

2 Regional agricultural resources and enterprises

The AIS guidelines require identification of the regional agricultural resources and enterprises in the region. This chapter provides an overview of the agricultural resources (soil, water, vegetation, climate and agricultural support infrastructure) and the current agricultural enterprises in the Wingecarribee Shire.

2.1 The Wingecarribee Shire

The project is located in the Wingecarribee Shire (LGA). The Shire boundary aligns with the Wingecarribee Australian Bureau of Statistics (ABS) Area level 3 (SA 3) and is broken into six Area level 2 regions (SA 2); namely, Hill Top (SA2), Mittagong (SA2), Bowral (SA2), Moss Vale (SA2), Robertson (SA2), Fitzroy Falls (SA2) and Southern Highlands (SA2) (see Figure 2.1). Although the SA2 areas have the same name as the towns they are centred on, the statistical areas include more than just the townships. Southern Highlands (SA2) is a smaller area than the Shire which is also commonly referred to as the 'Southern Highlands'.

The Wingecarribee Shire covers an area of approximately 269,000 ha, with 27.1% or approximately 73,000 ha classified as agricultural land (ABS 2006). The project area is 5,051 ha and located mostly on agricultural land, which represents approximately 6.9% of the land area available for use in agriculture in the Wingecarribee Shire. The regional topography is presented in Figure 2.2.

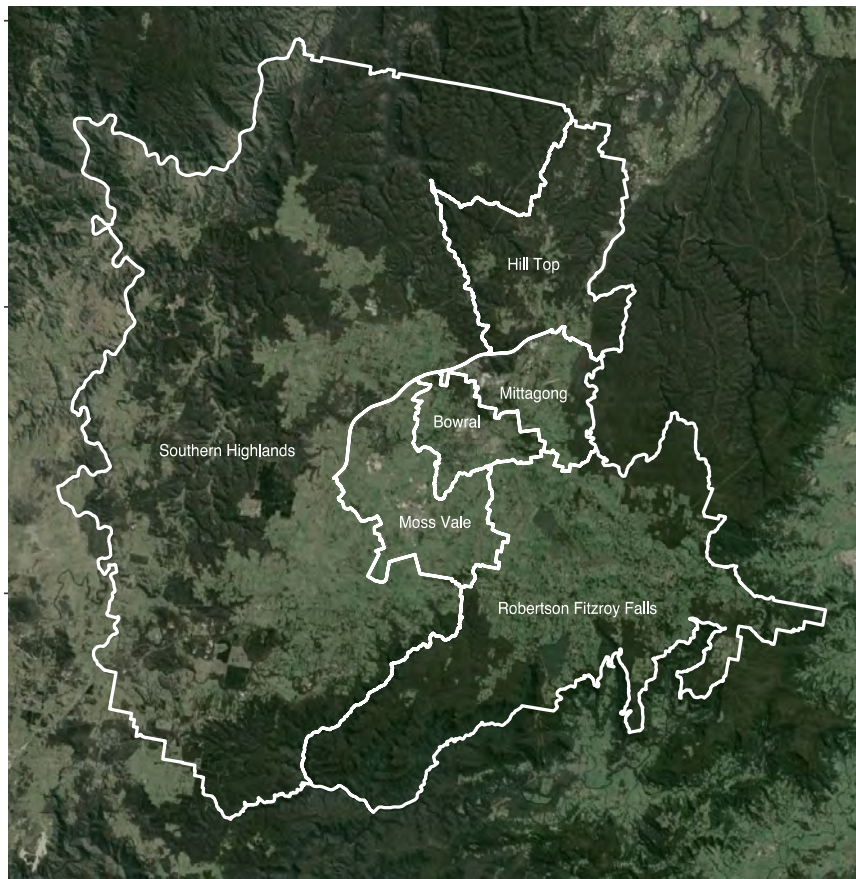
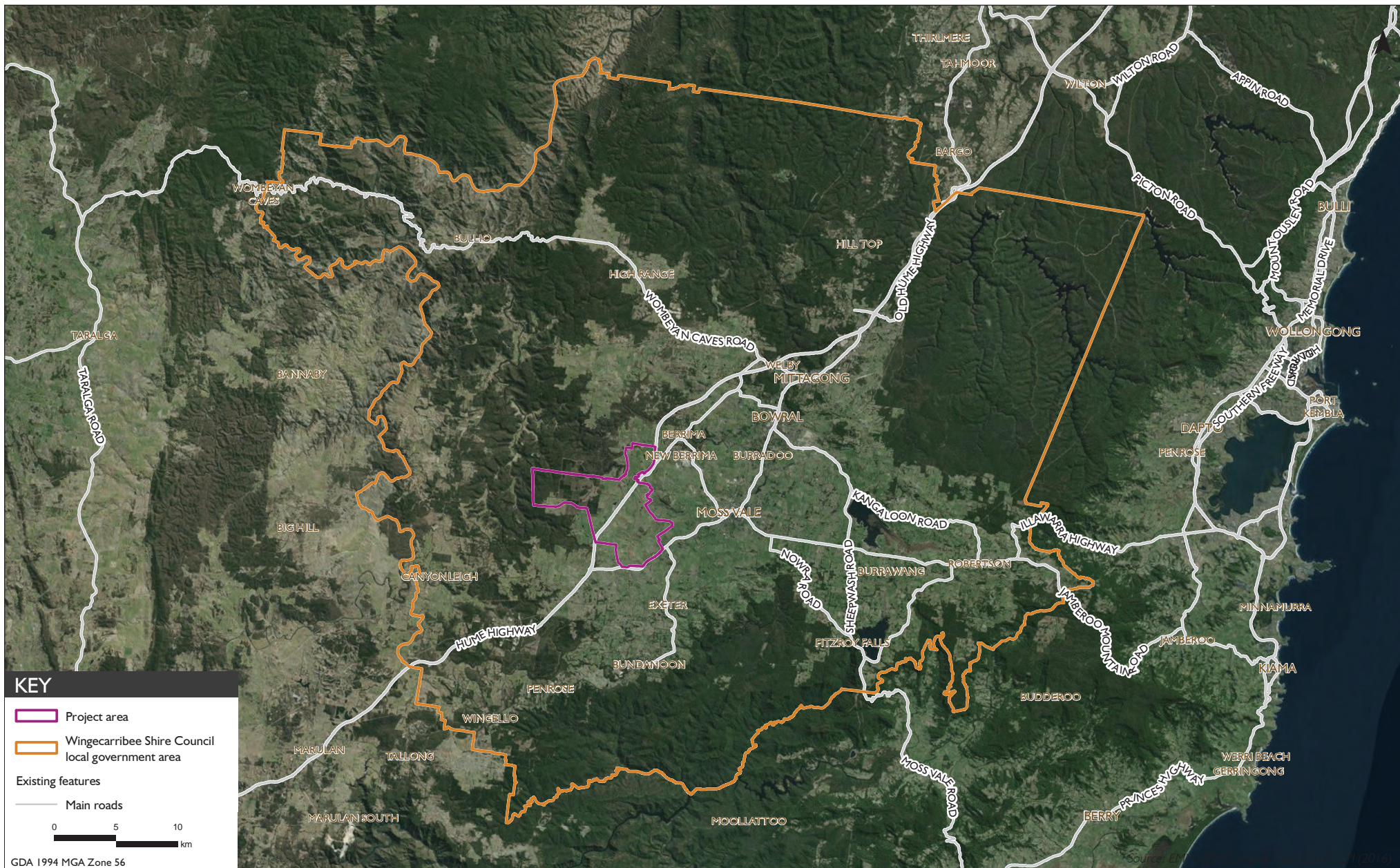


Figure 2.1 The Wingecarribee Shire ABS SA2 regions



Topographic map of Wingecarribee Shire
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Figure 2.2

2.2 Biophysical environment

2.2.1 Climate conditions

The Wingecarribee Shire is in the temperate climatic zone. It has a warm summer and cold winter, with generally uniform rainfall (Bureau of Meteorology (BoM) 2015). Average climatic data recorded at the BoM station in Moss Vale (068045), which is the closest station to the project area, is summarised in Table 2.1. The data in Table 2.1 shows that temperatures range from an average maximum of 25.8°C in January to an average minimum of 1.3°C in July. The area experiences moderate to high rainfall, with an average annual rainfall of approximately 967 millimetres (mm).

Table 2.1 Summary of climate data recorded at Moss Vale BoM station 068045

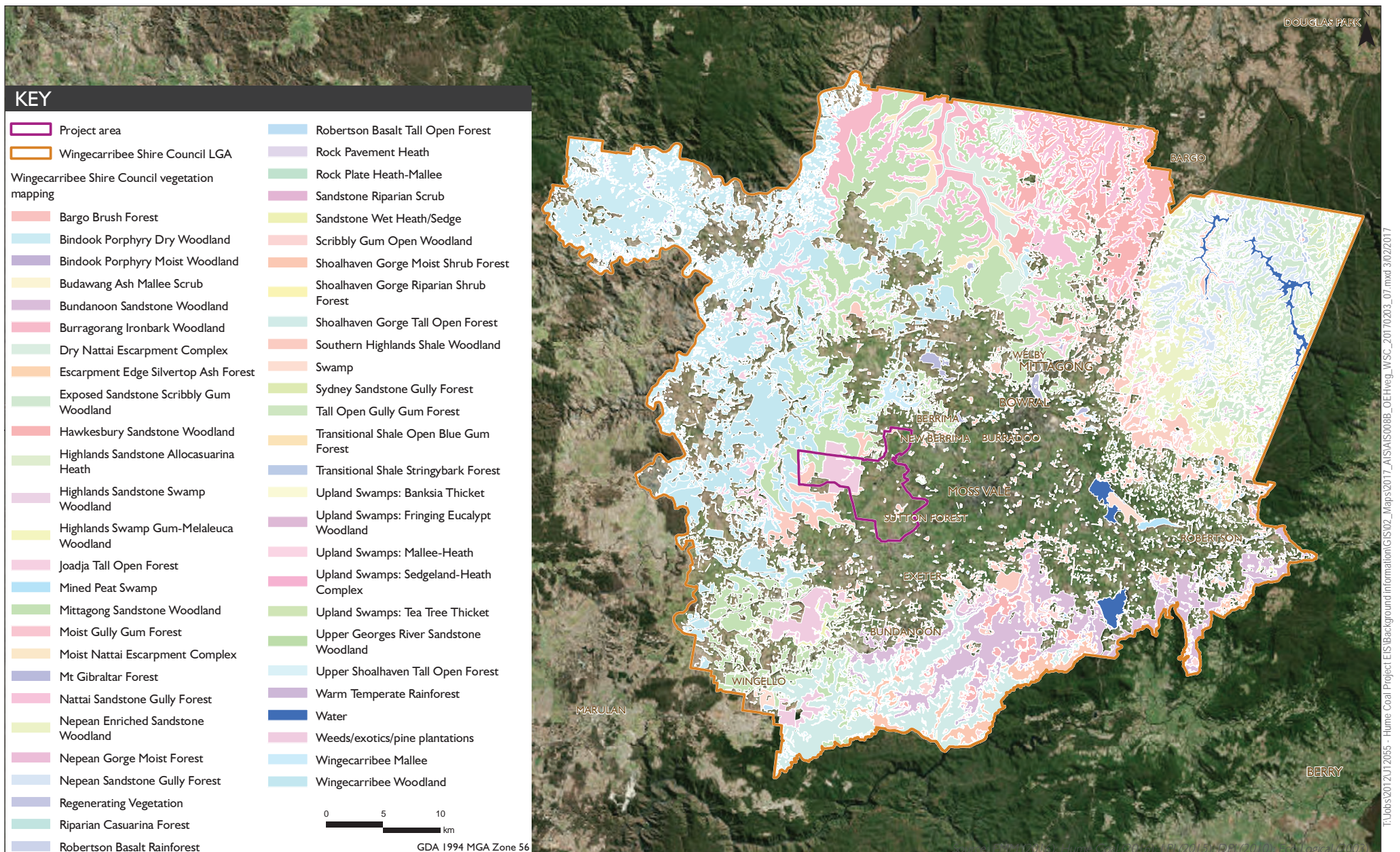
Parameter	Statistic	Measurement	Month
Temperature			
Mean maximum	Annual	19.2°C	-
	Highest monthly	25.8°C	January
	Lowest monthly	11.8°C	July
Mean minimum	Annual	7°C	-
	Highest monthly	12.6°C	February
	Lowest monthly	1.3°C	July
Mean rainfall	-		
Annual	-	966.7 mm	-
Highest monthly	-	100.5 mm	June
Lowest monthly	-	59.7 mm	September
Mean 9am wind speed			
Annual	-	11.5 km/hour	-
Highest monthly	-	13.5 km/hour	September
Lowest monthly	-	9.3 km/hour	February

There is an average of 53.7 potential frost days (below 2°C) at Moss Vale (15 year average, Moss Vale Station 68239, BOM data), depending on other weather factors. The highest likelihood of frost is in July with an average of 17 potential frost days.

Generally, the greatest average minimum wind gusts occur during late winter and early spring (August and September), with gentler winds observed for autumn months of April and May (Hume Coal 2013). A dominant westerly component is evident in the wind rose data (Ramboll Environ 2016).

2.2.2 Vegetation

Vegetation mapping of the Wingecarribee Shire by Eco Logical Australia (2003), described the Shire as being approximately 63.6% vegetated. The areas that are cleared for agriculture and residential use are generally in the central portion of the Shire. Figure 2.3 shows the mapped vegetation in the Wingecarribee Shire. The un-vegetated areas correlate with the areas indicated as having potential for agricultural use (Section 2.3.2ii).



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Native vegetation in Wingecarribee Shire

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Figure 2.3

2.3 Agricultural resources

2.3.1 Key agricultural support infrastructure

i Transport routes

The major transport routes used by agricultural producers to access supporting services and to move their products include the Hume Highway and the Illawarra Highway and some major local roads, such Golden Vale Road and Berrima Road, as well as the north-south rail line to Sydney and Goulburn and the eastern rail line to Wollongong (EMM 2017b). The Hume Highway has three grade separated interchanges which provide major road access into and around the project area. Potential impacts on transport routes from the project are addressed in Section 5.3.1.

ii General and specialist services

Agriculture in the Wingecarribee Shire is supported by a range of other general and specialist services and infrastructure. These services are located outside the project area and service a wide geographical area. Potential impacts on these services are addressed in Section 5.3.2.

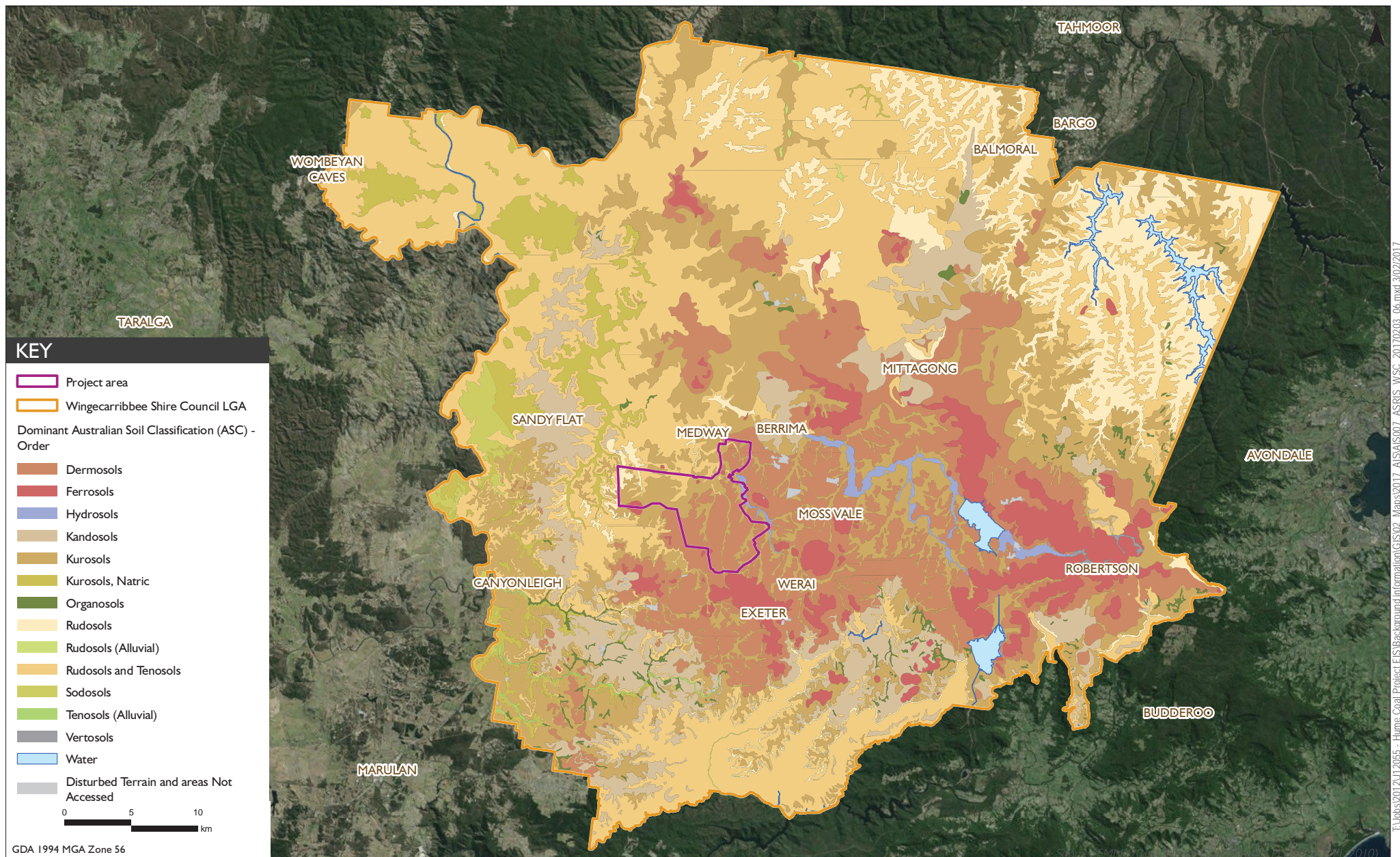
- The Southern Regional Livestock Exchange (SRLE) is one of the top ten saleyards in NSW, and is located on Berrima Road, around 2.5 km from the centre of Moss Vale. Wingecarribee Shire Council (WSC) runs the facility as a business unit of Council (WSC 2016). The SRLE turns over approximately 60,000 head of cattle per year, with an annual gross turnover of between \$30-\$35 million dollars (WSC 2016).
- The Inghams Enterprises Berrima Feed Mill, a poultry feedmill is also located on Berrima Road on the fringe of New Berrima, and has been operating for approximately 15 years. The feed mill is licensed to manufacture animal and bird feed.
- Agricultural producers supplying hay and silage as fodder crops operate in the area.
- Other services supplying producers include veterinary practices, input suppliers for seed, chemicals, agricultural irrigation suppliers and technicians and heavy and light engineering works.

2.3.2 Soil and land classification

Government soil surveys (OEH 2015a) have mapped NSW using the Australian Soil Classification scheme (Section 2.3.2i). Using the characteristics of these soil types, the agricultural potential of the land has been classified and mapped using the Agricultural Land Suitability scheme (Section 2.3.2ii) and the Land and Soil Capability scheme (Section 2.3.2iii). An overview of the regional classifications as per each of these systems is given in the sections below.

i Australian soil classification

The Australian Soil Classification (ASC) scheme (Isbell 1996) is a multi-category scheme with soil classes defined on the basis of diagnostic horizons and their arrangement in vertical sequence as seen in an exposed soil profile. Figure 2.4 shows the ASC orders which are currently mapped on a regional scale within the project area (OEH 2015a). The more fertile Dermosols and Ferrosols have been mapped in the centre and east of the Wingecarribee Shire, with the shallow sandy and granitic Rudosols and Tenosols in the higher elevated ridges.



Soil mapping in Wingecarribee Shire
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Figure 2.4

ii Agricultural land suitability

The five class system (NSW Agriculture 2002), used by NSW Agriculture classifies land in terms of its suitability for general agricultural use (Table 2.2). The majority of land within the Wingecarribee Shire is Class 4 and 5. There is no land suitable for intensive cultivation (Class 1) and less than 20% is suitable for rotational cropping (not continuous cropping) (see Figure 2.5).

Table 2.2 Agricultural land classification and distribution in the Wingecarribee Shire

Class	Description ¹	Distribution ²
1	Arable land suitable for intensive cultivation where constraints to sustained high levels of agricultural production are minor or absent.	No Class 1 land in Shire
2	Arable land suitable for regular cultivation for crops, but not suited to continuous cultivation. It has a moderate to high suitability for agriculture but edaphic (soil factors) or environmental constraints reduce the overall level of production and may limit the cropping phase to a rotation with sown pastures.	Within the eastern part of the shire around Kangaloon, Robertson, Avoca and Fitzroy Falls.
3	Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with sown pasture. The overall production level is moderate because of edaphic or environmental constraints. Erosion hazard, soil structural breakdown or other factors, including climate, may limit the capacity for cultivation and soil conservation or drainage works may be required.	Through the central part from the northern villages through to Moss Vale, Sutton Forest, Exeter and Bundanoon.
4	Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high but the overall production level is low as a result of major environmental constraints.	Through the western part of the Shire
5	Land unsuitable for agriculture, or at best suited only to light grazing. Agricultural production is very low or zero as a result of severe constraints, including economic factors which prevent land improvement.	Through the northern, western and southern parts of the Shire.

Notes: 1. Agricultural Land Classification (NSW Department of Agriculture 2002).
2. Rural Lands Development Control Plan (WSC May 2015).

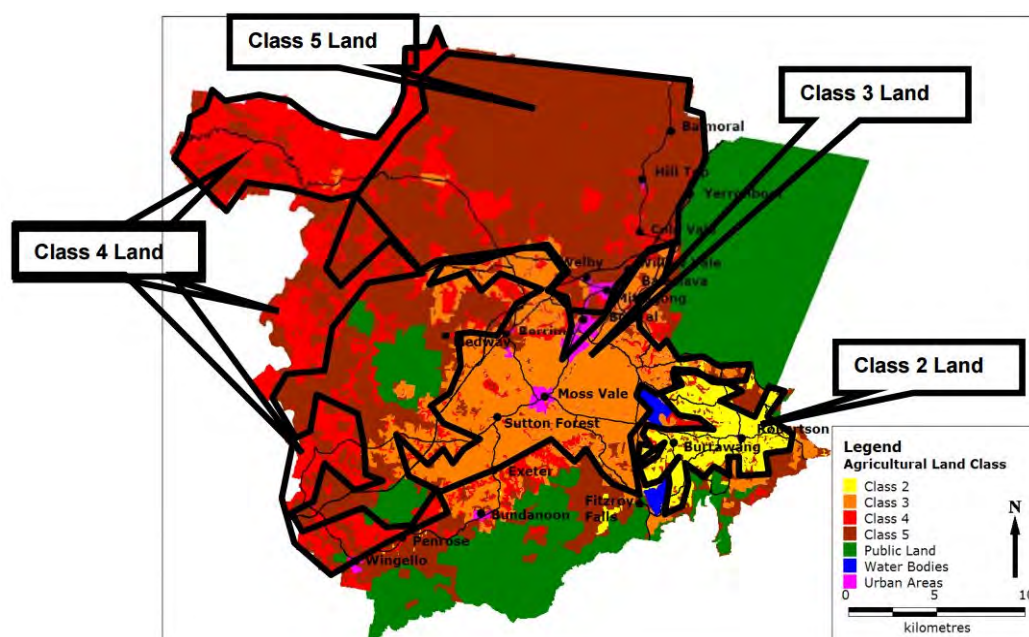


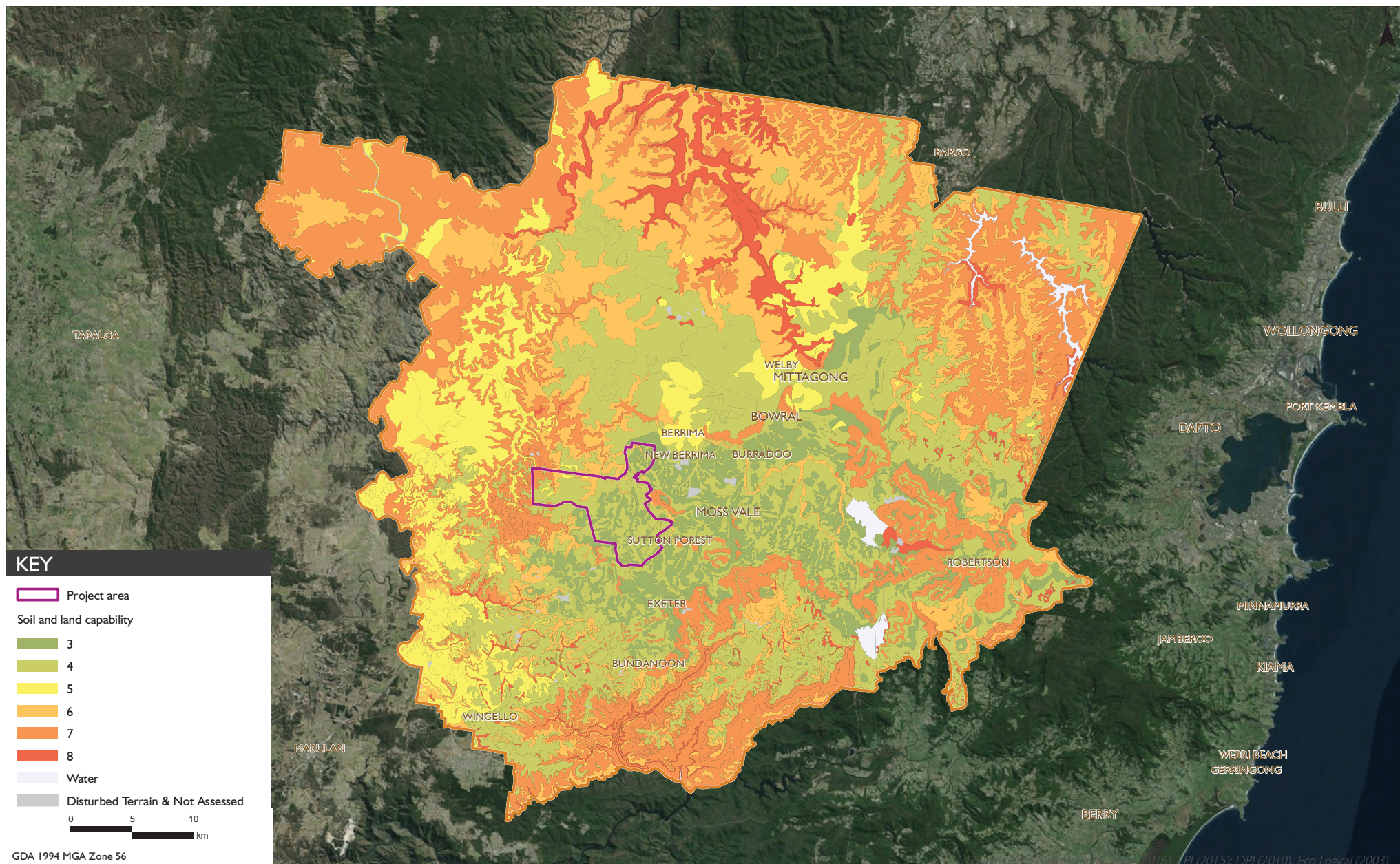
Figure 2.5 Agricultural land classification in Wingecarribee Shire

iii Land and soil capability classes

The Wingecarribee Shire is mapped using the *Land and Soil Capability Mapping of NSW* (OEH 2015b) and the class distribution is shown in Figure 2.6. Areas mapped as high capability land (Class 3) are limited to patches interspersed with moderate capability land (Class 4) in the centre of the Shire. A large area of the Shire is low capability land (Classes 6, 7 and 8). The patterns of land and soil capability (LSC) reflect the underlying soil types (see Figure 2.4) and the topography. The LSC classes are described in Table 2.3.

Table 2.3 Land and soil capability classes

Class	Description
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	Extremely High capability land: Land has no limitations. No special land management practices required. Capable of all rural land uses and land management practices.
2	Very high capability land: Land has slight limitations. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
4	Moderate capability land: Moderate to high limitations for high-impact land uses. It will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture; and the limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
5	Moderate-low capability land: High limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
Land capable for a limited set of land uses (grazing, forestry and nature conservation)	
6	Low capability land: Very high limitations for high-impact land uses and is generally suitable for limited land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
7	Very low capability land: Severe limitations that restrict most land uses and generally cannot be overcome. Generally suitable only for selective forestry and nature conservation.
8	Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation.



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Soil and land capability of Wingecarribee Shire
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Figure 2.6

2.3.3 Location and type of agricultural industries

i Agricultural land use

The area of land in the Wingecarribee Shire suitable for agriculture is estimated to be approximately 73,000 ha (ABS 2011). However, farms with an estimated value of agricultural operations (EVAO) greater than \$5,000 per year (the target population for the ABS agricultural census and surveys), cover a combined area of only about 16,900 ha.

Within the actively productive land:

- approximately 1,900 ha is cropped, with less than approximately 1,000 ha cultivated; and
- approximately 15,000 ha is managed for grazing.

The majority of land in agricultural production in the Wingecarribee Shire is in the Moss Vale - Berrima, Robertson - Fitzroy Falls and Southern Highland (SA 2) regions, as shown in Figure 2.7 (ABS 2011).

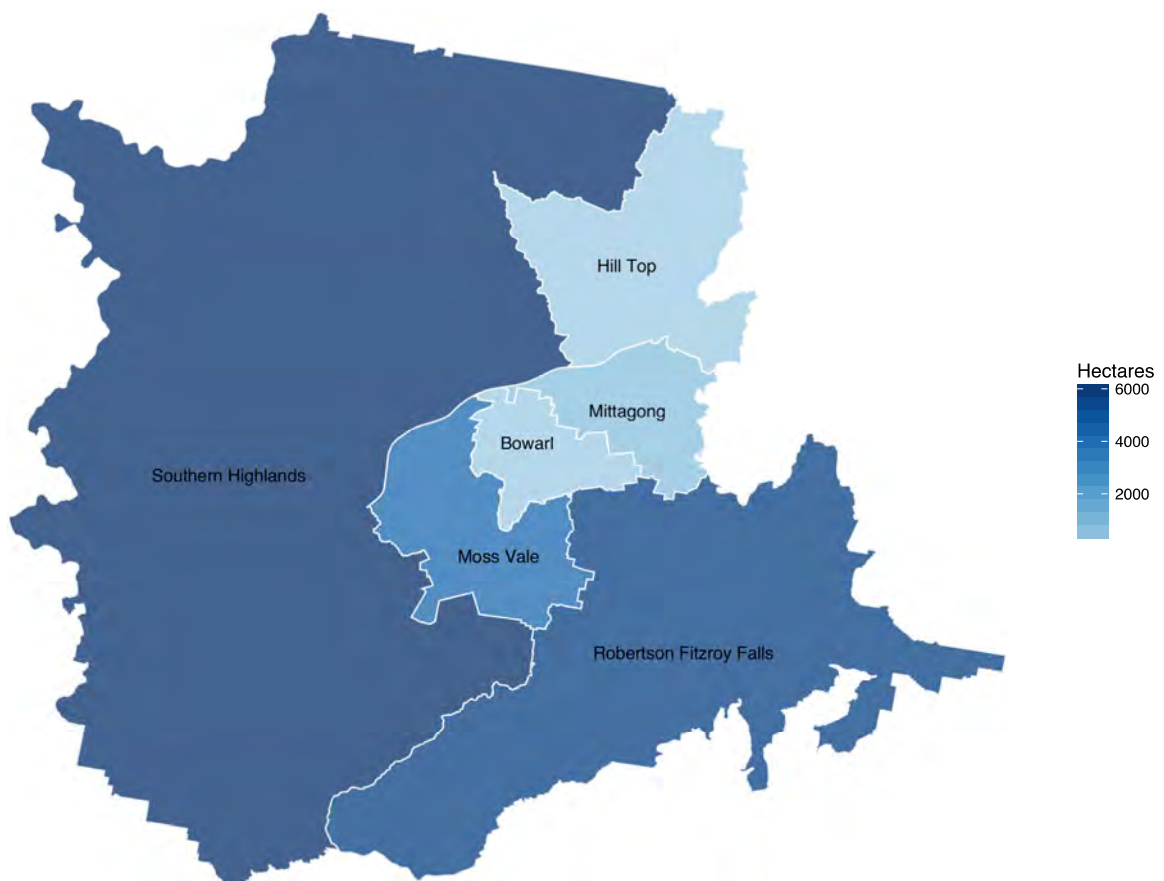


Figure 2.7 Wingecarribee land in agricultural production

ii Composition of agricultural production

The composition of livestock enterprises with an EVAO in excess of \$5,000 in the Wingecarribee Shire is shown in Figure 2.8 (ABS 2011). It is noted that more than one activity could be reported per farm. This data was the finest scale that was obtainable for the region.

The data shows that beef cattle accounts for approximately 69% of all livestock, and most cattle are raised for beef or breeding purposes with dairying accounting for approximately 13%, however is mostly confined to the eastern part of the shire towards Robertson.

In the last 30 years, horse farms have become more common. Non- stud horse farms account for approximately 19% of farms and horse stud farms approximately 6%. The non-stud horse farms include training and dressage facilities, and farms for resting horses. Other animals are also farmed in lesser numbers, such as Alpacas and emus. Some farmers are specialising in the production of specialist breeds of cattle or sheep for coloured wool.

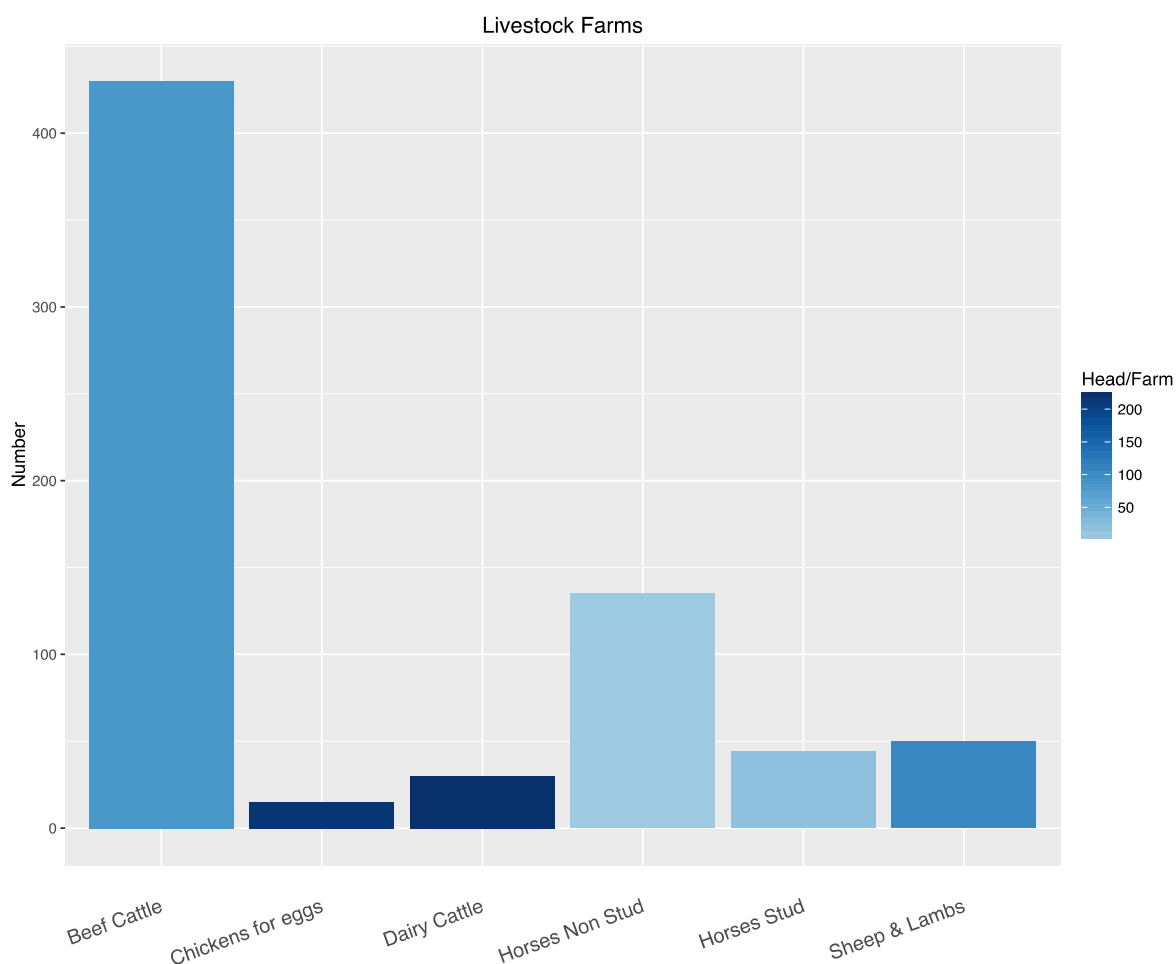


Figure 2.8 Livestock farming in Wingecarribee Shire

The composition of cropping enterprises with an EVAO in excess of \$5,000 in the Wingecarribee Shire is shown in Figure 2.9 (ABS 2011). Cropping is undertaken at a small scale and varies from year to year depending on rainfall with the main crops being wheat and fodder grasses. Cereal and non-cereal food crops account for only 14% of the land recorded as being under cultivation (and only 0.12% of the agricultural land in the Shire).

Cultivation for grapes is the most common cropping enterprise accounting for 214 ha or 35% of the area under cultivation. The Southern Highlands was declared an official wine region in 1999 and viticulture enterprises produce a range of cool climate wines.

Vegetable growing is carried out on 192 ha of land, on 12 different farms, accounting for 32% of area under cultivation. Horticulture has seen specialist crops such as berries, mushrooms, fruits, truffles, lavender and olives planted catering for boutique food markets. Fruit and berry orchards occur on 111 ha of land, on 27 different farms, accounting for 18% of land under cultivation. A new market is opening for the production of cider, preserves and other foodstuffs, including mushrooms which are grown in the old railway tunnels in Mittagong for shipment to major markets.

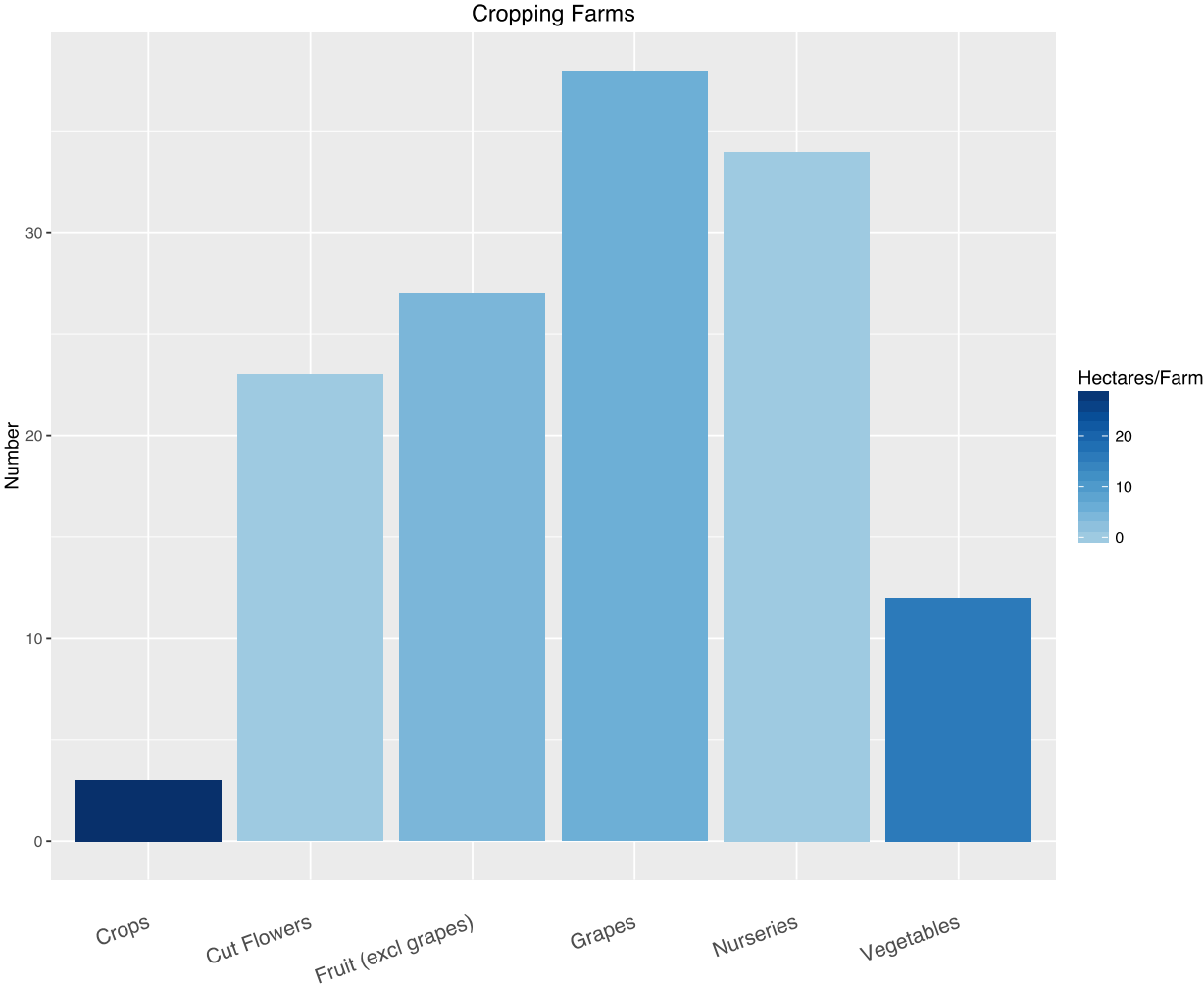


Figure 2.9 **Cropping in Wingecarribee Shire**

Table 2.4 shows the number and type of agricultural industries in the Wingecarribee Shire compared to the whole of NSW. While the beef cattle industry is the largest agricultural industry in the Shire, it represents less than 1% of the beef cattle industry in NSW. Horse studs account for almost 2.5% of horse studs in NSW.

Table 2.4 **Number and size of selected agricultural industries in Wingecarribee Shire (2011¹)**

Category	Units	Number of stock or Hectares		Number of Farms	
		Shire	% of NSW	Shire	% of NSW
Beef cattle	Number	36361	0.69%	430	1.60%
Dairy cattle	Number	6645	2.08%	30	2.05%
Chickens for eggs	Number	3203	0.07%	15	1.94%
Horses non Stud	Number	685	1.29%	135	1.28%
Horses stud	Number	829	2.49%	44	1.81%
Sheep and lambs	Number	5258	0.02%	50	0.31%
Crops	ha	88	0.01%	3	0.02%
Fruit (not grapes)	ha	111	0.24%	27	0.99%
Grapes	ha	214	0.48%	38	2.11%
Cut flowers	ha	1.1	2.02%	23	4.11%
Nurseries	ha	0.1	0.11%	34	2.27%
Vegetables	ha	192	1.22%	12	0.83%

Notes: 1. Source: Selected agricultural industries (2011 Agriculture Census (ABS)).

2.4 Current agricultural enterprises

2.4.1 Gross value of agricultural production

The gross value of the agricultural production (GVP) for the Wingecarribee Shire was \$44.8 million in 2010-2011 (ABS 2011). This represents 0.38% of the gross value of agricultural production in NSW. Figure 2.10 (ABS 2011) shows the gross value of different commodities and the relative value compared to NSW production. In terms of the value of GVP in 2011 there were only six substantive enterprises in the Wingecarribee Shire; cattle, milk, nurseries and cut flowers (shown collectively as nurseries etc on Figure 2.9), vegetables and hay. Nurseries and cut flowers, and seeds had the highest relative gross value compared to NSW.

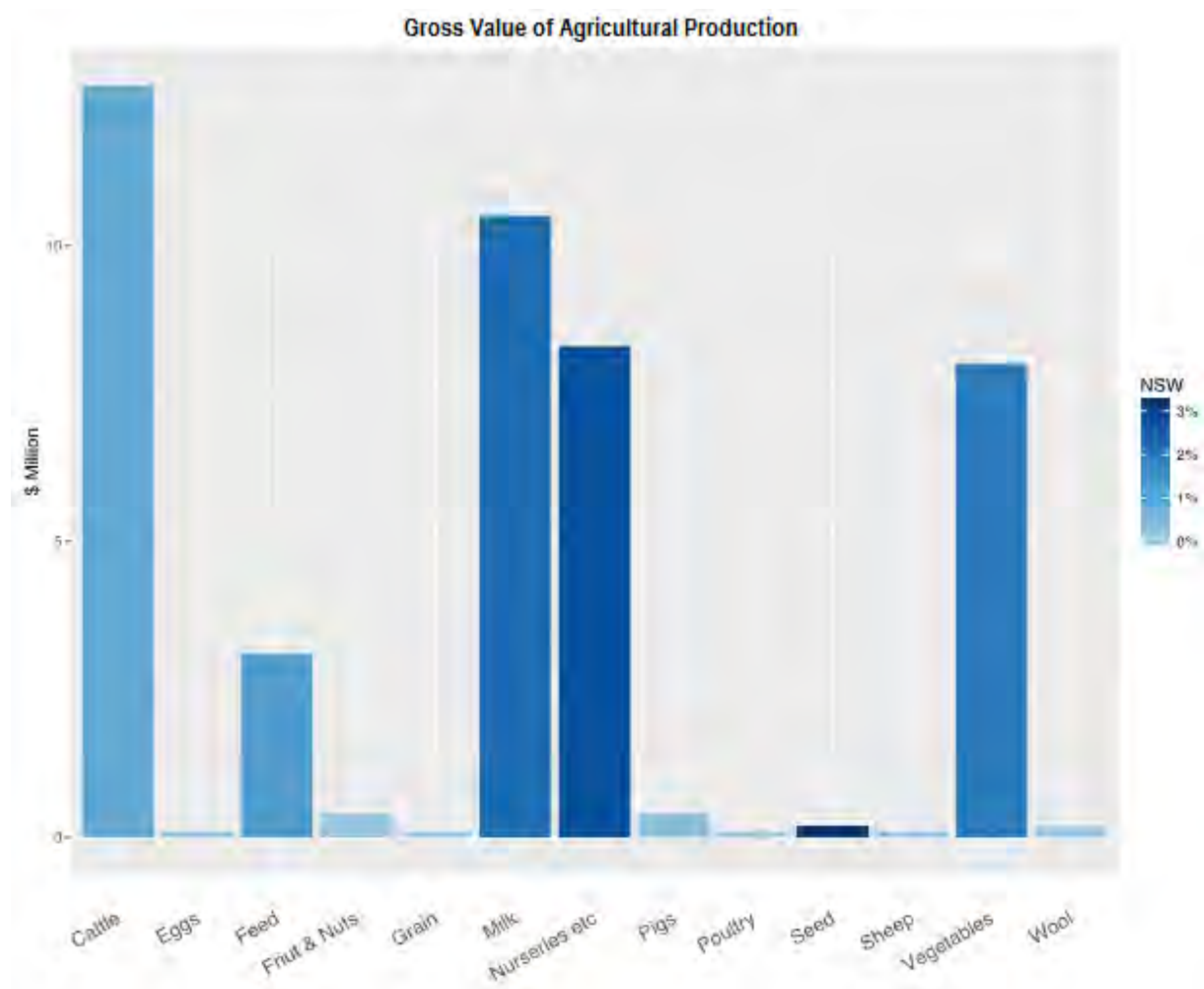


Figure 2.10 Gross value of agricultural production in the Wingecarribee Shire

The regional distribution of the GVP is shown in Figure 2.11. The figure highlights the relative concentration of livestock and agricultural activity in the Robertson – Fitzroy Fall region as well as the limited level of agricultural production in the Bowral, Hill Top and Mittagong regions.

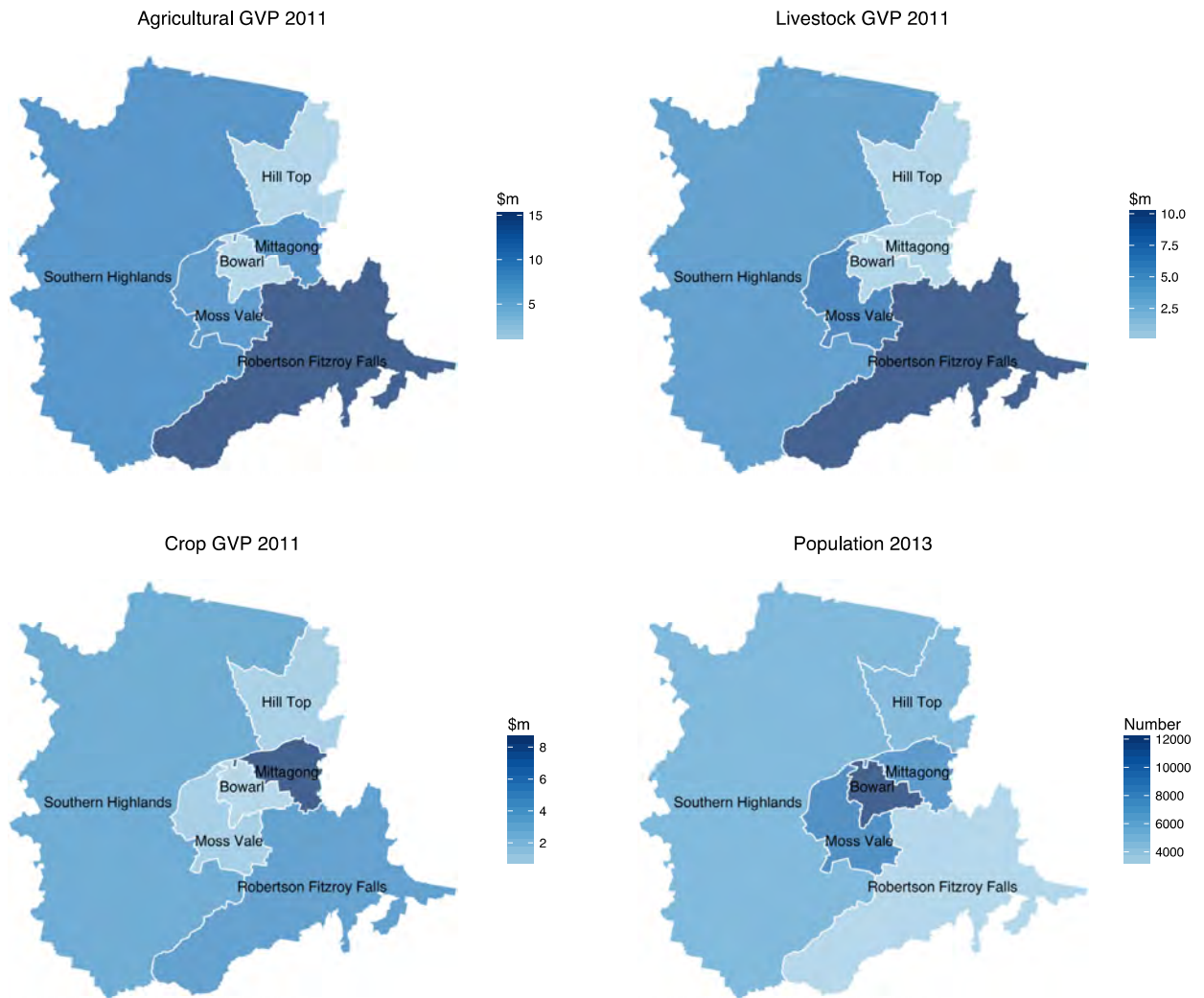


Figure 2.11 The regional distribution of GVP and population in the Wingecarribee Shire

2.4.2 Agricultural businesses in the Wingecarribee Shire

The financial structure of agricultural businesses in the Wingecarribee Shire is shown in Figure 2.12 and Figure 2.13. These represent all farms participating in the agricultural census, which would include farms with an EVAO \$5,000 or less (and therefore not recorded in the ABS data).

Consultation with local agribusiness was not undertaken, beyond the stakeholder engagement for the project (see Section 8), as the impact on agricultural business in the surrounding locality was not considered to be measurable.

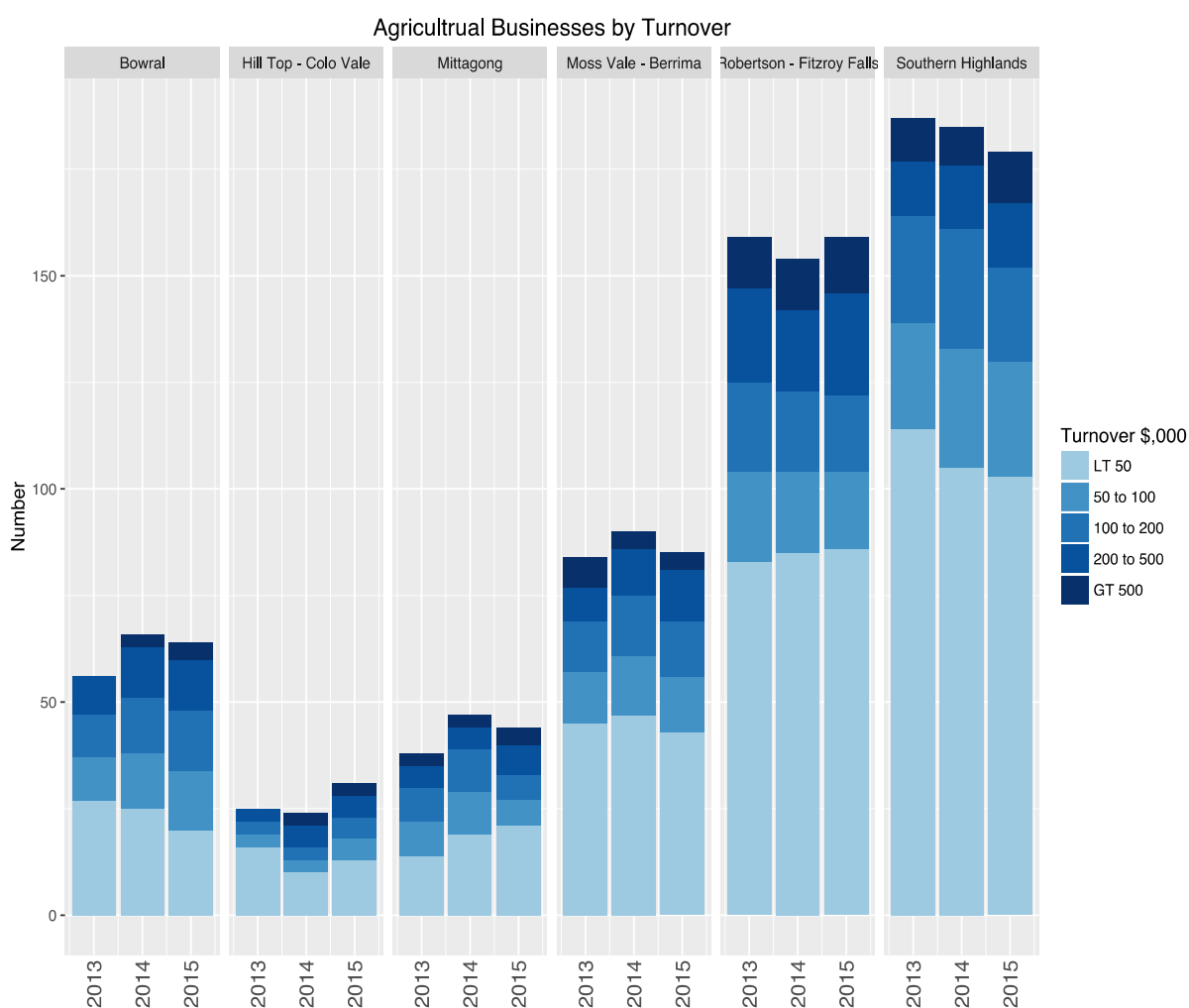


Figure 2.12 The composition of agricultural business in the Wingecarribee Shire by turnover category, 2013 to 2015

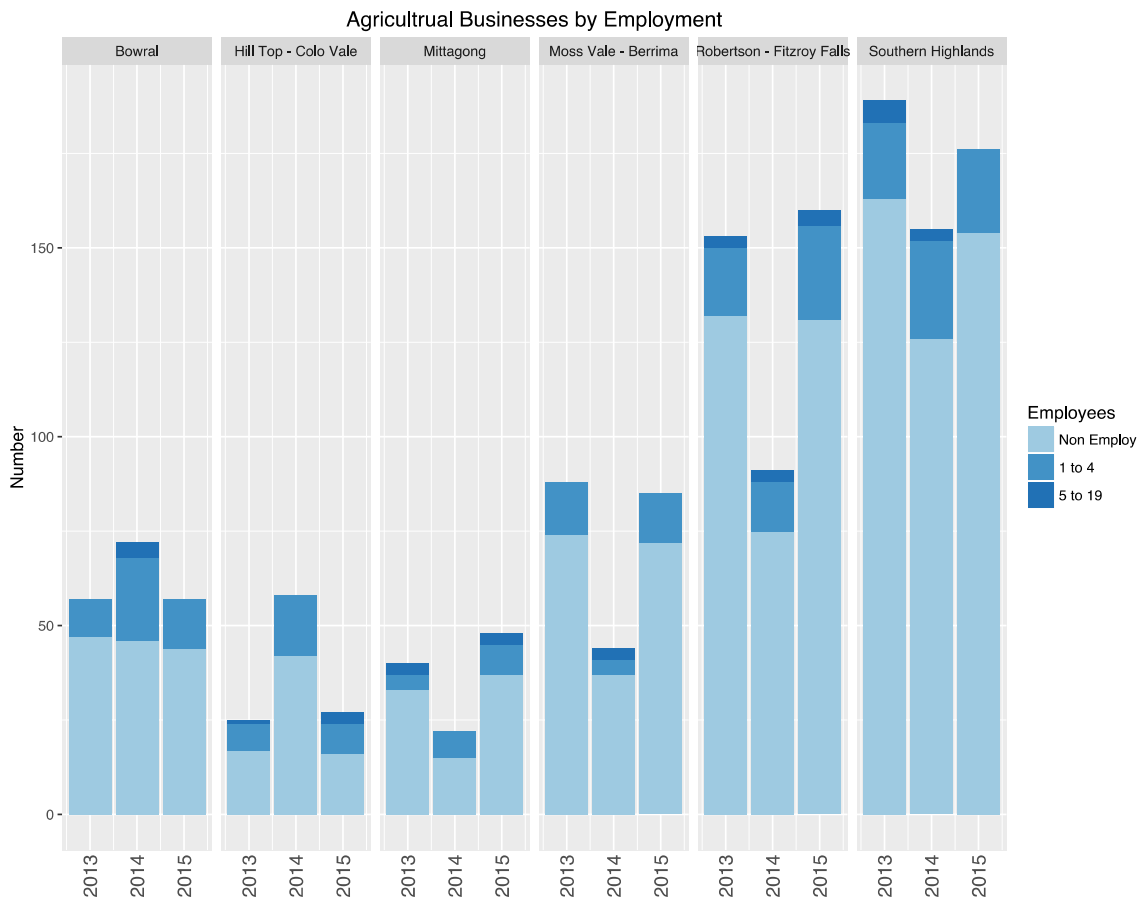


Figure 2.13 The composition of agricultural business in the Wingecarribee Shire by employment category

The following trends are observable from Figure 2.12 and Figure 2.13:

- Firstly, it is clear that the majority of businesses are small, with an annual turnover of less than \$50,000, in the major agricultural production regions. Further, the great majority of agricultural businesses are non-employing, using only owner operator and family labour, throughout the Wingecarribee Shire.
- Secondly, there are only a few large scale enterprises in the Wingecarribee Shire. In the Fitzroy Falls and Southern Highlands regions roughly 10% of businesses have a turnover in excess of \$500,000, in the remaining regions they are generally less than 5% of farms. Very few farms employ more than four individuals on a full time equivalent basis.
- Lastly, the variation from year to year is apparent in the count of businesses, largely in the smaller farms. Farms which are not actively trading within a year drop out of the register.

