla.

Export volumes are traditionally handled by rail and will continue to be, despite the recent closure of some lines (Cowra region) and the potential for others (in the Riverina). There is sufficient rail operating capacity available to handle the export and domestic task except in the occasional bumper years.

12. CASE STUDY – HORTICULTURE

12.1 Overview of the horticulture sector

The main horticultural industries within the study region comprise apple, grape and potato production along with smaller production quantities of peaches and other vegetables, notably broccoli, carrots and mushrooms. Weather conditions impact crop yields, and therefore harvest volumes can vary markedly from year to year.

The most recent reporting available at the Statistical Local Area level is the *Agricultural Commodities: Small Area Data, Australia 2005-06* produced by the Australian Bureau of Statistics. This report cites total horticultural production in the region *(including ACT)* as being about 46 kt with fruit making up 77% of the total. Apples are the dominant produce at greater than 50%, followed by grapes. Other commodities harvested include citrus fruits and berries *(both under 1 kt)* with total vegetable production amounting to 23% of the total. Nut production in the region is negligibly small.

Apple growing is the standout horticultural produce from the region with production centred around the Batlow region. Grape growing for wine making and distillation is the next highest produce though only a third of the production tonnage of apples. The volumes are however small with the study area accounting for just 3% of New South Wales total horticultural production.

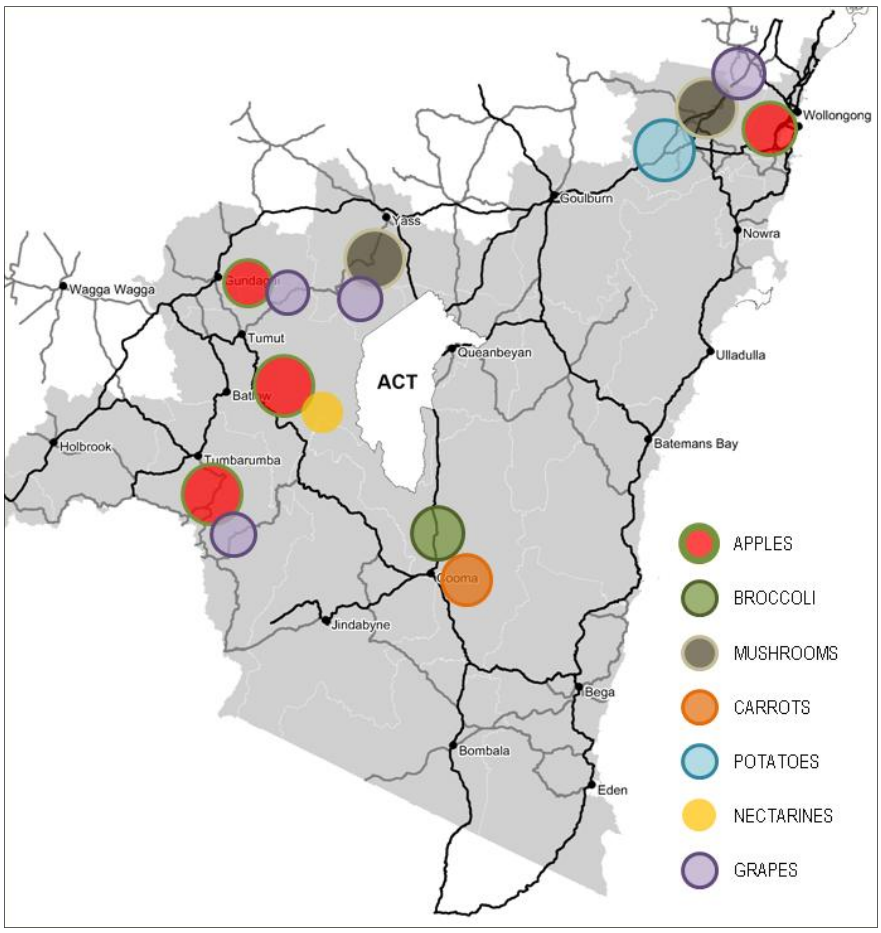
Apples are a major crop in NSW, with most grown in Batlow and Orange – these regions have 87% of the trees and 88% of the production in New South Wales[14]. Smaller amounts of apples are grown in the Sydney basin, Forbes and the Northern Tablelands. Apple harvesting occurs from February to May.

The grape growing industry consists of businesses mainly engaged in growing or sun-drying grapes. Grape growers purchase raw materials such as herbicides, pesticides, bird nets and irrigation systems and grow grapes for crushing for wine making *(which are sold directly to wineries)* while also selling table grapes whole to fruit wholesalers and retailers. Some of the grapes are also dehydrated or dried for packaging as sultanas and sold to consumers via grocery distributors.

Grapes are grown in several climatic zones in New South Wales. The main areas producing wine and table grapes are the Murrumbidgee irrigation area, the Hunter Valley, the central rangelands of Mudgee, Orange and Cowra and the area encompassing Wagga Wagga, Young and Gundagai. Table grapes are also grown in Sydney's south-west and grapes for dried fruit are grown in the lower Murray irrigation area. In the study area however, virtually all grape growing is targeted towards production for wine making / distillation.

[14] Apple Growing, www.soilzone.com

Figure 59 – Main horticultural regions within the study area



12.2 Supply chain structure – horticulture

As production of apples is clearly the dominant horticultural produce within the region, it is the apples supply chain that is the focus of the proceeding section.

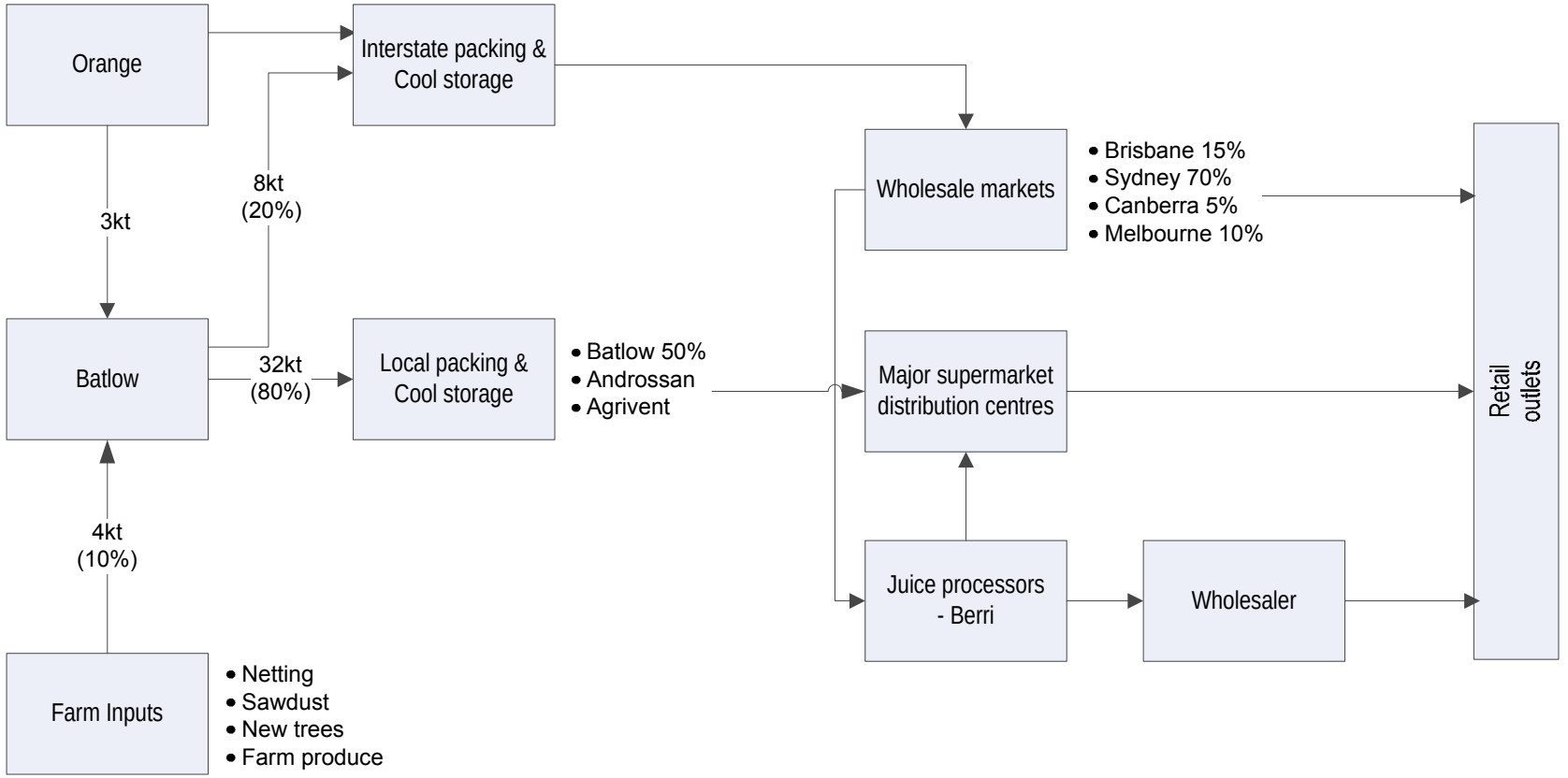
Farm inputs include structural netting, sawdust which is used as a growing medium, new and replacement trees and general farm produce. These inputs constitute approximately 10% of production in terms of weight, or 4,000 tonnes per annum. Warehousing inputs include chemicals and packaging materials.

These days practically all apples are harvested into bulk bins, which usually hold about half a tonne. Although some growers market their crops 'off the tree', most cool-store part of their crop for later marketing. Apples may be left in the bins for their entire storage life and not be withdrawn for grading or packing until shortly before marketing.

In the past, most fruit was packed at the point of production. The packing shed was an integral part of the business, and many growers also had their own cool-storage facilities. Some of the large growers or co-operatives now operate major packing sheds and cool-store facilities. A number of smaller growers no longer do their own grading and storing, but take their fruit to a larger packhouse where the fruit can be combined as long lines of a variety and grade, which are more suitable for supermarkets.

Batlow apples are transported from farms by semi-trailer loads of 54 bins or approximately 22 tonnes, to Batlow, Agrivest and Androssam warehouses in the region. "Batlow" apples refers not only to apples grown in the Batlow region but also to the major producer in the area, the Batlow Fruit Co-operative, which is grower owned and recognised as one of the largest storage and packing operations in Australia. Collectively the fifty co-operative growers located throughout the district; market and pack on average one million cartons of apples every year.

Figure 60 – Supply chain for SE NSW apples



Source: Sd+D from industry consultation.

Apples are sold through a 'free' marketing system. There are no regulated grade standards. Fruit specifications such as maturity, and minimum fruit and grade standards, are often negotiated between the producer/packer and the buyer as part of the quality assurance program.

Apples consigned to wholesale city markets are sold through agents or merchants, who arrange sales on behalf of the consignee. In NSW, a lot of fruit is also transported to the Sydney wholesale markets in bulk bins; 300 kg and 600 kg bulk bins are usually consigned directly to supermarkets, regional markets and wholesalers.

Only a very small proportion of the apple crop is exported annually. It is in the long-term interests of the industry that exporting be encouraged. Newer varieties such as Pink Lady and Fuji are opening up new markets in both Europe and Asia.

Fruit consigned to the city markets is mostly packaged in the Australian Traypack Carton, which holds about 18 kg as shown in the following illustration.

Figure 61 – Typical fruit packaging for transport movements

12.3 Freight flows and volumes – horticulture

Although greater distances from market outlets will normally result in higher transport costs, this consideration is secondary to locating the orchard where productivity will be high. As a result, most horticultural production in the region is spread out using a diverse range of local roads to access distribution points *(refer to Figure 59 – Main horticultural regions within the study area)*. The exception is apples with the majority of production centralised in and around Batlow.

Eighty percent (80%) of apple production is transported to local centralised packing-house facilities and cool storage warehouses while the remaining twenty percent (20%) is transported to Melbourne. From the local warehouses, production is further transported to wholesale markets in Brisbane (15%), Sydney (70%), Canberra (5%) and Melbourne (10%). The primary apple grower in the region, the Batlow Fruit Co-operative also freights product directly to Coles distribution centre in Eastern Creek, NSW and lesser grade apples to Berri Juices in Leeton, NSW. In the past few years, direct contracts between supermarkets and farmers have become more popular, as they offer both parties a price advantage over wholesale contracts.

Approximately 3,000 tonnes of apples for processing are also sourced from Orange in the intake season, representing 100 plus trucks coming into the region via Gocup Road and returning to Orange carrying empty bins.

There is rapid replenishment of orders for the wholesale markets. This short lead time presents challenges as to truck and driver availability. Trucks have to be loaded by 4pm in the afternoon for pre-dawn delivery to Canberra, Sydney and Melbourne wholesale markets the following day. Delivery to Brisbane takes two days.

12.4 Implications for road network – horticulture

There are essentially two types of freight movements for horticultural produce grown in the region:

- farm pick-ups to local packing and cool storage facilities, and
- packing and cool storage facilities to the major east coast wholesale city markets in Brisbane, Sydney, Canberra and Melbourne.

Freight corridors affected in the study area by these movements include local roads as well as Batlow-Tumut Road, Gocup Road and the Snowy Mountains Highway, are all used as access points to the Hume Highway.

13. CASE STUDY – COMMERCIAL FISHING

13.1 Overview of the commercial fishing sector

The NSW fishing industry is primarily made up of small family businesses that rely on high levels of local knowledge and skills learnt over many generations. The production in NSW of wild harvest commercial fisheries and aquaculture in 2005/06 was valued at $154.2 million and totalled 28,861 tonnes[15]. Wollongong, Nowra and Eden represent the key ports for commercial fishing within the study area. Our specific analysis focussed on Eden and the reality is that the other regions in the area will not vary markedly.

Figure 62 – Fishing trawlers moored at the Port of Eden

Source: Eden Community Site, www.eden.nsw.au

Although the study region is renowned for its commercial fishing industry, the current volumes are small. In 2006 the Federal Government conducted a $90 million fishing licence buyback to reduce pressure on fish populations by cutting over four hundred (400) licences nationally. The Port of Eden was severely affected with over half the commercial fishing fleet retiring.

The Port of Eden is the state's most southerly fishing port and currently has a significantly reduced fleet of commercial fishing vessels including three trawlers and five to six smaller vessels as well as kingfish boats from other regions.

13.1 Implications for road network – commercial fishing

There are two fishing co-operatives operating at the Port; being the Twofold Bay Fishing Co-operative and Southland Fish Supplies as well as the Bermagui Fisherman's Co-op further north. Bobbins South Coast transport hauls fish for all three operations. Freight movements involve two refrigerated semi-trailers, one to Melbourne and one to Sydney each day. Loads vary from 4-5 tonnes per truck to 18 tonnes per truck depending upon the size of the catch. Tonnages move North and South along the Princes Highway.

[15] Commercial Fishing in NSW, Primefact 825, NSW Department of Primary Industries, August 2008.

14. CASE STUDY – DAIRY SECTOR

14.1 Overview of the dairy sector

Dairy is Australia's third largest rural industry, behind beef and wheat, with an estimated farmgate value of $4.0 billion and an estimated wholesale value of $12 billion. Approximately 40,000 people are directly employed on dairy farms and in dairy manufacturing plants in Australia[16]. Exports are valued at $2.9 billion making dairy the fifth top agricultural export in 2008[17]. Forty-five percent of Australia's milk production is exported with the major export markets being Japan, Singapore, Malaysia, China and the Philippines.

Milk production is concentrated in the south-east corner of Australia, with Victoria, Tasmania and South Australia accounting for 80% of the national output. Most dairy production regions are located in coastal areas, where pasture growth generally depends on natural rainfall. The irrigated regions of southern New South Wales and northern Victoria however, account for around a quarter of national milk production. These regions faced very difficult conditions in 2008/09, with another season of very low water allocations, and milk production suffered accordingly. Despite this; overall Australian milk production increased by 165 million litres, or 1.8%, to 9,338 million litres in 2008/09[16].

The study area is included in the region referred to as Southern & Central NSW by industry body, Dairy Australia.

Figure 63 – Southern & Central NSW Dairy Farming Region

Source: Dairy Australia

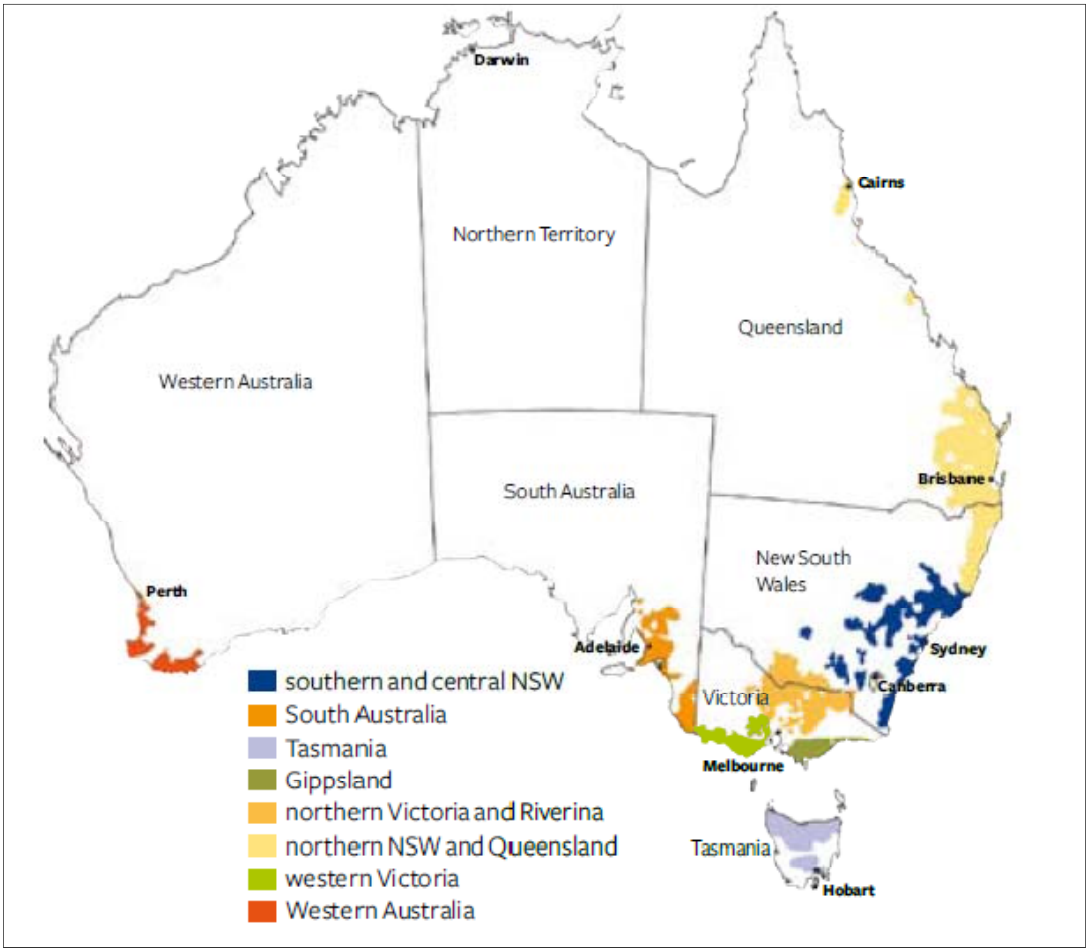
There are three major dairy industry players in the region being National Foods, Parmalat and Bega Cheese and a number of smaller businesses including South Coast Dairy, Country Valley Milk and Unicorn

[16] Australian Dairy Industry In Focus 2009, Dairy Australia.

[17] Agriculture and the WTO, Australian Government, Department of Foreign Affairs and Trade, http://www.dfat.gov.au/trade/negotiations/trade_in_agriculture.html

Cheese. The Southern dairy farming region of NSW produced 490.3 million litres of milk in 2008/09 with year-to-date production at 31/01/2010 at 307.2 million litres, an increase of 1.6% on the prior year. However, Dairy Australia's forecast for the full season's milk production remains at 9 million litres nationwide, 4% down on 2008/09[16].

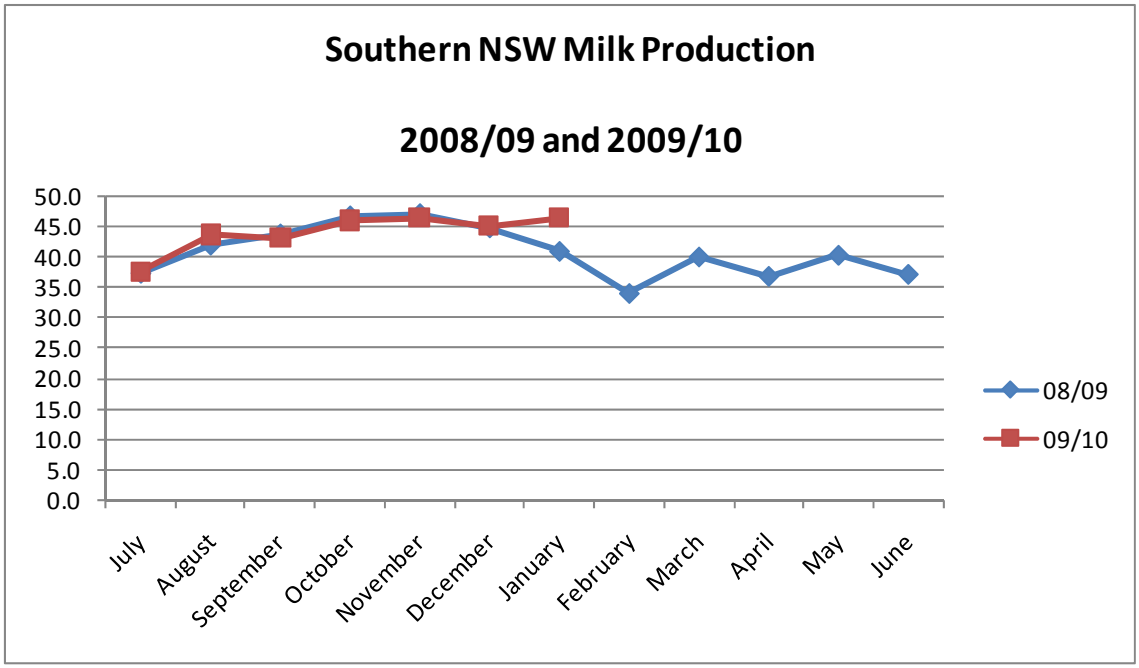
Figure 64 – Australian dairy farming regions



Source: Australian dairy 09.1, Surya Dharma, June 2009, Australian Bureau of Agricultural and Resource Economics (ABARE).

Figure 65 below, shows Southern NSW milk production for 2008/09 and 2009/10 to date, and also demonstrates the seasonality of milk production in Australia. Australian milk production remains strongly seasonal in these key south eastern dairying regions, reflecting the pasture-based nature of the industry. Milk production peaks in October and tapers off in the cooler months from April. The production of long shelf-life manufactured products in these parts of the country has enabled maximum milk utilisation within the seasonal cycle.

Figure 65 – Milk production – NSW southern region, 2008/09 and 2009/10



Source: Dairy Australia

14.2 Supply chain structure – dairy sector

The Southern & Central NSW region average annual milk production per cow is 7,426 L which equates to just over 20 L per day[18]. Cows are milked twice per day and the milk is stored in a refrigerated silo for up to 48 hours. A refrigerated tanker collects the milk from the dairy farm every 24-48 hours and transports it by road to a processing factory; where it is pasteurised and homogenised.

Processors in the region retain a preference for reliably-produced locally-sourced milk to maximise shelf-life for fresh products and to minimise logistics and handling costs. Milk is produced and sold as drinking milk but also manufactured to make dairy and other products which are consumed within Australia and exported to many world regions. These products include milk powder, butter, cheese, custard and yoghurt. Some products are further transported to packing factories e.g., Bega Cheese packages 65 kt of cheese for other manufacturers per annum.

There are also by-products of the manufacturing processes that are transported in the study area. These include permeate which is a milk derivative by-product of the cheese making process and is used to fortify other dairy products. Milk is also used as an ingredient in non-dairy product manufacture, such as chocolate.

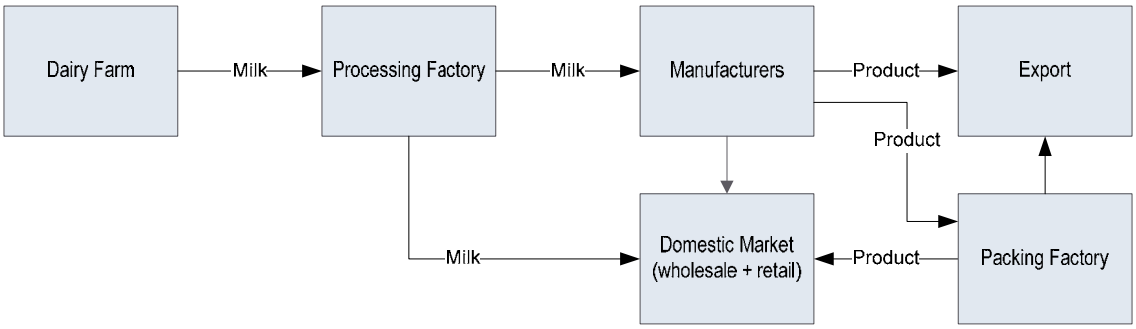
Around 60% of manufactured product *(in milk equivalent terms)* is exported and the remaining 40% is sold on the Australian market. This contrasts with drinking milk, where some 97% is consumed in the domestic market[19].

Milk is packaged and loaded onto pallets and transported by road to supermarkets and retail outlets. Dairy and other products are also loaded onto pallets and transported to port for export or to domestic wholesalers and retailers.

[18] Dairy in Southern & Central NSW Regional Profile from Dairy 2009: Situation and Outlook, Dairy Australia

[19] Australian Dairy Industry In Focus 2009, Dairy Australia.

Figure 66 – Generic Australian dairy supply chain



Three interdependent sectors can be easily identified in the chain structure as milk production, dairy manufacturing and dairy markets, with the latter comprising domestic and export markets. Key inputs for the dairy farms are grain, hay, fertiliser and fuel and are generally supplied by third party service providers. Farms in the region are either owned by the major dairy manufacturers such as National Foods, Parmalat and Bega Cheese, or stand alone as independent producers selling milk to manufacturers on a contract basis. In 2009 23% of farms in the Southern & Central NSW region were staffed by the owner or ownership couple[20].

The Australian dairy manufacturing sector is quite diverse and includes farmer-owned co-operatives, public, private and multi-national companies. Co-operatives no longer dominate the industry and now account for approximately 40% of Australia's milk production. The largest is Murray Goulburn, accounting for some 35% of national milk output.

There are now just two major players in the Australian drinking milk market: the enlarged National Foods after its takeover of the Dairy Farmers Group in late-2008 *(with the Pura and Dairy Farmers brands)* and Parmalat *(with the Pauls brand)*. There are also a number of smaller players in the marketplace with strong regional brands.

The dairy industry is somewhat unique in that there is co-operation between participants with regard to the collection of milk from farms. This co-operation between competitors falls under a relatively new term, known as co-opetition. Each processor has a network of farms supplying milk to its facility. Where one processor's farms are located nearer to a competitor's processing facility and vice versa, 'milk swaps' are arranged between the competitors in order to promote logistical efficiency for both players.

14.3 Freight flows and volumes – dairy sector

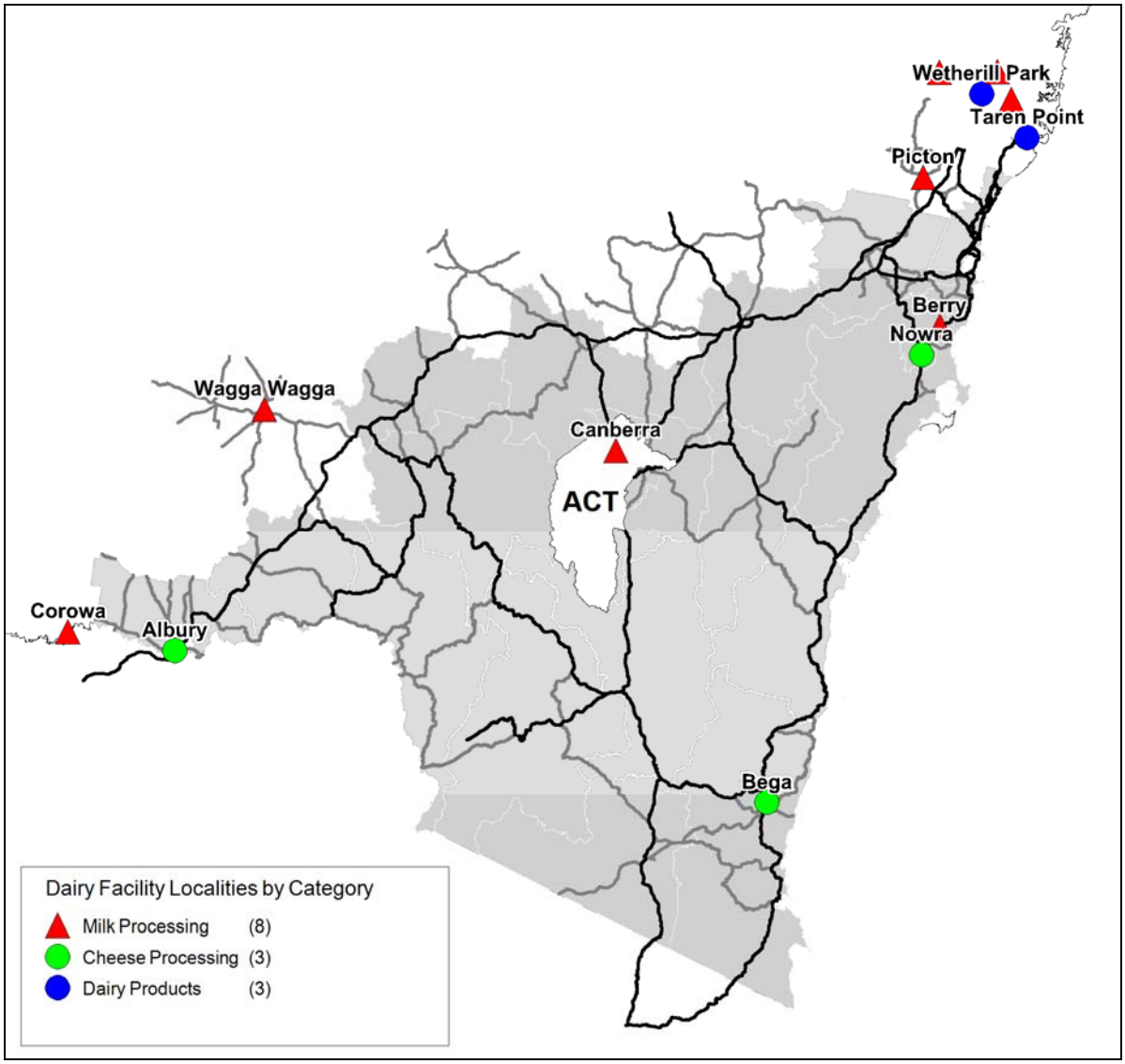
Dairy freight movements that impact upon the study area can be summarised as follows:

- From Orange and Bega to Capitol Chilled Foods Australia (CCFA) located in Canberra.
- From the Southern Highlands to National Foods in Penrith.
- From the South Coast to Parmalat at Lidcombe and Dairy Farmers at Wetherill Park.
- From Bega to Sydney and Melbourne.
- From East Gippsland and Bodalla to Bega.
- Movements within the Bega Valley SLA.

Figure 67 below depicts the location of dairy production centres in and around the study area

[20] Dairy in Southern & Central NSW Regional Profile from Dairy 2009: Situation and Outlook, Dairy Australia

Figure 67 – Dairy production centres in SE NSW



14.4 Industry and stakeholder perspectives – dairy sector

There are two significant freight attractors / generators within the study area that account for the majority of dairy movements, as follows:

- Capitol Chilled Foods Australia (CCFA) is a milk processing plant producing bottled milk, located in Canberra. CCFA is jointly owned by National Foods and Bega Cheese. While the ACT does not form part of the study area, freight movements from and to CCFA travel through the study area.
- Bega Cheese is the other major dairy processing company located within the region. Bega Cheese sources milk from 100 farms in the Bega Valley as well as a small number of farmers in the Illawarra and East Gippsland; and freights product North and South along the Princes Highway.
- There are also a number of smaller dairy operators within the study area, including Country Valley Dairy, South Coast Dairy and Unicorn Cheese. National Foods and Bega Cheese handle farm pick-ups of milk in the study area. National Foods also owns Berri Juice which has a processing site at Leeton, NSW. As a result 95% of National Foods tankers travel

loaded both ways, carrying milk out of and through the study area and juice into the study area.

- Road freight movements between Victoria and New South Wales to meet requisite milk demand in each state occur on a daily basis. These flows generally involve movements out of Melbourne mid-week into NSW and movements out of Sydney at week's end to Victoria; where there is insufficient storage capacity in Sydney at the weekend. However, the Newell and Hume Highways carry the majority of this freight which thus falls outside the study area.

14.5 Implications for road network – dairy sector

There are essentially two types of freight movements for milk production in the region:

- Farm pick-up to milk processing facilities, and
- Linehaul bulk, from milk processing facilities to dairy product manufacturers or to wholesale and retail markets.

All dairy movements in and through the region are by road encompassing two types of transport: farm pick-up and linehaul bulk. Farm pick-up involves single trailer refrigerated tankers (24-26 kl capacity) on local roads, while linehaul bulk transport involves pocket B-Doubles (32-38 kl capacity) travelling on highways from factory to factory.

14.6 Conclusion – dairy sector

The dairy freight task accounts for 500kTpa travelling within and through the study area. The main freight corridors include local roads with regard to farm pick-ups of milk and the Princes, Snowy Mountains, Monaro and Barton Highways with regard to linehaul bulk transport between processors and to wholesale and retail markets.

15. CASE STUDY – STEEL PRODUCTION

15.1 Overview of the steel production sector

Wollongong has been a significant centre for steel production in Australia for decades. The dominant player is BlueScope Steel which produces flat steel products (plate, slab, coil and welded beams) for a range of markets such as the building and automotive sectors. BlueScope's main sites are located in Port Kembla (steelworks and rolling mill), Western Port, Victoria (rolling mill), Erskine Park, NSW, and Acacia Ridge, Qld, (paint lines)

The other significant steel sector player in Australia is OneSteel which manufactures and distributes structural steel, bar and rod products and finished steel products throughout Australia. OneSteel's major manufacturing facilities are located in Whyalla, Melbourne, Western Sydney (Rooty Hill), Newcastle, and Brisbane with smaller manufacturing and distribution facilities throughout regional Australia.

Steel production in Port Kembla requires the movement of inbound bulk commodities such as coal by road and rail, iron ore by ship and limestone by rail. Outbound movements involve the use of both rail and road transport for movement of semi-manufactured and manufactured goods to Sydney, interstate locations and Port Botany (for export).

The Port Botany Steel works produces around 10 Mt of product per annum and BlueScope's national logistics task exceeds 40 Mt per annum. Around 15 Mt (40%) of this involves road and rail freight movements whereas the remainder is maritime and internal mill rail operations.

15.2 Supply chain structure – steel production

The steel sector uses road, rail and maritime transport to move input and output goods along the supply chain, as shown in Figure 68 on page 115.

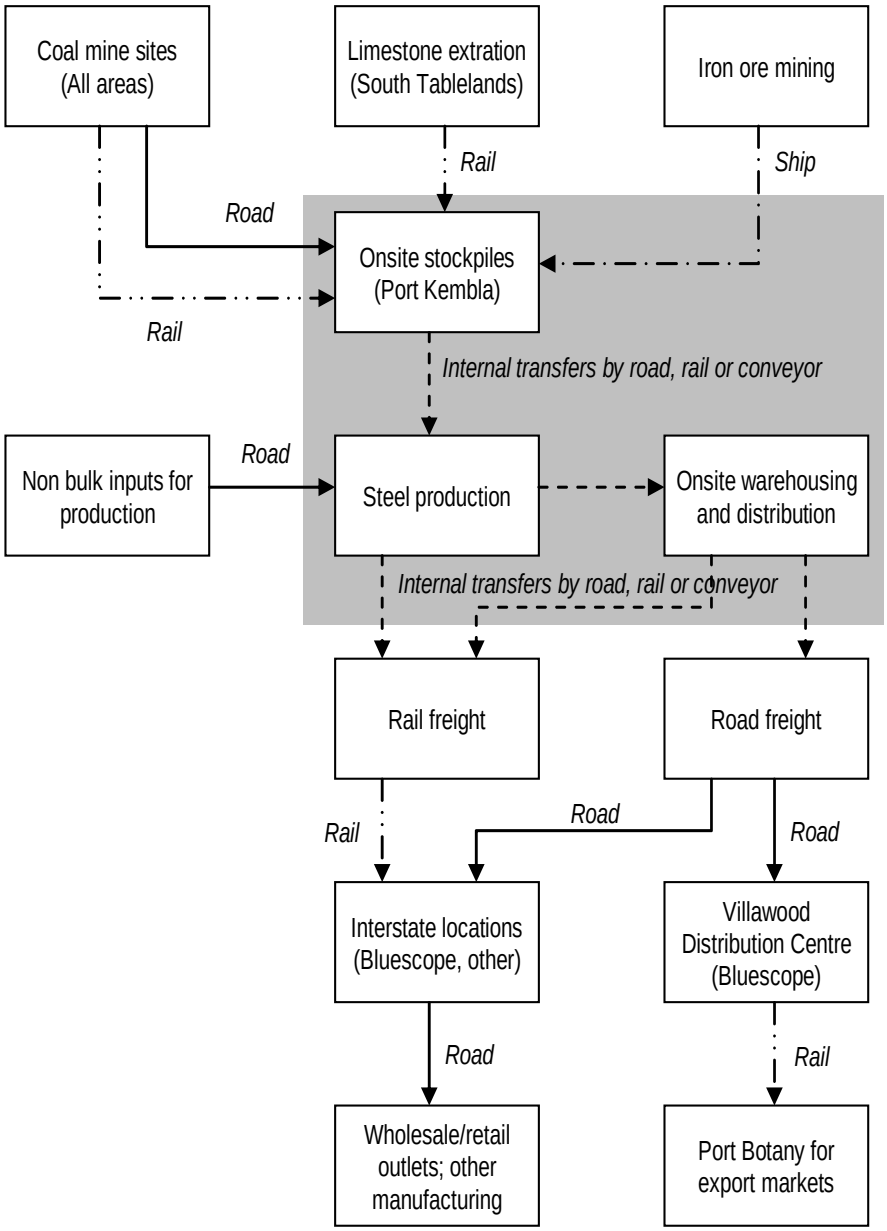
15.3 Freight flows and volumes – steel production

In the context of this study, the relevant freight flows relate to the daily movement of heavy steel products by road to other BlueScope sites in each capital city, as well as Newcastle and Whyalla. These operations are also coordinated in conjunction with OneSteel to optimise capacity and cost as indicated in Figure 69 – Key road and rail movements of the Australian steel task on page 116. Note that the numbers represent average weekly movements.

A number of key observations emerge from the analysis of domestic and export steel flow as follows:

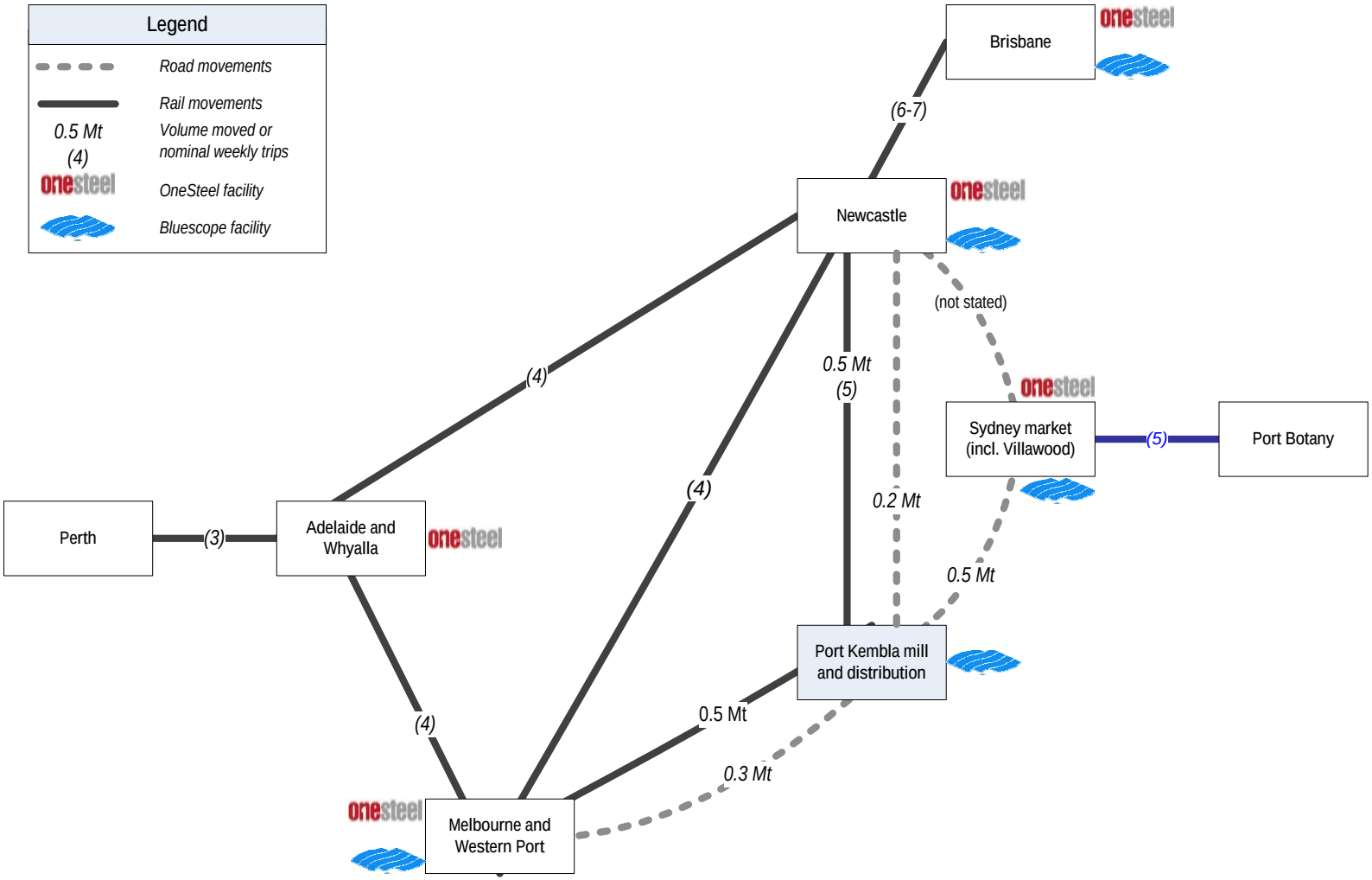
- The steel distribution network is bound by Brisbane, Newcastle, Sydney and Melbourne. Onesteel has an additional facility in Adelaide/Whyalla and Bluescope steel similarly in Port Kembla.
- An estimated 2 Mt of steel from Port Kembla is destined for the domestic markets primarily to Sydney (25% including Villawood), Newcastle (35%) and Melbourne (40% including ex-Perth).
- Road and rail modal share is split equally (about 1 Mt each) with Sydney being the dominant destination for the road task (50%).
- Steel exports in the form of coils, slabs and structural groups represent another 2 Mt while the main imports include iron ore (5.8 Mt), limestone (0.2 Mt) and dolomite (0.2 Mt) respectively.

Figure 68 – Supply chain movements through the Port Kembla steelworks



Source: Sd+D (2009) Maldon-Dombarton Prefeasibility Study

Figure 69 – Key road and rail movements of the Australian steel task



Source: Sd+D (2009) Maldon-Dombarton Prefeasibility Study

Table 20 below, summarises these observations and provides the basis to estimate domestic volumes for each OD pair while Table 21 shows volumes moving directly to / from ships at Port Kembla.

Table 20 – Freight volumes – steel, 2009

Origin	*Destination*	*2010 Freight Volume ('000 tonnes)*	*Domestic markets ('000 tonnes)*			*Export markets ('000 tonnes)*		
			Rail	Road	Total	Rail	Road	Total
Port Kembla	Newcastle	500	500	-	500	-	-	-
Port Kembla	Melbourne-Perth	500	500	-	500	-	-	-
Port Kembla	Newcastle	200	-	200	200	-	-	-
Port Kembla	Villawood	100	-	100	100	-	-	-
Port Kembla	Sydney Metro	400	-	400	400	-	-	-
Port Kembla	Melbourne	300	-	300	300	-	-	-
Total		*2,000*	*1,000*	*1,000*	*2,000*	-	-	-

Source: Sd+D (2009) Maldon-Dombarton Prefeasibility Study

Table 21 – Steel-related trade volumes through Port Kembla Port, 2009

Commodity	*Import ('000 tonnes)*	*Export ('000 tonnes)*	*Total Volume ('000 tonnes)*	*Comment*
Iron Ore	5,768	-	5,768	Steel production at BlueScope
Steel – Coils	58	948	1,006	Exports going to Western Port, Vic.
Steel – Slabs	5	983	988	May also be going to Western Port
Coke	-	417	417	50% from BlueScope
Limestone	182	-	182	Into BlueScope
Dolomite	152	-	152	Into BlueScope
Pig Iron	79	-	79	Into BlueScope
Coal Tar	-	53	53	By-product of steelmaking
Ferro Manganese	20	-	20	Into BlueScope
Steel – Structural	1	15	16	BlueScope
Total	*6,267*	*2,416*	*8,682*	

Source: Port Kembla Port Corporation (2009) Trade statistics

Table 21 above indicates a broader group of steel related products; to include steel processing inputs such as limestone, coke, iron ore, as well as by-products. Although mentioned in the port trade statistics, the diverse range of input and output products will be limited to steel coils, slabs and structural groups.

Based on the data drawn from industry, an estimated 4 Mt of steel products are sourced from the BlueScope steelworks in Port Kembla. Of these, 2 Mt is export oriented and does not affect the regional transport network. The remainder is split equally by rail and road modes of transport with most of the road task travelling to Sydney or Melbourne. It is expected that about 0.7 Mt or about 27,000 trucks (using

26t/semi truckload) will travel along Picton/Mt Ousley roads to reach the Sydney/Newcastle markets and similarly for Melbourne, 0.3 Mt or 12,000 trucks along the Princes Highway.

15.4 Industry and stakeholder perspectives – steel production

BlueScope raises the following issues as relevant to the study region:

- Chain of responsibility legislation brings some additional costs to road transport operations
- Urban congestion is increasingly adding to the cost of road deliveries into metropolitan Sydney
- The capacity of Illawarra line to handle freight traffic in the face of increasing passenger demand may overflow to additional truck movements
- A shortage of professional truck drivers may impact on future growth and costs
- Lighter product volumes already on road to Melbourne via Mt Ousley, Picton and the Hume Highway have an advantage over rail, in that the direct movement across to the Southern Highlands involves steep grades and additional locomotive power

15.5 Implications for road network – steel production

BlueScope and OneSteel are joint users of an integrated network of long distance services transporting a range of products from the steelworks at Whyalla, Western Port, Newcastle and Port Kembla to distribution terminals in each capital city, as well as bulk feedstock between these plants. The three main services operating on a daily basis are:

- Port Kembla-Sydney-Newcastle-Brisbane;
- Port Kembla-Sydney-Melbourne-Adelaide-Port Augusta-Perth; and
- Whyalla-Sydney-Newcastle

These trunk services are scheduled to interchange at locations such as Sydney and Newcastle to allow access to all capitals from each of the plants in a reasonably timely fashion. They run on well-defined timetables and use premium paths on the ARTC network.

Rail services between Port Kembla and Melbourne operate via the Illawarra line into Sydney, rather than the Moss Vale line, primarily because this optimises the amount of loco power required. The use of Sydney also offers flexibility regarding the loading on the east west and Brisbane services.

BlueScope also sends a substantial amount of freight into the Sydney market by road via Picton Road and Mt Ousley Rd, estimated to be up to 300 truck movements per day. This is for two reasons:

- Many of the deliveries are direct to customers who are not located near to a rail terminal in Sydney, and the costs associated with PUD transport would be prohibitive over the short distances involved
- Short haul rail services from Port Kembla into Sydney (e.g., containerised export products to Port Botany) are not currently provided by Pacific National (BlueScope's rail provider) and previous attempts to engage new entrants have been unsuccessful as they have not been able to secure suitable rail paths through the metropolitan network.

The substantial number of truck movements into Rooty Hill, Villawood and other Sydney destinations, however, (around 100-150 per day in each direction) is relevant to this study. This traffic accounts for an estimated 15-20% of heavy freight traffic on Mt Ousley. Of this total, 20-30 movements are for the Villawood distribution centre, with the balance as Sydney metro and intrastate and interstate movements.

Some product moved to Villawood is "blended" with other inventory and moved to Port Botany in international containers by rail for export to overseas markets.

15.6 Conclusion – steel production

There is benefit in considering the opportunity to operate a daily shuttle train from Port Kembla to Villawood and return, removing 40-50 truck movements from Mt Ousley in each direction. Some key considerations are:

- BlueScope operates in a highly cost competitive market, and therefore any transfer of freight to rail will only occur if it is cost effective relative to the cost of the road movement
- Timetabling of train paths must suit the operations at Port Kembla and Villawood, and train paths would need to be available for PN and new entrant operators on a competitive basis

16. CASE STUDY – MANILDRA STARCHES AND ETHANOL PLANT

16.1 Overview of the Manildra Group

The Manildra Group is a major global supplier of flour and industrial starches, glutens and food products. The Manildra starch plant at Bomaderry is one the largest in the world. This plant refines large volumes of flour and grains from the northern and western wheat belts, producing product for the domestic and export markets.

Manildra's products are primarily consumed by industry nationally as inputs to food and beverage manufacturing; supplying 30 customers in food, confectionery and pet food industries. Most of Manildra's outputs are destined for Sydney and Melbourne.

Demand for Manildra's products is driven by national and global economic conditions, particularly household food consumption. There is no expectation for a major capital investment program to increase production. Therefore it is assumed that any growth in output will occur through organic growth and productivity gains at around 1-2% per annum.

Manildra also produces ethanol as a by-product of the starch manufacturing process and ethanol is combined with fuel imports through Pt Kembla at Albion Park. The plant presently manufactures around 250 ktpa although is expected to increase further and was recently expanded.

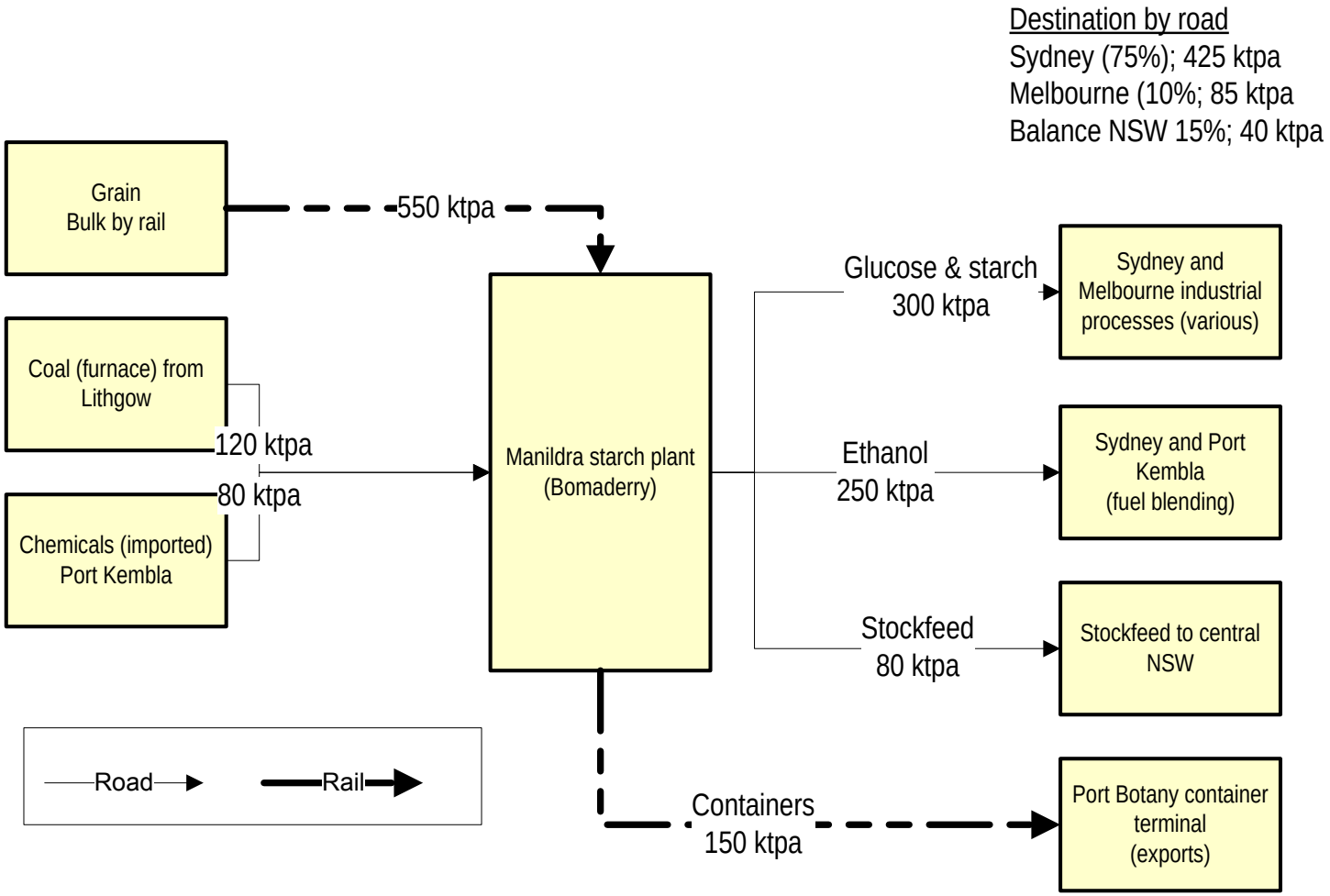
Figure 70 – Manildra's Bomaderry production facility

Source: Manildra website, www.manildra.com.au

16.2 Supply chain structure – Manildra Group

The supply chain structure for the Manildra Nowra operation is provided in Figure 71 on page 121 showing the inbound and outbound product flows.

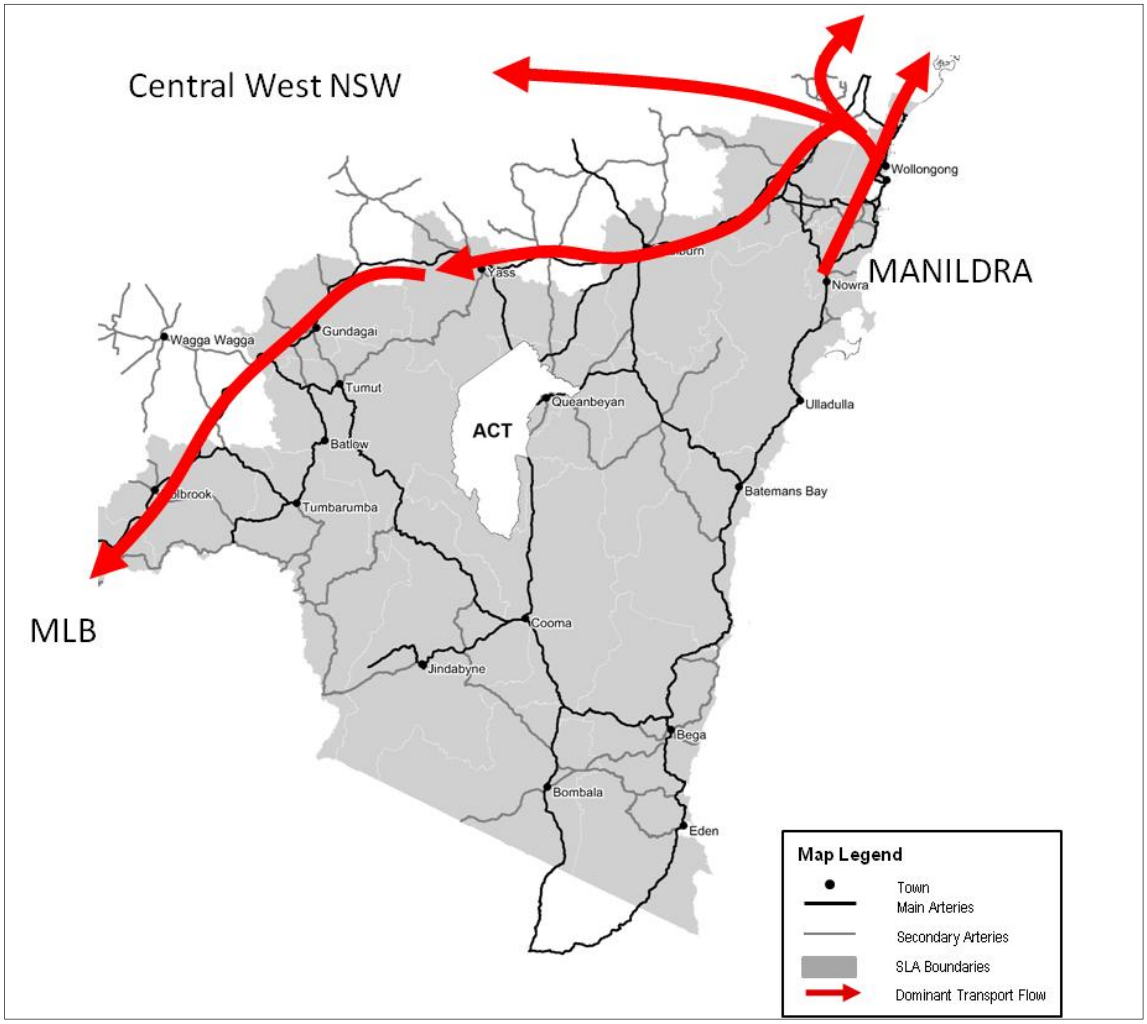
Figure 71 – Inbound and outbound flows for Manildra starch plant



16.3 Freight Flows and Transport Task – Manildra Group

Manildra's transport arrangements are strongly focussed on rail movements of bulk grain into the facility from central west NSW, and rail movement of containers to Port Botany. This transport task is supplemented by road movements to Sydney, Melbourne and the central west of NSW.

Figure 72 – Outbound flows from Manildra mill at Nowra



For inputs:

- 450 ktpa of flour from Manildra, Narrandera and Gunnedah on six trains per week on the Sydney corridor.
- 100 ktpa of sorghum from a variety of grain fields on one train per week.
- 120 ktpa of nut coal from the Western Coalfield. The size of this coal is specially suited for power generation but its characteristics are not suited to rail due to damage to the coal.

For outputs:

- 150 ktpa of containerised export products, railed to Port Botany on two trains per week. The containers used are 20' dry boxes and 20' liquid tankers, no refrigerated containers are used. The returning trains carry the empty containers for this task, sourced from Port Botany.
- One train per week transports brewers' syrup to Western Australia. It is assumed that this train has an average capacity of 1,500 tonnes per trip and is the only train operated by Manildra that uses the Moss Vale corridor.

- Liquid starch and glucose are transport by road to NSW, Vic. and Qld, with 200 road movements per week. The trucks are a mix of articulated and B-Doubles. Assuming 20 tonnes per truck, this would equate to approximately 210 ktpa. We have assumed that 65% of these flows transit the Sydney corridor and 35% on the Moss Vale corridor.
- Dry starch and gluten are transport by road to NSW, Vic. and Qld, with 100-150 road movements per week. The trucks are a mix of articulated and B-Doubles, and most of these flows transit the Picton Road to Sydney corridor and 35% on the Moss Vale corridor to access the interstate corridors.
- Stockfeed is produced as a by-product of the starch manufacturing process and sent to stockfeed plants in south-western NSW on 100 trucks per week. It is assumed that each truck carries 15 tonnes and transit the Moss Vale and Picton Road corridors.

16.4 Issues affecting distribution – Manildra Group

Isolation

- The Manildra plant has storage for between 1.5 and 2 days. In the past five years the plant experienced a five day rail closure, whereby the entire rail task was transported by road. Interruptions due to unexpected closures of rail lines do occur, but in most instances the trains are redirected to the Moss Vale corridor. Rail deviation costs are borne by the rail operators.
- The road and rail networks are vulnerable to natural disasters such as fires, floods and landslides, and due to accidents. Nevertheless, contingency plans exist for the isolation that these incidents cause and the plant has not ceased production in 11 years.

B-Doubles

- Some customers do not have the facilities to accept deliveries with B-Doubles. Consequently, current B-Double limitations on the local network are not necessarily the constraining factor to greater use of B-Doubles. However, investments to improve the efficiency (via increasing truck capacity) of the regional road transport system should be based on supporting those enterprises that have the capability of utilising larger vehicles and hence reduced transport costs.

Rail

- Curfew and passenger conflicts reduce flexibility.
- Line constraints on the Western Line reduce train productivity.
- Rail freight rates are currently competitive against road, but future rates depend on ongoing competitive viability of the privatised rail freight operators in this sector.

16.5 Implications for the network – Manildra Group

Manildra's sourcing and distribution operations channel road transport via Wollongong, and connect to the major interstate networks via Picton Road and Illawarra Highway to Moss Vale.

The absence of alternative east-west corridors therefore increases traffic on these selected road corridors.

16.6 Conclusions – Manildra Group

Manildra is a growing industrial facility in Nowra and relies heavily on road freight networks to compliment its rail operations. Its primary means of connectivity to the national road network is via Picton Road which increases its total transport task in tonne-kilometres.

17. CASE STUDY – QUARRYING AND BUILDING PRODUCTS

This case study deals with the complex and substantial supply chain associated with the quarrying, manufacture and distribution of building products within the study region. This will include a range of activities associated with:

- Gravel and sand quarrying
- Rock, limestone and claying mining
- The manufacture of building boards, bricks and other concrete products
- Building supplies wholesaling

While each of these activities is a complex supply chain in its own right, they have been consolidated given the nature of operations in the study region.

This case study will consolidate data from a number of prior studies as well as leverage economic data to estimate end-market demand.

17.1 Overview of the quarrying and building products sector

The upstream activities in the supply chain in the study area are dominated by Boral, with its extensive operations at Berrima and Marulan on the Southern Highlands. Other industry participants include Cement Australia through its Hanson operations although the cement production facilities outside the region and located in Kandos NSW. Adelaide Brighton which has established smaller operations in Wollongong and network operations through its Hanson Building products.

Boral's operations in the region are mainly focussed on movements along the Hume Highway to Sydney and along Picton Road and Illawarra Highway to Wollongong.

Half of the cement produced in Australia is consumed by the three large vertically integrated producers, being Boral, CEMEX/Readymix and Hanson. Each of these operators have localised production and distribution centres for cement, concrete, bricks, tiles and related building products through the region.

The demand across the sector is driven by new building construction and engineering construction such as highways and bridges. Recently, the study area has seen considerable growth in residential construction in the Shoalhaven region and road construction for the Hume Highway south of Yass and the Princess Highway around Kiama.

The data sources used in the various analyses for the case study are;

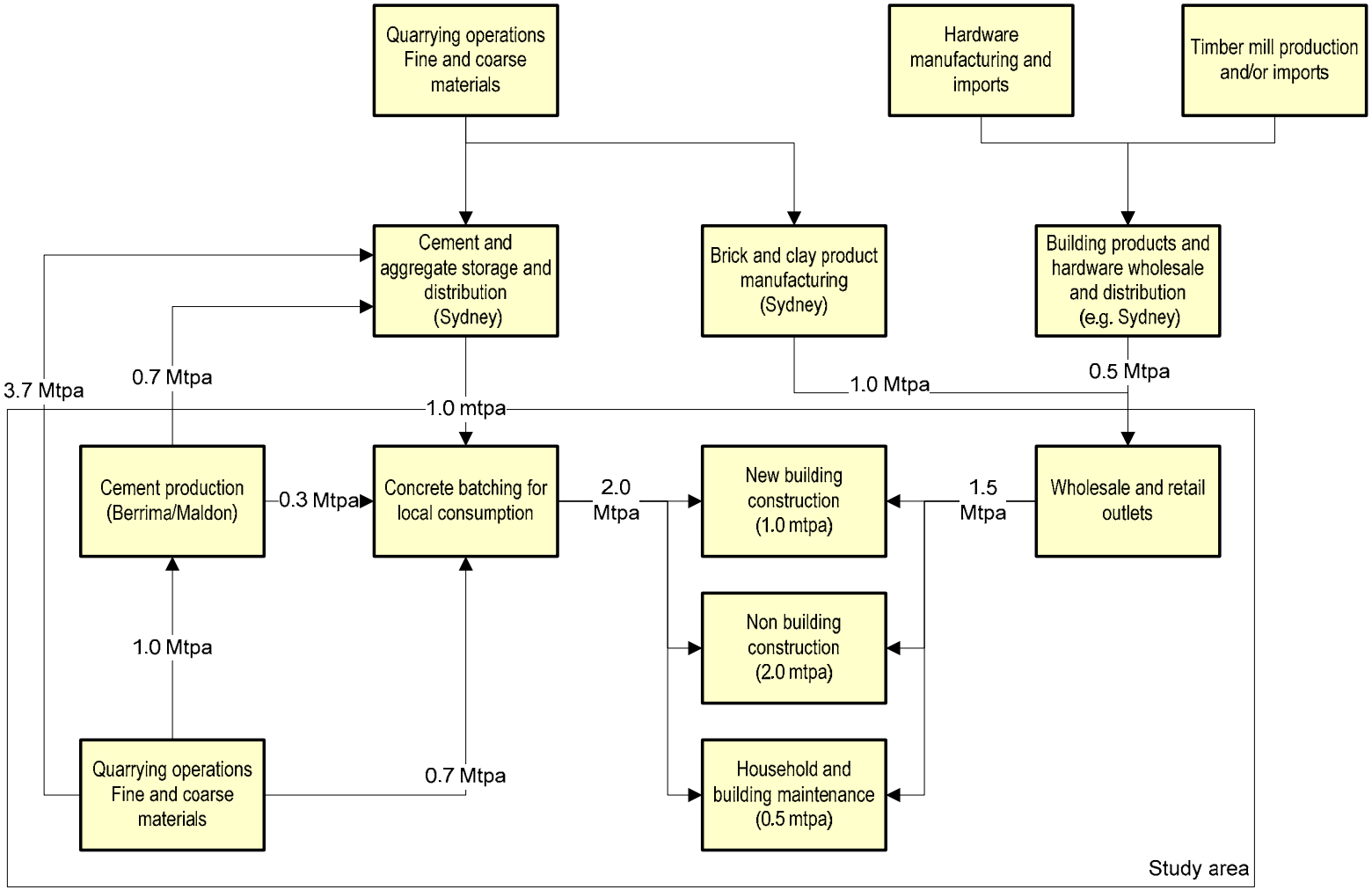
- Sd+D report on behalf of NSW Department of Planning (2006) Sydney construction materials freight strategy,
- Construction materials for the Sydney region, GEOS Mining (2006)
- DPI construction materials brochure,
- Blue Circle Southern product guide,
- ABS National regional profiles of each SLA in the study area.

17.2 Supply chain structure – quarrying and building products

The supply chain is characterised by quarries and mining activities upstream, intermediate processes such as cement, concrete, brick and board manufacturing, and staging and distribution activities closer to the market.

Figure 73 provides a generic structure for the sector. The volumes shown are broad estimates for each movement into, and within the study area. These estimates are explained further in the following sections.

Figure 73 – Quarry products, cement and concrete and building products supply chain



Note: values denote million tonnes per annum

17.3 Location of quarry resources

Figure 74 and Figure 75 on page 127 show the location of coarse and fine aggregate supply points for Sydney, which is the dominant market and also provides a stockholding for subsequent distribution.

It is estimated that around 7.35 Mtpa of quarry products are moved into the Sydney market, with around 3.7 Mtpa moved by road from the study area *(being Illawarra and South Eastern SD)*. This however fluctuates from year to year depending on the economic conditions affecting new construction activity.

Table 22 below shows the volume of material from source location, whereas Table 23 accounts for the volume moved by road along key corridors in the study area and presents low and high scenarios with an average of 3.7 Mtpa.

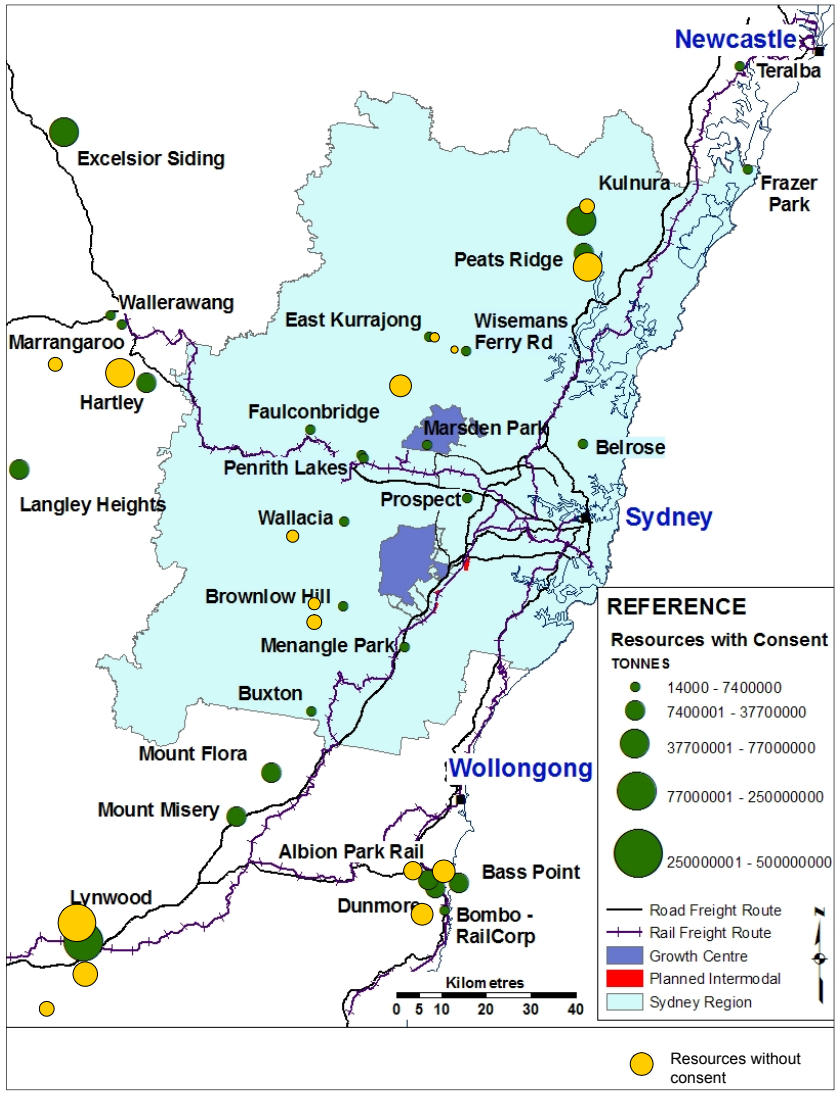
Table 22 – Raw construction inputs transported to Sydney, 2010

Material	*Origin SD*	*Tonnage (Mtpa)*
Coarse aggregate	Illawarra	2.00
	Central Western	1.00
	Hunter	0.25
	South Eastern	4.80
Fine aggregate	Illawarra	0.50
	Central Western	1.30
	Hunter	0.40
	South Eastern	0.00
Structural clay / Shale	Illawarra	0.01
	Central Western	1.80
	Hunter	0.00
	South Eastern	0.04
Total from study area	*Illawarra and South eastern*	*7.35*

Table 23 – Illawarra and Southern Highlands quarry products, 2010

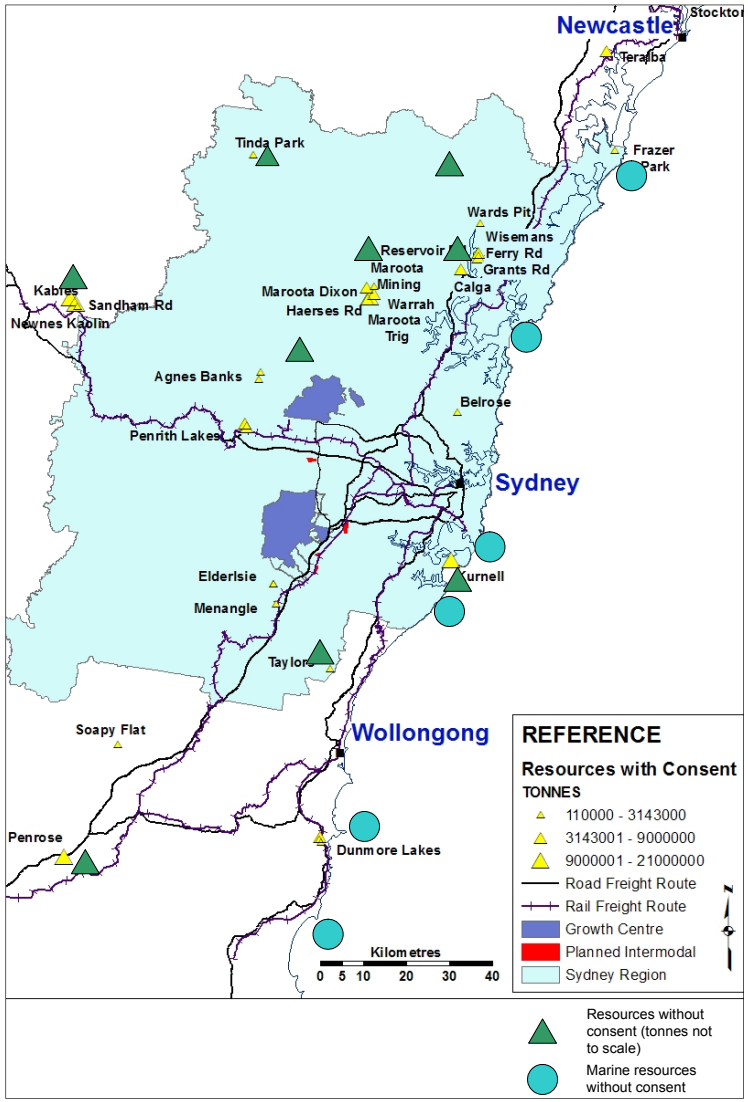
Route into Sydney	*Tonnage (lower) Mt*	*% of (lower) Total*	*Tonnage (upper) Mt*	*% of (upper) Total*
Hume Hwy	1.5	45%	1.8	45%
Princes Hwy	1.3	39%	1.5	39%
Picton Rd	0.5	15%	0.7	15%
Total	*3.3*	*100%*	*4.0*	*100%*

Figure 74 – Coarse Aggregate sources near Sydney



Source: After GEOS

Figure 75 – Fine Aggregate sources near Sydney



Source: After GEOS

17.4 Estimating the task associated with construction

The estimation of freight movements associated with distribution of building materials and products for construction is highly fragmented however the following provides a basis for determining freight volumes.

The per capita weight estimate for building products in the Sydney region is around 4.7 tonnes as per Table 24. For the study region construction rate, a lower estimate is assumed, to avoid over counting demand associated with Sydney CBD construction. An estimate of 3.5 tonnes per person is assumed, totalling 3.5 million tonnes of end-market demand for new building construction, non- building construction, and maintenance activities.

Table 24 – Average Sydney building material consumption

Material	*Per capita (t p.a.)*
Coarse aggregate	2.65
Fine aggregate	1.61
Structural clay / Shale	0.48
Total	*4.74*

Source: Construction Materials... Essential Community Resources, Department of Mineral Resources 1996

New dwelling construction is averaging around 6,000 dwellings per annum. Research from several sources indicates that the average dwelling uses about 125 tonnes of products, totalling around 750 ktpa. This value is increased to allow for non-residential construction within the region. An estimate of 1 Mtpa is assumed.

Based on data input from Boral, and factoring in market shares for Hanson and Readymix, it is estimated that the total tonnage for concrete and base for the study area is around 2.5 Mtpa, sourced from within the region and also from Sydney.

The weight associated with clay products within building construction is around 50%, with the balance of materials used in other construction activity and maintenance. An estimate of 1.0 Mtpa is assumed.

Table 25 – Total quarry products consumed in residential housing

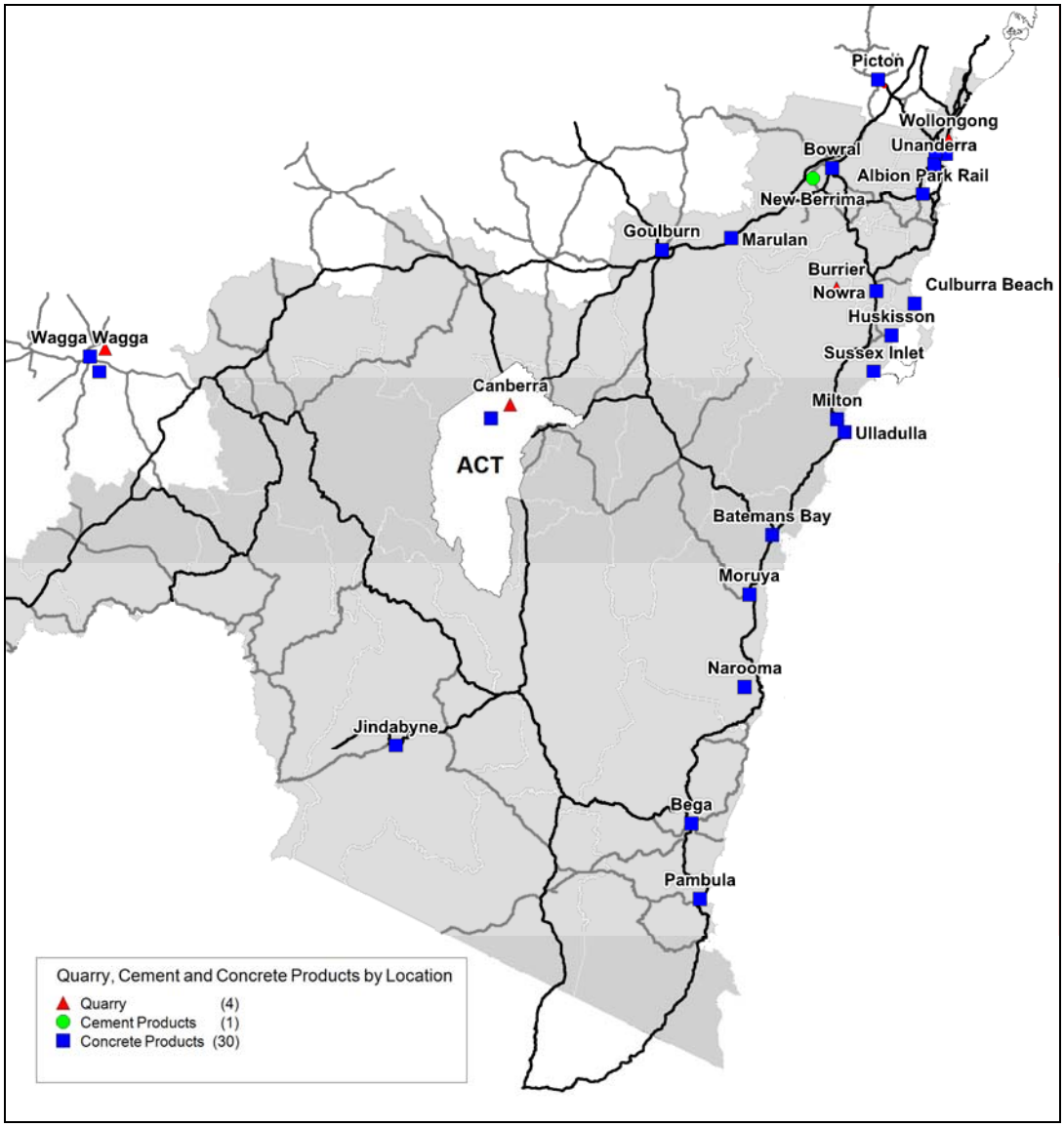
Building products	*Average mass per dwelling (tonne)*
Bricks	40
Tiles	10
Mortar	15.5
Concrete	37.4
Total	*102.9*

Source: Construction Materials... Essential Community Resources, Department of Mineral Resources 1996

Based on analysis of hardware distribution, around $1000 is spent per capita nationally and the weighted value of hardware products is around $2000 per tonne. Given that there are around 1 million persons in the study area, an estimate of 0.5 Mtpa is derived for hardware goods through wholesalers and retailers.

Each of these estimates is reflected in Figure 73 shown earlier on page 125.

Figure 76 – Location of concrete batching facilities



17.5 Freight flows and volumes – quarrying and building products

Freight movements associated with the sector are relatively easy to identify and measure in the upstream activities between quarry and downstream production facilities (mills, kilns, etc). Downstream, and closer to the market, the distribution activities are less concentrated and more difficult to measure within an O-D basis.

Figure 77 – Flow diagram – quarrying and building products

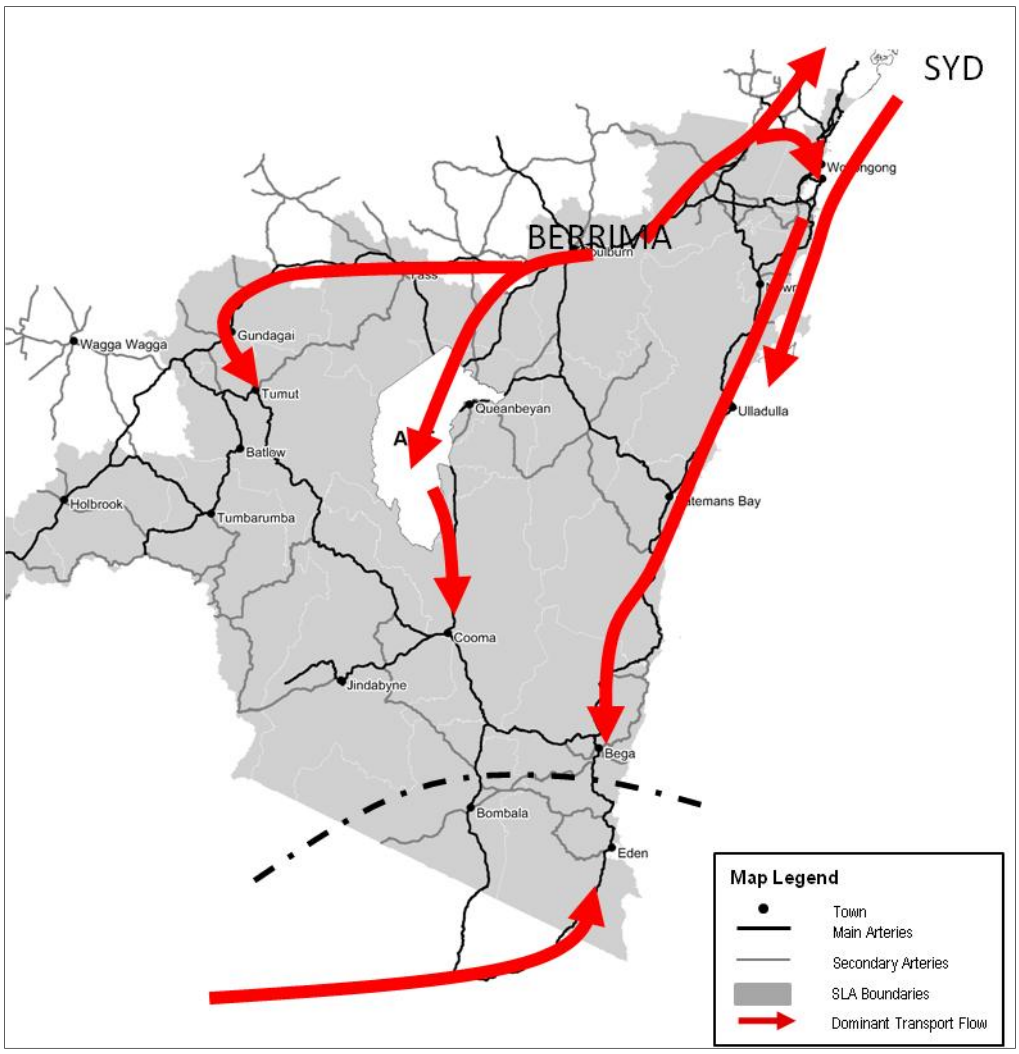


Table 26 summarises the movements by product and flow in the study area, totalling more than 13 Mtpa to, from and within the region.

Table 26 – Regional freight movements – quarrying and building products, 2006

Product	*Transport flows across the study area (Mtpa)*			*Basis of allocation in study area (by SLA)*
	From	*To*	*Within*	
Quarry products	3.7	-	1.0	Prior studies and industry advice
Cement powders	0.7	-	0.3	New building activity
Concrete products	-	1.0	2.7	New building activity
Clay products	-	1.0	1.0	New building activity
Hardware products	-	0.5	1.5	Households
Total	4.4	2.5	6.5	
Total for all movements	*13.4*			

Source: Construction materials for the Sydney region, GEOS Mining (2006), Industry consultation, Sd+D.

17.6 Industry and stakeholders perspectives – quarrying and building products

For the study area, industry stakeholders do not foresee any substantial growth in the study area in terms of quarrying activity however the demand for building products is expected to grow by around 2% per annum.

South of the Shoalhaven area, the freight transport and distribution activities are relatively dispersed and the network has sufficient capacity to meet the needs of the sector.

Between Sydney and Wollongong, both the Picton Road and Princes Highway carry substantial volumes.

The industry sector believes there is a need to develop alternative corridors to access the Illawarra region, particularly given the ongoing development of residential buildings in the Nowra and Kiama areas.

17.7 Implications for network – quarrying and building products

The movement of quarrying and related building products is extensive through the study region, and made complex by the location of product source and refractory facilities and the growth in the housing market.

While the end markets align with the pattern of population, today and into the future, the distribution patterns do not align with other population driven demand such as grocery and fuel.

17.8 Conclusion and key issues – quarrying and building products

The quarry and building products task in the study region accounts for around one-third of the transport task and future demand is expected to be strong into the future.

There is a need to develop road networks to accommodate further demands for HML-type vehicles especially from major quarrying and production facilities.

18. CASE STUDY – MOTOR VEHICLES

18.1 Overview of the motor vehicles sector

The new vehicle market for the full year 2009 reached 937,328 vehicle sales nationwide, a decrease of 74,836 or 7.4% on 2008 figures. Of this, 303,519 vehicles were sold in New South Wales and the ACT, representing 32.4% of total new vehicles sold[21], up from 31.7% in 2008. Looking ahead, the Federal Chamber of Automotive Industries (FCAI) forecasts that new vehicle sales in 2010 will exceed 940,000[22].

Whilst sales in 2009 were down 7.4% on 2008 volumes, this fall was less than it might have been, when compared to earlier periods of recession where monthly sales fell 29% from Mar-1990 to Oct-1991 and 44% from Feb-1985 to May-1987[23]. The Federal Government's small business tax break buffered the industry somewhat from the effects of the global financial crisis particularly towards the end of 2009, before the stimulus measure ended on 31 December, 2009.

New car sales for 2010 will continue to be boosted by the reduction in the import tariff on many vehicles from 10% to 5% effective 1 January, 2010. Some distributors have passed this saving on by reducing prices whilst others have increased vehicle specifications.

More than 80% of domestic new vehicles sold in Australia are imported[24]. Port Kembla is NSW's principal vehicle importing hub with the remaining NSW vehicle import trade being relocated to the port from Glebe Island in November 2008. Motor vehicles represented 19.4% of major trading commodity imports in 2008/09 and some 1,807,029 trade revenue tonnes to the Port Kembla Port Corporation[25]. Motor vehicles are predicted to account for over 57 per cent of the total value of trade through the port in future years[26].

Around 50% of cars arriving into Port Kembla are processed on site which enables importers to send cars directly from the port to the final point of sale, being the retail dealership, rather than having to first send them to a separate processing facility. The remaining vehicles are transported by road to bonded storage facilities at Minto *(PrixCar)*, Ingleburn *(Patrick Autocare)* and Clyde *(AutoNexus)*.

Completion of the Inner Harbour car import and general cargo terminals in October 2008 at the port of Port Kembla resulted in the remaining Sydney motor vehicle import trade transferring to Port Kembla in November 2008. Motor vehicle components and parts however, are still imported through Port Jackson.

18.2 Supply chain structure – motor vehicles

The move to Port Kembla for motor vehicles resulted in a threefold increase in imports of motor vehicles from the previous year through the port[27]. This change has seen significant landside development take place at the port including the provision of approximately twenty (20) hectares for Pre Delivery Inspection (PDI) facilities where imported vehicles will be prepared for delivery to motor dealerships in Sydney and regional NSW. Currently around 50% of imported vehicles are processed at port by a number of PDI

[21] VFACTS National Report, Federal Chamber of Automotive Industries (FCAI), Dec-2009.

[22] New Vehicle Market Ends Strong Year With Record December, Federal Chamber of Automotive Industries (FCAI), 6/01/2010,

[23] ANZ Motor vehicle outlook 31 August, 2009, Julie Toth, Senior Economist, ANZ Economics & Markets Research.

[24] Automotive Trade and Exports, Federal Chamber of Automotive Industries (FCAI), http://www.fcai.com.au/policy/automotive-trade-and-exports

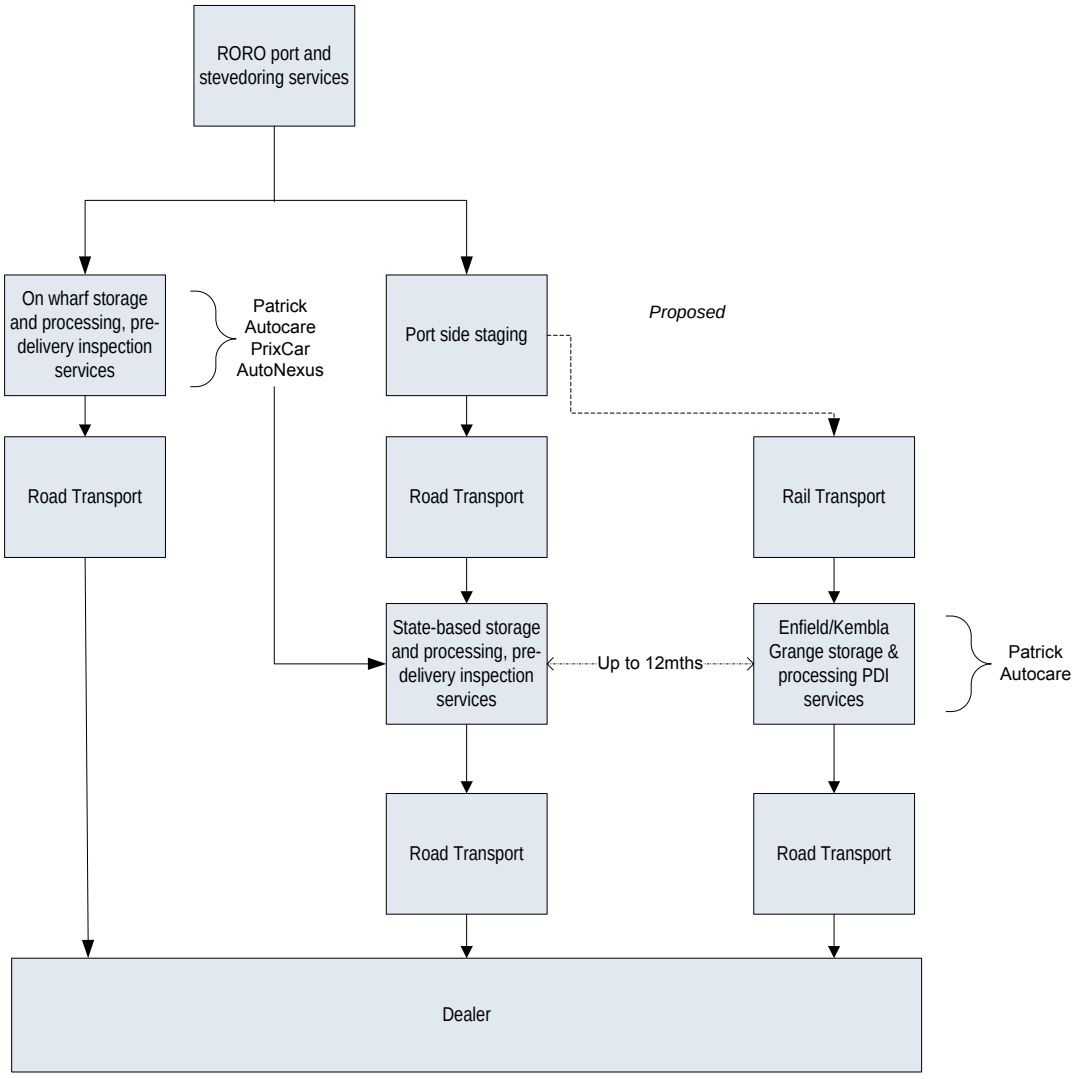
[25] Annual Report 2008-09, Trade 2008/09 Revenue Tonnes, Port Kembla Port Corporation.

[26] Port of Port Kembla Economic Impact Study, EconSearch Pty Ltd, 10 December, 2009.

[27] Annual Report 2008-09, Business Growth, Port Kembla Port Corporation.

operators. There is initial portside capacity for 7,000 vehicles upon unloading with further storage capacity for an additional 10,000 PDI vehicles. Those vehicles processed at port are generally fast moving models already allocated to dealers and specific model variants or high-end vehicles made to order.

Figure 78 – NSW supply chain structure for motor vehicle imports



This variation in the supply chain between vehicles being processed and stored in the Inner Harbour versus vehicles being transported to a bonded store; may also reflect whether the distributor operates a "push" supply chain allocating vehicles to dealers or a "pull" supply chain fulfilling specific customer orders.

Transport within the supply chain generally uses road transport for wharf cartage and distribution activity. Motor vehicles are imported to Australia through major ports in each of five capital cities. Interstate transport of motor vehicles does occur but on an infrequent basis as a result of its prohibitive cost.

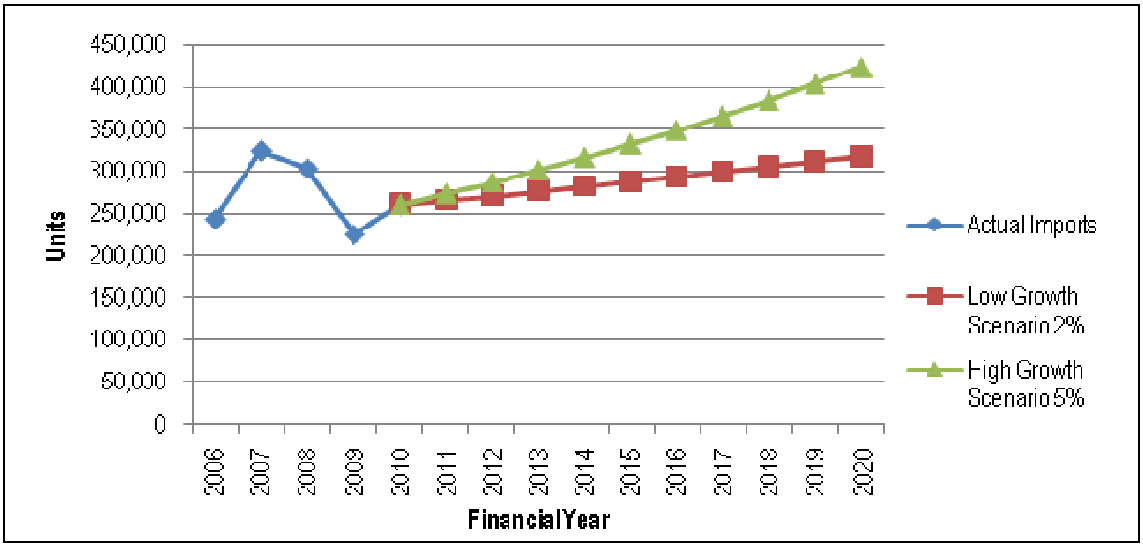
The emerging supply chain for future Port Kembla throughput however has the opportunity of integrating rail into the supply chain for part of the volume transferred to Sydney. The Illawarra line is the rail corridor presently nominated to handle this service to Enfield however the Maldon-Dombarton corridor *(currently the subject of a feasibility study)*, may provide an alternative corridor in the future. It is understood however that rail transport is not likely to become operational till 2014.

The current supply chain sees storage and staging precincts continue to operate in South West and Western Sydney with the prospect of facilities reopening at Enfield and new facilities opening at Kembla Grange, to receive vehicles from Port Kembla by rail in the future.

18.3 Freight flows and volumes – motor vehicles

In the last five years, the import of vehicles through a combination of Sydney's East Darling Harbour, Glebe Island and Port Kembla ports has ranged between 240,000 and 320,000 units. The port of Port Kembla now has three dedicated berths totalling 800 metres in length to accommodate up to three car carrying vessels simultaneously. During the 2009 year some 225,000 vehicles were processed through the port with import volumes expected to increase by up to 5% p.a. over the long term.

Figure 79 – Motor vehicle historical volumes and scenario projections to 2020



Source: Sydney Ports Corporation and Port Kembla Ports Corporation.

70-80% of the imported vehicles not processed portside are transported via Picton Road to bonded storage facilities at Minto (PrixCar), Ingleburn (Patrick Autocare) and Clyde (AutoNexus), with a smaller number of vehicle transporters travelling via Appin Road.

Vehicle transporter configurations include single vehicle tray trucks, five or seven vehicle transporters up to ten vehicle carrying trailers with side curtains.

Figure 80 – Vehicle transporters

Source: CEVA Logistics

Stakeholder engagement has revealed that an allowance of up to two months vehicle storage is made when costing local processing charges per motor vehicle, however, in some instances, time in storage can be up to twelve (12) months.

A number of factors contribute to this, including:

- lead time from overseas manufacturers to ensure reasonable local lead times,
- demand uncertainty for particular models, specifications and colours,

- price sensitivity of demand and market segment considerations, and
- Factory and distributor promotions.

Vehicles approaching twelve months in storage will be superseded by vehicles with newer build dates and are therefore likely to be discounted or otherwise incentivised in order to move them.

Table 27 – Motor vehicle volumes forecasts

Forecasting measure	*Units*	*Forecast year*					
		2010	*2012*	*2014*	*2016*	*2018*	*2020*
Port throughput	units	260,400	287,000	316,000	348,000	384,000	423,000
Assumed annual growth	%p.a.		5%	5%	5%	5%	5%
% Movement to storage							
By road	%share	50%	50%	20%	20%	20%	20%
By rail	%share	0%	0%	30%	30%	30%	30%
Total		*50%*	*50%*	*50%*	*50%*	*50%*	*50%*
% Movement to dealer							
By road	%share	50%	50%	50%	50%	50%	50%
Total volume by road	*units*	*260,400*	*287,000*	*221,200*	*243,600*	*268,800*	*296,100*
Total volume by rail	*units*	*0*	*0*	*94,800*	*104,400*	*115,200*	*126,900*
Motor vehicle units per movement							
By road	Units / trip	6	6	6	6	6	6
By rail	Units / trip	300	300	300	300	300	300
Movements per annum							
By road	Trips	43,400	47,833	36,867	40,600	44,800	49,350
By rail	Trips	0	0	316	348	384	423
Equivalent empty returns							
By road	Trips	43,400	47,833	36,867	40,600	44,800	49,350
By rail	Trips	0	0	316	348	384	423
Total movements p.a.							
By road	Trips	86,800	95,667	73,733	81,200	89,600	98,700
By rail	Trips	0	0	632	696	768	846
Working days per annum	Days	250	250	250	250	250	250
Movements per day							
By road	Trips	347	383	295	325	358	395
By rail	Trips	0	0	3	3	3	3
Picton Rd movements	*75%*	*260*	*287*	*221*	*244*	*269*	*296*
Other Rd movements	*25%*	*87*	*96*	*74*	*81*	*90*	*99*

Source: Port of Port Kembla and Sd+D

18.4 Industry and stakeholder perspectives – motor vehicles

During the last quarter of 2008, the global financial crisis began to impact new vehicle sales as consumers became more cautious about spending and access to finance was restricted. The ongoing supply of vehicles to Australia against orders placed pre-GFC in early 2008 saw stock holdings increase markedly causing an acute demand for storage capacity both at port and throughout the country.

Motor vehicle sales were boosted however during 2009, by the Federal Government's small business tax break which provided additional support, in the form of a bonus tax deduction, for Australian businesses undertaking capital investment in 2009; including the procurement of new motor vehicles. This stimulus measure had particular impact towards the end of the year as eligible assets had to be acquired before 31 December, 2009. As a result, October 2009 saw a turnaround in new car sales with an increase on the prior year for the first time in 16 months. The year-on-year increases continued in November, December and January with new vehicle market rises as follows:

Table 28 – New Vehicle Sales Oct-2009 to Jan-2010

New Vehicle Sales	*2008*	*2009*	*2010*	*Increase %*
October	79,105	80,813		*2.2%*
November	71,617	85,833		*19.9%*
December	76,510	88,708		*15.9%*
January		67,079	74,864	*11.6%*

Source: Federal Chamber of Automotive Industries (FCAI)

The Federal Government's tax break assisted in running vehicle inventories back down to normal levels; which has in turn seen motor vehicle imports slowly returning to normal levels.

18.5 Implications for road network – motor vehicles

In November 2008, Ports and Waterways Minister Joe Tripodi and Wollongong MP Noreen Hay announced an agreement to move cars by rail may soon be finalised. It was announced that Patrick Autocare and Sydney Ports Corporation had signed a 'letter of intent' and were moving forward with an agreement to transport more cars by rail. The agreement will allow Patrick Autocare to set up an open-access facility at the Enfield Intermodal Centre for unloading cars carried by rail. This facility will be available to any company seeking to move cars by rail from Port Kembla.

Mr Tripodi said the agreement was subject to an impact assessment and amendment of the current planning approval at Enfield to allow the handling of cars. *"If successful, the facility would provide capacity to move up to one third of all cars imported through Port Kembla by rail, removing trucks from Wollongong and Sydney roads,"* Mr Tripodi said[28].

Car-Tech Services operated a vehicle storage and pre-delivery inspection service out of Enfield in the 1990s and early 2000s. The operations were acquired however in 2006 by AutoNexus and at that point the Car-Tech operations moved from Enfield to Wetherill Park. The Enfield storage facility however still exists and is outlined in yellow in the Google Earth photo above, located adjacent to the Enfield Intermodal Logistics Centre.

In addition to the proposed Enfield facility, Patrick Autocare has also acquired a property in the order of 10-14 hectares at Kembla Grange, earmarked to receive vehicles ex Port Kembla for processing and storage.

[28] "More Cars on Rail", Harbourline Newsletter Edition 1: 2009, Port Kembla Port Corporation.

This location also bides well for railing vehicles from port with the opportunity for a rail siding to be developed.

The cars on rail scenario would have positive implications for the South Eastern NSW road network in removing a proportion of vehicle transporters from the road network in the study area, however, at this stage the concept does not appear to have progressed and it is likely that motor vehicles export will continue to be transported by road over the next few years.

18.6 Conclusion – motor vehicles

There are essentially three categories of motor vehicle transport movements that currently impact upon the study area as follows:

- motor vehicles ex Port Kembla transported to storage facilities in Western Sydney (40 kt) and South Western Sydney (252 kt),
- motor vehicles ex Port Kembla transported direct to dealers (122 kt), and
- Motor vehicles ex Sydney storage facilities transported back into the study area to dealers (26 kt).

Motor vehicle imports into Port Kembla are forecast to be 260,400 units for the 2009/10 year which translates into 260 car carriers per day on Picton Road and 87 car carriers per day on other roads in the region, including Appin Road.

19. CASE STUDY – PORT KEMBLA THROUGHPUT

19.1 Overview of Port Kembla

Port Kembla is a key component of the infrastructure platform in the study area, and is one of the three pillars of the NSW Government ports strategy along with Port Botany and Port of Newcastle.

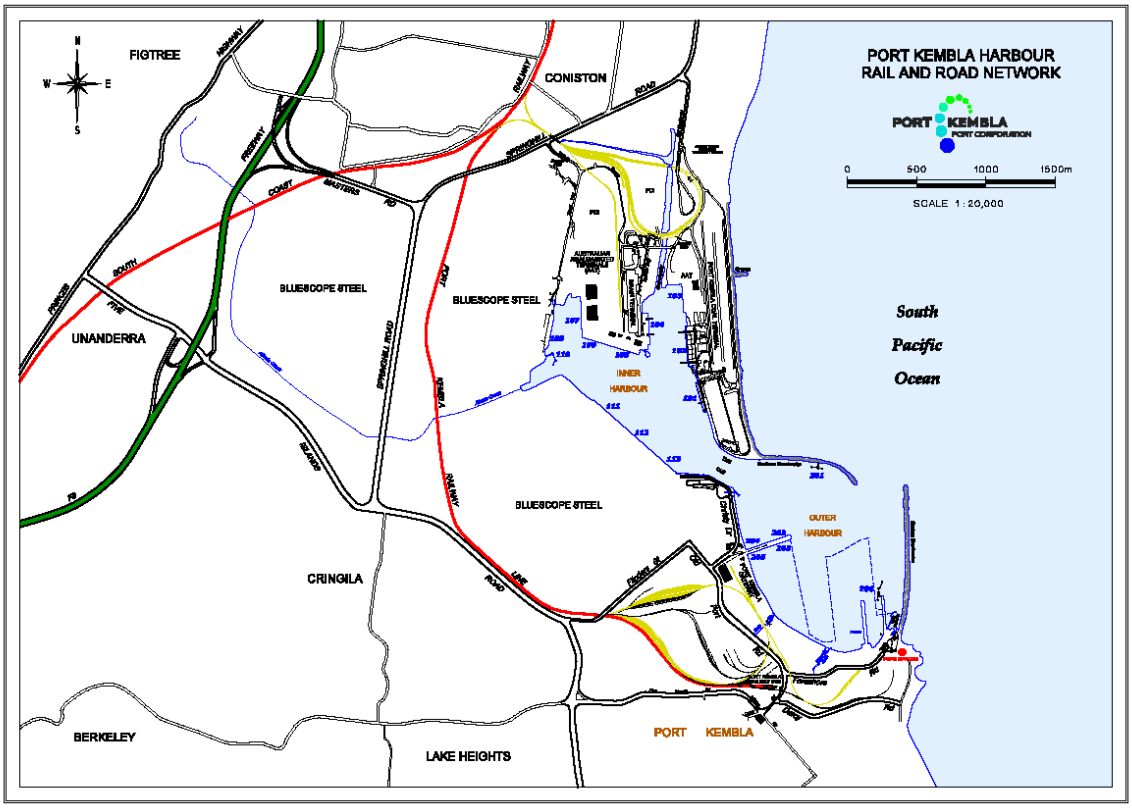
The port was originally built to support the export of coal from the region, and the imports and exports associated with the steelworks located in the close vicinity. The trade base has been progressively expanded to include the handling of a wider range of cargoes than have been traditionally handled. Expansion into break bulk, containerised cargo, and grains sourced from Southern and South Western NSW has supported the growth of the port activities.

The recent closure of cargo activities in Sydney's White Bay area has seen Port Kembla become the largest motor vehicle importing hub in Australia, and the infrastructure required to support this industry resulted in the construction of three new berths at the port.

Future developments in and around the port will also serve to increase access and facilitate the growth of commodities moving through the port. The planned Outer Harbour development will see the construction of an additional seven new berths and additional land based infrastructure to accommodate increased freight movements. The potential development of the Maldon-Dombarton Rail Link will improve access to the port for industries based in South Western Sydney and increase flexibility for import and export businesses based in that growing region of Sydney.

Figure 81 below shows the position of the Port relative to other key locally based industries and relative to local road infrastructure links to highlight the importance of integrated infrastructure in the region.

Figure 81 – Port Kembla and related industry and road links



Source: Port Kembla Port Corporation (PKPC).

19.2 Trade Volumes Port Kembla

The major commodity throughputs for Port Kembla are covered in the case studies represented in this report, however there is a wide range of commodities that move through the port and are represented in lesser volumes.

Table 29 below outlines the lesser volume commodities, their estimated volumes, and transport mode.

Table 29 – Port Kembla throughput – miscellaneous commodities, 2008/09

Commodity	*Imports (tonnes)*	*Exports (tonnes)*	*Total Volume (tonnes)*	*Mode*
Copper Ore & Concentrates		373,505	373,505	Rail
Gypsum	111,750		111,750	Road
Wind Energy Equipment	93,531		93,531	Road
Steel Pipes	70,528	6,413	76,941	Road
Steel Scrap		75,812	75,812	Road
Sulphuric Acid	61,781	4,005	65,786	Road
General Cargo	40,144	18,817	58,961	Road
Boats and Floating Structures	38,285	2,174	40,459	90% Road
Industrial Machinery & Equipment	15,482	5,635	21,117	Road
Soda Ash	16,236		16,236	Road
Sawn Timber	54,684		54,684	Road
Other Vehicles	182,334	20,374	202,708	Road
Motor Vehicle Parts & Accessories	15,858	1,305	17,163	Road
Cement Clinker	77,000		77,000	Road
Fertilisers	35,538		35,538	Road
Agricultural Machinery Equipment & Parts	23,395	165	23,560	Road
Woodpulp	23,249	4,626	27,875	Road
Construction machinery parts	14,450	2,013	16,463	Road
Total	*874,245*	*514,844*	*1,389,089*	
< 10,000 Revenue Tonnes				
Manganese Ore	5,498		5,498	
Sodium Sulphate	5,246		5,246	
Magnesite	5,029		5,029	
Caustic Soda	4,014		4,014	
Bauxite	3,242		3,242	
Motor Lorries	1,901	1,119	3,020	
Mining Equipment	2,510	479	2,989	
Ethanol	1,605		1,605	
Other Manufactured Parts	715	40	755	
Paper & Paperboard	64		64	
Oats	26		26	
Hydrogen Peroxide	24		24	
Gaseous Hydrocarbons	18		18	
Total	*29,892*	*1,638*	*31,530*	

Source: Port Kembla Port Corporation (PKPC) Trade 2008/09 Revenue Tonnes

The table shows a diverse range of commodities moving through the port, with the predominant (known) transport mode being road. The catchment area for Port Kembla suggests that these commodities have origins and destinations across NSW, but most probably in Southern and South Western NSW and South Western Sydney.

The emphasis on road as the predominant transport mode also suggests that the movement of these commodities would be on corridors common to other commodities, namely Mt Ousley Rd, Picton Rd, and the F6 Freeway.

19.3 Conclusion – Port Kembla Port

While the port is recognised for its coal, grain and steel volumes, other products can account for around 700 kt port throughput.

Distribution of these products is generally in and around Wollongong urban area with other movements north along Picton Rd and the Princes Highway to Sydney. Arguably these movements are captured within the various transport strategies for the Wollongong urban area.

20. FREIGHT DEMAND – THE BASE CASE

This section consolidates prior analysis, including the case studies to develop a Base Case of the 2009 logistics task. From this, an estimate of the tonnage and trips is derived for the forty-three (43) segments of the freight network.

20.1 Restating the top-down view

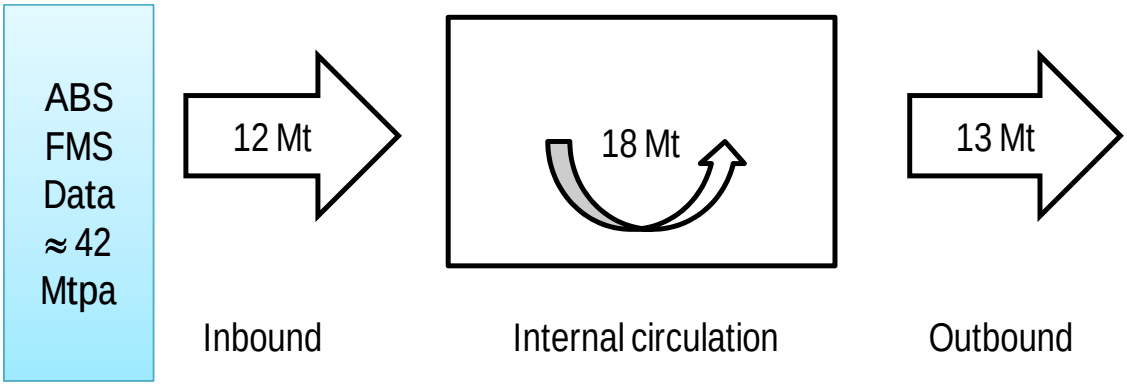
As outlined previously in *Section 5 – Overview of freight demand in the study area*, a generalised estimate for 2009 freight demand was derived by extrapolating the 2001 ABS freight movement data to 2009, by:

- Applying an annual growth rate of 2.5% for movements between Sydney and the Illawarra, and within the Illawarra
- Applying an annual growth rate of 1.0% for movements to, from and within the remainder of the region, and
- Adjusting the freight volumes downwards to reflect the fact that around 5 Mtpa of coal movements from Sydney to the Illawarra by road have ceased since 2001.

It should be noted however that this process has limited utility having only been undertaken to develop an indicative estimate for comparison with the case studies.

The following diagram summarises the indicative freight demand estimates for 2009.

Figure 82 – Top-down freight volumes, 2009



Source: 2001 ABS freight movements data extrapolated to 2009 (numbers rounded)

The tonnages associated with all freight flows derived from the ABS Freight Movements Study data total just over 42 Mtpa. These numbers provide a yardstick, or the top-down view, against which the realism of the case study numbers can be assessed.

20.2 Consolidating the case studies

The value of case study and associated supply chain analysis cannot be underestimated. This approach facilitates a good understanding of what is actually happening on the ground in the study area and lays the foundations for the bottom-up view of freight analysis, supported by real numbers. Whilst the focus has been on the major industries in the area, it is not possible to capture industries in their entirety. Table 30 below brings together the data gathered in each of the reported case studies in terms of tonnages.

Table 30 – Consolidated case study freight volumes, 2009

Sector		*Observed case study volumes, 2009 ('000 tonnes)*			
		Within	Outbound	Inbound	All flows
1	Steel	2,625	1,000	0	3,625
2	MV	16	397	26	439
3	Coal	6,500	0	0	6,500
4	Coke	420	0	0	420
5	Port, miscellaneous	362	374	105	841
6	Dairy	184	207	44	435
7	Horticulture, marine	55	65	7	127
8	Grain Export	0	0	150	150
9	Manildra	80	550	120	750
10	FMCG	1,147	0	1,339	2,485
11	Fuel	0	0	897	897
12	Forestry, Plantation	3,375	140	2,376	5,891
13	Timber, Paper	0	1,390	0	1,390
14	Other Industrial	0	0	0	0
15	Quarrying	1,000	3,700	0	4,700
16	Cement, Concrete, Clay	4,000	700	2,000	6,700
17	Building Products	500	0	500	1,000
18	Other	0	0	0	0
	Total	20,264	8,523	7,563	36,350
	% direction	56%	23%	21%	100%

This real data is then uplifted to account for other industry participants who were not specifically interviewed in conducting the case studies.

20.3 Accounting for unexplained demand in the base case

Differing levels of confidence were derived for each case study as to the percentage of the industry that was captured versus the size of the industry as it impacts upon the study area. As a result, based on this and other known factors affecting each industry, uplift factors between 5% and 30% have been adopted.

Each case study is assessed in isolation as to the uplift factor required to be applied to the original numbers in order to account for the entire industry and the various participants operating in the study area. Once the uplift factor is applied, these numbers aggregated, represent *the Base Case*.

In deciding uplift factors, regard is paid to the extent of each industry that was captured during the stakeholder engagement process. For example:

- BlueScope Steel is the major operator in the steel industry in the area. As such, actual freight data gathered in speaking with BlueScope and the Port Kembla Port Corporation (PKPC) provides a good representation of total freight data for that industry in the study area and an uplift factor of just 5% is applied as a result.
- With regard to the motor vehicle industry, all passenger and light commercial vehicle movements have been captured primarily via discussions with the Port Kembla Port Corporation and industry participants. However, it is also known that other vehicles including

heavy vehicles, agricultural and industrial machinery and equipment as well as construction machinery parts and other related parts and accessories are also imported on RORO vessels through Port Kembla. For example, Wallenius Wilhelmsen has a pre-delivery and inspection facility at Kemblawarra for processing trucks, backhoes, agricultural equipment and other vehicles. Total tonnages are known for these other vehicles via port throughput records and an uplift factor of 10% for the industry allows these additional tonnages to be captured.

- At the other end of the scale, an uplift factor of 30% has been applied to Port Kembla throughput not elsewhere stated. As described in Section 19 – Case study – Port Kembla throughput, this case study picks up a variety of port throughput that has not been captured in any of the reported case studies. As the nature and volume of port throughput varies from year to year, an uplift factor of 30% has been applied to this sector taking into account the planned port development works and those already underway to increase port capacity.

The following table summarises the scaling factors for each of the sectors considered in the case studies.

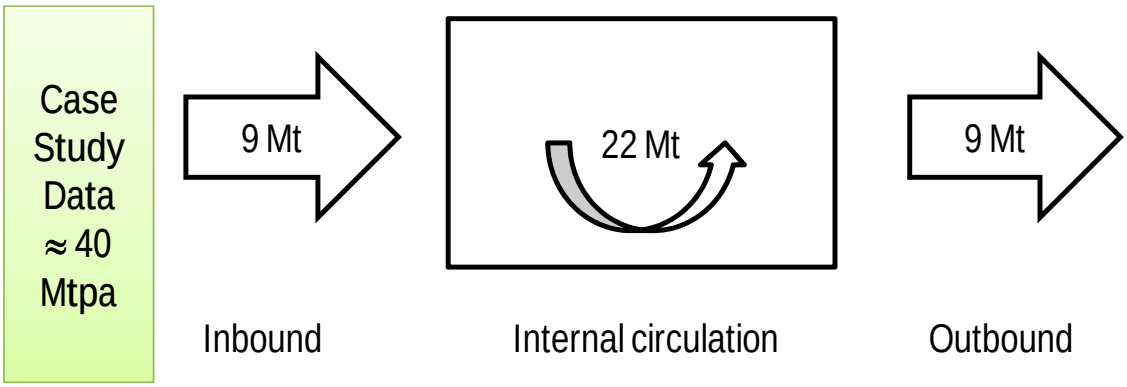
Table 31 – Industry uplift factors to arrive at the Base Case

Sector		*% not captured in case study*
1	Steel	5%
2	MV	10%
3	Coal	5%
4	Coke	10%
5	Port, miscellaneous	30%
6	Dairy	20%
7	Horticulture, marine	20%
8	Grain Export	10%
9	Manildra	5%
10	FMCG	20%
11	Fuel	20%
12	Forestry, Plantation	10%
13	Timber, Paper	10%
14	Other Industrial	30%
15	Quarrying	10%
16	Cement, Concrete, Clay	10%
17	Building Products	10%
18	Other	20%

20.4 Confirming the base case

The Base Case represents the known 'as is' situation in respect to inbound, internal and outbound freight, or the bottom-up view. The total uplifted tonnages associated with all freight flows derived from the case study data are just over 40 Mtpa as shown in Table 32 below.

Figure 83 – Base Case freight volumes, 2009



Source: Consolidated case study freight movements data for the study area including the ACT.

Table 32 – Base case freight volumes, 2009

Industry sector		*Freight volumes, 2009 ('000 tonnes)*				
		Within	Outbound	Inbound	All flows	%share
1	Steel	2,756	1,050	0	3,806	10%
2	MV	18	436	28	483	1%
3	Coal	6,825	0	0	6,825	17%
4	Coke	462	0	0	462	1%
5	Port, miscellaneous	471	486	137	1,093	3%
6	Dairy	221	248	53	522	1%
7	Horticulture, marine	66	78	8	152	0%
8	Grain Export	0	0	165	165	0%
9	Manildra	84	578	126	788	2%
10	FMCG	1,376	0	1,606	2,982	7%
11	Fuel	0	0	1,076	1,076	3%
12	Forestry, Plantation	3,713	154	2,614	6,480	16%
13	Timber, Paper	0	1,529	0	1,529	4%
14	Other Industrial	0	0	0	0	0%
15	Quarrying	1,100	4,070	0	5,170	13%
16	Cement, Concrete, Clay	4,400	770	2,200	7,370	18%
17	Building Products	550	0	550	1,100	3%
18	Other	0	0	0	0	0%
	Total	22,041	9,400	8,563	40,004	100%
	% direction	55%	23%	21%	100%	-

20.5 Rationale for converting tonnes to trips

Having established the base case in terms of tonnes, there is a requirement to convert these tonnages into numbers of truck trips. The rationale for this conversion is that it enables freight movements to be analysed in physical terms. For each case study, industry consultation has been sought with regard to:

- truck configurations
- fleet composition
- truck capacity, and
- back loading.

Further information on conversion considerations by industry is provided at Table 54 in Section 23.3 of the Appendices – Supplementary base case data.

The following Table 33, summarises estimated number of trips for each sector across the study area, and includes movements to / from the ACT.

Table 33 – Base case truck trips, 2009

Sector		*Total articulated vehicles including backloads ('000 trips)*				
		Within	Outbound	Inbound	All flows	%share
1	Steel	177	67	0	244	10%
2	MV	3	73	5	80	3%
3	Coal	370	0	0	370	16%
4	Coke	29	0	0	29	1%
5	Port, miscellaneous	35	36	10	80	3%
6	Dairy	14	16	3	34	1%
7	Horticulture, marine	5	6	1	11	0%
8	Grain Export	0	0	11	11	0%
9	Manildra	4	28	6	38	2%
10	FMCG	115	0	134	249	10%
11	Fuel	0	0	85	85	4%
12	Forestry, Plantation	238	10	168	415	17%
13	Timber, Paper	0	86	0	86	4%
14	Other Industrial	0	0	0	0	0%
15	Quarrying	53	196	0	249	10%
16	Cement, Concrete, Clay	212	37	106	354	15%
17	Building Products	26	0	26	53	2%
18	Other	0	0	0	0	0%
	Total	1,280	554	554	2,388	100%
	% direction	54%	23%	23%	100%	-

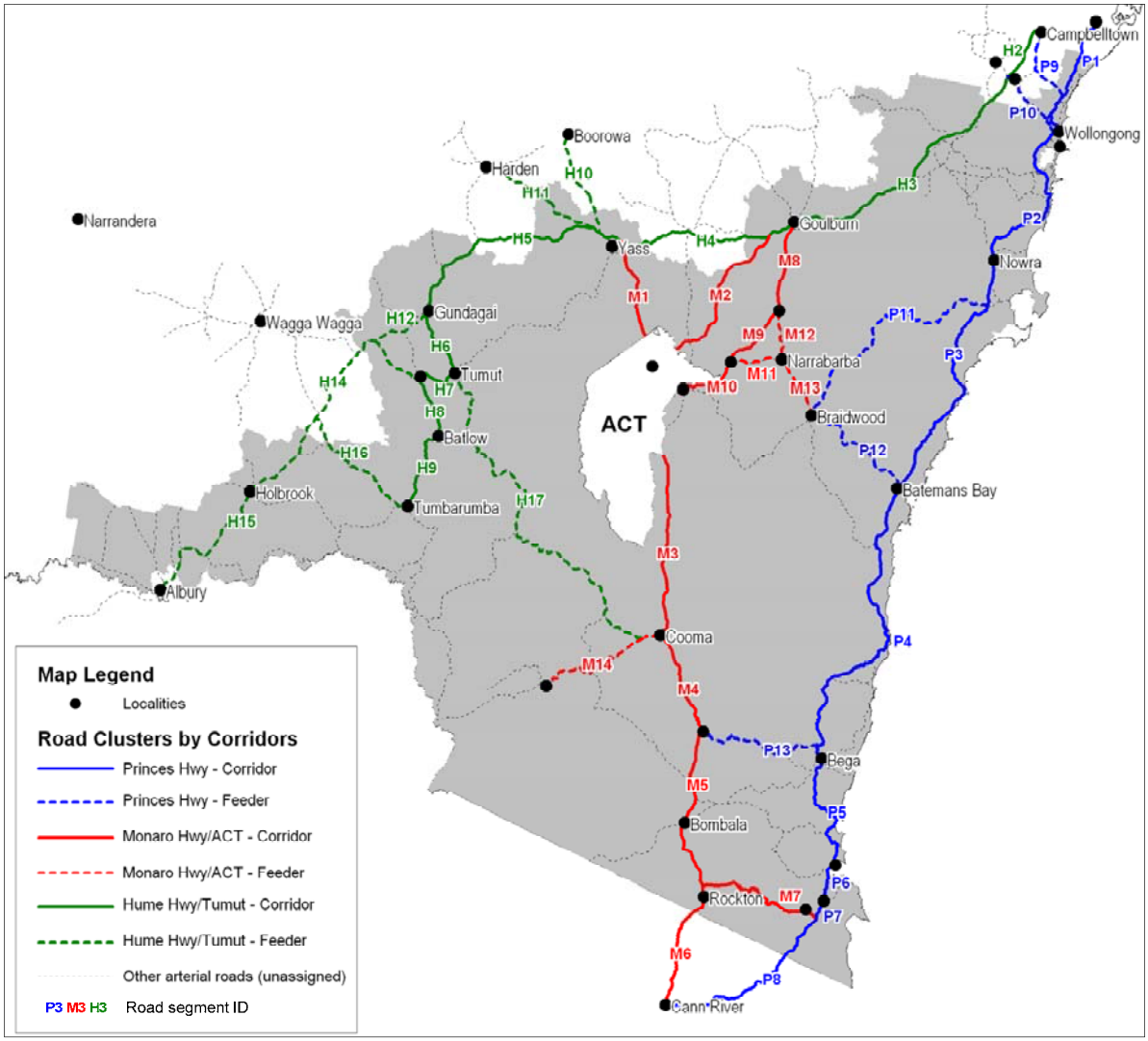
20.6 Segment analysis

Section 5 – Analytical framework on page 46 includes a section detailing the segmentation of the network. The origin-destination analysis undertaken as part of each case study enables the base case tonnages and number of truck trips to be directly assigned to each individual road segment in the study area. These segments have been further classified into the three dominant corridors and associated feeder groupings in the study area, being:

- the Princes Highway corridor
- the Monaro Highway / ACT corridor, and
- The Hume Highway / Tumut corridor.

These segments are plotted on the map below which is repeated from Section 5 for ease of reference.

Figure 84 – Map of corridor / feeder groupings



Note: Illawarra Highway excluded from forecasting of long-haul movements (see Section 5.2).

The base case data is depicted graphically below for each corridor / feeder grouping.

From the graph, the segment experiencing the greatest level of demand is the Wilton-Picton to Wollongong (P10) segment at 224,000 truck trips per annum carrying almost 3 Mtpa. The Sutherland to Wollongong (P1) segment is experiencing the next highest level of demand at 206,000 truck trips per annum carrying just over 3 Mtpa.

It should be noted however, that Picton Road movements are known to have been underestimated when compared to observed traffic counts. The bottom-up nature of the case study approach enables a partial analysis of freight demand in the area as it is not possible to capture all industries or entire industries within the scope of the study or to capture through traffic.

Figure 85 – Princes Highway Corridor Base Case 2009 Study Tonnages and Truck Trips

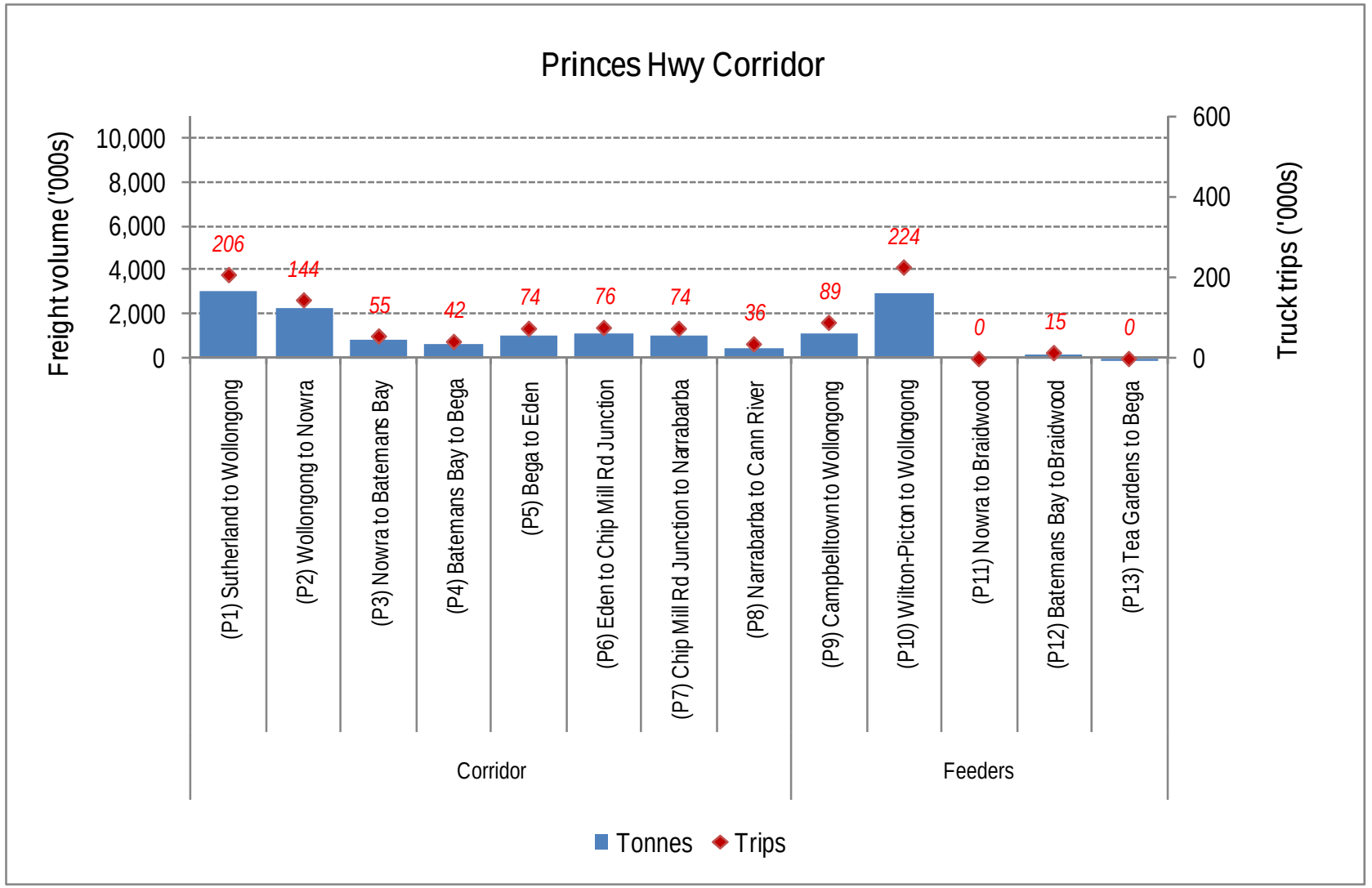


Figure 86 – Monaro Highway / ACT Corridor Base Case 2009 Tonnages and Truck Trips

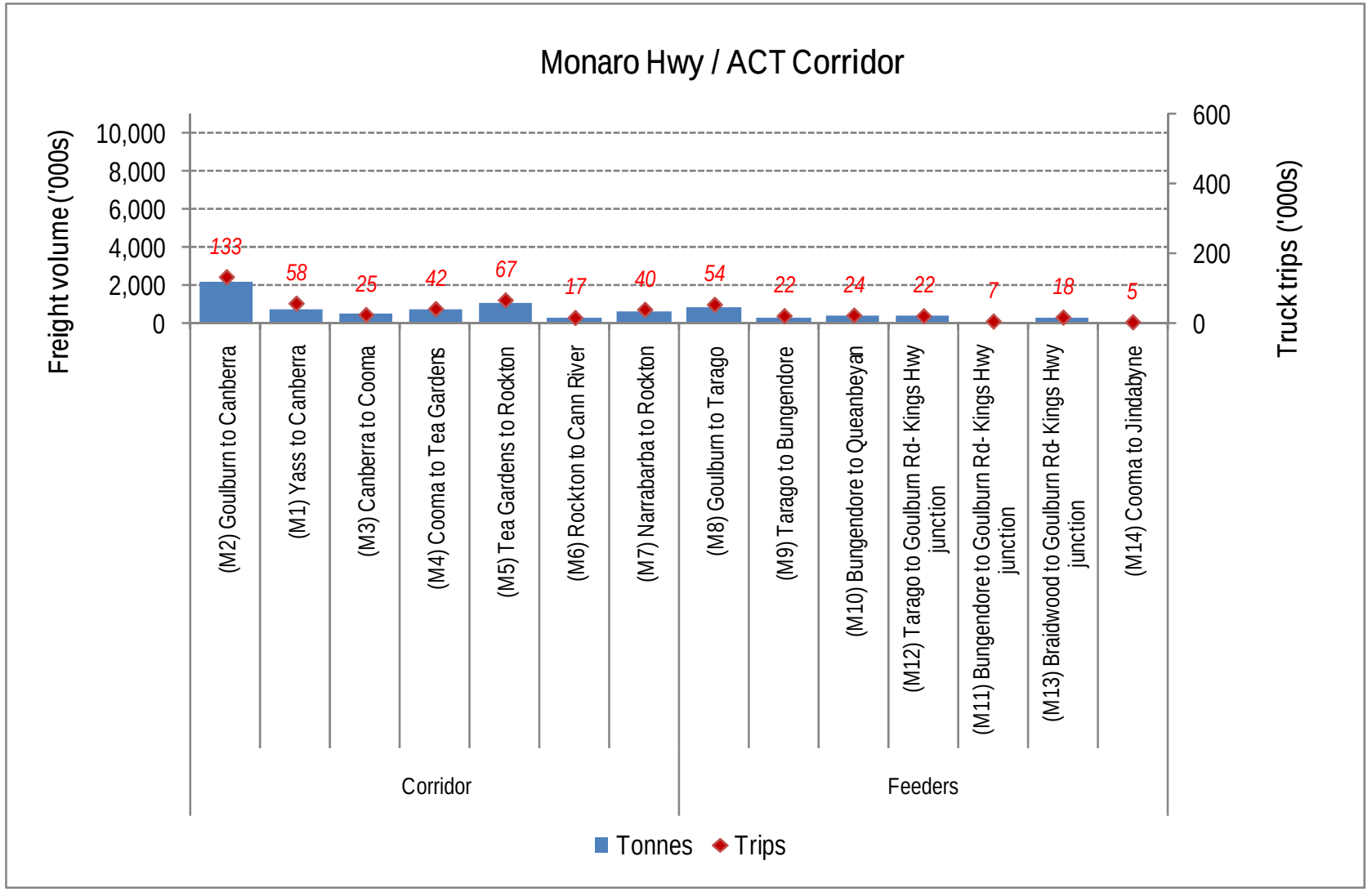
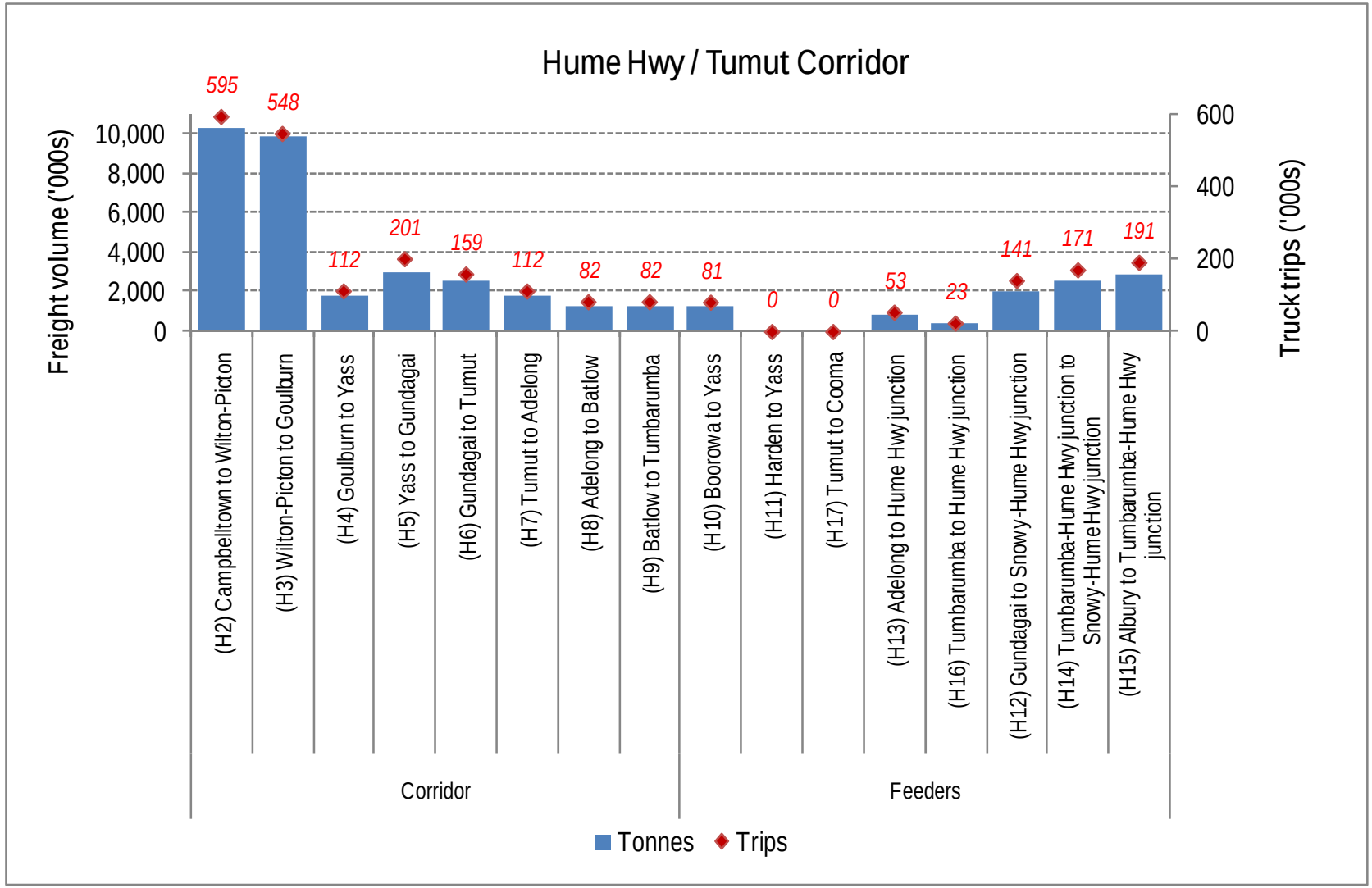


Figure 87 – Hume Highway / Tumut Corridor Base Case 2009 Study Tonnages and Truck Trips



20.7 Validation of current truck volumes

The RTA provided Weigh-In-Motion System (WIMS) data from the two locations within the study area. This section compares these observed traffic counts with base case volumes derived from the analysis in this report.

The Austroads vehicle classification system is provided at Table 49 in Section 23.1 of the Appendices – Heavy Vehicles, for reference purposes.

Table 34 – Vehicle classifications, 2009

Austroads vehicle class	*Monaro Highway, Michelago*				*Princes Highway, Batemans Bay*			
	NB	*SB*	*Total*		*NB*	*SB*	*Total*	
	Month	*Month*	*Month*	*Annualised*	*6 months*	*6 months*	*6 months*	*Annualised*
1	35,491	40,801	76,292	915,504	500,684	579,523	1,080,207	2,160,414
2	2,720	3,604	6,324	75,888	20,759	24,391	45,150	90,300
3	1,374	1,492	2,866	34,392	27,086	28,695	55,781	111,562
4	197	215	412	4,944	4,065	4,495	8,560	17,120
5	12	16	28	336	512	565	1,077	2,154
6	76	88	164	1,968	1,228	1,179	2,407	4,814
7	109	163	272	3,264	1,226	1,291	2,517	5,034
8	63	69	132	1,584	910	1,283	2,193	4,386
9	912	1,115	2,027	24,324	7,162	6,847	14,009	28,018
10	262	304	566	6,792	588	671	1,259	2,518
11	0	1	1	12	4	7	11	22
12	1	0	1	12	3	1	4	8
All classes	41,217	47,868	89,085	1,069,020	564,227	648,948	1,213,175	2,426,350

Source: WIMS from RTA (2009).

Table 35 -Vehicle classification summary, 2009

Vehicle class	*Monaro Highway, Michelago*					*Princes Highway, Batemans Bay*				
	NB	*SB*	*Total*			*NB*	*SB*	*Total*		
	Month	*Month*	*Month*	*Annualised*		*6 months*	*6 months*	*6 months*	*Annualised*	
Cars (Class 1-2)	38,211	44,405	82,616	991,392	92.7%	521,443	603,914	1,125,357	2,250,714	92.8%
Rigid / Bus (Class 3-5)	1,583	1,723	3,306	39,672	3.7%	31,663	33,755	65,418	130,836	5.4%
Articulated (Class 6-12)	1,423	1,740	3,163	37,956	3.6%	11,121	11,279	22,400	44,800	1.8%
Total vehicles	41,217	47,868	89,085	1,069,020	100%	564,227	648,948	1,213,175	2,426,350	100%

Source: WIMS from RTA (2009).

Table 36 – Comparison between WIMS and Sd+D base case volumes (2009)

RTA WIM site	*Sd+D road segment*	*Annual traffic volume 2009 (vehicles)*		
		WIMS	*Sd+D*	*% captured by case studies*
All classes				
Michelago (MI)	-	1,069,020	-	-
Batemans Bay (BB)	-	2,426,350	-	-
Class 6-12 (articulated)				
Michelago (MI)	(M3) Canberra to Cooma	37,956	25,428	67%
Batemans Bay (BB)	(P4) Batemans Bay to Bega	44,800	41,892	94%

Source: RTA (2009), Sd+D.

For both locations, the percentage of vehicles captured by the case study methodology is less than the observed vehicle counts. This is to be expected given that the study follows a bottom-up approach assessing supply chains that are important to the study region.

It can be seen that the Princes Highway is highly relevant to the case studies that have been undertaken, as indicated by 94% of the articulated vehicle count being captured.

It must be recognised however that there is traffic moving through the region, particularly from the Gippsland region, with origins and destinations that fall outside the study area. There is also a myriad of traffic from small supply chains that are highly fragmented and not in themselves, significant. It is impossible in the scope of this study to capture these.

AADT counts were also sourced for the east-west corridors in the RTA Southern Region however the truck composition did not differentiate between rigid and articulated trucks and was insufficiently detailed to provide a comparison with the reported case study data.

21. ECONOMIC FORECASTS

21.1 Forecasting indices

Having established the Base Case as at 2009 in the preceding section, the analysis now moves onto deriving the Future Case.

The purpose of this section is to determine forecasting indices to use in evaluating the future case to 2021 and 2031.

Estimating growth rates to forecast demand in 2021 and 2031 requires the consideration of three causal factors:

- Sectors where production capacity limits exist and further growth will be constrained into the future.
- Sectors where growth is driven by population growth in the study area, or the wider Australian population.
- Other industry specific factors.

Table 37 below summarises this approach.

Table 37 – Basis of freight forecasting indices

Growth factor	*Data sources*
Capacity or production constraints	Industry advice based on present outlook
Population growth	Population forecasts by government
Sector specific factors	Industry or economic databases e.g. ABARE, IBISWorld,etc.

21.1.1 Capacity or production constraints

For some industries there is finite growth; where these industries continue to grow to a ceiling and then plateau i.e. coal into Port Kembla Port has a maximum limit of 10 Mtpa. The reason for this is that this level of throughput represents the current capacity limit at the Port Kembla coal terminal. Similar production capacity constraints apply to coke, grain exports and forestry plantations. There are ceiling output levels that these respective industries expect will be reached in the next 5-10 years.

21.1.2 Population growth

Population driven demand is assessed in two ways. Firstly, inbound goods, which are consumed within the study area, are based upon the population growth rate of the area. Secondly, outbound goods, which are consumed outside the study area, are based upon the population growth rate for Australia as a whole.

For the purpose of the analysis, an estimated population growth rate for Australia as a whole of 1.8% p.a.[29] has been selected to calculate the forecasts for those industries that have a predominately outbound flow. These industries include dairy, horticulture/marine and Manildra starches.

[29] Australian Demographic Statistics 3101.0, September Quarter 2009, Australian Bureau of Statistics 25 Mar 2010.

For the study area, an estimated population growth rate of 1.2% p.a.[29] has been selected to determine long term growth for industries where demand is driven by the population of the study area. These industries include FMCG and fuel distribution.

These rates are slightly higher than forecasts mentioned earlier in the report in order to account for domestic consumption being generally higher than population growth itself and the multiplier effect implied by increasing consumerism

21.1.3 Sector specific factors

For all other sectors, industry forecasts have been sourced either directly via industry consultation in the study area or via relevant industry reports.

A number of these sectors are construction related. For building products, the IBISWorld[30] Building Supplies Wholesaling in Australia industry report has been consulted as to expected growth rates in residential construction, home improvements and non-residential building, with an overall estimated construction growth rate of 4% p.a. selected for use in the analysis. For quarrying and cement products, the IBISWorld Gravel and Sand Quarrying in Australia and Cement and Lime Manufacturing in Australia reports have been consulted with an overall growth rate of 2.7% selected for use in the analysis.

All of the timber paper production is destined for outbound sources, and is limited by the current footprint for forested areas. As such an annual growth rate of 0.5% has been selected, allowing for modest productivity improvements.

The port of Port Kembla Economic Impact Study prepared by EconSearch Pty Ltd, Dec-2009, identified that port throughput will almost double in 10 years, implying a growth rate of between 3% and 3.5% per annum. Port Kembla Port Corporation is also presently undergoing expansion through its outer harbour development. As such, a growth rate of 3% p.a. has been selected for port throughput not elsewhere stated (NES).

Table 38 below provides a summary of the information sources and indices used for each industry.

The indices used for each sector have an aggregate effect of between 2% and 2.5% growth per annum. These indices have been used to calculate the forecasts to 2021 and 2031.

21.2 Sensitivity Analysis

Sensitivity analysis has then been undertaken looking at a high growth scenario and a low growth scenario. For the high growth scenario, 3.3% has been used as reported by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) for the growth of freight in Australia[31]. The lower growth used in the sensitivity analysis was a nominal 1.5% which is the average of the population growth of the study area and of Australia as a whole. The results of this sensitivity analysis are dealt with in Section 22 – Freight Demand – The Future Case where Figure 88 displays the different scenarios.

[30] Building Supplies Wholesaling in Australia: F4539, IBISWorld Industry Report, 23 February, 2010.

[31] Working paper 75 - National road network intercity traffic projections to 2030, BITRE, 2009.

Table 38 – Information sources and indices for each industry

Sector		Growth index			Comments	Source
		Nominal max. capacity ('000 tonnes p.a.)	*Population Driven (% p.a.)*	*Industry Forecasts (% p.a.)*		
1	Steel	-	-	3.4%	ABARE provides a long term outlook for steel to 2013/14 with a growth rate of 3.4%	ABARE www.abare.gov.au
2	MV	-	-	500	Industry knowledge.	Port Kembla Port Corporation
3	Coal	10,000	-	-	Export demand, capped to 10Mt.	Port Kembla Port Corporation website www.pkpc.com.au
4	Coke	500	-	-	Industry knowledge and the maximum capacity of Port Kembla Port.	Ditto
5	Port/NES	-	-	3.0%	The port continues to grow at approximately 3% a year.	Port Kembla Port Corporation website www.pkpc.com.au/EconSearch
6	Dairy	-	1.8%	-	Increases at the same rate as the population of Australia.	ABS www.abs.gov.au
7	Horticulture/marine	-	1.8%	-	Increases at the same rate as the population of Australia.	Ditto
8	Grain/Export	200	-	-	Industry knowledge and the maximum capacity of Port Kembla Port.	Ditto
9	Manildra	-	1.8%	-	Increases at the same rate as the population of Australia.	Ditto
10	FMCG	-	1.2%	-	Increases with the rate of population of the study area.	ABS and NSW Government Transport Data Centre
11	Fuel	-	1.2%	-	Increases with the rate of population of the study area.	Ditto
12	Forestry/Plantation	6,500	-	-	Industry advice	Industry sources
13	Timber/Paper	-	-	0.5%	Limited by current footprint for forested areas	Ditto
15	Quarrying	-	-	2.7%	IBISWorld suggests a growth rate range of 3-4%. A growth rate of 2.7% has been used in the forecast modelling.	IBISWorld Industry Report – Gravel and Sand Quarrying in Australia (B1411)
16	Cement/Concrete/Clay	-	-	2.7%	IBISWorld suggests a growth rate range of 3-4%. A growth rate of 2.7% has been used in the forecast modelling.	Ditto
17	Building/Products	-	-	4.0%	A growth rate of 4% per annum, as specified in the IBISWorld report has been chosen.	Ditto

22. FREIGHT DEMAND – THE FUTURE CASE

22.1 Overview

Observations:

- From previous sections, the base case is about 40 Mt. This is expected to reach 52Mt by 2021 and 62 Mt by 2031 (central case) (see .
- Similarly, total truck trips are estimated to increase to 3.1 million (2021) and 3.6 million (2031) from a base level of 2.4 million in 2009 (central case).
- Overall, the 2031 freight task could vary between 56 – 82 Mt with a central estimate of 62 Mt. The gap is smaller in 2021 with a range 48-59 Mt and the central estimate at 52 Mt.
- The basis for this sensitivity analysis is assuming an upper growth scenario at 3.3% p.a. (BTRE corridor study) and 1.5% p.a. (population driven) for a lower growth scenario.
- Note that for population, an average value of 1.5% is used between the two long term growth rates indicated for Australia (1.8%) and the study area (1.2%) respectively.
- The central growth scenario is the integrated case-by-case growth forecast for each commodity as classified in the previous section. Recall, growth rates for each commodities were classified by three types – (i) infrastructure cap/ceiling, (ii) population driven and (iii) some other industry indices such as construction or manufacturing.

Figure 88 below illustrates these trends; the resultant freight flows between sub-regions is shown on Table 39 and the total freight task on Figure 89.

Figure 88 – Demand projections and sensitivity bounds

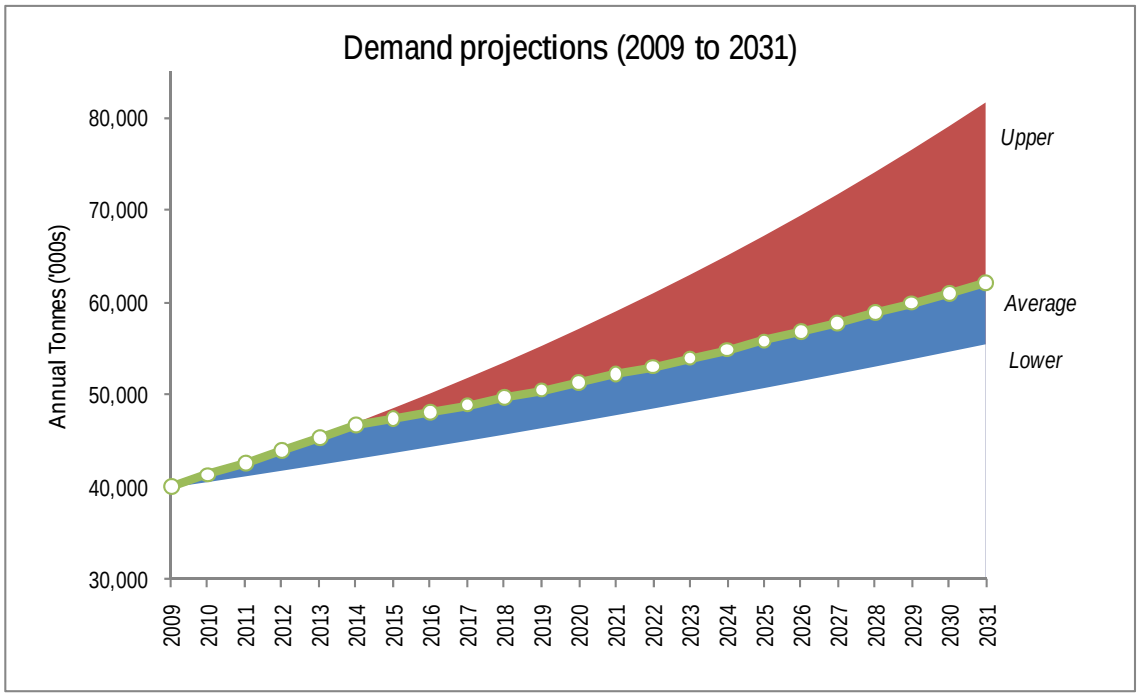
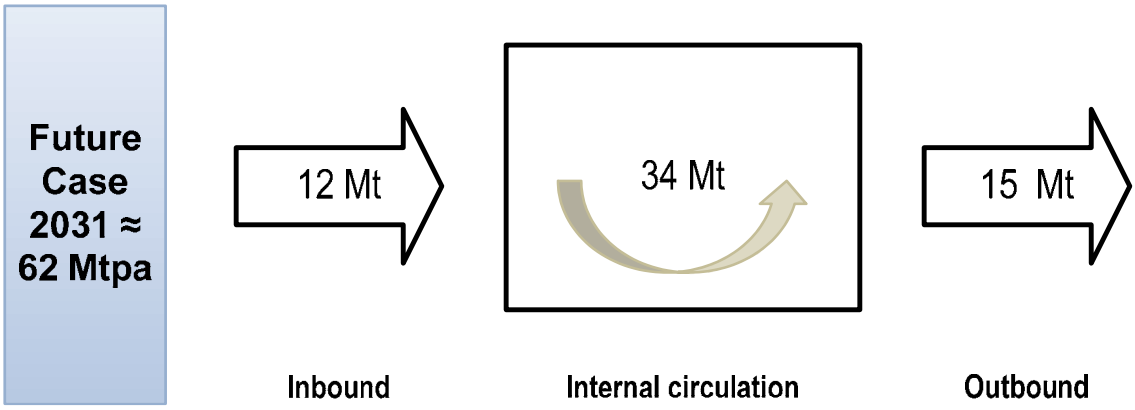


Table 39 – Forecast freight volumes, 2031

Yr 2031 Projected ('000 tonnes)	*Wollongong*	*Nowra-Bomaderry*	*Illawarra Bal*	*Queanbeyan*	*Southern Tablelands (excl. Queanbeyan)*	*Lower South Coast*	*Snowy*	*Central Murrumbidgee*	*Albury*	*Upper Murray (excl. Albury)*	*ACT*	*Subtotal*	*Central West*	*Ovens-Murray*	*East Gippsland*	*Sydney*	*Melbourne*	*Bal. NSW*	*Bal. VIC*	*Bal Aust*	*Subtotal*
	INTERNAL CIRCULATION OF FREIGHT WITHIN STUDY AREA												FREIGHT OUTBOUND FROM THE STUDY AREA								
Wollongong	18,918	1	2	1	275	1	0	0	0	0	8	19,206	151	1	0	2,764	657	1	0	0	3,575
Nowra-Bomaderry	0	327	0	0	0	0	0	0	0	0	0	327	132	0	0	792	62	0	0	0	987
Illawarra Statistical Division Bal	554	53	2,981	165	90	166	60	21	5	18	642	4,754	0	0	0	8,760	0	0	0	0	8,760
Queanbeyan	0	0	0	557	0	0	0	0	0	0	0	557	0	0	0	0	0	0	0	0	0
Southern Tablelands (excl. Q'byn)	337	39	127	58	385	0	0	18	4	12	405	1,385	0	0	0	0	0	0	0	0	0
Lower South Coast	0	0	39	0	0	1,287	0	0	0	0	36	1,362	0	0	0	92	117	0	0	0	210
Snowy	0	0	0	0	0	596	317	154	0	0	0	1,068	0	0	0	0	0	88	0	0	88
Central Murrumbidgee	0	0	0	0	0	33	0	800	143	386	0	1,363	0	0	0	528	614	66	0	196	1,404
Albury	0	0	0	0	0	0	0	31	26	21	676	753	0	0	0	0	0	0	0	0	0
Upper Murray (excl. Albury)	0	0	0	0	0	0	0	717	0	542	9	1,268	0	0	0	229	211	9	0	0	448
ACT	0	0	0	0	0	0	0	0	0	0	2,377	2,377	0	0	0	0	0	0	0	0	0
Subtotal	19,809	420	3,147	781	750	2,084	378	1,742	179	979	4,153	34,421	283	1	0	13,165	1,661	165	0	196	15,471
	FREIGHT INBOUND TO THE STUDY AREA												SELECTED TRANSIT THROUGH STUDY AREA								
Central West	100	187	0	0	0	11	0	883	0	0	46	1,226									0
Ovens-Murray	0	0	0	0	0	154	0	613	309	166	0	1,242									0
East Gippsland	0	0	0	0	0	186	0	0	0	0	0	186				250					250
Sydney	2,899	294	1,035	601	440	496	147	266	14	60	2,505	8,757									0
Melbourne	0	0	0	0	0	304	115	166	9	22	0	617									0
Bal. NSW	100	0	0	0	0	0	0	0	0	5	0	105									0
Bal. VIC	0	0	0	0	0	0	0	0	0	0	0	0									0
Bal. Aust	0	0	0	0	0	0	0	0	0	0	0	0									0
Subtotal	3,099	480	1,035	601	440	1,152	262	1,927	332	253	2,551	12,134	0	0	0	250	0	0	0	0	250

Figure 89 – Forecast freight volumes, 2031



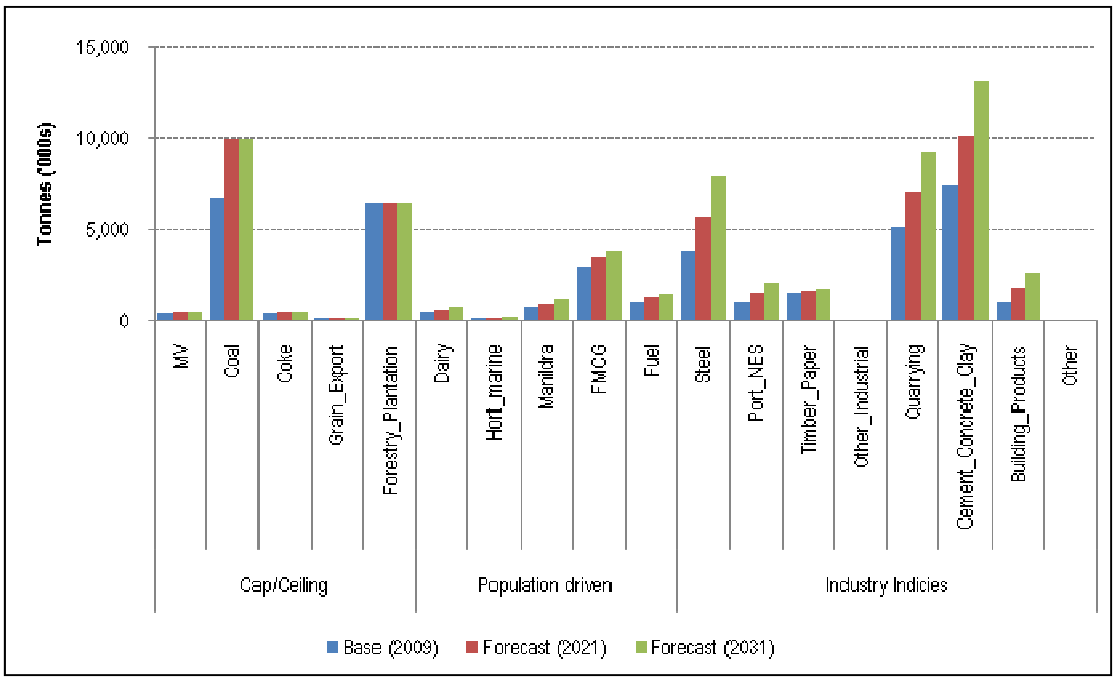
22.2 Projection by commodity groups

Observations:

- Cap ceiling commodity groups are presently near their capacity with the exception of coal which is expected to reach the cap limit of 10 Mt by 2014.
- Population driven commodity groups are subject to local or national factors and consequently adopt their respective population growth rate (i.e. 1.2% for the study area and 1.8% for Australia).
- Industrial indices include manufacturing and construction as well as general port growth forecasts.

Figure 90 below illustrates these trends. Additional graphs by commodity grouping are provided in Section 23.4 of the Appendices – Supplementary forecast data.

Figure 90 – Projections by commodity groups



22.3 Projection by corridor groupings

The issue with corridor grouping analysis is that a single movement can be duplicated across several road segments for any given origin-destination pairing. Although the total freight task in the region is estimated at 40 Mt, the accumulated total of all road segments is 66 Mt. Likewise; the forecast projection for 2021 is 79 Mt and 93 Mt. The duplication occurs primarily within the Wollongong and the Hume Highway region near Tumut.

Observations:

- In 2009, 62% of all truck trips in the study area occurred within the Hume Highway / Tumut grouping while the Princes Highway and Monaro Highway / ACT groupings accounted for 25% and 13% respectively.
- By 2021, the number of truck trips increase by 19% overall but the highest growth is observed for the Hume Highway / Tumut grouping at around 21%. Princes and Monaro groupings grow at 18% and 12% respectively.
- From 2021 to 2031, an additional 17% growth in the number of truck trips is expected above the 2021 values. However, growth rate of the Hume Highway / Tumut grouping is slowed to 17% while the Princes Highway starts to emerge as the next booming corridor. Growth rate of the Monaro Highway / ACT grouping is largely constant throughout to 2009 – 2031 period at around 12-13%.
- With respect to vehicle productivity, the Princes Highway carries a heavier load of 23.0 tonnes on average as compared to 16.6 tonnes in the Hume Highway / Tumut grouping and 16.1 tonnes in the Monaro grouping.

Table 40 – OD matrix case study trips, 2031

Yr 2031 Projected ('000 trips)		*Wollongong*	*Nowra-Bomaderry*	*Illawarra Statistical Division Bal*	*Queanbeyan*	*Sthn Tablelands (excl. Q'byn)*	*Lower South Coast*	*Snowy*	*Central Murrumbidgee*	*Albury*	*Upper Murray (excl. Albury)*	*ACT*	*Subtotal*	*Central West*	*Ovens-Murray*	*East Gippsland*	*Sydney*	*Melbourne*	*Bal. NSW*	*Bal. VIC*	*Bal. Aust*	*Subtotal*
		INTERNAL CIRCULATION OF FREIGHT WITHIN STUDY AREA												FREIGHT OUTBOUND FROM THE STUDY AREA								
Wollongong	SSD	1,087	0	0	0	20	0	0	0	0	0	1	1,110	11	0		230	42	0			284
Nowra-Bomaderry	SSD		16										16	6			40	3				50
Illawarra Statistical Division Bal	SSD	27	3	143	8	4	8	3	1	0	1	31	229				422					422
Queanbeyan	SSD				27								27									0
Southern Tablelands (excl. Queanbeyan)	SSD	28	3	11	5	20			2	0	1	34	104									0
Lower South Coast	SSD			2			74					2	79				6	8				14
Snowy	SSD						38	17	10				65						6			6
Central Murrumbidgee (excl. Wagga Wagga)	SSD						2		50	9	25		86				30	34	4		11	79
Albury	SSD								3	2	2	56	62									0
Upper Murray (excl. Albury)	SSD								46		34	1	81				14	12	1			26
ACT	State											114	114									0
Subtotal		1,142	22	157	40	45	123	20	111	11	63	240	1,972	18	0	0	742	100	11	0	11	882
		FREIGHT INBOUND TO THE STUDY AREA												SELECTED TRANSIT THROUGH STUDY AREA								
Central West	SD	7	9				1		57			3	76									0
Ovens-Murray	SD						10		39	20	11		80									0
East Gippsland	SD						12						12				9					9
Sydney	SD	186	19	65	36	28	27	7	17	1	3	146	535									0
Melbourne	SD						25	9	11	1	2		48									0
Bal. NSW	State	7									0		7									0
Bal. VIC	State												0									0
Bal. Aust													0									0
Subtotal		199	28	65	36	28	74	17	123	21	16	150	757	0	0	0	9	0	0	0	0	9
All movements													3,611									

Table 41 – Forecast truck volumes, 2009, 2021, 2031

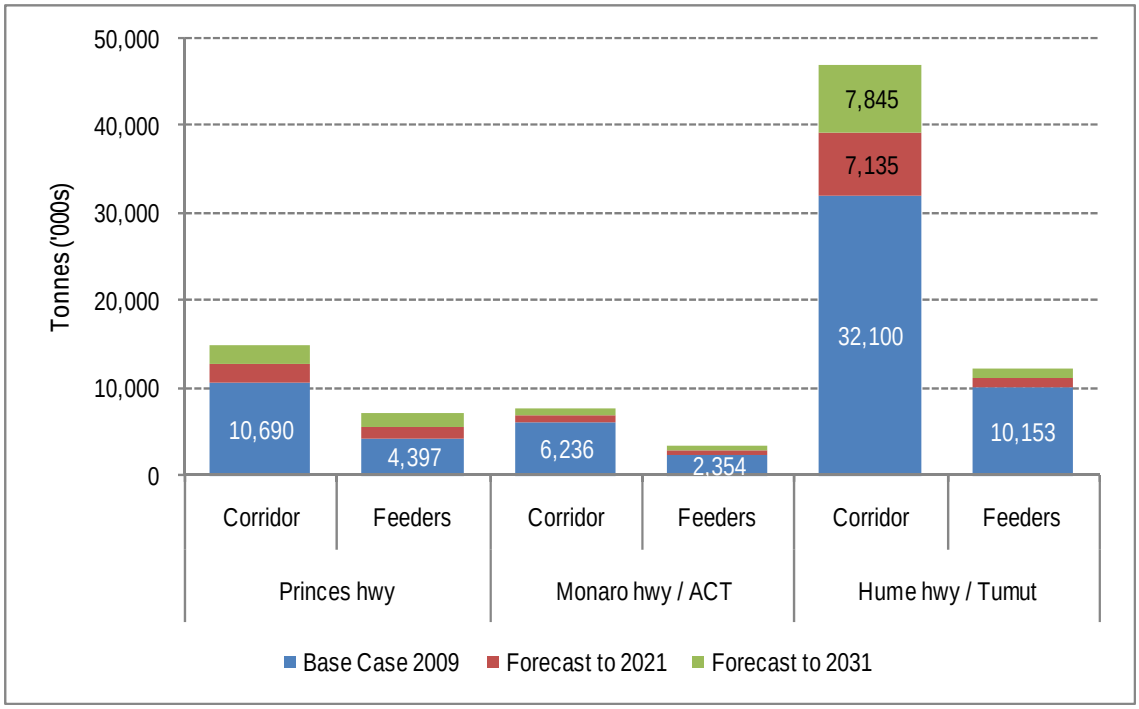
Road segment		Base Case 2009		Forecast to 2021		Forecast to 2031		%Change
		Truck Trips ('000)	Tonnes ('000)	Truck Trips ('000)	Tonnes ('000)	Truck Trips ('000)	Tonnes ('000)	Trucks (2009-2031)
Corridors	(P1) Sutherland to Wollongong	206	3,086	258	3,972	314	4,946	52%
	(P2) Wollongong to Nowra	144	2,339	178	2,950	214	3,604	49%
	(P3) Nowra to Batemans Bay	55	855	69	1,093	83	1,355	51%
	(P4) Batemans Bay to Bega	42	640	48	737	54	840	28%
	(P5) Bega to Eden	74	1,083	79	1,145	83	1,204	12%
	(P6) Eden to Chip Mill Rd J'n	76	1,116	81	1,178	85	1,237	12%
	(P7) Chip Mill Rd J'n to Narrabarba	74	1,083	79	1,145	83	1,204	12%
	(P8) Narrabarba to Cann River	36	489	40	549	45	608	25%
Feeders	(P9) Campbelltown to Wollongong	89	1,172	111	1,534	136	1,940	54%
	(P10) Wilton-Picton to Wollongong	224	2,989	286	3,929	352	4,967	57%
	(P11) Nowra to Braidwood	0	0	0	0	0	0	-
	(P12) Batemans Bay to Braidwood	15	236	16	256	17	277	15%
	(P13) Tea Gardens to Bega	0	0	0	0	0	0	4%
	Subtotal Princes Highway grouping	1,034	15,087	1,243	18,490	1,467	22,183	-
Corridors	(M2) Goulburn to Canberra	133	2,148	165	2,702	198	3,316	49%
	(M1) Yass to Canberra	58	744	65	833	72	918	25%
	(M3) Canberra to Cooma	25	516	27	548	29	585	13%
	(M4) Cooma to Tea Gardens	42	739	43	754	44	768	5%
	(M5) Tea Gardens to Rockton	67	1,124	69	1,142	70	1,158	4%
	(M6) Rockton to Cann River	17	339	18	352	19	365	13%
	(M7) Narrabarba to Rockton	40	627	40	629	40	629	0%

Road segment		Base Case 2009		Forecast to 2021		Forecast to 2031		%Change
		Truck Trips ('000)	Tonnes ('000)	Truck Trips ('000)	Tonnes ('000)	Truck Trips ('000)	Tonnes ('000)	Trucks (2009-2031)
Feeders	(M8) Goulburn to Tarago	54	833	67	1,044	81	1,279	50%
	(M9) Tarago to Bungendore	22	338	28	433	33	537	51%
	(M10) Bungendore to Queanbeyan	24	362	29	463	36	573	51%
	(M12) Tarago to Goulburn Rd- Kings Hwy J'n	22	351	25	407	28	467	28%
	(M11) Bungendore to Goulburn Rd- Kings Hwy J'n	7	102	8	129	10	158	50%
	(M13) Braidwood to Goulburn Rd- Kings Hwy J'n	18	297	20	337	22	380	24%
	(M14) Cooma to Jindabyne	5	71	6	90	7	112	51%
	Subtotal Monaro Highway grouping	534	8,590	610	9,864	690	11,245	-
Corridors	(H2) Campbelltown to Wilton-Picton	595	10,316	766	13,553	954	17,161	60%
	(H3) Wilton-Picton to Goulburn	548	9,887	709	12,967	886	16,374	62%
	(H4) Goulburn to Yass	112	1,881	133	2,226	154	2,588	37%
	(H5) Yass to Gundagai	201	3,066	224	3,402	247	3,761	23%
	(H6) Gundagai to Tumut	159	2,538	162	2,589	164	2,632	3%
	(H7) Tumut to Adelong	112	1,811	114	1,851	116	1,883	4%
	(H8) Adelong to Batlow	82	1,301	84	1,323	85	1,341	3%
	(H9) Batlow to Tumbarumba	82	1,301	84	1,323	85	1,341	3%

Road segment		Base Case 2009		Forecast to 2021		Forecast to 2031		%Change
		Truck Trips ('000)	Tonnes ('000)	Truck Trips ('000)	Tonnes ('000)	Truck Trips ('000)	Tonnes ('000)	Trucks (2009-2031)
Feeders	(H10) Boorowa to Yass	81	1,301	88	1,412	94	1,510	15%
	(H11) Harden to Yass	0	0	0	0	0	0	-
	(H17) Tumut to Cooma	0	0	0	0	0	0	-
	(H13) Adelong to Hume Hwy J'n	53	912	57	967	60	1,017	12%
	(H16) Tumbarumba to Hume Hwy J'n	23	378	25	400	26	422	12%
	(H12) Gundagai to Snowy-Hume Hwy J'n	141	2,068	160	2,354	182	2,665	29%
	(H14) Tumbarumba-Hume Hwy J'n to Snowy-Hume Hwy J'n	171	2,578	191	2,882	213	3,208	25%
	(H15) Albury to Tumbarumba-Hume Hwy J'n	191	2,917	212	3,232	235	3,566	23%
	Subtotal Hume Highway/Tumut grouping	2,552	42,253	3,008	50,482	3,501	59,469	-

Note: refer to Figure 84 for road locations

Figure 91 – Summary of corridor forecasts



22.4 Projection by road segments for 2021 and 2031

The following graphs show freight volumes and truck trips by road segment. Overall, truck traffic within the study area is forecast to increase by an average of about 1.5% per annum over the forecast horizon to 2031. No routes are forecast to decrease in truck volumes, although some are predicted to remain relatively static.

The following sections make comment on key aspects of the forecasts.

Princes Highway grouping (Figure 92, 2021 and Figure 95, 2031):

- The most heavily trafficked road segments are those connecting Wollongong-Sydney i.e. the top 4 segments (P1, P2, P9, P10) which contribute over 833,000 trips or two-thirds of the total number of trips in this grouping in 2021 and 1,016,000 by 2031.
- The fastest growing segments are also the same 4 segments connecting Wollongong-Sydney with an average 2.1% growth in truck trips per annum over the forecast period.
- Although, segment P3 (Nowra to Batemans Bay) has a lower freight base than the Wollongong segments, the growth rate in this section is also high at an average growth in truck trips of 2.0% p.a.
- The segments showing the lowest growth include P5, P6 and P7 which are the Bega-Eden-Narrabarba segments with the forecast to 2021 estimated at about 0.5% growth rate per annum.

Monaro Highway / ACT grouping (Figure 93, 2021 and Figure 96):

- The most heavily trafficked road segment is M2 being the Federal Highway connecting the ACT to the Hume Highway at Goulburn. This segment is notably higher than the next two highest tr ked segments contributing 27% alone of the total number of trips in this grouping. It is forecast to grow at about 1.8% p.a.
- The fastest growing segment is M14 from Cooma to Jindabyne with an average growth of 2.1% p.a.
- There are several segments north-east of the ACT connecting the ACT, Goulburn, Tarago, Bungendore and Queanbeyan (M2, M8, M9, M10 and M11), also showing high growth at an average 2.0% p.a.
- The segments showing the lowest growth include M6 and M7 which are the Rockton to Cann River and Narrabarba to Rockton segments in the south-east of the study area with the forecast to 2021 estimated at an average 0.3% p.a. off a low base. The Monaro Highway (M3) connecting Cooma to the ACT also shows low growth at 0.5% p.a. also off a low base.

Hume Highway / Tumut grouping 2021 (Figure 94, 2021 and Figure 97, 2031):

- The most heavily trafficked road segments are the Hume Highway segments closest to Sydney, H2 from Campbelltown to Wilton-Picton and H3 from Wilton-Picton to Goulburn, with a combined 1,475,000 and 1,840,000 truck trips in 2021 and 2031 respectively, representing nearly 50% of the total truck trips for the grouping.
- These two segments also constitute the fastest growing segments at 2.5% p.a. for segment H3 Wilton-Picton to Goulburn and 2.4% p.a. for H2 Campbelltown to Wilton-Picton.
- It is important to note that the highest growth segments (H2, H3) form part of the Hume Highway and therefore border the study area rather than form part of it. As such the most heavily trafficked road segment in this grouping that actually falls within the study area is H6 Gundagai to Tumut with 162,000 and 164,000 truck trips in 2021 and 2031 respectively or 5% of total truck trips for the Hume Highway / Tumut grouping in 2021. Its share of the sub-regional traffic will, however, decline as its forecast growth rate is low.
- The fastest growing segments falling within the study area are H13 Adelong to Hume Highway and H16 Tumbarumba to the Hume Highway with an average 0.5% p.a. growth in truck trips per annum, although total relative volumes are low.
- The segments showing the lowest growth include H8 and H9 connecting Adelong to Batlow to Tumbarumba with the forecast estimated at an average 0.1% growth rate per annum.

Figure 92 – Forecasts – Princes Highway corridor, 2021

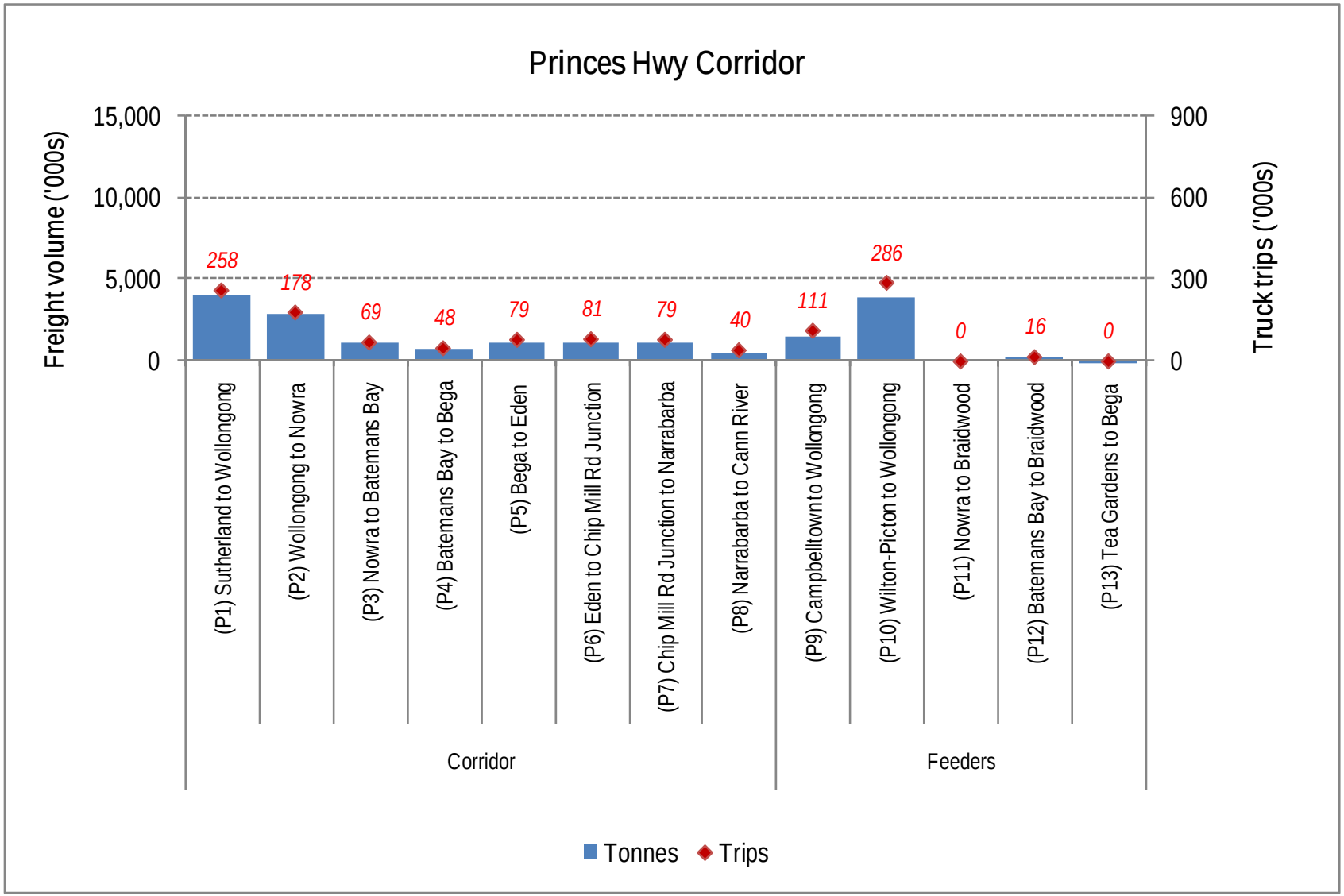


Figure 93 – Forecasts – Monaro Highway / ACT corridor, 2021

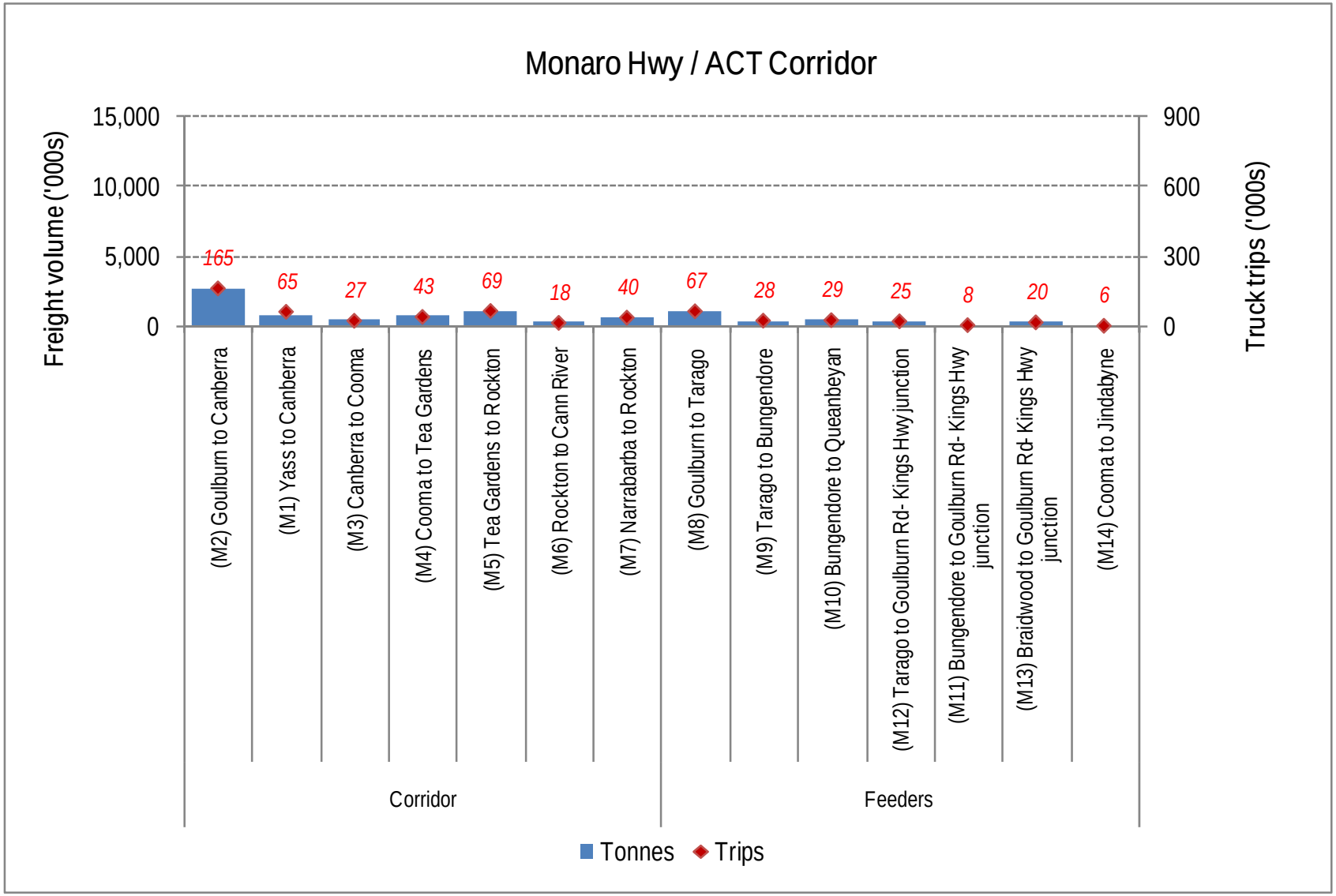


Figure 94 – Forecasts – Hume Highway / Tumut corridor, 2021

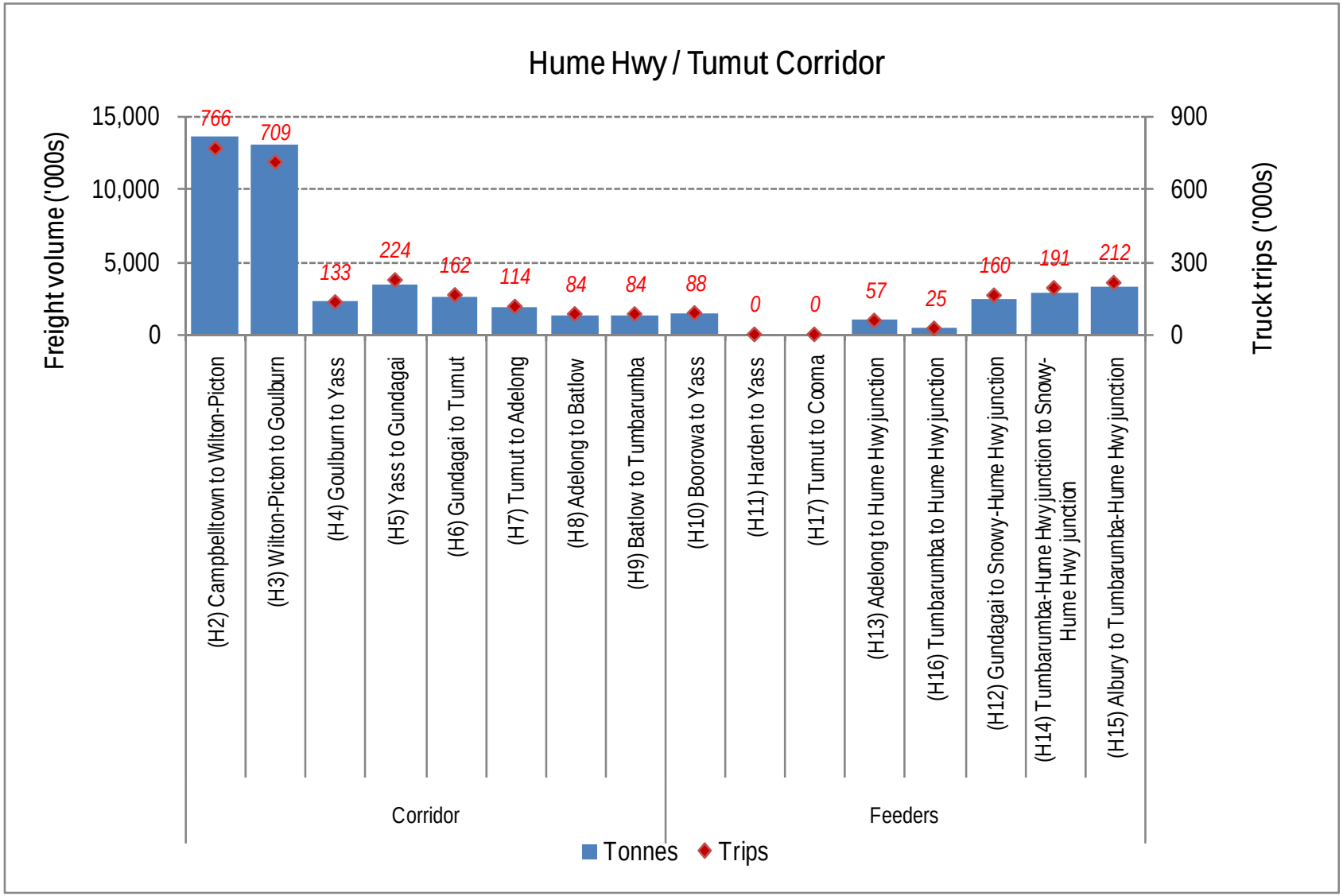


Figure 95 – Forecasts – Princes Highway corridor, 2031

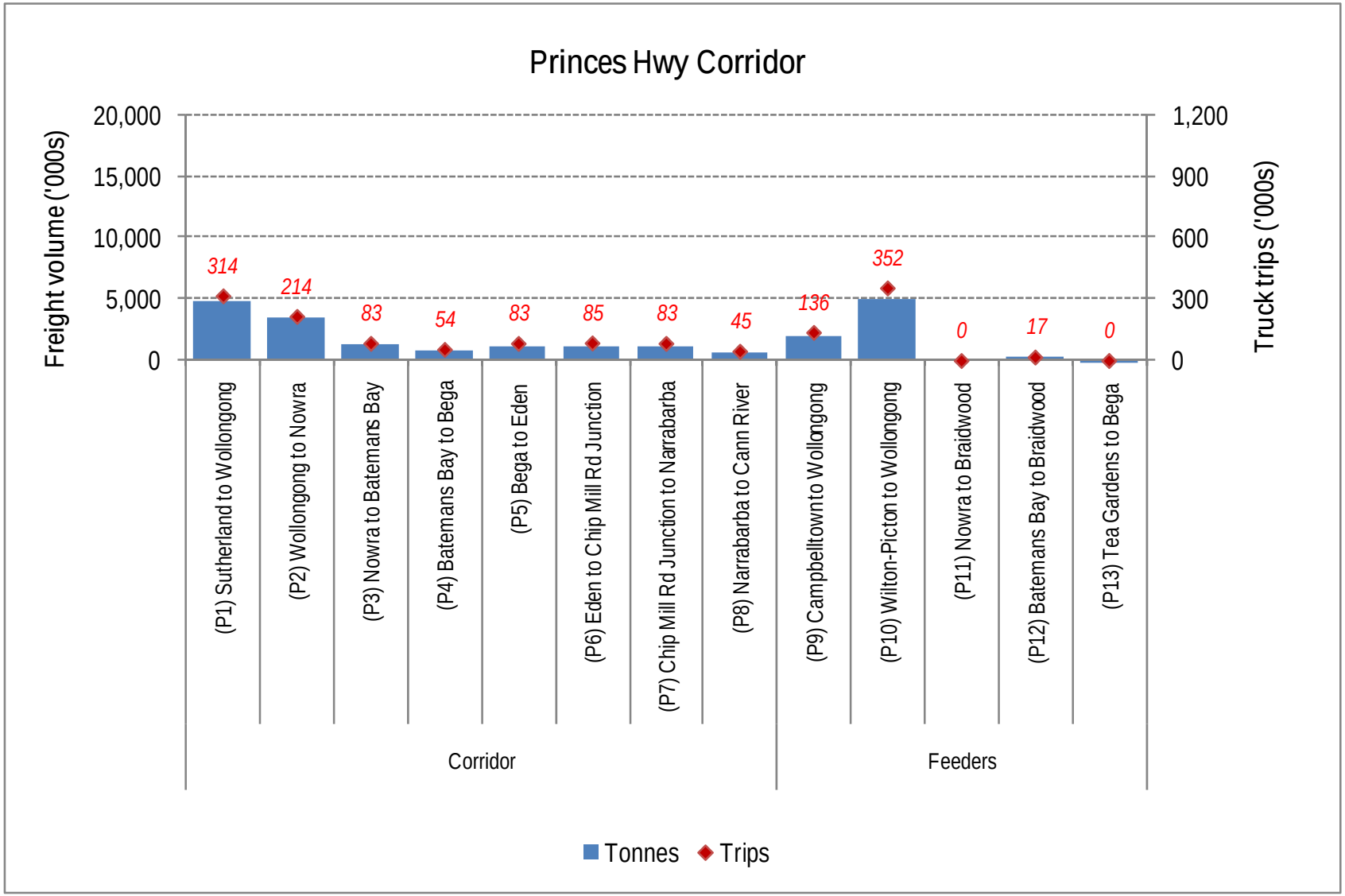


Figure 96 – Forecasts – Monaro Highway / ACT corridor, 2031

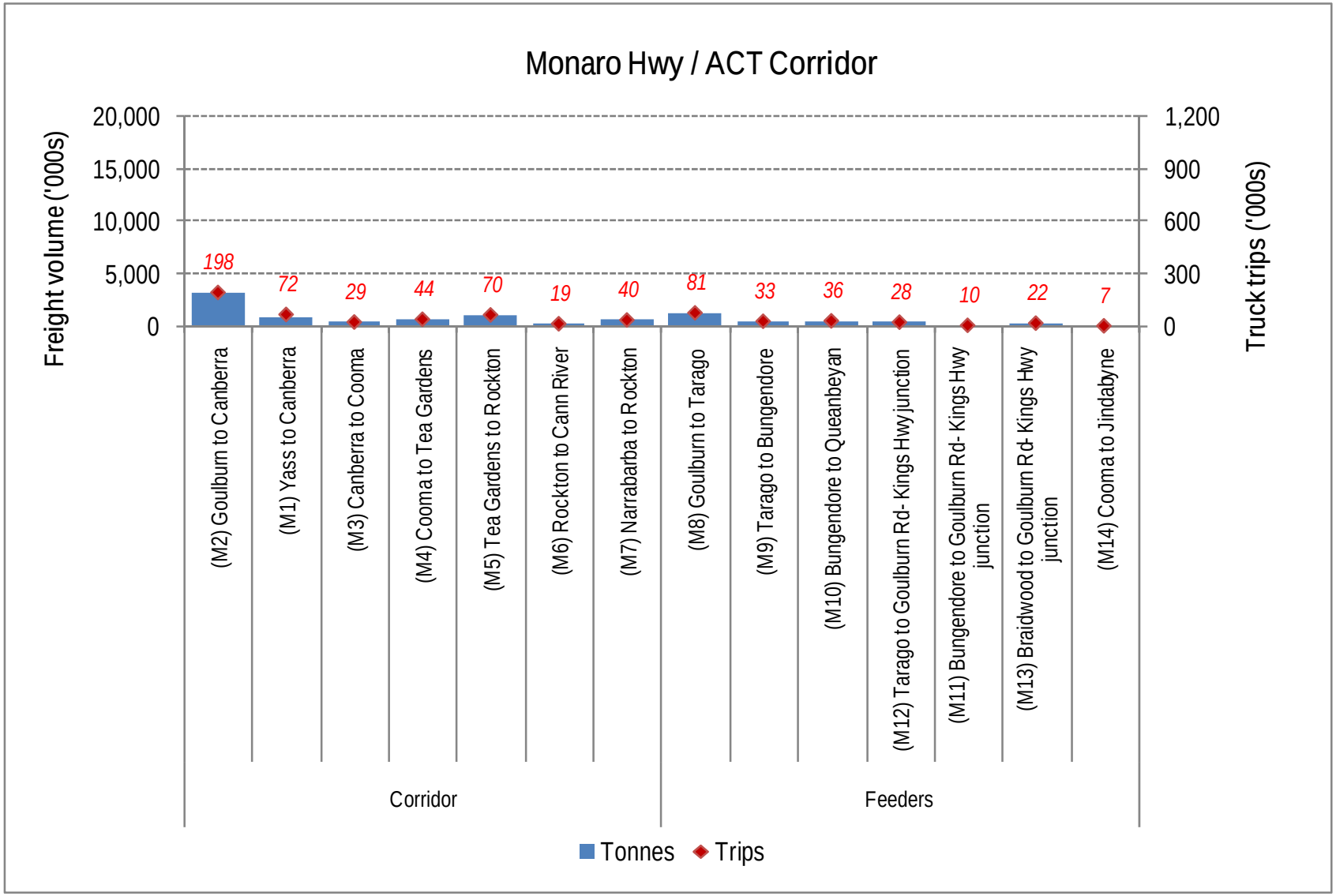
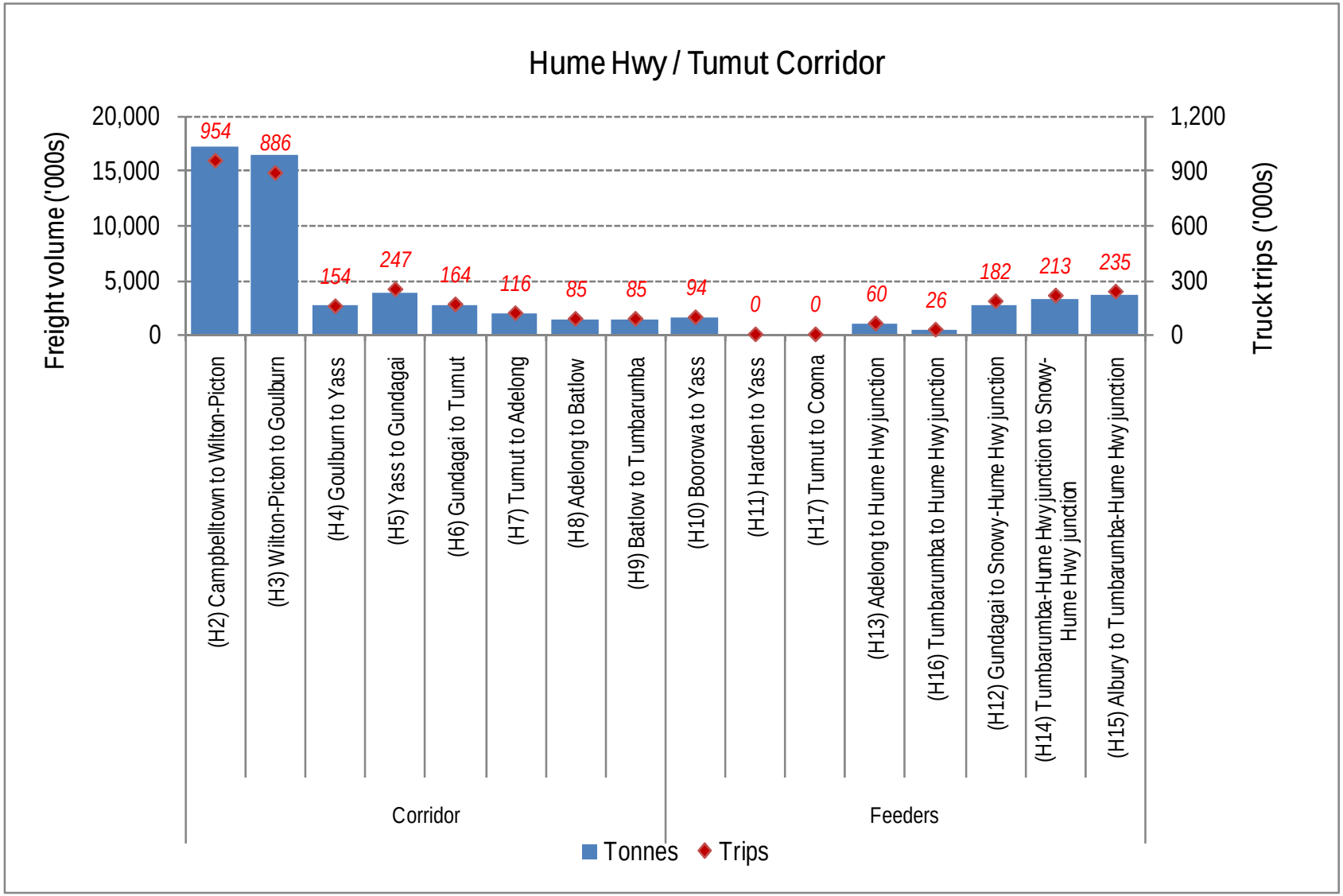


Figure 97 – Forecasts – Hume Highway / Tumut corridor, 2031



23. IMPLICATIONS FOR THE ROAD NETWORK

The purpose of this chapter is to summarise a number of high level findings regarding the use of the road network by heavy freight vehicles which emerge from the forecasting.

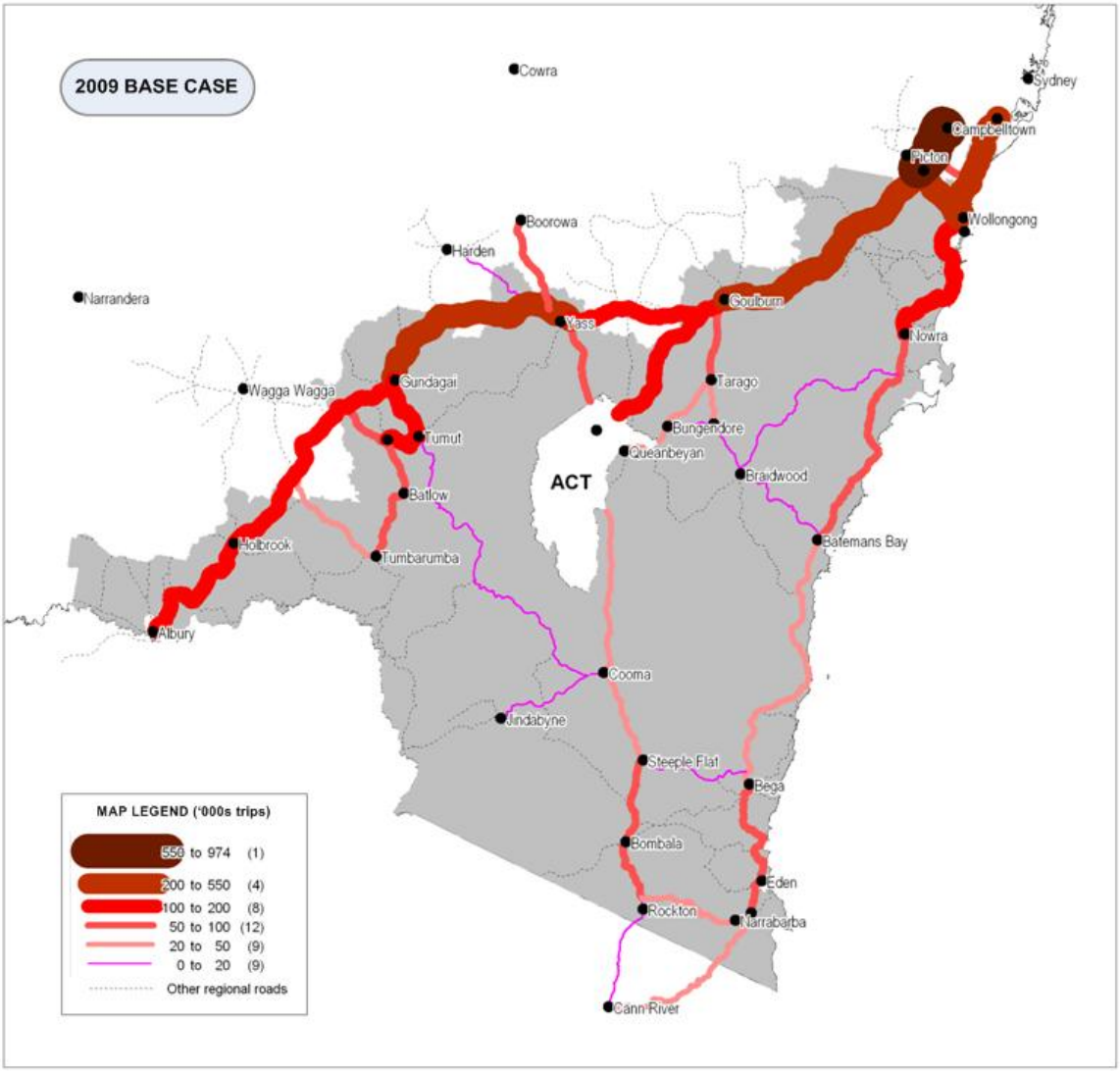
23.1 Key findings

- The Hume Highway will continue to be the primary north-south arterial servicing the study area.
- Appin Road is likely to function as the logical overflow road as Picton Road becomes more congested.
- Growing demand from Canberra will be serviced primarily by the Federal Highway and, to a lesser extent, the Barton Highway driven by additional volumes along the Hume Highway from Sydney / Melbourne based distribution centres.
- The Princes Highway south of Wollongong experiences only modest freight growth within the forecast period to 2031 but further growth along this corridor is inevitable beyond 2031.
- There are issues with NSW-ACT cross-border HML harmonisation which could impede growth along the Monaro Highway.

23.1.1 Observations of 2009 traffic forecasts

- Picton Road is presently the main arterial which connects Sydney to the greater Wollongong area, via the F5 freeway.
- The Hume Highway is a major freight corridor with peaking between Gundagai-Yass and Goulburn-Picton.
- The Princes Highway is highly trafficked through Sydney to Wollongong to Nowra but there is a dramatic reduction in truck volumes heading south to Batemans Bay and the lower south coast.
- The route via Rockton-Narrabarba is the most heavily trafficked east-west corridor connecting the Monaro and Princes Highways due to forestry vehicles travelling to the port of Eden.
- The Federal and Barton Highways are the main feeders into Canberra from the north and the Monaro Highway is the main feeder from the south. Access through Queanbeyan is minimal due to reasons of topography and road classification.
- Freight destined for the neighbouring Central West NSW region tends to travel via Boorowa (Lachlan Valley Way) rather than through Harden.

Figure 98 – Base case truck volumes, 2009

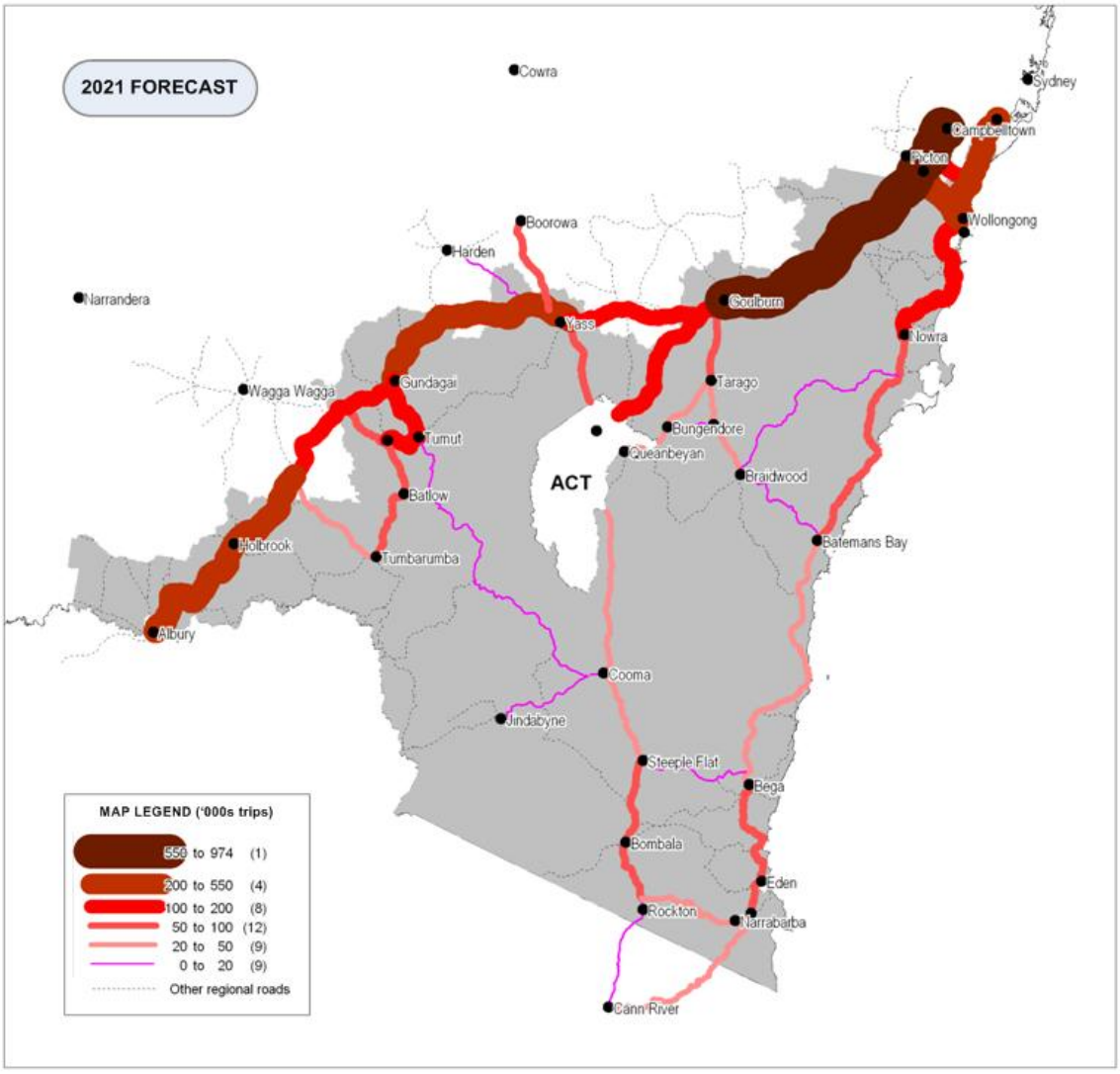


Note: some escarpment routes unable to be traversed by articulated vehicles are not shown

23.1.2 Observations of 2021 traffic forecasts

- Overflow volumes from Picton Road will translate to substantial growth in Appin Road traffic as highlighted on the map at Figure 99 below.
- A major increase in volume is expected along the Hume Highway, in particular between Goulburn-Picton as well as the general northbound traffic through Albany.
- No significant growth in freight volumes is observed along the Princes Highway and traffic patterns are not dissimilar to 2009.

Figure 99 – Forecast truck volumes, 2021

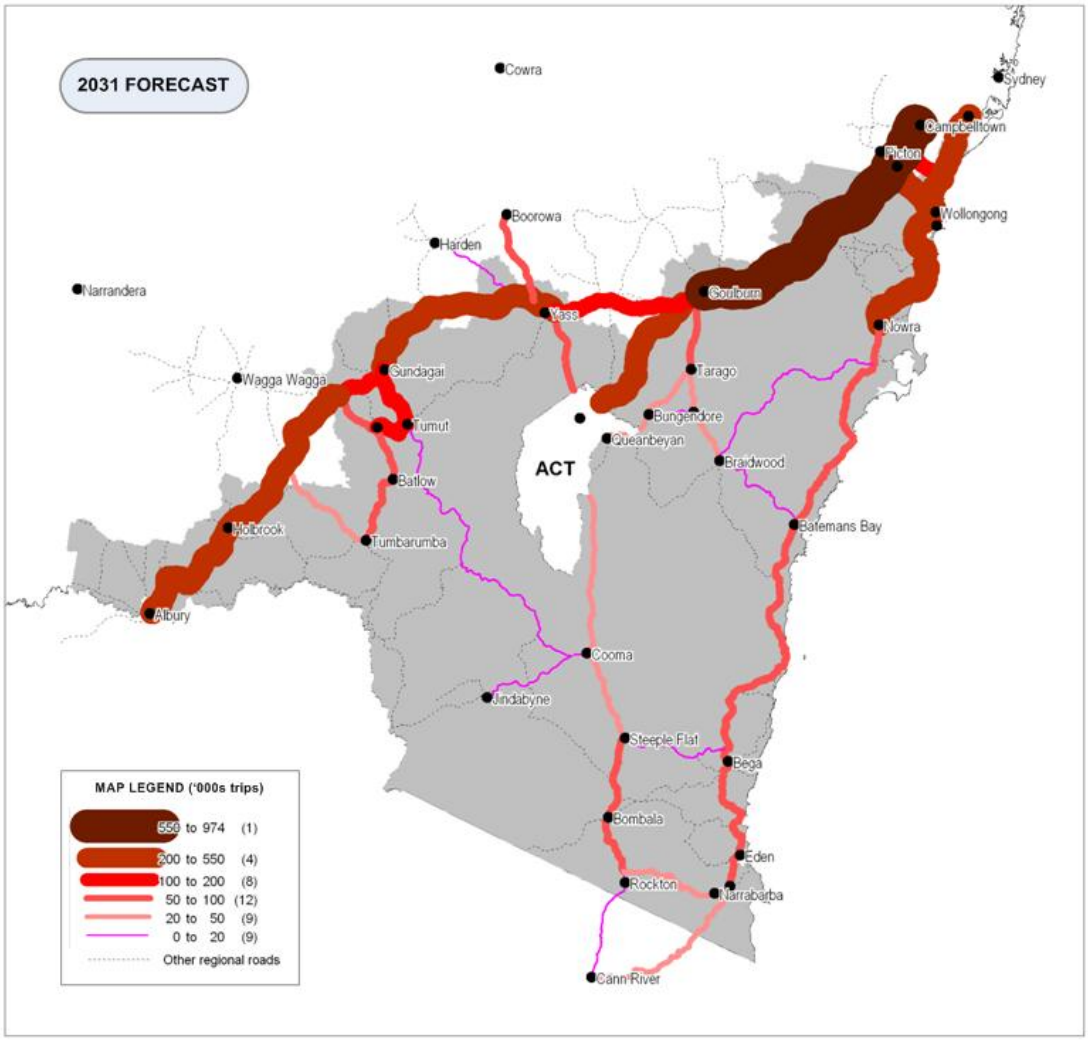


Note: some escarpment routes unable to be traversed by articulated vehicles are not shown

23.1.3 Observations of 2031 traffic forecasts

- Growth on Picton and Appin Roads may be constrained as these roads become congested beyond 2021.
- Almost all stretches of the Hume Highway are handling over 550,000 truck trips p.a.
- The Federal Highway is responsible for the majority of freight volume servicing Canberra.
- Some growth along the Princes Highway is observed with the length of the lower south coast past Nowra handling over 50,000 truck trips p.a.
- No significant increases to the Monaro Highway or any of the east-west corridors are observed.

Figure 100 – Forecast truck volumes, 2031



Note: some escarpment routes unable to be traversed by articulated vehicles are not shown

23.2 Highlighting road segments of significance

The analysis in this report has presented a series of scenarios for forty-three (43) different road segments within the study area; both out to year 2021 and year 2031.

Whilst there are a host of possible ways in which to interpret these forecast numbers; the following section presents two possibilities as to identifying road segments of significance. This type of analysis may provide assistance for prioritising future road planning particularly as road upgrades tend to be interval based rather than incremental.

The first basis for identifying significant road segments is those road segments forecast to endure traffic increases of greater than 50% during the period 2009 to 2031. The second basis is identifying the top three road segments by share of each corridor / feeder grouping i.e. the top three road segments for each of the Princes Highway, Monaro Highway and Hume Highway / Tumut groupings. Table 42 below details the segments that meet both these criteria under the central case, as well as providing high case and low case scenario values for these segments.

It is noted that some road segments are represented in both categories, whilst others are only considered significant in one of the categories.

Table 42 – Road segments with traffic increases >50%, 2009-2031

Selected road segments		*Case Study – Central Case*				*High (3.3% linear)*	*Low (1.5% linear)*
		2009 trips	2031 trips	% change	% share	2031 trips	2031 trips
(P1) Sutherland to Wollongong	Corridor	206	314	52%	21%	420	285
(P3) Nowra to Batemans Bay	Corridor	55	83	51%	6%	113	77
(P9) Campbelltown to Wollongong	Feeders	89	136	54%	9%	181	123
(P10) Wilton-Picton to Wollongong	Feeders	224	352	57%	24%	458	311
(M9) Tarago to Bungendore	Feeders	22	33	51%	5%	45	31
(M10) Bungendore to Queanbeyan	Feeders	24	36	51%	5%	48	33
(M14) Cooma to Jindabyne	Feeders	5	7	51%	1%	9	6
(H2) Campbelltown to Wilton-Picton	Corridor	595	954	60%	27%	1,215	825
(H3) Wilton-Picton to Goulburn	Corridor	548	886	62%	25%	1,118	760
Subtotal of selection	-	1,766	2,802	-	-	3,608	2,451
Total all study area	-	2,552	3,501	-	-	5,213	3,541
% selected roads of total	-	69%	80%	-	-	69%	69%

Note: refer to Figure 84 for road locations

Table 43 – Top three road segments by share of corridor

Selected road segments		*Case Study – Central Case*				*High (3.5% linear)*	*Low (1.5% linear)*
		2009 trips	2031 trips	% change	% share	2031 trips	2031 trips
(P1) Sutherland to Wollongong	Corridor	206	314	52%	21%	420	285
(P2) Wollongong to Nowra	Corridor	144	214	49%	15%	293	199
(P10) Wilton-Picton to Wollongong	Feeders	224	352	57%	24%	458	311
(M2) Goulburn to Canberra	Corridor	133	198	49%	29%	272	185
(M5) Tea Gardens to Rockton	Corridor	67	70	4%	10%	137	93
(M8) Goulburn to Tarago	Feeders	54	81	50%	12%	111	75
(H2) Campbelltown to Wilton-Picton	Corridor	595	954	60%	27%	1,215	825
(H3) Wilton-Picton to Goulburn	Corridor	548	886	62%	25%	1,118	760
(H5) Yass to Gundagai	Corridor	201	247	23%	7%	411	279
Subtotal of selection	-	2,172	3,317	-	-	4,436	3,013
Total all study area	-	2,552	3,501	-	-	5,213	3,541
% selected roads of total	-	85%	95%	-	-	85%	85%

Note: refer to Figure 84 for road locations

23.2.1 Demand projections for the study region

Figure 101 – Tonnage demand projections for the study region, 2009 to 2031

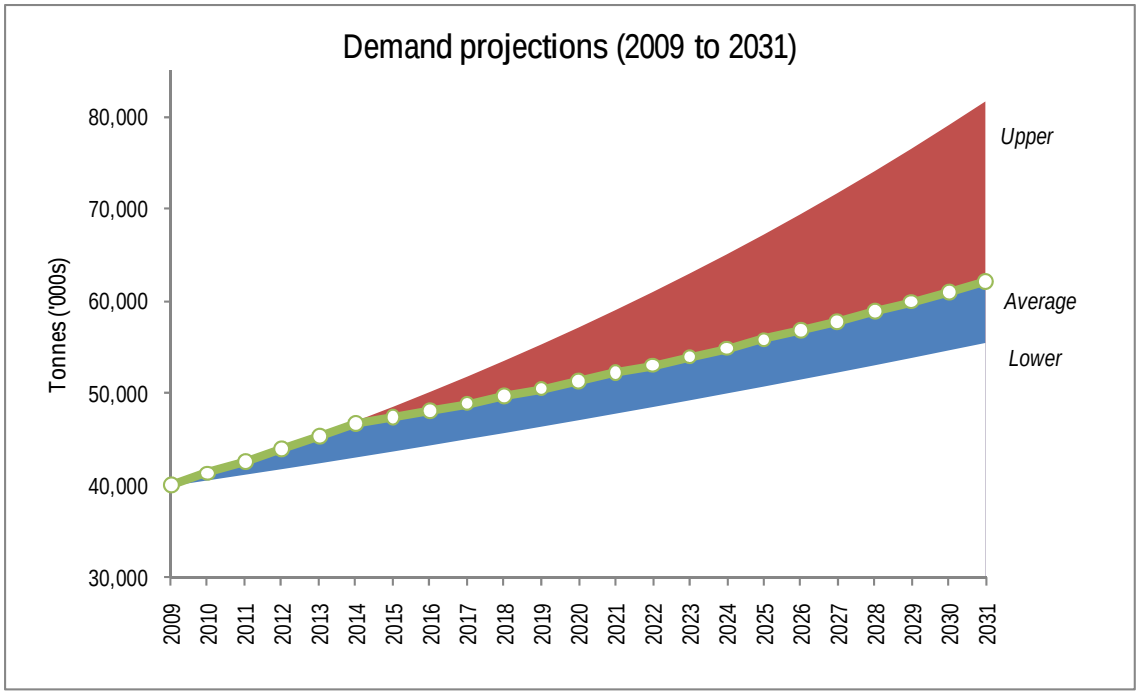
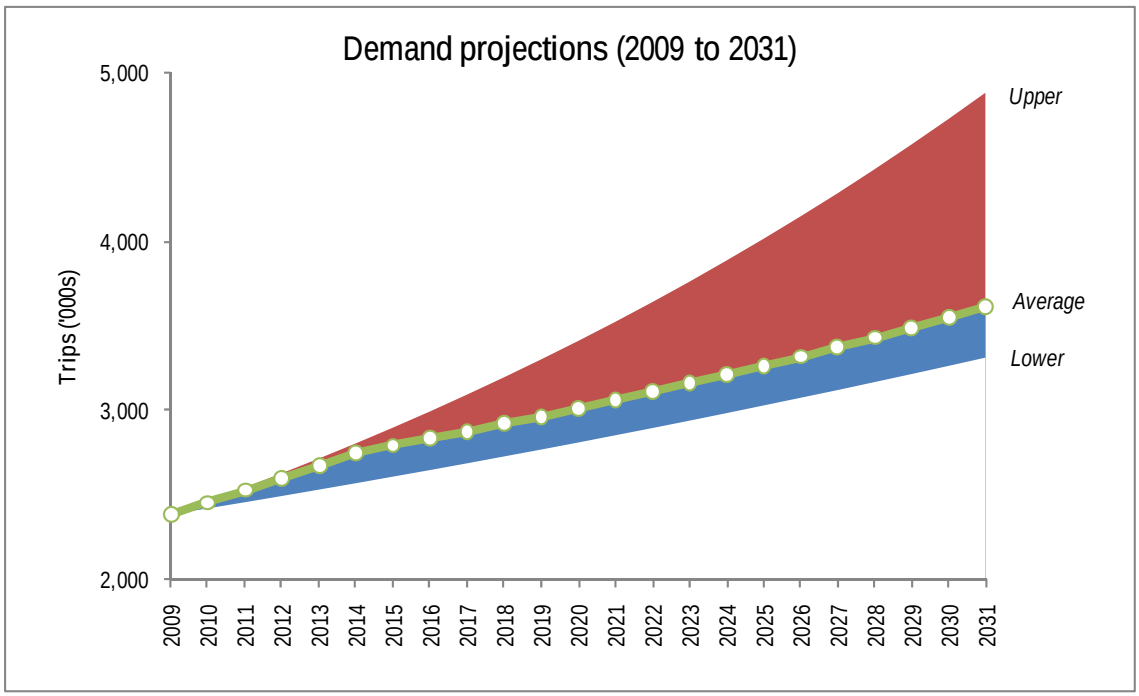


Figure 102 – Truck trips demand projections for the study region, 2009 to 2031



APPENDICES

23.3 Stakeholders

Table 44 – Listing of stakeholders interviewed during the study

Organisation	*Address*	*Interview Method*
Australian Paper	340 Bolong Road, Bomaderry NSW 2541 Ph. (02) 4428-6421	In person
Batlow Apples	74 Forrest Road, Batlow	In person
Bega Cheese	23 – 45 Ridge Street North Bega NSW 2550 Ph. (02) 6491-7777	In person
Bobbins South Coast	12 Redfern Close Pambula NSW 2549 Ph: (02) 6495 6733	By phone
Boral	Clunies Ross Street, Redfern	In person
CHH Particleboard	Linfox Jepson Road, Tumut Ph. (02) 6981-4022	In person
CHH Woodproducts	22 Prospect Street, Box Hill	In person
Cocks Petroleum	Princes Highway Ph. (02) 6496-8100	In person
Forests NSW	Ph. (02) 9407-4260	By phone
Hayes Haulage	2 Princes Highway, Bega Ph. (02) 6492-2299	In person
Horticulture NSW		By phone
HYNE Timber	Jingellic Road, Tumbarumba	In person
Kel Campbell Haulage	16 Flinders Street, Port Kembla Ph. (02) 4423-2789	In person
K&S Group	340 Bolong Road, Bomaderry	In person
Metcash	Sydney	In person
National Foods Limited	P: (02) 8732 5243	By phone
Pentarch	Ph. (02) 6496-4612	In person
Port Kembla Port Corporation	Maritime Centre Level 3, 91 Foreshore Rd Port Kembla NSW 2505 (02) 4275 0114	By phone
RTA Wagga Wagga	1 Simmons Street, Wagga Wagga	In person
RTA Wollongong	Level 4, 90 Crown Street, Wollongong Ph. (02) 4221-2468	In person
Softwood Working Group		By phone
South East Fibre Exports (SEFE)	Eden Ph. (02) 6496-0220	In person
State Forests Bombala	Jonas Street, Bombala Ph. (02) 6458-3177	In person
State Forests Eden	13 Bass Street, Eden	In person
State Forests Tumut	Shire building 76 Capper Street, Tumut Ph. (02) 6947-3911	In person
Visy	Tumut Mill Ph. (02) 6947-7900	By phone
Woolworths	Pennant Hills Ph. (02) 8885 2969	In person

23.4 Key statistics and regional demographics

Table 45 – Historical population and forecasts to 2031

SD	SSD	SLA	2001	2006	2008	2011	2016	2021	2026	2031
			Estimated resident population ('000s)			Forecast population ('000s)				
Illawarra	Illawarra SD Bal	Shoalhaven (C) – Pt B	57	60	61	68	73	77	82	86
		Wingecarribee (A)	43	44	45	49	51	54	56	59
	Nowra-Bomaderry	Shoalhaven (C) – Pt A	30	32	33	34	36	37	39	40
	Wollongong	Kiama (A)	20	20	20	21	22	23	24	24
		Shellharbour (C)	60	63	66	67	70	72	74	75
		Wollongong (C)	190	195	198	199	205	212	218	224
South Eastern	Lower South Coast	Bega Valley (A)	31	32	33	35	37	40	42	44
		Eurobodalla (A)	34	37	37	40	44	47	50	53
	Queanbeyan	Palerang (A) – Pt A	8	10	10	9	10	11	13	14
		Queanbeyan (C)	34	38	40	41	44	47	50	53
	Snowy	Bombala (A)	3	3	3	2	2	2	2	2
		Cooma-Monaro (A)	10	10	10	10	10	10	9	9
		Snowy River (A)	7	8	8	8	9	9	10	10
	Southern Tablelands (excl. Queanbeyan)	Boorowa (A)	2	2	2	2	2	2	2	2
		Goulburn Mulwaree (A) – Goulburn	21	21	21	21	21	20	20	19
		Goulburn Mulwaree (A) Bal	5	6	6	6	7	7	7	8
		Harden (A)	4	4	4	4	4	3	3	3
		Palerang (A) – Pt B	3	3	4	3	3	3	4	4
		Upper Lachlan Shire (A)	7	7	7	7	7	7	7	7
		Yass Valley (A)	12	14	14	14	15	15	16	17
		Young (A)	12	12	13	12	12	12	12	12

SD	SSD	SLA	2001	2006	2008	2011	2016	2021	2026	2031
			Estimated resident population ('000s)			Forecast population ('000s)				
Murrumbidgee	Central Murrumbidgee (excl. Wagga Wagga)	Gundagai (A)	4	4	4	4	3	3	3	3
		Tumut Shire (A)	11	11	11	11	11	11	11	11
Murray	Albury	Greater Hume Shire (A) – Pt A	4	4	4	4	5	5	5	6
	Upper Murray (excl. Albury)	Greater Hume Shire (A) – Pt B	7	7	7	6	6	6	5	5
		Tumbarumba (A)	4	4	4	3	3	3	3	3
Total in scope (excl. ACT)			*623*	*651*	*665*	*680*	*712*	*738*	*767*	*793*
ACT			*319*	*334*	*346*	*358*	*379*	*400*	*419*	*437*
Total in scope (incl. ACT)			*942*	*985*	*1,011*	*1,038*	*1,091*	*1,138*	*1,186*	*1,230*
NSW			*6,575*	*6,816*	*6,984*	*7,145*	*7,437*	*7,725*	*8,002*	*8,259*
Study area as percentage of NSW			9%	10%	10%	10%	10%	10%	10%	10%

Source: Australian Bureau of Statistics, Regional Population Growth, Australia 3218.0, 23 April, 2009 (Historical) and Department of Planning NSW, Transport and Population Data Centre (TDC), Population Projections 2001-2031, 2005 Release (Projections).

Table 46 – Registered motor vehicles across study area and NSW, 2006

SLA	*Passenger vehicles*	*Camper vans*	*Light commercial vehicles*	*Light rigid trucks*	*Heavy rigid trucks*	*Articulated trucks*	*Non-freight carrying trucks*	*Buses*	*Motor cycles*	*Total registered motor vehicles*
Kiama (A)	11,134	60	1,793	84	223	38	5	66	427	13,830
Shellharbour (C)	32,357	90	5,247	265	459	168	11	163	1,584	40,344
Wollongong (C) – Inner	46,272	117	6,206	386	632	101	45	197	1,784	55,739
Wollongong (C) Bal	46,149	102	7,133	524	858	240	25	191	1,938	57,159
Shoalhaven (C) – Pt A	17,599	110	3,714	224	518	123	19	334	1,011	23,652
Shoalhaven (C) – Pt B	31,557	214	6,651	264	616	80	25	205	1,634	41,245
Wingecarribee (A)	24,427	83	5,848	322	700	126	18	102	1,064	32,689
Palerang (A) – Pt A	3,803	7	1,343	72	190	16	3	26	209	5,669
Queanbeyan (C)	19,522	37	5,449	297	872	132	16	114	1,091	27,531
Goulburn Mulwaree (A) – Goulburn	10,685	41	3,406	155	406	66	16	97	657	15,530
Goulburn Mulwaree (A) Bal	2,691	11	891	45	108	16	3	19	171	3,955
Palerang (A) – Pt B	1,707	7	858	34	138	10	3	24	86	2,868
Yass Valley (A)	6,516	23	2,536	98	389	42	14	48	285	9,951
Bega Valley (A)	16,345	98	4,932	183	545	115	16	154	849	23,236
Eurobodalla (A)	19,682	142	4,697	156	453	48	17	180	1,208	26,584
Bombala (A)	1,101	9	734	15	60	24	3	17	73	2,037
Cooma-Monaro (A)	4,707	18	2,052	56	236	24	13	63	268	7,437
Snowy River (A)	3,516	18	1,438	43	169	18	8	62	236	5,508
Gundagai (A)	1,607	7	843	23	160	20	4	25	60	2,749
Tumut Shire (A)	5,506	16	2,333	56	347	97	5	52	299	8,712
Greater Hume Shire (A) – Pt A	1,496	6	724	18	140	33	0	11	77	2,506
Greater Hume Shire (A) – Pt B	3,207	12	1,352	27	268	96	4	40	142	5,149
Tumbarumba (A)	1,708	5	943	32	151	55	0	23	81	2,998

SLA	*Passenger vehicles*	*Camper vans*	*Light commercial vehicles*	*Light rigid trucks*	*Heavy rigid trucks*	*Articulated trucks*	*Non-freight carrying trucks*	*Buses*	*Motor cycles*	*Total registered motor vehicles*
Study Area (excl. ACT)	313,294	1,233	71,123	3,379	8,638	1,688	273	2,213	15,234	417,078
Study Area (incl. ACT)	503,402	1,705	90,495	3,982	10,093	1,816	354	3,095	23,192	638,167
ACT	190,108	472	19,372	603	1,455	128	81	882	7,958	221,089
Total SYDNEY	2,124,030	3,288	258,476	19,840	37,171	6,409	2,158	11,422	61,610	2,524,399
Total NSW	3,363,092	8,751	580,368	33,152	79,621	16,730	3,311	20,466	121,641	4,227,133

Source: Australian Bureau of Statistics, National Regional Profile, 2002 to 2006.

Table 47 – Number of businesses by Industry, 2006

SLA	Agriculture, forestry and fishing	Mining	Manufacturing	Electricity, gas and water	Construction	Wholesale trade	Retail trade	Accommodation, cafes & restaurants	Transport and storage	Communication services	Finance and insurance	Property and business services	Education	Health and community services	Cultural and recreational services	Personal and other services	Total businesses
Kiama (A)	180	0	54	0	384	36	213	63	54	18	78	363	30	78	45	54	1,650
Shellharbour (C)	84	6	126	0	759	90	447	93	234	42	90	621	36	120	63	102	2,913
Wollongong (C) – Inner	90	24	348	0	1,047	294	990	246	369	69	462	1,986	90	528	171	240	6,954
Wollongong (C) Bal	114	12	333	6	1,065	183	744	144	408	78	222	1,146	48	246	111	174	5,034
Shoalhaven (C) – Pt A	159	3	129	3	486	63	423	72	153	27	120	492	21	171	57	75	2,454
Shoalhaven (C) – Pt B	429	6	213	3	1,053	114	639	282	210	36	120	870	24	162	93	132	4,386
Wingecarribee (A)	675	24	246	0	843	153	495	144	219	54	204	1,146	30	240	153	195	4,821
Palerang (A) – Pt A	192	6	54	0	192	12	78	27	24	6	24	225	3	27	39	6	915
Queanbeyan (C)	99	3	213	3	663	60	240	75	198	27	111	540	18	78	51	78	2,457
Goulburn Mulwaree (A) – Goulburn	252	0	87	3	267	54	216	96	117	3	75	306	24	108	42	48	1,698
Goulburn Mulwaree (A) Bal	261	3	18	0	66	15	24	9	51	9	18	66	6	9	12	12	579
Palerang (A) – Pt B	267	0	24	0	42	15	33	21	12	6	0	54	3	18	21	0	516
Yass Valley (A)	657	3	42	3	198	33	141	78	72	12	42	237	12	51	48	30	1,659
Bega Valley (A)	576	3	159	6	504	126	387	204	141	27	84	438	21	123	45	60	2,904
Eurobodalla (A)	276	6	180	6	690	78	480	183	144	18	99	561	12	120	90	105	3,048
Bombala (A)	270	0	9	0	18	9	30	9	12	3	6	33	0	12	6	0	417
Cooma-Monaro (A)	393	9	33	3	186	39	168	42	69	21	33	192	15	48	15	36	1,302
Snowy River (A)	159	3	24	0	144	18	63	75	24	6	15	96	3	9	9	27	675
Gundagai (A)	255	0	0	3	51	15	45	15	27	3	0	42	3	9	6	3	477

SLA	Agriculture, forestry and fishing	Mining	Manufacturing	Electricity, gas and water	Construction	Wholesale trade	Retail trade	Accommodation, cafes & restaurants	Transport and storage	Communication services	Finance and insurance	Property and business services	Education	Health and community services	Cultural and recreational services	Personal and other services	Total businesses
Tumut Shire (A)	414	0	27	0	138	33	108	42	78	9	24	144	6	36	0	27	1,086
Greater Hume Shire (A) – Pt A	234	0	15	0	51	0	21	6	15	0	15	51	6	12	6	6	438
Greater Hume Shire (A) – Pt B	492	0	24	0	42	33	75	30	42	12	24	57	0	3	3	15	852
Tumbarumba (A)	270	3	6	0	27	21	30	21	27	6	12	21	0	15	0	12	471
Study Area (excl. ACT)	6,798	114	2,364	39	8,916	1,494	6,090	1,977	2,700	492	1,878	9,687	411	2,223	1,086	1,437	47,706
ACT	660	18	885	24	4,593	582	2,655	792	1,164	300	1,413	7,812	285	1,563	765	783	24,294
Study Area (incl. ACT)	*7,458*	*132*	*3,249*	*63*	*13,509*	*2,076*	*8,745*	*2,769*	*3,864*	*792*	*3,291*	*17,499*	*696*	*3,786*	*1,851*	*2,220*	*72,000*

Source: Australian Bureau of Statistics, National Regional Profile, 2002 to 2006.

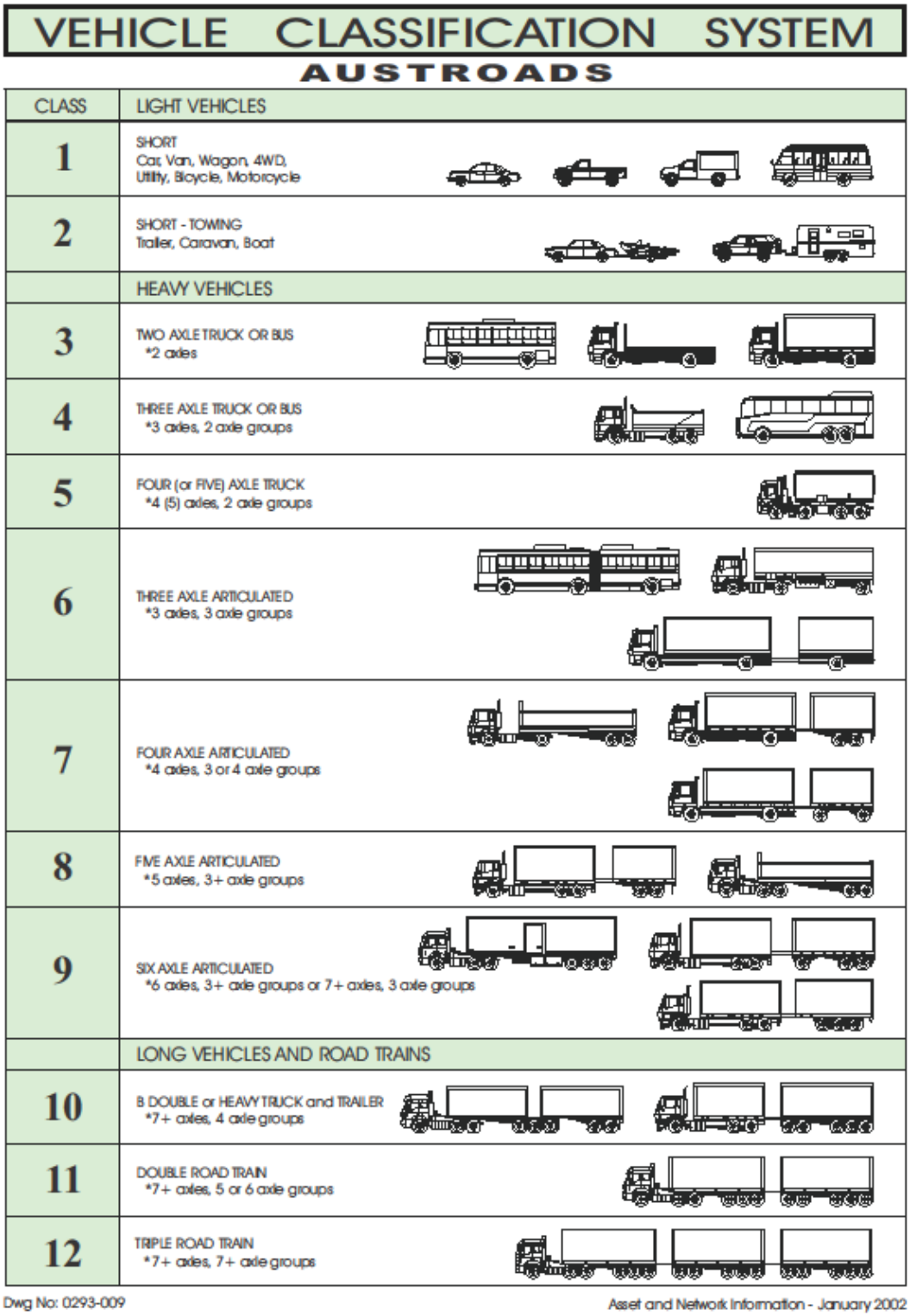
Table 48 – Building approvals, 2006

SLA	*Private sector houses*	*Total dwelling units*	*Value of total residential building*	*Value of total non-residential building*	*Value of total building*
	no.	no.	$m	$m	$m
Kiama (A)	27	31	14	6	19
Shellharbour (C)	276	338	77	36	112
Wollongong (C) – Inner	224	635	142	84	225
Wollongong (C) Bal	214	609	136	80	216
Shoalhaven (C) – Pt A	149	154	33	20	53
Shoalhaven (C) – Pt B	310	388	97	40	137
Wingecarribee (A)	164	235	59	24	83
Palerang (A) – Pt A	77	87	25	4	28
Queanbeyan (C)	134	393	61	35	96
Goulburn Mulwaree (A) – Goulburn	29	39	8	24	32
Goulburn Mulwaree (A) Bal	29	29	6	0	6
Palerang (A) – Pt B	43	113	15	1	16
Yass Valley (A)	81	81	19	1	20
Bega Valley (A)	150	189	44	29	73
Eurobodalla (A)	236	263	69	7	76
Bombala (A)	8	8	3	0	3
Cooma-Monaro (A)	36	79	15	12	27
Snowy River (A)	51	88	18	20	38
Gundagai (A)	15	15	4	1	5
Tumut Shire (A)	43	45	13	11	24
Greater Hume Shire (A) – Pt A	14	14	4	1	5
Greater Hume Shire (A) – Pt B	32	34	8	2	10
Tumbarumba (A)	16	17	4	1	5
Study Area (excl. ACT)	2,358	3,884	871	437	1,308
Study Area (incl. ACT)	3,357	5,751	1,380	1,675	3,055
ACT	999	1,867	509	1,238	1,747
Total SYDNEY	6,281	17,407	5,218	4,434	9,652
Total NSW	16,181	33,156	8,709	6,579	15,289

Source: Australian Bureau of Statistics, National Regional Profile, 2002 to 2006.

23.1 Heavy Vehicles

Table 49 – Austroads vehicle classification system



Source: Roads and Traffic Authority of NSW, www.rta.nsw.gov.au

Table 50 – Table of ACT Higher Mass Limit (HML) approved routes

Type of Route	Road	Starting Point	Finishing Point
Higher Mass Limits	Barton Highway	ACT/NSW Border (Entire length)	Mitchell Industrial Estate or Federal Highway, ACT
Higher Mass Limits	Federal Highway	ACT/NSW Border (Entire length)	Mitchell Industrial Estate or Barton Highway, ACT
Higher Mass Limits	Approaches To Mitchell Industrial Estate	1. Barton Hwy/Gunghalin Drive 2. Barton Hwy/Federal Hwy/Flemington Road 3. Federal Highway/ Flemington Road	All roads in the area bounded by and including Gunghalin Drive, Sandford Street, Wells Station Drive, Hoskins Street, Vicars Street, Flemington Rd & Lysaght Streets
Higher Mass Limits	Mitchell Industrial Estate Area	All roads in the area bounded by and including Gunghalin Drive, Sandford Street, Wells Station Drive, Hoskins Street, Vicars Street, Flemington Rd & Lysaght Streets	

Source: Road Transport (Mass, Dimensions and Loading) Higher Mass Limits (HML) Exemption Notice 2010 (No 1), Department of Territory and Municipal Services, ACT, www.tams.act.gov.au

Table 51 – Table of approved ACT routes for 62.5 tonne B-Doubles, 4.6m high vehicles and 14.5m long buses

National Highways & Main Roads into the ACT	From	To	Restrictions / Conditions (if applicable)
Barton Highway (entire length)	ACT/NSW border	Northbourne Ave	
Canberra Avenue	ACT/NSW border	Hume Place	
Federal Highway (entire length)	ACT/NSW border	Northbourne Ave	
Kings Highway (entire length)	ACT/NSW border	ACT/NSW border	
Monaro Highway (entire length)	ACT/NSW border	Dairy Rd	
Sutton Road (entire length)	ACT/NSW border	Yass Rd	
Yass Road (entire length)	ACT/NSW border	Sutton Rd	

Source: Road Transport (Mass, Dimensions and Loading) General B-Double Exemption Notice 2010 (No. 1), Department of Territory and Municipal Services, ACT, www.tams.act.gov.au

Note: only routes to/from the NSW border are shown. The Notice extends to 17 pages of local ACT roads in addition to those listed above.

23.2 Supplementary case studies data

Figure 103 – Total NSW forests area and harvesting status

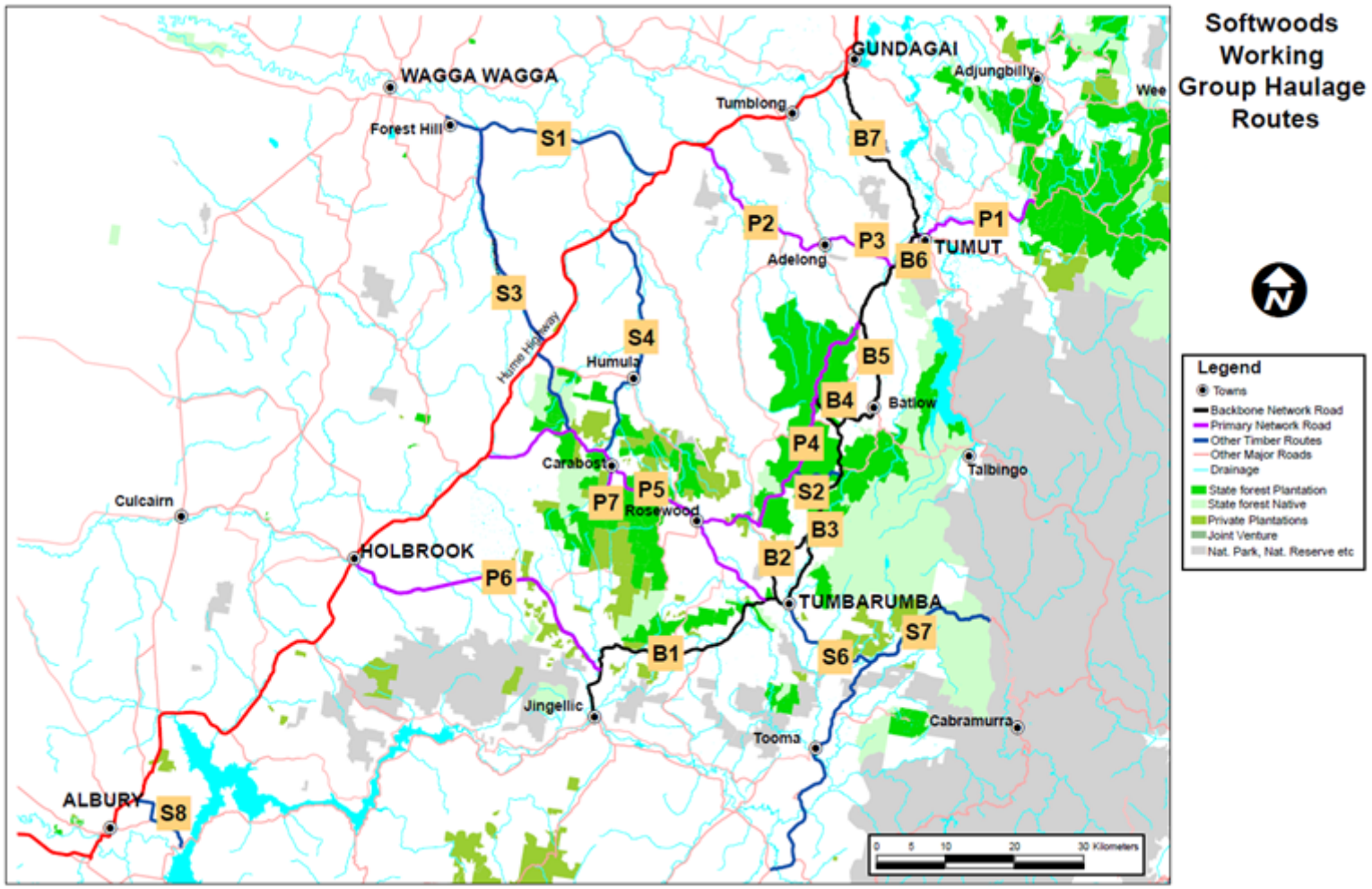
Source: Forests NSW Annual Report 2008-09, Social, Environmental and Economic Performance.

Table 52 – Export of forest products by port, 2008-09

State	Port	Logs	Timber products	Woodchips	Grand Total
NSW	Eden (NSW Maritime Authority)	289,533		908,382	*1,197,915*
	Newcastle Port Corporation			264,530	*264,530*
	Sydney Ports Corporation	74,522	165,801	3,313	*243,636*
	Yamba (NSW Maritime Authority)	3,952	619		*4,571*
VIC	Geelong Port	70,000	18,000	980,000	*1,068,000*
	Melbourne Port Corporation		330,351		*330,351*
	Port of Portland			1,141,641	*1,141,641*
QLD	Port of Brisbane Corporation	10,086	194,875	245,537	*450,498*
SA	Port Adelaide (Flinders)	28	266		*294*
WA	Albany Port Authority	97,950		1,626,537	*1,724,487*
	Fremantle Port Authority	5			*5*
TAS	Bell Bay (TasPorts Pty Ltd)	978	67,414	2,113,444	*2,181,836*
	Bunbury Port Authority			1,094,405	*1,094,405*
	Burnie (TasPorts Pty Ltd)	27,778	48,711	1,036,442	*1,112,931*
	Devonport (TasPorts Pty Ltd)		56,832		*56,832*
	Hobart (TasPorts Pty Ltd)		67,778	802,178	*869,956*
NT	Darwin Port Corporation		3		*3*
Australia		*574,832*	*950,650*	*10,216,409*	*11,741,891*

Source: Ports Australia (previously the Association of Australian Port and Maritime Authorities Inc.)

Figure 104 – Softwoods Working Group Haulage Routes



Source: TIMBER Industry Haulage Study for the South West Slopes of New South Wales, 2009 update of 2001 Study for Softwood Working Group, Dec-2009.

Table 53 – Timber study network list

Map Reference (Figure 104)	*Classification*	*Management Category*	*Road Number*	*LGA or Authority*	*Additional Link Description*
Backbone Route					
B1.1	Main Road	State Road	MR 85	Tumbarumba	Jingellic to Tumbarumba
B1.2	Main Road	State Road	MR 85	Tumbarumba	Jingellic to Tumbarumba
B2	Unclassified	Local Road	Courabyra Road	Tumbarumba	Tumbarumba Bypass
B3.1	Main Road	State Road	MR 85	Tumbarumba	Tumbarumba to Batlow
B3.2	Main Road	State Road	MR 85	Tumut	Tumbarumba to Batlow
B4	Unclassified	Local Road	TBA	Tumut	Batlow Bypass
B5.1	Main Road	State Road	MR 85	Tumut	Batlow to Wondalga
B5.2	Main Road	State Road	MR 85	Tumut	Wondalga to Gilmore
B6	Highway	State Road	SH 4	RTA	Gilmore to Tumut
B7.1	Main Road	Regional Road	MR 279	Tumut	Tumut to Gundagai
B7.2	Main Road	Regional Road	MR 279	Gundagai	Tumut to Gundagai
Primary Network (remainder)					
P1.1	Unclassified	Local Road	Bombowlee Creek Road	Forests NSW	Brindabella/WeeJasper Roads to Tumut
P1.2	Unclassified	Local Road	Bombowlee Creek Road	Tumut	Brindabella/WeeJasper Roads to Tumut
P1.3	Main Road	Regional Road	MR 278	Tumut	Bombowlee Creek Rd to Tumut
P2.1	Highway	State Road	SH 4	RTA Tumut	Gilmore to Visy Turnoff
P2.2	Highway	State Road	SH 4	RTA Tumut	Visy Turnoff to Hume Highway
P3	Unclassified	Local Road	Visy Access	Tumut (Visy)	Snowy Mountains Highway to Visy
P4.1	Unclassified	Local Road	Wondalga Road <-> Greenhills Access Road Extension	Forests NSW	Wondalga to Broadleaf Park Link Road
P4.2	Main Road	Regional Road 7602	Broadleaf Park Link Road <->Broadleaf Park Road	Forests NSW assisting Tumbarumba	Wondalga Road to Rosewood
P4.3	Main Road	Regional Road 7602	Broadleaf Park Link Road	Tumbarumba	Wondalga Road to Rosewood
P5.1	Main Road	State Road	MR 284	Tumbarumba	Tumbarumba to RR384, Carabost
P5.2	Main Road	State Road	MR 284	Greater Hume	Tumbarumba to RR384, Carabost
P5.3	Main Road	State Road	MR 284	Greater Hume	MR 384, Carabost to Hume Highway
P6	Main Road	Regional Road	MR 331	Greater Hume	Main Road 85 to Holbrook
P7	Unclassified	Local Road	Coppabella Road	Greater Hume	Plantations to MR 284

Map Reference (Figure 104)	*Classification*	*Management Category*	*Road Number*	*LGA or Authority*	*Additional Link Description*
Identified timber routes not currently in primary network					
S1	Highway	State Road	SH 14	Wagga Wagga	Sturt Highway, Hume Highway to Wagga
S2	Unclassified	Local Road	Lochinvar Road	Forests NSW	Lochinvar to Wondalga Road
S3	Main Road	Regional Road	MR 384	Mainly Wagga Wagga, part Greater Hume	Carabost to Hume Highway at Kyeamba S3.1 and to Forest Hill S3.2
S4	Unclassified	Local Road	Humula Road	Mainly Wagga Wagga, part Greater Hume	Main Road 284 to Humula S4.1 and Humula to Tarcutta S4.2
S6	Main Road	Regional Road	MR 628	Tumbarumba	Main Road 628 Tumbarumba to Tooma and to Victoria
S7	Main Road	Regional Road 7603	Elliot Way	Tumbarumba	Elliot Way from Main Road 628 to plantations
S8.1	Highway	State Road	SH 20	RTA	Riverina Highway Heywoods Bridge to Wirlinga
S8.2	Unclassified	Local Road	Various roads	Greater Hume	Riverina Highway to Norske Skog Albury

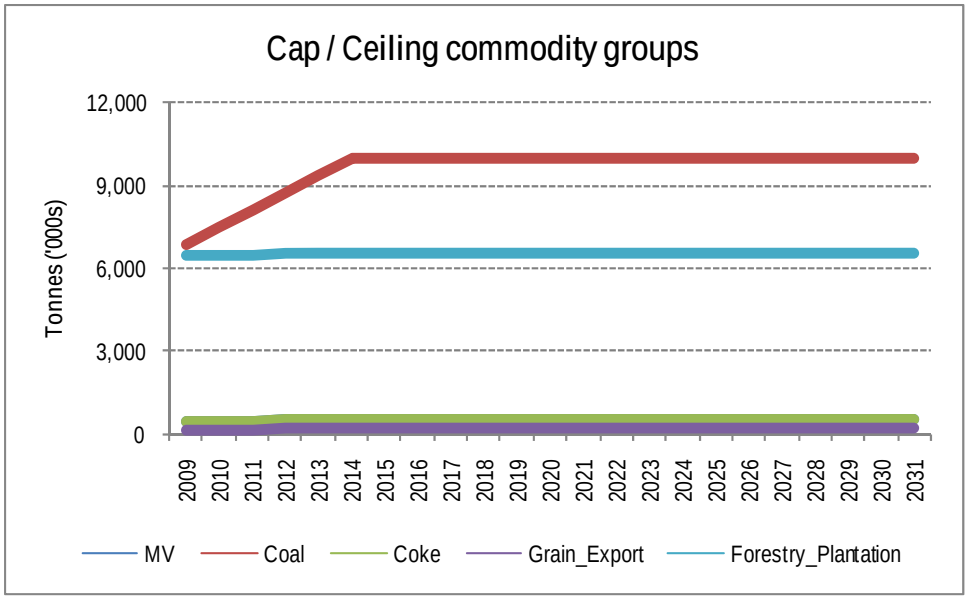
23.3 Supplementary base case data

Table 54 – Tonnes to trips conversion table

Vehicle Type	*Vehicle capacity (t per load)*	*Assumed vehicle share for each case study*								
		Consumer Goods	*Fuel Distribution*	*Forestry Plantation*	*Timber Paper*	*Coal*	*Coke*	*Export Grain*	*Horticulture Marine*	*Dairy*
Semi – Car carrier	12	0%	0%	0%	0%	0%	0%	0%	0%	0%
Semi – Standard	24	100%	60%	10%	10%	0%	0%	10%	100%	60%
Semi – HML	28	0%	40%	50%	50%	50%	50%	50%	0%	20%
B-double- 19m	38	0%	0%	20%	20%	50%	50%	40%	0%	20%
B-double- 25m	42	0%	0%	20%	20%	0%	0%	0%	0%	0%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%
% Backload		100%	100%	100%	75%	75%	100%	100%	75%	75%
		Steel	*Manildra*	*Quarrying*	*Cement Concrete*	*Building Products*	*Motor Vehicles*	*Port (misc commodities)*	*Other Industrial*	*Other*
Semi – Car carrier	12	0%	0%	0%	0%	0%	100%	0%	0%	0%
Semi – Standard	24	10%	10%	10%	10%	10%	0%	50%	10%	10%
Semi – HML	28	50%	50%	50%	50%	50%	0%	30%	50%	50%
B-double- 19m	38	20%	20%	20%	20%	20%	0%	20%	20%	20%
B-double- 25m	42	20%	20%	20%	20%	20%	0%	0%	20%	20%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%
% Backload		100%	50%	50%	50%	50%	100%	100%	100%	50%

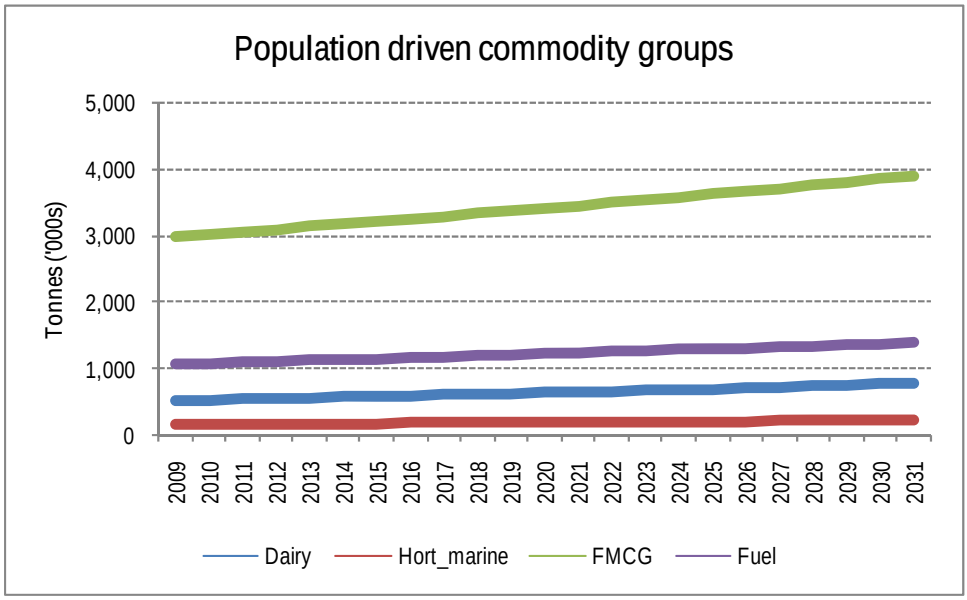
23.4 Supplementary forecast data

Figure 105 – Cap ceiling commodity groups



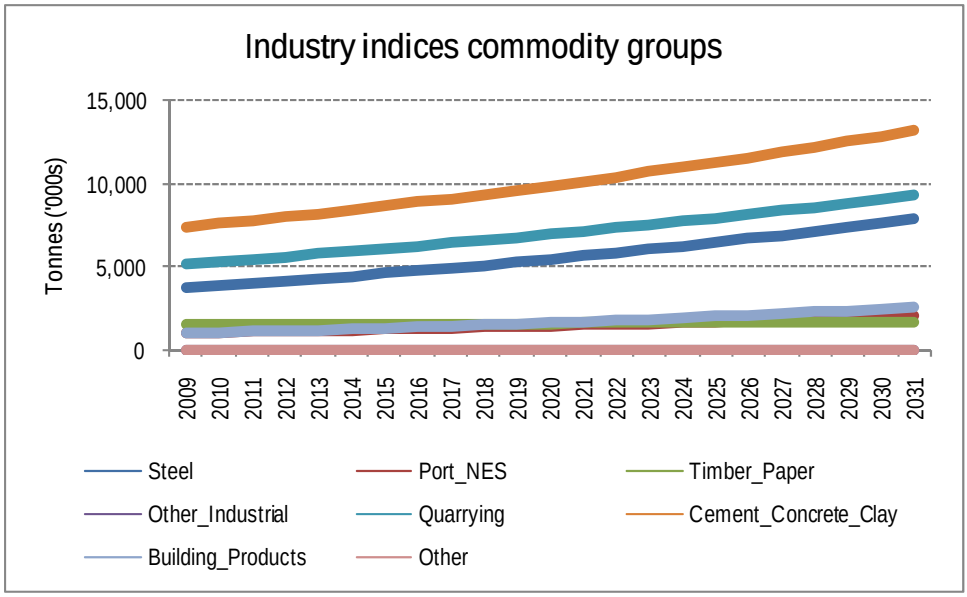
Source: Stakeholder consultation.

Figure 106 – Population driven commodity groups



Source: Department of Planning NSW, Transport and Population Data Centre (TDC), Population Projections 2001-2031, 2005 Release.

Figure 107 – Industry indices commodity groups



Source: Industry and economic databases e.g. ABARE, IBISWorld as well as stakeholder consultation.