Environmental Scan Report

Hume Region

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1. Introduction

Planning by agencies has traditionally focused on each hazard type e.g. fire, flood or storm, using risk-based decision-making processes to inform preparedness, response, relief and recovery (PPRR) activities. Victorian emergency management arrangements also support agencies and relevant stakeholders to work together across all hazard types. This includes creating opportunities to identify and manage priorities to effectively manage risks, together with communities and organisations from within and outside the emergency management sector.

In 2020, the *Emergency Management Act 2013* was amended by the *Emergency Management Legislation Amendment Act 2018*. In response to this, new State, Regional and Municipal plans are required to comply with the new legislation. Some of the key inclusions are information on regional context, and mitigation, response and recovery strategies, along with supporting roles and responsibilities for regional collaboration. The new arrangements also require the establishment of regional emergency management planning committees (REMPCs) and the preparation of regional emergency management plans (REMPs).

Emergency Management Victoria (EMV) is providing guidance to the REMPCs for each of the eight emergency management regions in Victoria to assist with the development of updated regional plans.

2. Purpose

The aim of this is to produce a document containing consistent, accurate contextual data and information for each REMPCs to use as a resource when preparing the context section of the REMPs.

The outputs from this analysis will link directly to the context section of the REMPs. The standard headings from the State plan reference natural, built, economic and social environments for consideration. While the relative importance of each of these will vary between regions, they will still provide a good overview of the key regional context.

3. Structure of document

The structure of this document first summarises the process used to investigate the environment under which each region operates. This environmental scanning process was undertaken using a PESTEL analysis (Political, Economic, Social, Technological, Environmental and Legal). The content of the document then explores the data and information found, grouped under the standard headings from the State Emergency Management Plan, Natural, Built, Social and Economic environments. Each of these has sub-headings relevant to the region. Finally, a data source section shows the data and information attribution and summarises the metadata for each source used in the document. This gives context to the data and information as well as an assessment of reliability, credibility and currency of the data.

4. Environmental scan process

The categories of a PESTEL analysis are often used for business analysis to cover all aspects of context for a project or business proposal to expand the thinking outside of the standard considerations. This will broaden the scope of the emergency management sector to cover all emergencies and all communities. Further detail for each key area is in the image below.

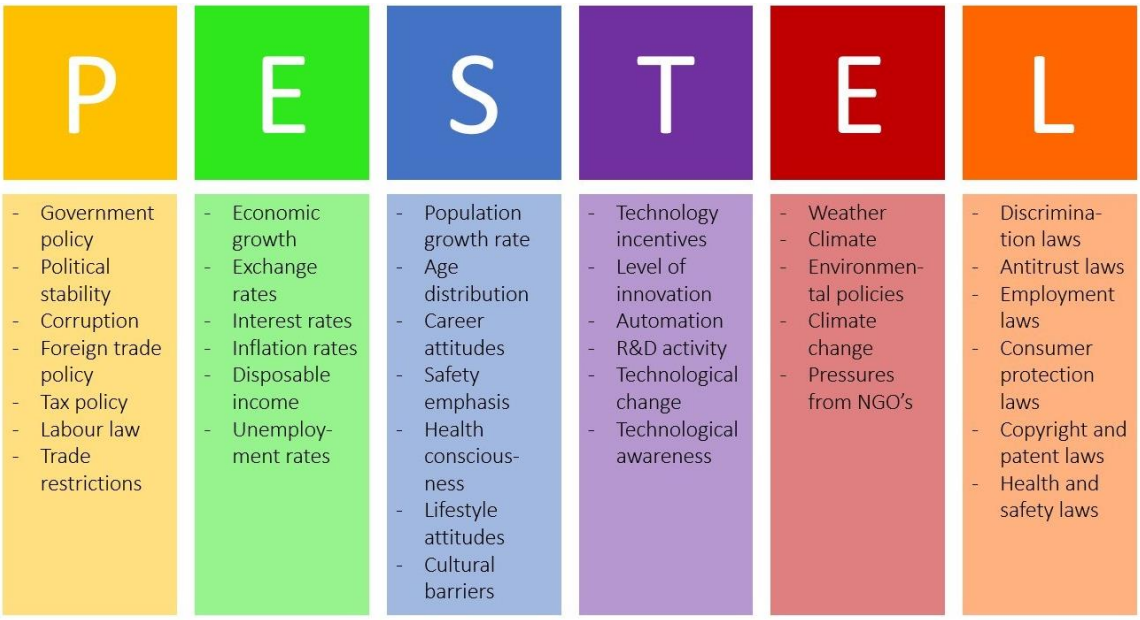


Figure 1. PESTEL analysis[1]

The broad environmental scanning process ensured that all impacts on the region were considered, including those influences outside of the regional boundaries.

5. Regional Context

The Hume Region includes the traditional lands of the Yorta Yorta and Taungurung peoples[2], and is one of eight regions for emergency management in Victoria, declared under Section 63 of the *Emergency Management Act 2013*.

1 B2U (2020): https://www.business-to-you.com/scanning-the-environment-pestel-analysis/
2 ACHRIS (2020): https://achris.vic.gov.au/weave/wca.html

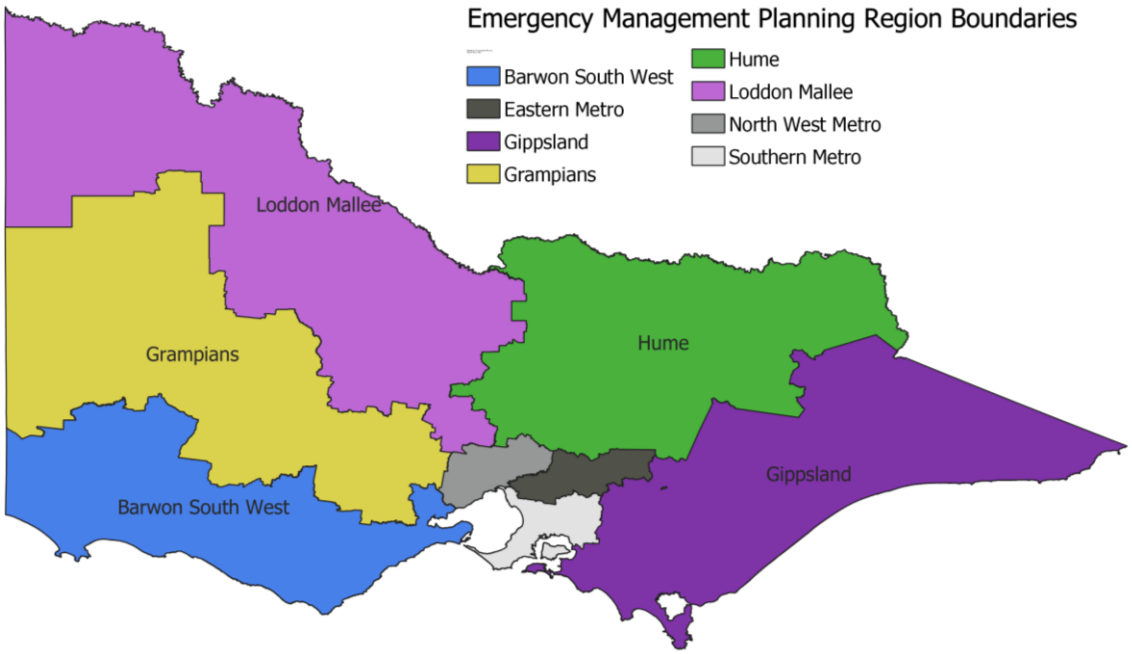


Figure 2. Victorian Emergency Management Regions

The Hume Region shares boundaries with the Loddon Mallee, North West and Eastern Metropolitan and Gippsland Regions. It covers 40,291 square kilometres (18% of Victoria) and includes 12 local government areas (LGAs).

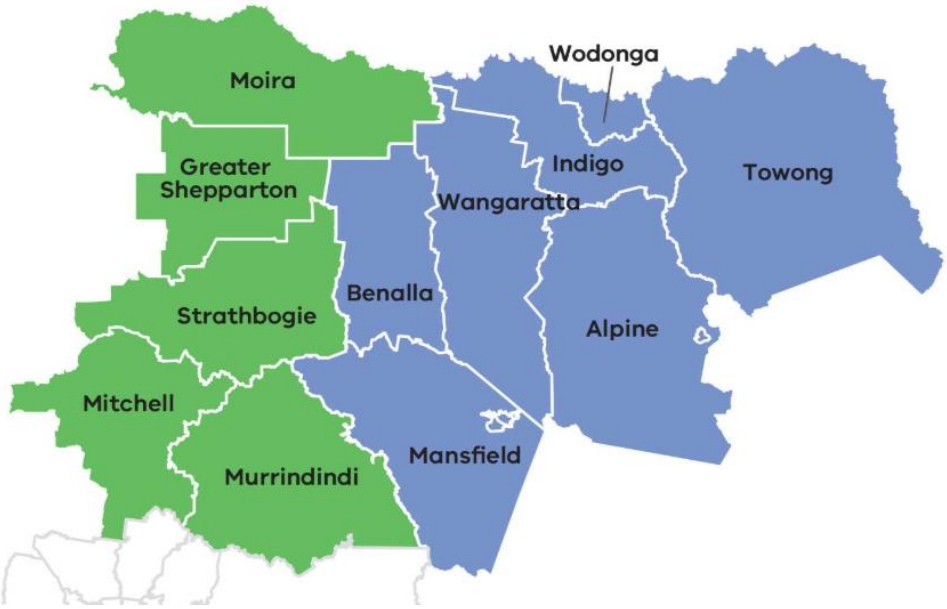


Figure 3. Hume Region including LGA boundaries[3]

3 DJPR (2020): https://www.rdv.vic.gov.au/victorias-regions/hume

The LGAs located within the Hume Region, and their corresponding populations (2019), are:

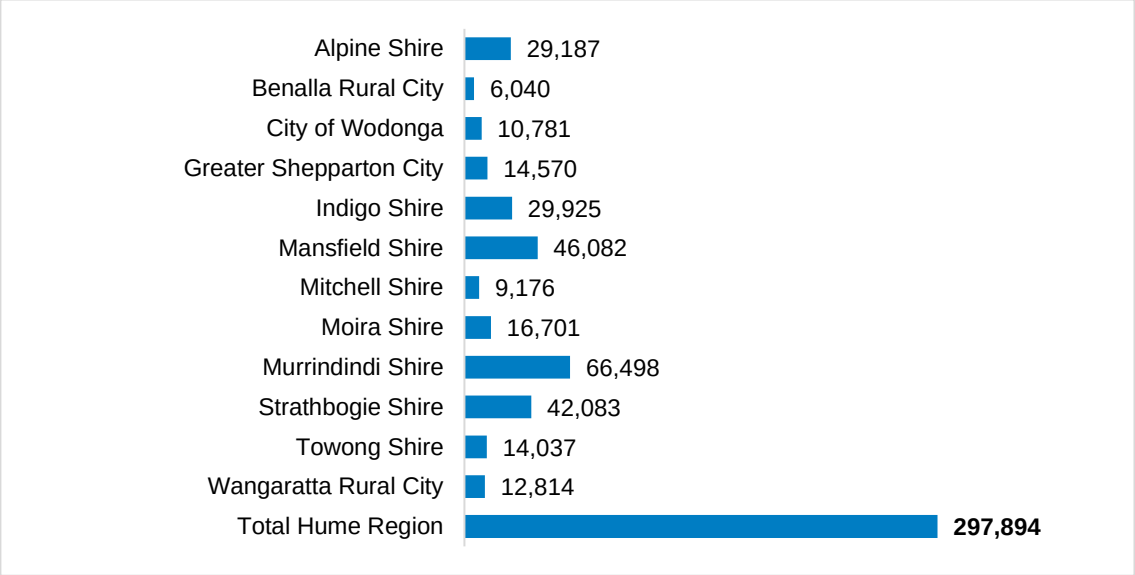


Figure 4. Population by LGA for Hume Region[4]

Alpine Resorts

There are also five alpine resorts (of a total of six in Victoria) physically located in the Hume Region which are excised from the surrounding shires by declarations made under the *Alpine Resorts Act* 1983 and administered by alpine resort management boards under the *Alpine Resorts (Management) Act* 1997. Mount Baw Baw Alpine Resort is included in the Hume region for emergency management planning purposes, despite being physically located in the Gippsland Region. Unlike local councils, these boards are fully appointed by the state government, but fulfil similar functions. For the purposes of data presented in this environmental scan document, the six alpine resorts have been included under the general category of 'Alpine Resorts' for fields where relevant data is available. The six alpine resorts that are included in the Hume Region are shown in Figure 5 are as follows:

- Falls Creek Alpine Resort
- Lake Mountain Alpine Resort
- Mount Buller Alpine Resort
- Mount Hotham Alpine Resort
- Mount Stirling Alpine Resort
- Mount Baw Baw Alpine Resort

4 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Figure 5. Map of alpine resorts in Hume Region

Over 1.4 million people visited at least one of the six resorts during the 2018/19 year, with around 75% of those being Victorian residents. Interstate and international visitations are increasing in numbers, bringing significant economic benefits to regional economies. The Gross State Product (GSP) contribution for the 2018/19 period by the alpine resorts to the Victorian economy is estimated at $1.22 billion. This level of expenditure results in a contribution to total Victorian employment in annual equivalent terms of approximately 10,000 direct and indirect jobs, with most of these jobs situated in regional Victoria.

While these figures demonstrate that the snow season remains the number one tourist attraction in regional Victoria and for the alpine resort's economy. During the 2018 snow season, Victorian alpine resorts received 982,003 visitors and 1.7 million visitor days. The contribution from the green season is also notable, the 2018/19 green season saw a 2.3 per cent increase in vehicle numbers compared to the previous year with just over 219,000 vehicles entering the resorts. There was a 4 per cent increase in visitor numbers compared to the previous year, with almost 454,000 visitors to the resorts.[5]

[5] https://arcc.vic.gov.au/wp-content/uploads/2020/03/ARCC_StratPlan_2020_March_web.pdf

The Hume Region has a wide variety of settlement types ranging from Melbourne's peri-urban regions to regional cities. The region incorporates two sub-regions – Goulburn and Ovens Murray.

It is one of the five regions which borders metropolitan Melbourne, with some areas in the west (parts of the Goulburn sub-region) falling within Melbourne's peri-urban fringe. As a result, these areas experience elevated population and development pressures on landscapes, agricultural, waterway and environmental assets. For the areas falling in the eastern part of the region (the Ovens Murray sub-region) there are fewer development pressures, with more rural landscapes and smaller towns.

Goulburn sub-region

The Goulburn sub-region includes the LGAs of Greater Shepparton, Mitchell Shire, Moira Shire, Murrindindi Shire and Strathbogie Shire. Its main regional centre is Shepparton, which is the primary location for tertiary, health, cultural and higher education services. Surrounding regional towns include Yarrawonga, Euroa and Nagambie. The flood plains of the Murray, Goulburn and Ovens rivers provide fertile agricultural land, with the area being of national significance for dairying, horticultural production and secondary processing.[6]

Ovens Murray sub-region

The Ovens Murray sub-region includes the LGAs of Alpine Shire, Benalla Rural City, Indigo Shire, Mansfield Shire, Towong Shire, Wodonga City and Wangaratta Rural City. The sub-region has three regional centres – Wodonga, Wangaratta and Benalla – which are major manufacturing and retail centres, while the high country and snowfields attract significant tourism activity.[7]

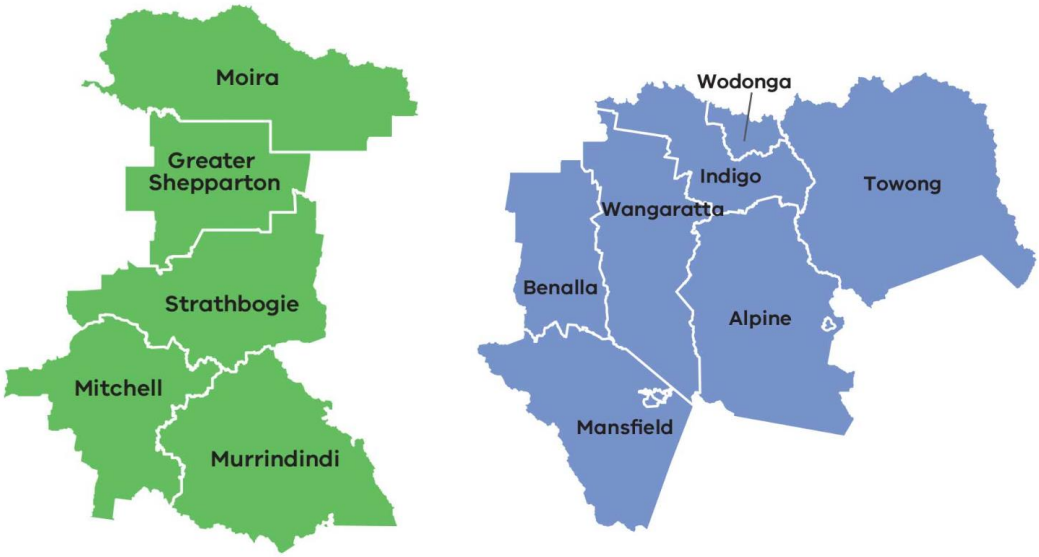


Figure 6. Goulburn and Ovens Murray sub-regions including LGA boundaries[8]

6 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
7 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
8 DJPR (2020): https://www.rdv.vic.gov.au/victorias-regions/hume

6. Natural Environment

Environmental assets of the Hume Region include snow covered alpine areas, river valleys, forests and woodlands, granite outcrops and river red gum floodplains. The region has significant landscapes such as the Australian Alps, Great Dividing Range and Murray River corridor. The headwaters and catchments of many of Victoria's major rivers are located in the region, including the Broken, Goulburn, Kiewa, King, Mitta Mitta, Murray and Ovens Rivers.

It is estimated that there are over 3,000 wetlands in the region, many of which are of national significance, while the Barmah Forest is listed under the Ramsar convention as a wetland of international significance.[9]

6.1 Climate

6.1.1 Average Temperatures

The climate in the Hume Region varies significantly between the alpine regions and the floodplains along the Murray River. In alpine areas, the summer maximum average temperature is around 20°, while the winter average maximum temperature is 4°.[10] In the lower slopes and plains, summer maximum average temperatures are 31°, while winter average maximum temperatures are 12°.[11]

Average maximum (max) and minimum (min) temperatures from a 30-year climate period from (1961-1990) are outlined below:

Table 1. Seasonal average temperatures for Hume Region by LGA[12]

LGA	Summer (°C)		Winter (°C)	
	Max	Min	Max	Min
Alpine Shire	24.3	10.1	8.9	0.9
Benalla Rural City	28.6	13.0	12.5	3.1
City of Wodonga	29.2	13.6	12.5	3.0
Greater Shepparton City	29.2	14.1	13.7	3.9
Indigo Shire	28.9	13.2	12.2	2.8
Mansfield Shire	24.3	10.4	9.4	2.0
Mitchell Shire	25.9	12.3	11.6	3.8
Moira Shire	30.3	14.7	14.2	3.9
Murrindindi Shire	24.7	11.4	10.5	3.5
Strathbogie Shire	27.9	13.0	12.6	3.5
Towong Shire	26.0	10.9	10.0	1.1
Wangaratta Rural City	27.9	12.5	11.8	2.5

9 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
10 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf
11 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf
12 BOM (2020): http://www.bom.gov.au/climate/averages/maps.shtml

Hume Average	**27.3**	**12.4**	**11.7**	**2.8**

6.1.2 Rainfall

Average annual rainfall in the Hume Region ranges from 2,000mm in alpine areas, to less than 500mm in the lower slopes and plains. [13] Most rainfall occurs in winter and spring, with summer thunderstorms being relatively common, contributing to the risk of fires and floods.[14] Since the 1960s, average rainfall has declined, especially in Autumn.

Table 2. Annual and seasonal average rainfalls (mm) for Hume Region by LGA[15]

LGA	Mean Rainfall (mm)				
	Annual	Summer	Autumn	Winter	Spring
Alpine Shire	1,377.3	220.1	312.8	477.4	366.9
Benalla Rural City	765.6	130.2	183.3	256.8	195.3
Falls Creek Alpine Resort	1,970.9	306.2	439.8	690.8	534.2
City of Wodonga	791.6	141.9	183.4	264.5	201.8
Greater Shepparton City	501.6	98.5	128.2	148.4	126.4
Indigo Shire	829.8	144.0	193.5	278.0	214.3
Lake Mountain Alpine Resort	1,715.3	291.0	386.1	586.0	452.2
Mansfield Shire	1,109.9	180.1	259.5	373.8	296.5
Mitchell Shire	710.5	133.7	167.7	223.9	185.3
Moira Shire	469.6	97.3	117.1	136.5	118.8
Mount Baw Baw Alpine Resort	1,556.8	270.2	379.3	466.7	440.5
Mount Buller Alpine Resort	1,349.3	213.5	317.2	456.2	362.4
Mount Hotham Alpine Resort	1,862.5	298.7	429.4	630.0	504.4
Mount Stirling Alpine Resort	1,415.6	222.9	337.2	473.8	381.7
Murrindindi Shire	1,065.8	179.7	250.5	356.6	279.0
Strathbogie Shire	696.5	122.5	169.6	230.8	173.6
Towong Shire	1,095.3	186.0	247.5	365.3	296.4
Wangaratta Rural City	931.8	154.7	217.4	317.6	242.0
Alpine Resorts Average	**1,645.1**	**267.1**	**381.5**	**550.6**	**445.9**
Hume Average	**1,108.1**	**186.5**	**259.2**	**368.0**	**294.4**

13 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf
14 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf
15 http://www.bom.gov.au/climate/averages/maps.shtml

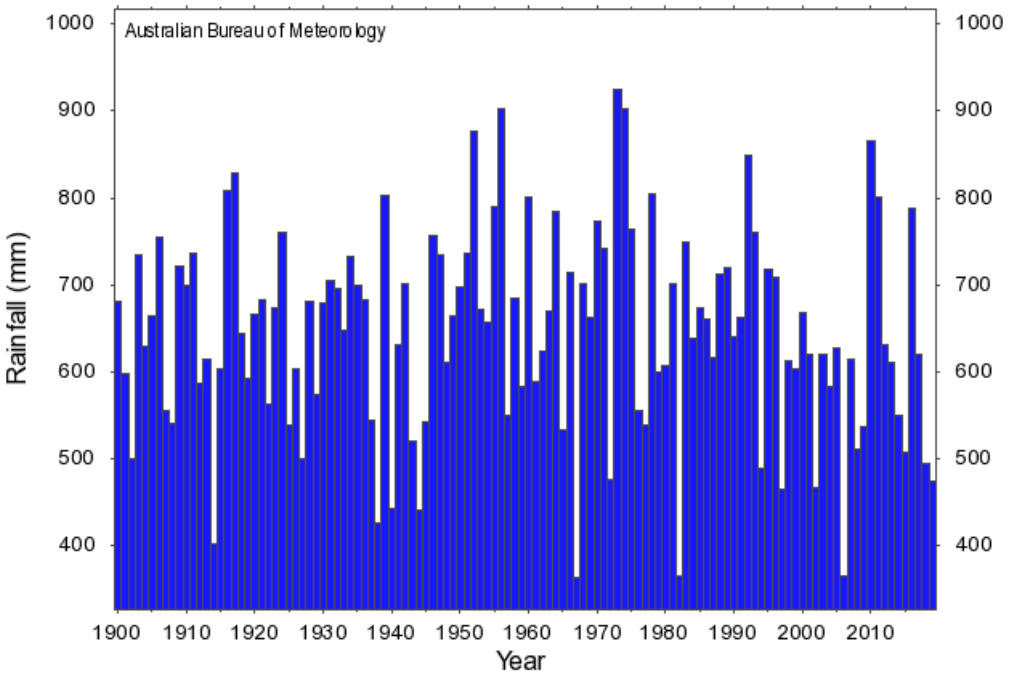


Figure 7. Annual rainfall Victoria (1900-2019) [16]

Intensity–Frequency–Duration (IFD) design rainfall intensities (mm/h) or design rainfall depths (mm) corresponding to selected standard probabilities, are based on the statistical analysis of historical rainfall. Design rainfall are used in the design of infrastructure including gutters, roofs, culverts, stormwater drains, flood mitigation levees, retarding basins and dams. They can also be used to assess the severity of observed rainfall events.

The following tables summarise the design rainfalls that could be of interest for critical infrastructure planning. They give an indication of heavy rainfall probability across the region and can be used as potential triggers for response based on observed or forecast rainfall.[17] The standard probabilities shown here for reference are 10% annual exceedance probability (AEP) equivalent to 1 in 10 year average recurrence interval (ARI) and 1% AEP, equivalent to 1 in 100 year ARI.

16 Bureau of Meteorology
http://www.bom.gov.au/climate/change/index.shtml#tabs=Trackerandtracker=timeseriesandtQ=graph%3Drain%26area%3Dvic%26season%3D0112%26ave_yr%3D0
17 Further values can be obtained from: http://www.bom.gov.au/water/designRainfalls/revised-ifd/

Table 3. Hume Design rainfalls by LGA – 5 min[18] [19]

LGA	5 min 10% AEP (mm)				5 min 1% AEP (mm)			
	Mean	Min	Max	Range	Mean	Min	Max	Range
Alpine Shire	10.0	8.6	11.0	2.5	14.7	13.4	16.1	2.7
Benalla Rural City	10.3	9.9	10.6	0.8	15.6	14.7	16.3	1.6
Falls Creek Alpine Resort	9.3	9.3	9.3	0.0	14.0	14.0	14.0	0.1
City of Wodonga	10.2	9.9	10.4	0.6	15.1	14.6	15.6	1.0
Greater Shepparton City	9.6	9.3	10.2	1.0	15.1	14.5	16.6	2.1
Indigo Shire	10.2	9.6	10.8	1.2	15.1	14.4	16.1	1.7
Lake Mountain Alpine Resort	9.6	9.5	9.7	0.2	14.6	14.5	15.0	0.5
Mansfield Shire	9.5	8.8	10.2	1.4	14.4	13.1	15.4	2.2
Mitchell Shire	9.4	8.9	10.4	1.5	15.6	14.4	17.4	3.0
Moira Shire	9.7	9.2	10.1	0.9	15.2	14.5	16.3	1.8
Mount Baw Baw Alpine Resort	9.3	9.2	10.0	0.8	14.4	14.2	15.7	1.5
Mount Buller Alpine Resort	9.3	9.2	9.6	0.4	13.8	13.6	14.2	0.5
Mount Hotham Alpine Resort	9.2	9.2	9.3	0.1	13.8	13.8	13.9	0.1
Mount Stirling Alpine Resort	9.3	9.2	9.5	0.3	13.8	13.6	14.1	0.4
Murrindindi Shire	9.5	8.9	9.9	1.0	14.9	14.0	16.0	2.0
Strathbogie Shire	10.0	9.3	10.6	1.3	15.9	14.9	18.1	3.2
Towong Shire	9.8	8.8	10.8	2.0	15.1	13.7	16.1	2.4
Wangaratta Rural City	10.2	9.1	11.2	2.1	14.9	13.5	16.0	2.5

18 BOM (2016): http://www.bom.gov.au/water/designRainfalls/revised-ifd/
19 The standard probabilities shown here for reference are 10% annual exceedance probability (AEP) equivalent to 1 in 10 year average recurrence interval (ARI) and 1% AEP, equivalent to 1 in 100 year ARI

Table 4. Hume Design rainfalls by LGA – 1 hour [20] [21]

LGA	1hr 10% AEP (mm)				1hr 1% AEP (mm)			
	Mean	Min	Max	Range	Mean	Min	Max	Range
Alpine Shire	31.1	26.8	34.1	7.3	46.3	42.1	50.6	8.5
Benalla Rural City	32.0	30.4	32.9	2.5	48.6	45.4	50.8	5.4
Falls Creek Alpine Resort	29.3	29.2	29.4	0.1	44.2	44.1	44.3	0.2
City of Wodonga	31.4	30.5	32.2	1.8	47.1	45.5	48.7	3.2
Greater Shepparton City	29.3	28.2	31.3	3.1	46.3	44.4	51.1	6.6
Indigo Shire	31.5	29.4	33.5	4.1	47.2	44.7	50.5	5.8
Lake Mountain Alpine Resort	30.0	29.8	30.4	0.6	45.6	45.2	46.5	1.3
Mansfield Shire	29.7	27.8	31.8	4.0	45.0	41.9	47.9	6.0
Mitchell Shire	28.9	27.1	31.9	4.8	47.8	43.6	53.6	10.0
Moira Shire	29.7	28.3	31.2	2.9	47.0	44.8	50.5	5.7
Mount Baw Baw Alpine Resort	29.7	29.4	31.5	2.1	46.1	45.3	49.8	4.5
Mount Buller Alpine Resort	29.3	29.1	29.9	0.9	43.4	43.1	44.4	1.3
Mount Hotham Alpine Resort	29.1	29.0	29.3	0.3	43.8	43.7	44.0	0.3
Mount Stirling Alpine Resort	29.4	29.1	29.8	0.7	43.5	43.1	44.2	1.1
Murrindindi Shire	29.2	27.4	30.7	3.3	45.4	42.5	48.3	5.8
Strathbogie Shire	30.8	28.5	32.7	4.2	48.9	45.3	55.6	10.2
Towong Shire	30.8	27.5	33.6	6.1	47.2	43.2	50.9	7.7
Wangaratta Rural City	31.4	28.8	34.4	5.6	46.5	42.7	49.7	6.9

20 BOM (2016): http://www.bom.gov.au/water/designRainfalls/revised-ifd/

21 The standard probabilities shown here for reference are 10% annual exceedance probability (AEP) equivalent to 1 in 10 year average recurrence interval (ARI) and 1% AEP, equivalent to 1 in 100 year ARI

Table 5. Hume Design rainfalls by LGA – 1 Day[22] [23]

LGA	1 day 10% AEP (mm)				1 day 1% AEP (mm)			
	Mean	Min	Max	Range	Mean	Min	Max	Range
Alpine Shire	114.8	82.5	159.0	76.5	165.3	123.8	229.1	105.3
Benalla Rural City	90.2	71.7	128.2	56.6	142.0	114.2	192.1	77.9
Falls Creek Alpine Resort	147.9	144.6	151.3	6.7	211.7	206.6	216.8	10.2
City of Wodonga	80.6	73.7	88.7	15.0	120.3	113.4	130.6	17.2
Greater Shepparton City	72.3	69.1	81.3	12.2	115.5	108.8	130.0	21.2
Indigo Shire	86.1	73.2	114.7	41.5	130.0	113.9	162.3	48.3
Lake Mountain Alpine Resort	135.3	118.4	144.3	25.9	208.9	184.0	221.7	37.7
Mansfield Shire	102.0	80.3	148.8	68.6	156.8	125.9	220.7	94.8
Mitchell Shire	81.6	70.8	115.0	44.2	127.6	111.3	181.2	69.9
Moira Shire	72.5	66.4	80.4	14.0	114.5	102.8	127.4	24.6
Mount Baw Baw Alpine Resort	145.0	117.3	156.0	38.6	227.7	193.4	242.6	49.2
Mount Buller Alpine Resort	135.4	109.6	150.8	41.2	201.4	163.6	223.7	60.1
Mount Hotham Alpine Resort	146.6	140.8	152.1	11.3	211.0	202.2	219.1	17.0
Mount Stirling Alpine Resort	139.1	120.7	149.3	28.7	206.2	179.8	221.2	41.4
Murrindindi Shire	94.3	70.6	144.3	73.7	147.6	111.3	221.7	110.4
Strathbogie Shire	82.2	73.1	115.3	42.2	130.9	115.3	180.0	64.7
Towong Shire	93.6	75.9	133.1	57.2	131.1	111.3	194.5	83.3
Wangaratta Rural City	95.5	76.2	145.0	68.8	145.2	116.1	213.6	97.5

For the Hume Region, there is little variation in the shorter duration events which are generally driven by convective activity. Statistical analysis shows that that patterns of heavy rainfall from these storm events are similar across the region. This is shown by similar mean design rainfall values across all LGAs and low ranges between maximums and minimums for the selected probabilities.

The largest difference is observed in the longer duration events, where orographic enhancement from larger synoptic systems generally leads to higher rainfall about elevated areas based on the prevailing wind direction, in this case, the regions with variable topography. The Alpine resorts highlight this effect with the highest mean 1-day design rainfall values. The regions with significant elevation changes also tend to show a larger range between maximum and minimum values.

It is expected that an impact of climate change will be to have less days with rain, but higher intensity rain events when these do happen. This is because a warmer atmosphere can hold more moisture. Australia's

22 BOM (2016): http://www.bom.gov.au/water/designRainfalls/revised-ifd/
23 The standard probabilities shown here for reference are 10% annual exceedance probability (AEP) equivalent to 1 in 10 year average recurrence interval (ARI) and 1% AEP, equivalent to 1 in 100 year ARI

heavy rainfall patterns have a high natural variability and some sites are witnessing a larger increase in heavy rainfall for shorter duration events that may increase the risk of flash flooding[24].

For the Hume Region, despite an overall trend of declining rainfall, it is expected that more of the rain which does fall will be in increasingly extreme downpours, increasing the incidence of flood events.[25]

Rain Days >5mm by LGA

This rainfall calculation is based on the standard 30-year reference climate period (1961–1990). This threshold was chosen as 5mm is the threshold to exceed canopy and interception losses in the Keetch-Byram Drought Index, which is used to estimate soil moisture as a surrogate for heavy fuel availability in fires. The high range between the maximum and minimum number of rain days highlights the rainfall variability across the region with the drier areas to the north and wetter around the elevated areas.

Table 6. Hume Rain Days >5mm by LGA (days) [26] [27]

LGA	Rain Days >5mm (days)			
	Mean	Min	Max	Range
Alpine Shire	69	53	85	32
Benalla Rural City	46	34	68	34
City of Wodonga	45	43	49	6
Greater Shepparton City	31	28	35	7
Indigo Shire	46	35	61	26
Mansfield Shire	74	52	94	42
Mitchell Shire	45	35	69	34
Moira Shire	29	25	37	12
Murrindindi Shire	94	71	96	25
Strathbogie Shire	63	45	96	51
Towong Shire	41	33	60	27
Wangaratta Rural City	56	46	68	22
Hume Average	**53.3**	**41.7**	**68.2**	**26.5**

6.1.3 Climate Change

The Hume Region has been getting warmer and dryer, with the rate of warming increasing since 1960 and rainfall declining. In the future, the region can expect:[28]

24 BOM (2020): http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml
25 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf
26 This calculation is based on the standard 30 year reference climate period (1961 – 1990). The threshold chosen as 5mm is the threshold to exceed canopy and interception losses in the Keetch-Byram Drought Index, which is used to estimate soil moisture as a surrogate for heavy fuel availability in fires.
27 BOM (2016): http://www.bom.gov.au/jsp/ncc/climate_averages/raindays/index.jsp?period=anandproduct=5mm#maps
28 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf

- Temperatures to continue to increase year-round;
- More frequent and intense downpours;
- Less rainfall in autumn, winter and spring;
- Fewer frosts;
- More hot days and warm spells; and
- Harsher fire weather and longer fire seasons.

By 2050, as a result of these changes, the climate of Shepparton is expected to be more like the climate of Griffith currently, while the climates of Wangaratta and Benalla will be more like the current climate of Dubbo.[29]

Figure 8. Hume climate in 2050[30]

The potential impacts of these changes in climate affect all aspects of the natural, built, social and economic aspects of the region, including primary production, infrastructure, tourism, health and community and the natural environment, as outlined below:[31]

29 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf
30 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf
31 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0022/60745/Hume.pdf

Primary production

The impacts on primary production are likely to be more acutely felt in the Hume Region, where the economy and employment are significant in irrigated and dryland agriculture, grazing, manufacturing (including food processing) and horticulture. Horticulture and vegetables are highly sensitive to reduced water availability, while changes in temperature will alter planting and harvesting times and compress suitable time available for harvesting. In addition, pest and disease incidence is likely to change, with intensive animal industries possibly requiring more power and water to cool facilities and maintain adequate temperatures as heat increases.

Infrastructure

Critical services such as power, water, sewerage and telecommunications will be susceptible to the more extreme weather events caused by the changing climate. Transport infrastructure will be increasingly exposed to periodic flooding and increased heat loading, while long hot spells will weaken road surfaces and exposure to extreme heat events may result in road rutting and cracking.

Health and community

An ageing population, coupled with a higher proportion of the population with obesity and chronic diseases, disability and high risk behaviours, will increase the number of people who may need assistance to manage extreme heat, bushfires and flooding, which will subsequently increase pressure on health and community services.

Tourism

The ski industry is expected to face significant challenges as a result of the warming climate. While snow making will offset some of the losses of natural snow, the warming climate will also translate into fewer days where the temperature is suitable for snow making. Increased fire weather and community perception of fire danger, as well as reductions in river flows and water availability may also affect tourist numbers.

Environment

The region's environment is under threat from warmer and drier conditions, with reduced stream flows, affecting several species of fish which are sensitive to changed flow regimes, such as the Murray Cod and Macquarie Perch. Flooding along the Murray River is important for maintaining the River Red Gums, while the riverine forests and waterways are important breeding sites for a range of species. Degradation of biodiversity will place greater stress on the person and economic wellbeing of communities in the Hume Region.

Land Use

Land use in the Hume Region is dominated by primary production (57%) and parkland (39%).

In the Goulburn sub-region land use is predominantly either agricultural or parkland, with a network of regional towns supporting residential use. Agricultural uses include dryland and irrigated farming, as well as irrigated horticulture and dairy, with associated food processing facilities centres around Shepparton.[32]

Victoria's forestry and wood products industry is one of Australia's largest. In Victoria, it accounts for 9 million cubic metres or 27.5% of Australia's log harvest volume.[33] It accounts for approximately $7.3 billion or 31% of Australia's forest product manufacturing sales and service income.[34] [35] Hume is home to over 7,332 businesses in the agriculture, forestry and fishing industries, creating an approximate total of 9739 jobs for the region.[36]

The Ovens Murray sub-region is dominated by parkland, with native forests, woodlands and grassland in the southern and eastern sections, while dryland agriculture accounts for a significant amount of land use in the north.[37]

Table 7. Land usage by type across the Hume region by LGA (2017)[38]

Land Use Type	Area (Sq. Km)	% Total Area
Primary Production	22,966	*57.0%*
Parkland	15,713	*39.0%*
Other	403	*1.0%*
Residential	806	*2.0%*
Water	403	*1.0%*
Industrial	0	*0.0%*
Commercial	0	*0.0%*
Transport	0	*0.0%*
Education	0	*0.0%*
Hospital/Medical	0	*0.0%*
Total	**40,291**	***100.0%***

32 DELWP (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf

33 DJPR (2020) https://djpr.vic.gov.au/forestry

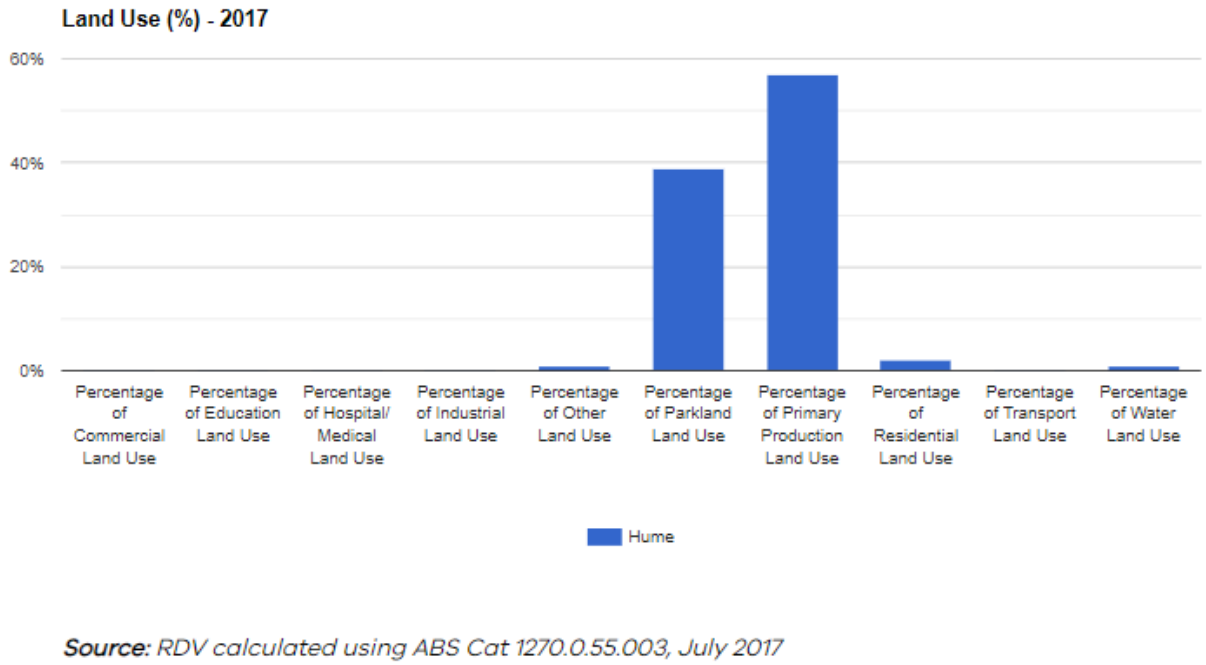
34 DJPR (2020) https://djpr.vic.gov.au/__data/assets/pdf_file/0008/1924811/DJPR-Inclusion-Forestry-Plan-1.pdf

35 DJPR (2020) https://djpr.vic.gov.au/forestry

36 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

37 DELWP (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf

38 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart



Source: *RDV calculated using ABS Cat 1270.0.55.003, July 2017*

Figure 9. Land use in Hume Region (2017)

The significant State and National parks located in the region are outlined below:

Table 8. Significant State and National Parks in Hume Region[39]

LGA	State and National Parks
Alpine Shire	Mount Buffalo National Park, Alpine National Park (part)
Benalla Rural City	Mt Samaria State Park, Strathbogie State Forest, Reef Hills State Park
City of Wodonga	Baranduda Regional Park
Greater Shepparton City	Lower Goulburn National Park
Indigo Shire	Chiltern-Mount Pilot National Park
Mansfield Shire	None
Mitchell Shire	Kinglake National Park, Mount Disappointment State Forest, Tallarook State Forest
Moira Shire	Barmah State Park, Broken Boosey State Park, Murray River Park
Murrindindi Shire	None
Strathbogie Shire	Heathcote-Graytown National Park, Strathbogie Ranges
Towong Shire	Eildon State park, Lake Eildon, Cathedral Range Conservation Reserve, Toolangi Black Range State Forest, Kinglake national Park Lake Mountain.
Wangaratta Rural City	Alpine National Park (part), Chiltern-Mount Pilot National Park (part), Warby-Ovens National Park

39 https://profile.id.com.au/

6.2 Bushfire Risk

Like the rest of Victoria, a large portion of the region is prone to bushfires, particularly whenever grassland vegetation and forest litter become very dry.

The Goulburn sub-region is predisposed to bushfires, with the region experience major impacts in the recent past.

The Ovens Murray sub-region is also predisposed to bushfires, with many high bushfire hazard areas intersecting with settlements and areas that are experiencing rural residential and tourism expansion.[40] This is most apparent in more densely vegetated high amenity areas, such as the Alpine Resorts, while the settlements of Wodonga, Beechworth and Yackandandah have been identified for urban growth, but are also located in areas with bushfire hazards.[41]

The Fire Danger Period (FDP) in Victoria has become longer over time, indicating a trend towards extended fire seasons. Seasonal fire restriction dates are set by municipality and depend on amounts of rain, grassland curing and other local conditions. In 2019-2020, fire restriction dates for Victoria extended from as early as 23 September 2019 to 23 March 2020.[42]

Smoke from fires, including from planned burns, can also be a hazard within the Hume Region. Those most at risk from smoke exposure include young children, adults over 65 years of age, people with asthma or existing heart or lung conditions, pregnant women, outdoor workers and smokers.[43]

In January 2020, smoke from bushfires across Victoria (and from New South Wales) rendered Melbourne's air quality the worst in the world[44] with the smoke haze estimated to cost the cities of Melbourne, Sydney and Canberra over $500 million.[45]

6.2.1 Bushfire prone areas

Bushfire prone areas are subject to or likely to be subject to bushfires, and to which specific bushfire construction standards apply.[46] Nearly all of the land in the Hume Region is a designated bushfire area.

40 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
41 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
42 FFMV (2020): https://www.ffm.vic.gov.au/permits-and-regulations/fire-restriction-dates
43 DHHS (2020): https://www2.health.vic.gov.au/public-health/environmental-health/climate-weather-and-public-health/bushfires-and-public-health/smoke-from-fires-and-public-health
44 The Guardian (2020): https://www.theguardian.com/australia-news/2020/jan/14/melbourne-choked-by-hazardous-smoke-as-bushfires-continue-to-burn-across-victoria
45 City of Melbourne (2020): https://www.melbourne.vic.gov.au/about-council/vision-goals/eco-city/Pages/adapting-to-climate-change.aspx
46 DELWP (2020): https://www.planning.vic.gov.au/policy-and-strategy/bushfire-protection/building-in-bushfire-prone-areas

Table 9. Bushfire Risk for Hume Region by LGA[47]

LGA	Bushfire Prone Area (km²) [48]	Total area (km²)[49]	% Area Bushfire Prone	Plan Number
Alpine Shire	4,788	4,788	*100.0%*	LEGL./15-254
Benalla Rural City	2,346	2,353	*99.7%*	LEGL./18-235
City of Wodonga	388	433	*89.6%*	LEGL./19-227
Greater Shepparton City	2,230	2,422	*92.1%*	LEGL./20-106
Indigo Shire	2,025	2,040	*99.3%*	LEGL./13-180
Mansfield Shire	3,815	3,844	*99.2%*	LEGL./18-245
Mitchell Shire	2,837	2,862	*99.1%*	LEGL./19-221
Moira Shire	3,963	4,046	*97.9%*	LEGL./14-554
Murrindindi Shire	3,875	3,880	*99.9%*	LEGL./13-156
Strathbogie Shire	3,294	3,303	*99.7%*	LEGL./18-410
Towong Shire	6,614	6,675	*99.1%*	LEGL./13-189
Wangaratta Rural City	3,632	3,645	*99.6%*	LEGL./19-154
Total or Average	**39,807**	**40,291**	***98.8%***	

6.3 Waterways

Several waterways in the Hume Region are key tourism assets including Lake Hume, Lake Nagambie, Lake Eildon and Lake Dartmouth, the Murray River and wetlands including the Barmah Forest and Winton Wetlands. Waterways across the region also provide water for the environment and feed major water storages, with the region's significant irrigation infrastructure supplying water for one of Australia's major food producing areas.[50]

The Goulburn and Ovens Murray sub-regions are part of the Murray-Darling Basin, with rivers from the catchment and those adjoining providing major inflows to the system. Important features include the Goulburn and Murray Rivers, their tributaries, wetlands, shallow and deep aquifers and nationally important water storages.[51] Hume region is solely inland waters and includes a significant portion of the Murray river. Hume region has substantial rivers and lakes with high usage during summer as well as out of season for some waterways. It is also prone to annual flooding events with fast flowing waters.

47 DELWP (2020): https://discover.data.vic.gov.au/dataset/designated-bushfire-prone-area-bpa
48 DELWP (2020): https://discover.data.vic.gov.au/dataset/designated-bushfire-prone-area-bpa
49 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
50 DELWP (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
51 DELWP (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf

Red lines – catchment boundaries
Dark Blue lines – main rivers
Light blue lines – main tributaries

Figure 10. Natural waterways in the Hume Region[52] [53]

Natural waterways across the Goulburn sub-region have been heavily impacted by historical land use, including clearing and agriculture, and are in moderate condition, while those in the Ovens Murray sub-region have been less impacted by these activities are in moderate to good condition, as shown in the figure below.[54]

52 Data Vic (2020): https://discover.data.vic.gov.au/dataset/vicmap-lite

53 https://discover.data.vic.gov.au/dataset/awrc-major-river-basins-of-victoria

54 DELWP (2016): https://www.water.vic.gov.au/__data/assets/pdf_file/0030/58827/Water-Plan-strategy2.pdf

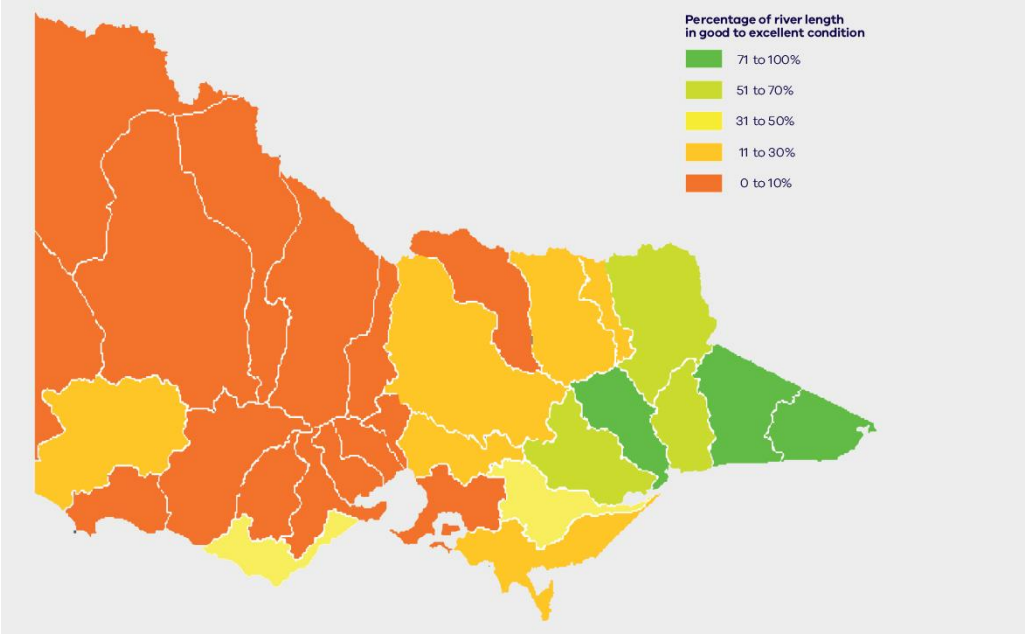


Figure 11. River length condition for Victoria[55]

Many of these waterways are managed by appointed waterway managers who are responsible for managing vessel activities on waters under their control. One of the key roles of waterway managers is to provide and maintain navigational aids, appropriate signage of water levels and hazards, and rules applying to their waters.[56]

Managed waterways across the Hume Region are outlined below:

Table 10. Managed Waterways in Hume Region by LGA[57]

LGA	No. Waterways	Name	Appointed Manager
Alpine Shire	7	Lake Catani (within Mount Buffalo National Park)	DELWP
		Pretty Valley Pondage	
		Rocky Valley Dam	
		Junction Dam at Bogong	AGL Hydro Partnership
		Clover Dam	
		Mt Beauty Regulating Pondage	
		Lake Buffalo	Goulburn-Murray Water
Benalla Rural City	2	Broken River within the boundaries of Benalla Rural City including Lake Benalla	Director, Transport Safety Victoria
		Winton Wetlands	Winton Wetlands Committee of Management
Greater Shepparton City	3	Kialla Lake	Greater Shepparton City
		Victoria Park Lake	

55 DELWP (2016): https://www.water.vic.gov.au/__data/assets/pdf_file/0030/58827/Water-Plan-strategy2.pdf
56 DOT (2020): https://transportsafety.vic.gov.au/maritime-safety/ports-and-waterways
57 DOT (2020): https://transportsafety.vic.gov.au/maritime-safety/ports-and-waterways/waterway-managers

LGA	No. Waterways	Name	Appointed Manager
		Waters of former International Village	
Indigo Shire	5	Fletchers Dam	Indigo Shire
		Lake Kerferd	
		Lake Sambell	
		Allans Flat Lake	Committee of Management of Allans Flat Recreation Reserve Inc.
		Lake Moodemere	DELWP
Mansfield Shire	3	Lake Eildon	Goulburn-Murray Water
		Goulburn River upstream of the Goulburn Weir to the Eildon Pondage	Director, Transport Safety Victoria
		Lake Nillahcootie	Goulburn-Murray Water
Moira Shire	1	Waters within Barmah State Park	DELWP
Murrindindi Shire	2	Rubicon Dam	AGL Hydro Partnership
		Lake Eildon pondage	Goulburn-Murray Water
		Royston Dam	AGL Hydro Partnership
Strathbogie Shire	1	Goulburn River from Hughes Creek to Goulburn Weir including Lake Nagambie	Strathbogie Shire
Towong Shire	4	Mitta Mitta River between the top water line of Lake Hume and the junction of the river with Callaghans Creek	Director, Transport Safety Victoria
		Lake Banimboola (Dartmouth Pondage)	Goulburn-Murray Water
		Lake Dartmouth	
		Lake Hume (also Indigo Shire and City of Wodonga)	
Wangaratta Rural City	1	Lake William Hovell	Goulburn-Murray Water
Total	**29**		

Water supplies and catchments are discussed further in Section 7 – Built Environment.

6.3.1 Floods

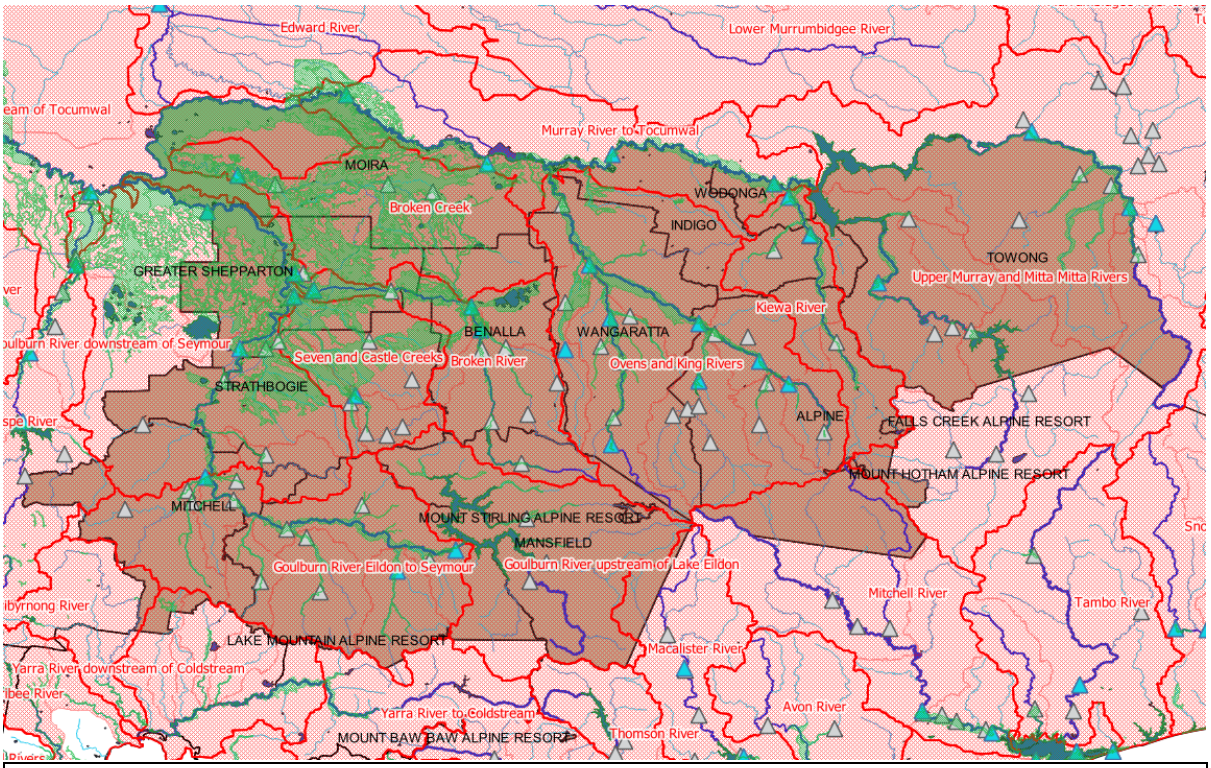
Floods cause more damage – including loss of life and livelihoods and damage to property and infrastructure – than any other type of natural disaster in Australia.[58] Victoria is prone to riverine flooding, which occurs in low-lying areas near rivers and streams, and flash flooding, which can happen anywhere in the event of intense rainfall. Flash flooding can be unpredictable, overwhelming drainage systems and causing localised threats.

58 Flood Victoria (2020): https://www.floodvictoria.vic.gov.au/

The Goulburn and Ovens Murray sub-regions are predisposed to floods, with many major settlements in the Ovens Murray sub-region located on floodplains, including Benalla, Shepparton, Seymour, Wangaratta and Wodonga.[59]

Flood management guidelines, including prevention, response and recovery activities, are provided in the *State Emergency Response Plan Flood Sub-Plan,* published in 2016. [60] This strategy relies on the combined efforts of various agencies including local government, SES, Catchment Management Authorities and community partnerships.[61]

The Bureau of Meteorology is responsible for providing a flood warning service for riverine flooding resulting from heavy rainfall in Victoria in cooperation with other government, water and emergency management agencies[62]. The coverage of this flood warning service is shown in Figure 12 with both the Flood Watch and Flood Warning catchment shown. The products from the Service Level Specification that cover the catchments in Hume are listed in Table 11[63]. The river observations sites when flood levels are defined are shown as blue triangles and are listed in Table 11.



Red Boundaries – Bureau of Meteorology Flood Watch areas	Red Shading – Bureau of Meteorology Flood Warning Catchments

59 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
60 EMV (2016): https://www.ses.vic.gov.au/documents/112015/2504320/State+Emergency+Response+Plan+-+Flood+Sub-Plan+-+Edition+1.pdf/e4d997fa-080b-39fd-366b-42b5cb23443f
61 DELWP (2016): https://www.water.vic.gov.au/managing-floodplains/new-victorian-floodplain-management-strategy
62 http://www.bom.gov.au/water/floods/document/National_Arrangements_V4.pdf
63 http://www.bom.gov.au/vic/flood/brochures/VIC_SLS_current.pdf

Dark Blue areas – Lakes and dams	Blue lines – rivers and streams
Green areas – 1:100 year ARI modelled inundation area	Triangles – River observations sites

Figure 12. Flood warning and 1:100 year ARI inundation [64] [65] [66] [67] [68] [69]

64 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900441?template=full
65 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900561?template=full
66 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900563?template=full
67 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900564?template=full
68 https://discover.data.vic.gov.au/dataset/1-in-100-year-flood-extent
69 Data Vic (2020): https://discover.data.vic.gov.au/dataset/vicmap-lite

Table 11. Flood Warning products and Flood Warning Locations[70]

Product	Warning Area	Site	Minor	Moderate	Major
IDN36629	Flood Warning for the Murray River D/S of Lake Hume	Murray River at Albury	4.3	4.9	5.5
		Murray River at Yarrawonga Downstream	6.4	6.7	7.8
		Murray River at Tocumwal	6.4	6.7	7.3
IDV36610	Flood Warning for the Mitta Mitta River	Mitta Mitta River at Tallandoon	4.2	4.9	5.6
IDV36620	Flood Warning for the Kiewa River	Kiewa River at Kiewa (Main Stream)	3.3	3.7	4.0
IDV36620		Kiewa River at Bandiana	2.8	3.1	3.3
IDV36630	Flood Warning for the Ovens River	Ovens River at Bright	3.0	3.6	4.3
	Flood Warning for the King River	Ovens River at Eurobin	4.5	5.5	6.0
	Flood Warning for the Buffalo River	Ovens River at Rocky Point	3.2	4.4	5.2
	Flood Warning for the Fifteen Mile Creek	King River at Docker Rd Bridge	3.7	3.95	4.1
		Fifteen Mile Creek at Greta South	2.8	4.2	6.0
		Ovens River at Wangaratta	11.9	12.4	12.7
		King River D/S Lake William Hovell	1.8	-	-
		Buffalo River D/S Lake Buffalo	3.2	5.0	6.3
IDV36640	Flood Warning for the Broken River	Broken River at Benalla	2.5	3.7	4.5
		Broken River at Casey Weir	2.1	2.6	3.0
		Broken River at Orrvale	6.8	7.2	7.9
IDV36641	Flood Warning for the Seven Creeks	Seven Creeks at Euroa	2.5	4.0	4.6
	Flood Warning for the Castle Creek	Seven Creeks at Kialla West	4.5	5.0	6.6
IDV36642	Flood Warning for the Broken Creek	Broken Creek at Nathalia	1.3	2.5	2.9
IDV36710	Flood Warning for the Goulburn River	Acheron River at Taggerty	2.3	2.6	3.0
	Flood Warning for the Yea River	Goulburn River at Seymour	3.8	5.2	7.0
	Flood Warning for the Sunday Creek	Goulburn River at Murchison	9.0	10.2	10.7
		Goulburn River at Shepparton	9.5	10.7	11.0
	Flood Warning for the Hughes Creek	Goulburn River D/S Lake Eildon	3.0	4.0	5.0
IDV36140	Flood Warning for the Mitchell River				

The flood risk and area impacted by flooding varies around the region. Table 12 shows the percentage of each LGA which is impacted by flooding at the 1:100 year average recurrence interval (ARI). This is shown in Green in Figure 12. There is a one percent chance (1% annual exceedance probability (AEP)) of these areas experiencing flooding of this level in any given year[71] based on flood modelling results from flood

70 http://www.bom.gov.au/vic/flood/brochures/VIC_SLS_current.pdf

71 http://arr.ga.gov.au/arr-guideline

studies. The localities listed have some defined built up area in or near the flood impact area defined by the 1:100 year ARI. This list may not be exhaustive and some areas may experience impacts from flash flooding due to heavy rainfall that are not shown here.

Table 12. Areas potentially impacted by flooding inundation[72]

LGA	% included in 1:100 ARI area	Main Localities with Affected Built Up Areas
Alpine	*2.1%*	Bright, Harrietville, Myrtleford, Porepunkah, Wandiligong
Benalla	*10.1%*	Benalla
Greater Shepparton	*47.3%*	Grahamvale, Kialla, Mooroopna, Murchison, Shepparton, Shepparton East, Tatura, Toolamba
Indigo	*7.5%*	Chiltern, Kiewa, Wahgunyah, Yackandandah
Mansfield	*4.5%*	Jamieson, Mansfield
Mitchell	*2.5%*	Broadford, Seymour, Tallarook, Wallan
Moira	*48.0%*	Barooga (NSW), Cobram, Nathalia, Numurkah, Strathmerton, Yarrawonga
Murrindindi	*5.0%*	Alexandra, Buxton, Flowerdale, Marysville, Yea
Strathbogie	*20.2%*	Avenel, Euroa, Longwood, Nagambie, Violet Town
Towong	*5.12%*	Tallangatta
Wangaratta	*10.0%*	Oxley, Waldara, Wangaratta
Wodonga	*22.8%*	Wodonga

6.4 Geology

There are significant aspects of the Victorian environment that rely on natural workings underground. Victoria's geology contributes to a large cluster of volcanic plains, the frequency of weak to medium magnitude earthquakes and the versatility of groundwater.

There is an extensive area of volcanism in Victoria. Large basaltic formations (formed after the rapid cooling of lava) are present along the western coast of Victoria. The time of the last volcanic eruption in Victoria is contested by volcanologists, however common consensus is that it occurred approximately 7000 years ago at Mount Napier.[73] Older Volcanic Plains are scattered throughout eastern Victoria and as a whole experienced an estimated 400 eruptions that were sporadic, relatively low volume and widespread.[74]

72 https://discover.data.vic.gov.au/dataset/1-in-100-year-flood-extent

73 New 40Ar/39Ar ages for selected young (<1 Ma) basalt flows of the Newer Volcanic Province, Southeastern Australia (2011) https://www.sciencedirect.com/science/article/abs/pii/S1871101411000112

74 New 40Ar/39Ar ages for selected young (<1 Ma) basalt flows of the Newer Volcanic Province, Southeastern Australia (2011) https://www.sciencedirect.com/science/article/abs/pii/S1871101411000112

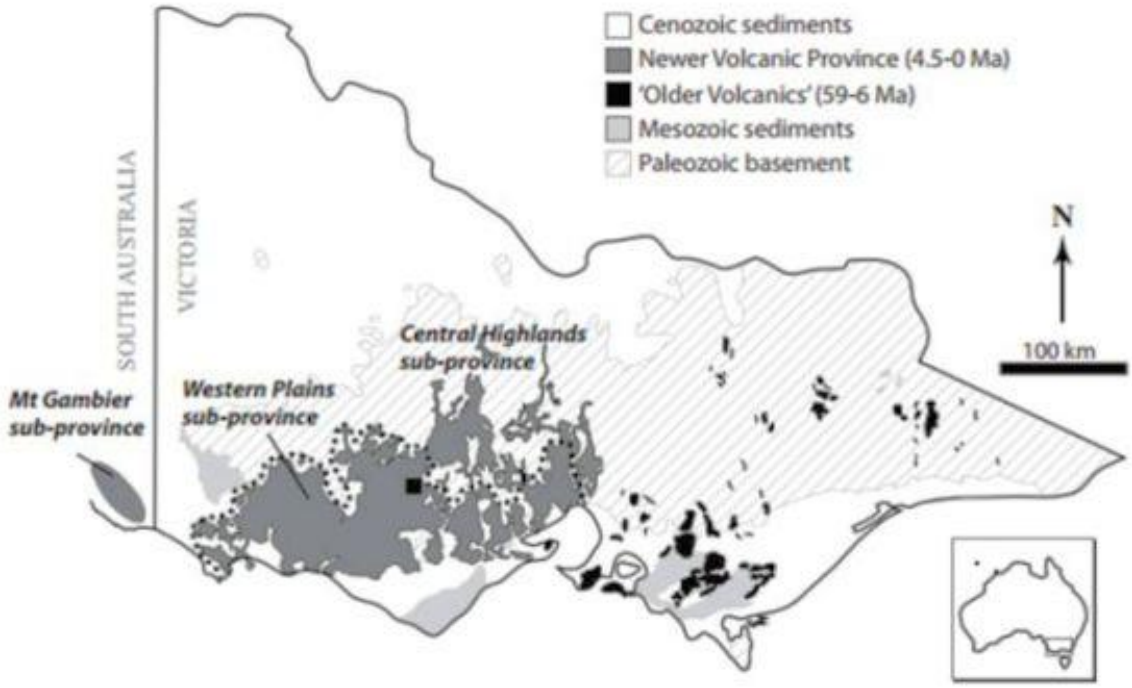


Figure 13. Map of Victoria with Volcanic overlay[75]

On average, there are approximately 100 earthquakes in Australia per year that register above 3 magnitude.[76] As a nation, Australia experiences significantly less earthquakes than other parts of the world near tectonic boundaries, where large earthquakes occur more often. [77] However, the country experiences earthquakes due to a series of interlocking, interspersed fault lines that spread throughout the nation. In Victoria, several vault lines have been identified including the Strzelecki Ranges, The Mornington Peninsula and the Otway Ranges. However, the frequency of earthquakes in the state indicates that there are multiple minor fault lines that have not been formally identified. [78] Included below is a table that lists earthquakes in Victoria with a magnitude over 4.5 since records began with damage reported:

75 New 40Ar/39Ar ages for selected young (<1 Ma) basalt flows of the Newer Volcanic Province, Southeastern Australia (2011) https://www.sciencedirect.com/science/article/abs/pii/S1871101411000112

76 Geology Australia (2020) https://www.ga.gov.au/scientific-topics/community-safety/earthquake

77 Geology Australia (2020) https://www.ga.gov.au/scientific-topics/community-safety/earthquake

78 Geology Australia (2020) https://www.ga.gov.au/scientific-topics/community-safety/earthquake

Table 13. List of earthquakes above 4.5 magnitude in Victoria since records began[79] [80]

Location	Date	Magnitude	Damage Reported
Cape Liptrap	02 July 1885	5.7	Tied Victoria's largest earthquake – minor damage reported around epicentre
Warrnambool	14 July 1903	5.3	Minor damage over wide geographical area near epicentre
Alpine National Park	10 April 1904	5.0	No damage reported – epicentre in national park
Ocean Grove (offshore)	10 April 1922	5.7	Reports of minor item damage in Cranbourne, East Malvern, Pakenham and Portalington – aftershock 4.7 magnitude
Benalla	Unknown date 1931	4.5	Largest in a series of earthquakes in Benalla region throughout the 1930s. Damage throughout this period was approximately 2000 pounds or over $400,000 in 2015.
Mornington	03 September 1932	4.5	Minor damage
Bass Strait (offshore)	15 September 1946	6.2	Minor damage reported in Gippsland region and Tasmanian northern coast
Cape Otway	25 December 1950	5.3	No Damage Reported
Mt Hotham	5 May 1966	*5.5	Windows broken in ski village
Boolarra	20 June 1969	5.3	5.0 magnitude aftershock, cracked walls and windows near epicentre
Western Port	7 July 1971	5.0	Damage reported in Cowes
Balliang	2 December 1979	4.7	Felt across south eastern suburbs, minor damage caused in Anakie area
Wonnangatta	21 November 1982	5.4	Felt across state, no damage reported
Mount Baw Baw	25 September	5.0	No damage reported
Boolarra	29 August 2000	5.0	Minor damage
Swan Hill	27 October 2001	4.8	Minor damage, power disruption
Wonthaggi	6 March 2011	4.5	No damage reported
Gippsland	19 June 2012	5.4	Minor damage. Damaged windows, cracks in plaster, some very mild community panic.

*VicSES reported 5.7

The Hume region experiences the second highest rate of earthquakes in Victoria, behind only the Gippsland region. One of the largest reported earthquakes in Victoria's recorded history occurred at Mt Hotham and caused some damage in the ski village. Another earthquake in the Alpine region during winter ski season

79 Seismology Research Centre (2020) https://www.src.com.au/earthquakes/older-quakes/

80 Earthquake Tracker (2020) https://earthquaketrack.com/p/australia/victoria/recent?mag_filter=4

adds a further risk of avalanche, extrapolating the risk and consequences.[81] In an Earthquake Emergency Management Plan produced in 2018, the SES identified the following dams with credible earthquake risk[82]:

Table 14. SES identified dams with credible earthquake risk[83]

Dam Name	Location	Dam Safety Emergency Plans Available (Y/N)
Bakers Gully	Bright	N (recently decommissioned)
Dartmouth Dam	Dartmouth	Y
Goulburn Weir	Near Shepparton	Y
Hume Dam	Wodonga	Y
Kerford Dam	Near Stanley	Y
Kiewa Dam (Basin) Mount Beauty Pondage (AGL hydro)	Adjacent to Mount Beauty	Y
Khancoban Pondage (Snowy Hydro)	Khancoban	Y
Lake Buffalo	Mt Buffalo	Y
Lake Eildon	Mansfield	Y
Lake Loombah and Mccall Says Reservior	East of Tatong South	Y
Lake Nagambie	Nagambie	N
Lake Nillachootie	Swanpool	Y
Lake Sambell	Beechworth	Y
Lake William Hovel	Whitlands	Y
Nils Gully	Myrtleford	Y
Rocky Valley Reservoir	Falls Creek	N
Rocky Valley Storage	Bogong High Plains	N
Yarrawonga Weir	Yarrawonga	Y

Groundwater is water found under the ground that flows through layers known as aquifers. Surface water from rainfall seeps into cracks or pores in the ground (aquifers), however aquifers can also be recharged from streams or indirectly from other aquifers.[84] Groundwater resources eventually flow into rivers, lakes or the ocean. Many surface environments known as 'groundwater dependent ecosystems' rely on groundwater including wetlands and river baseflows. Groundwater is also important as a water resource in semi-arid parts of Victoria where rainfall is infrequent or inadequate to reliably meet water needs.[85] In areas where groundwater may be replenished on a regular basis (through rainfall), extraction can be managed on a

81 State Emergency Services – Hume Earthquake Emergency Plan (2018)
82 State Emergency Services – Earthquake Emergency Plan (2018)
83 State Emergency Services – Earthquake Emergency Plan (2018)
84 Southern Rural Water – Groundwater Atlas (2012) http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf
85 Geology Australia (2020) https://www.ga.gov.au/scientific-topics/water/groundwater/basics/what-is-groundwater

renewable basis. However, in many areas in Australia the extraction greatly exceeds the rate at which groundwater is replenished - Australian Water Resources 2005 concluded that 30 per cent of groundwater extraction sites were approaching or beyond sustainable extraction limits.[86]

The area around the Murray-Darling Basin is a primary source for groundwater in the Hume region. [87] Major issues arising in Hume region around groundwater is the unsustainable demand and declining groundwater levels in current aquifers. [88] Most of the recent discussion around the utilisation of groundwater in Hume has focused on the water and land salinity problems that occur through the unsustainable harvesting of the resource.[89]

Peat consists of decayed vegetation or organic matter. Peat can pose a major fire hazard and a smouldering peat fire cannot be extinguished by light rain.[90] Peat fuelled fires can burn for extended periods of time and have also been observed as smouldering underground resulting in reignition if an oxygen source is present.[91] The minimum rainfall intensity required to extinguish a peat fire is roughly 4mm/h.[92] Hume region has little reported peat deposits in comparison to other regions. The largest deposit is found north of Benalla but smaller scattered clusters can be found to the north of the region and west near the boarder with Gippsland. A full map of peat deposits can be found on EM-COP, below is a screenshot of the BSW region with the peat hazard layer shown in yellow.

86 Geology Australia (2020) https://www.ga.gov.au/scientific-topics/water/groundwater/basics/what-is-groundwater

87 Murray Darling Basin – Groundwater Report - https://www.mdba.gov.au/sites/default/files/archived/mdbc-GW-reports/2173_GW_a_resource_for_the_future.pdf

88 Murray Darling Basin – Groundwater Report - https://www.mdba.gov.au/sites/default/files/archived/mdbc-GW-reports/2173_GW_a_resource_for_the_future.pdf

89 Murray Darling Basin – Groundwater Report - https://www.mdba.gov.au/sites/default/files/archived/mdbc-GW-reports/2173_GW_a_resource_for_the_future.pdf

90 Lin and Huang (2020) https://www.sciencedirect.com/science/article/abs/pii/S0048969720319811

91 Lin and Huang (2020) https://www.sciencedirect.com/science/article/abs/pii/S0048969720319811

92 Lin and Huang (2020) https://www.sciencedirect.com/science/article/abs/pii/S0048969720319811

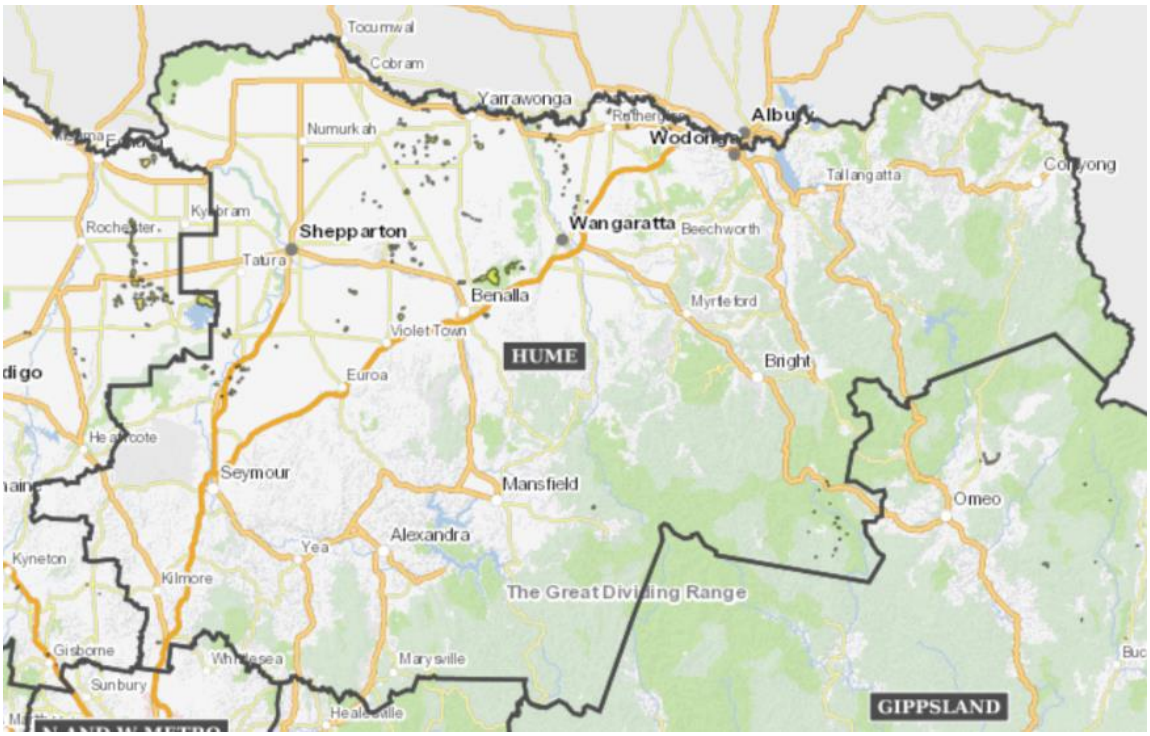


Figure 14. EM-COP layer depicting peat deposits in Hume Region[93]

7. Built Environment

Key infrastructure includes major roads and rail lines, water, power, sewerage, telecommunications, airports and seaports, all of which support ongoing growth in the Hume Region.

Extreme weather events however threaten this critical infrastructure and increase maintenance costs, with the critical services outlined below particularly susceptible to extreme weather.

7.1 Information and telecommunications

The communications sector – incorporating internet, phone, radio, television, online transactions and business operations – is a foundation for economic and social development and stability within Victoria. These interconnected networks are owned by both national and international providers and are regulated by the Commonwealth.[94]

Key assets and infrastructure include:

- Networks – copper, hybrid fibre-coaxial, fibre-optic cable
- Towers – mobile telephone, wireless internet (e.g., 3G, 4G)
- Satellites

93 EM-COP – Peat Overlay Layer
94 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf

- Base stations
- Exchanges or points of interconnect
- Data centres
- Backhaul infrastructure (which transfers high data volumes to and from the core network)
- Cables – between onshore nodes and other countries

Key risks to the sector include:

- Natural disasters – fire, flood, storm, extreme weather
- Pandemic
- Security breaches
- Technical issues (e.g., electricity disruption, asset failure)

In the Hume Region the quality of digital infrastructure, including fixed broadband and mobile access, is highly variable. While for cities and large towns such as Shepparton and Wodonga, access is generally comparable to metropolitan Melbourne, smaller towns and localities such as Murchison and Yackandandah generally have less capacity and reliability.[95]

For the Hume Region, key assets and infrastructure are summarised below:

Table 15. Communications infrastructure in Hume Region by LGA[96]

LGA	Radio Broadcast	Television Broadcast	Radio Communication	Telephone Exchanges
Alpine Shire	10	46	5	11
Benalla Rural City	0	0	1	7
City of Wodonga	7	10	1	4
Greater Shepparton City	10	10	1	21
Indigo Shire	4	15	4	12
Mansfield Shire	3	23	4	11
Mitchell Shire	1	15	5	13
Moira Shire	1	0	3	24
Murrindindi Shire	14	48	9	14
Strathbogie Shire	1	0	2	16
Towong Shire	5	23	8	24
Wangaratta Rural City	3	0	2	15
Alpine Resorts	5	0	8	2
Total	**64**	**190**	**53**	**174**

95 Infrastructure Victoria (2019): https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/Aither-Goulburn-Regional-Profile-March-2019.pdf
96 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

7.2 Energy

Energy – including electricity, gas and liquid fuels – is one of eight critical infrastructure sectors identified for Victoria. All three of these sub-sectors are privately owned and operated, and form part of extensive national networks to import and export energy between Victoria and other States.[97]

Victoria's primary energy sources are electricity generated from brown coal in the La Trobe Valley, and natural gas sourced from the Gippsland Basin.[98]

7.2.1 Energy distribution

Energy distribution in the Hume Region is summarised by LGA in the below table and discussed further by form in the following sections.

Table 16. Energy distribution (km) in Hume Region[99]

LGA	Major Electricity Transmission Lines	Oil Pipelines	Gas Pipelines
Alpine Shire	374.4	0.0	0.0
Benalla Rural City	169.0	0.0	34.4
City of Wodonga	75.7	0.0	22.1
Greater Shepparton City	256.9	0.0	60.7
Indigo Shire	42.1	0.0	54.0
Mansfield Shire	189.2	0.0	0.0
Mitchell Shire	98.0	0.0	85.7
Moira Shire	68.4	0.0	69.1
Murrindindi Shire	316.4	0.0	0.0
Strathbogie Shire	0.0	0.0	99.0
Towong Shire	194.2	0.0	0.0
Wangaratta Rural City	313.4	0.0	54.5
Total	**2,097.7**	**0.0**	**479.5**

For the energy sector overall, key risks include:

- Fire
- Severe weather
- Extreme temperatures
- Cyber-attack

97 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
98 DELWP (2020): https://www.energy.vic.gov.au/
99 EMV (2020): Potential Impact Reports (by LGA)

- Earthquake
- Earthworks damaging underground infrastructure
- Loss of communication
- Workforce issues (which could arise for any number of reasons but include industrial issues, heat stress, pandemic, an ageing workforce and lack of experience or specialist staff).[100]

Key dependencies for the energy sector include:

- Production infrastructure
- Supporting infrastructure (e.g., energy supplies for operations)
- Water
- Transport infrastructure
- Human resources and management systems
- Information technology and communications[101]

7.2.2 Electricity

The key assets and infrastructure for the electricity sector include generators, high and low voltage transmission and distribution systems.[102]

Most of Victoria's electricity is generated by brown coal generators in the La Trobe Valley.[103]

Terminal stations are key centres for receiving high voltage electricity from transmission lines and converting it to lower voltages for distribution to zone substations.[104] Zone Substations receive electricity from bulk supply substations and transform the voltage to 11,000 volts for distribution to customers' homes and businesses along powerlines or cables.[105]

Within the Hume Region, there are 6 terminal stations and 18 zone substations as outlined below. Most of the network is owned and maintained by AusNet Services, with some areas in the east of the region owned and maintained by Powercor.[106]

100 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
101 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
102 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
103 DELWP (2020): https://www.energy.vic.gov.au/electricity/about-the-electricity-sector
104 https://www.energy.vic.gov.au/electricity/electricity-distributors
105 https://dapr.ausnetservices.com.au/
106 https://www.energy.vic.gov.au/electricity/electricity-distributors

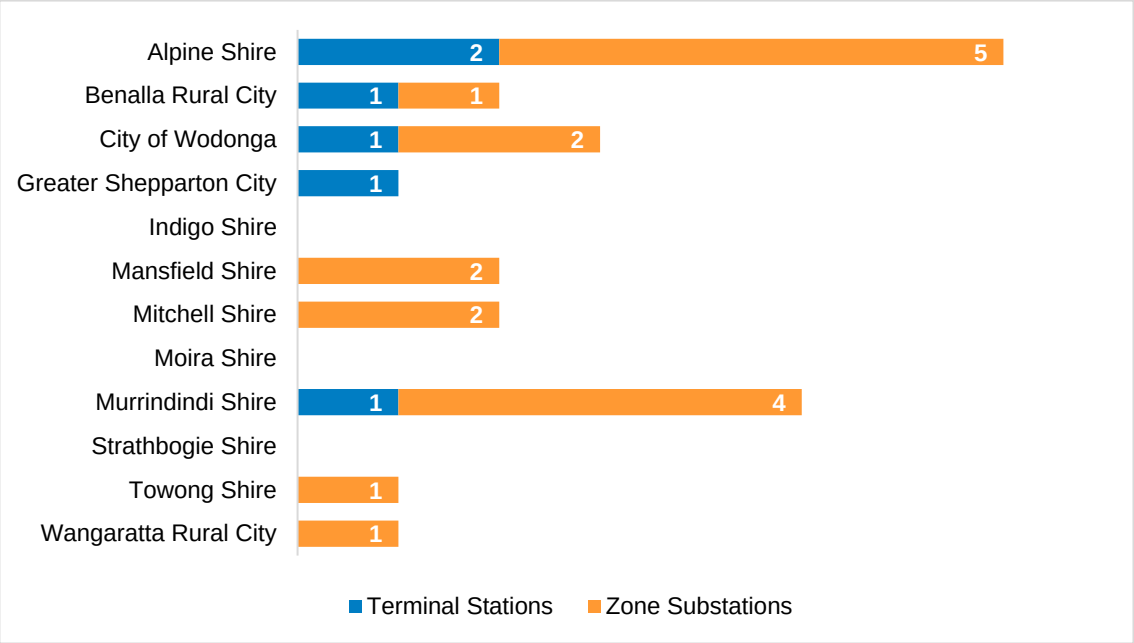
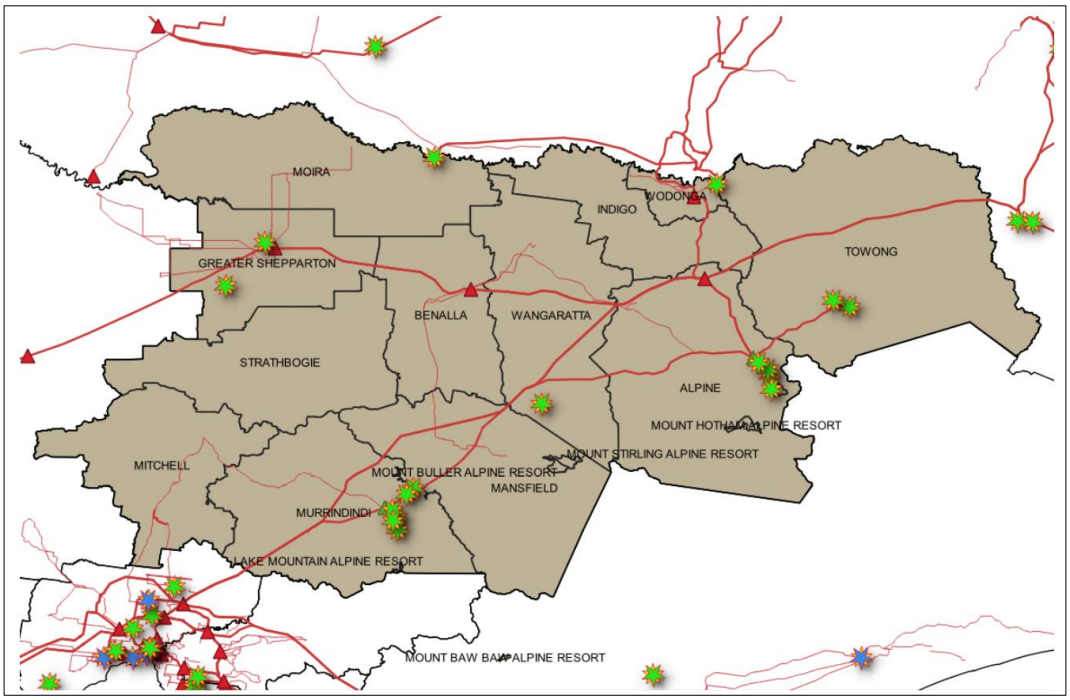


Figure 15. Terminal stations and zone sub-stations in Hume Region by LGA[107]

107 EMV (2020): Potential Impact Reports (by LGA)

A map of electrical infrastructure is provided in the figure below:



Green star – renewable power generation	Blue star – non-renewable power generation
Red triangle – Electrical substation	Green triangle – Electrical switchyard
Yellow triangle – Electrical transmission	Blue triangle – Electrical zone
Black dot – Electrical terminal	Thick red line – Power transmission
Thin red line – Power sub-transmission	

Figure 16. Transmission lines within Hume Region[108] [109] [110]

7.2.3 Solar and Wind

Renewable energy sources have not been a strong focus in the Hume Region, however there are a number of solar farms as well as the Dartmouth Power Station which generates hydropower through Lake Dartmouth.

There are no wind farms and 10 solar farms in the Hume Region, including:

108 https://data.gov.au/dataset/ds-aurin-aurin%3Adatasource-AU_Govt_GA-UoM_AURIN_DB_national_major_power_stations_2016/details?q=Major%20Power%20Stations

109 https://data.gov.au/dataset/ds-aurin-aurin%3Adatasource-AU_Govt_GA-UoM_AURIN_DB_national_electricity_transmission_substations_2017/details?q=electricity%20transmission%20substations

110 https://discover.data.vic.gov.au/dataset/foi-line-vicmap-features-of-interest

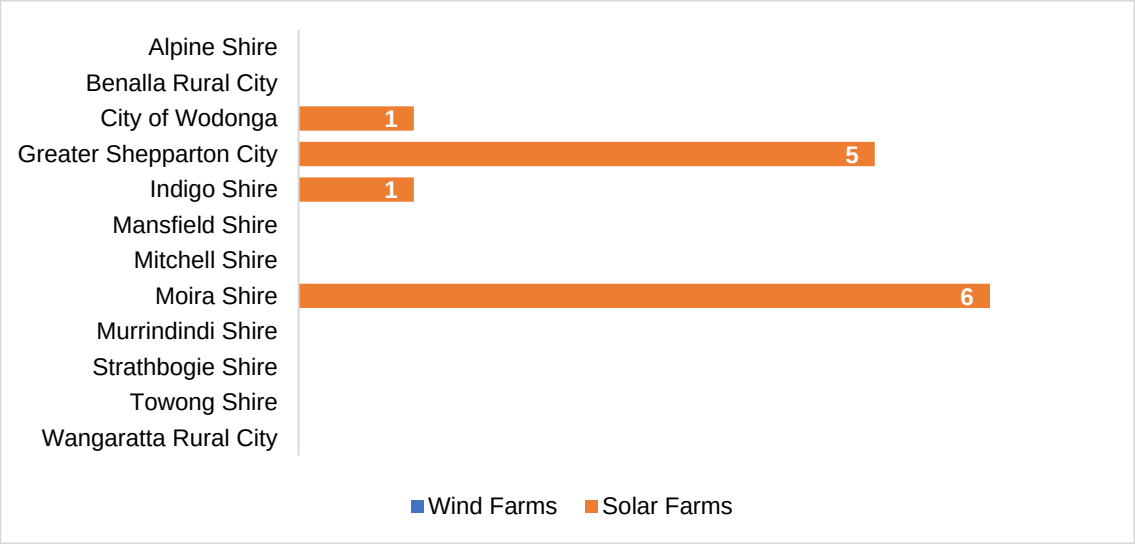


Figure 17. Wind and solar farms in Hume Region[111]

7.2.4 Gas

The key assets and infrastructure for the gas sector include production, receiving, processing and storage facilities, and transmission and distribution systems.[112]

Victoria's natural gas supply is sourced predominantly in the Gippsland Basin and processed in Longford. The Principal Transmission System, which covers Melbourne and central Victoria, is owned by GasNet and operated by the Australian Energy Market Operator (AEMO).[113]

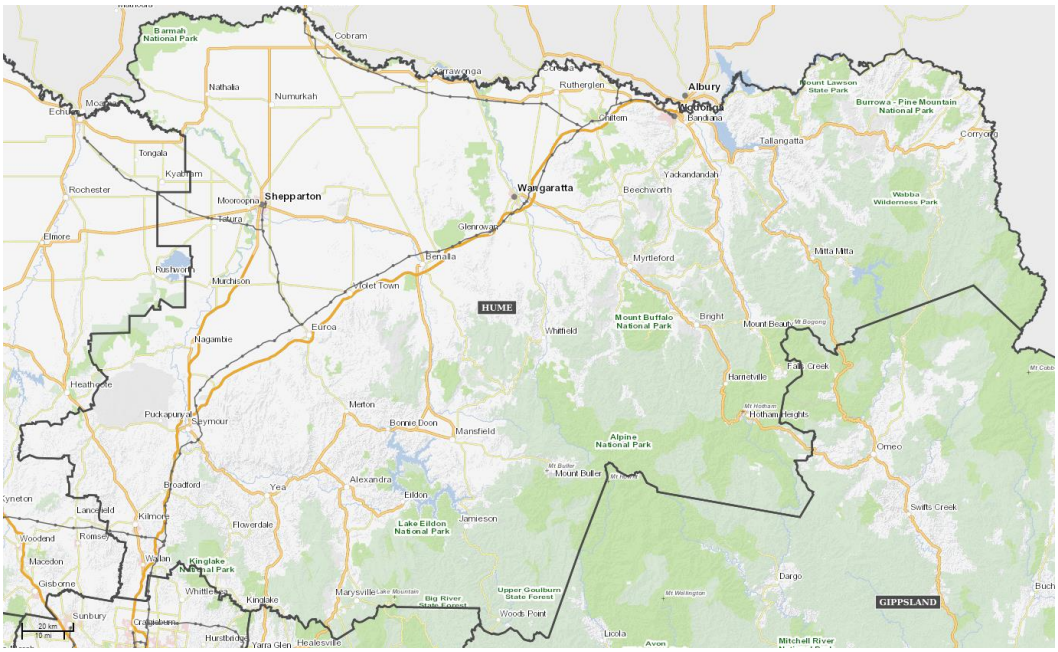
Approximately 480km of gas pipelines traverse the Hume Region, including:

111 EMV (2020): Potential Impact Reports (by LGA)
112 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
113 DELWP (2017): https://www.energy.vic.gov.au/gas/about-the-gas-sector

Table 17. Gas pipelines in Hume Region[114]

LGA	Gas Pipelines (km)	Location/Route
Alpine Shire	0.0	N/A
Benalla Rural City	34.4	Keon Park to Wodonga West
City of Wodonga	22.1	Keon Park to Wodonga West Wodonga West to Albury Wodonga West to Wodonga
Greater Shepparton City	60.7	Euroa to Shepparton Kyabram to Echuca Shepparton to Kyabram Shepparton City Gate to Shepparton
Indigo Shire	54.0	Chiltern to Rutherglen Culcairn to Barnawatha Keon Park to Wodonga West Rutherglen to Dederang
Mansfield Shire	0.0	N/A
Mitchell Shire	85.7	Keon Park to Wodonga West Wandong to Kyneton City Gate
Moira Shire	69.1	Rutherglen to Koonoomoo
Murrindindi Shire	0.0	N/A
Strathbogie Shire	99.0	Euroa to Shepparton Keon Park to Wodonga West
Towong Shire	0.0	N/A
Wangaratta Rural City	54.5	Keon Park to Wodonga West Rutherglen to Koonoomoo
Total	**479.5**	

114 EMV (2020): Potential Impact Reports (by LGA)



Gas Pipeline

Figure 18. Natural gas pipelines within the Hume Region[115]

7.2.5 Liquid fuels

The key assets and infrastructure for the liquid fuels sector include production and import facilities, fuel refineries, storage, distribution systems (including pipelines and transport) and retail outlets.[116]

There are no oil refineries located in the Hume Region, with only two refineries situated in Victoria – at Altona (Mobil) and Geelong (Viva Energy).[117]

7.3 Food, grocery and manufacturing

Victoria is the epicentre of manufacturing in Australia, home to more than 13,000 manufacturing firms employing over 280,000 people and generating $30 billion for the Victorian economy.[118]

Several large businesses operate home bases or sites in the Hume Region including:[119]

- SPC Ardmona canning factory at Shepparton
- Uncle Toby's factory at Wahgunyah
- Mars Petcare manufacturing site at Wodonga
- Nestle factory at Broadford

115 EM-COP – Gas Pipelines Overlay Layer
116 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
117 Australian Institute of Petroleum (2017):https://aip.com.au/sites/default/files/download-files/2017-09/At%20a%20Glance%20Australian%20Oil%20Refineries.pdf
118 DJPR (2020): https://djpr.vic.gov.au/about-us/overview/strategies-and-initiatives/advancing-victorian-manufacturing
119 DJPR (2020): https://www.rdv.vic.gov.au/victorias-regions/hume

- Unilever manufacturing site at Tatura
- Campbells manufacturing site at Shepparton
- Bega Cheese at Strathmerton
- Saputo Dairy Australia at Cobram
- GrainCorp Oilseeds in Numurkah
- Peechelba Beef in Peechelba
- Flavourwave and Katunga Fresh in Katunga

Key assets and infrastructure may include:

- Warehousing and distribution centres
- Complex logistics networks
- Multiple modes of transport

7.3.1 Food supply chain

The safety, security and continuity of Australia's food supply is complicated. It is a nationally distributed system, generally owned and operated by the private sector, with oversight from the Department of Agriculture, Water and the Environment (DAWE) and other industry and government agencies. However, "States and territories have the lead responsibility for planning for and responding to emergency events within their jurisdictions."[120] Emergency situations that could give rise to supply chain disruptions, with downstream effects on consumers, include:

- Pandemic
- Biosecurity concern (e.g., foot and mouth disease)
- Drought
- Industrial action
- Natural disaster
- Severe weather event
- Terrorist attack
- Food or water contamination
- Power, water or communications outage

Figure 19 provides an overview of the food supply chain and its dependencies.

120 DAWR (2020): https://www.agriculture.gov.au/ag-farm-food/food/food-chain-resilience

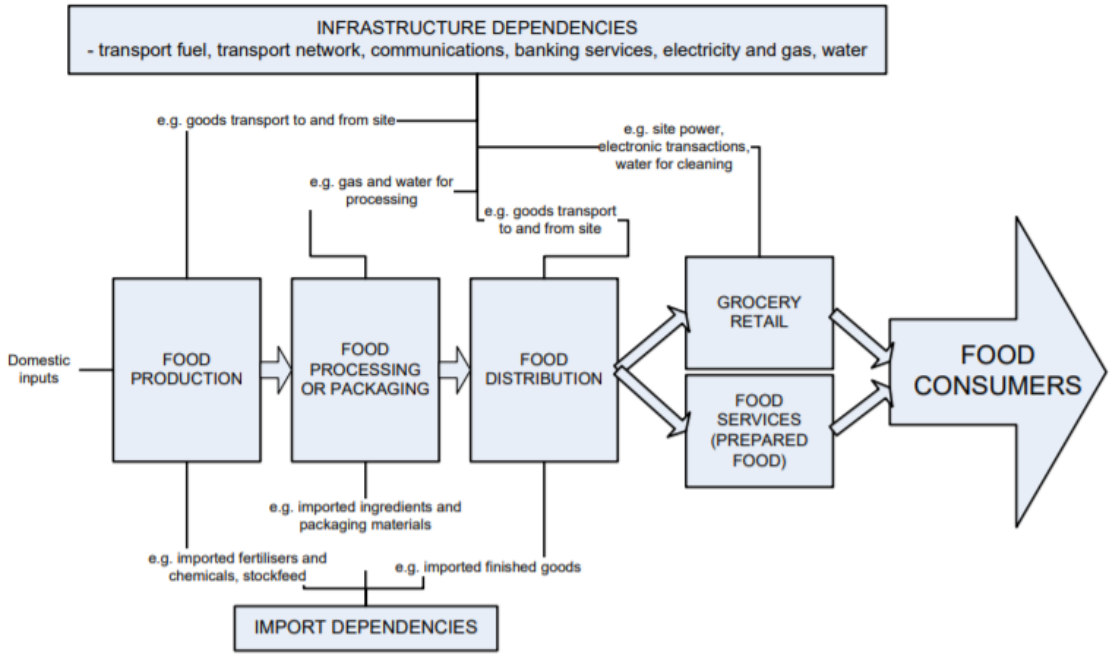


Figure 19. Overview of food supply chain and dependencies[121]

7.4 Transport

The Hume (Melbourne-Canberra-Sydney) and Goulburn Valley (Melbourne-Brisbane) road and rail corridors form the backbone of the transport network in the Hume Region, with the region strategically located from a national perspective with key interstate transport linkages traversing the region. Population centres are based around high-functioning regional hubs (Shepparton, Wangaratta and Wodonga), which are in turn located along major transport routes.[122]

Across the Hume Region, the percentage of the population close to public transport declines as the distance from larger population centres increases.

7.4.1 Transport infrastructure

Major transport infrastructure in the Hume Region is outlined below, and discussed further by mode in the following sections:

121 DAFF (2012): https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/ag-food/food/national-food-plan/submissions-received/resilience-food-supply.pdf
122 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf

Table 18. Transport infrastructure (km) by LGA (2015) [123]

LGA	Major Roads	Major Rail	Distance to Melbourne CBD[124]	% Population close to Public Transport[125]
Alpine Shire	293.7	0.0	286	*3.0%*
Benalla Rural City	260.7	99.2	199	*41.2%*
City of Wodonga	136.1	72.2	307	*53.5%*
Greater Shepparton City	413.0	121.6	178	*54.1%*
Indigo Shire	344.2	45.7	272	*7.1%*
Mansfield Shire	242.3	0.0	188	*3.0%*
Mitchell Shire	375.1	223.2	51	*28.0%*
Moira Shire	447.6	90.1	259	*23.5%*
Murrindindi Shire	321.6	0.0	129	*5.9%*
Strathbogie Shire	381.8	187.4	152	*12.2%*
Towong Shire	509.0	0.0	423	*5.3%*
Wangaratta Rural City	367.0	97.0	238	*47.0%*
Hume Total	**4,092.1**	**936.3**		

7.4.2 Roads

More than 4,000km of major roads traverse the Hume Region, including major highways, freeways, arterial roads, bridges and tunnels.

The road network is shown in the figure below, with darker red representing arterial roads, and lighter red municipal roads and tracks. This network includes:

- Hume Freeway – Melbourne-Seymour-Wodonga-Sydney link
- Goulburn Valley Freeway/Highway – Eildon-Yea-Seymour-Shepparton-Strathmerton link
- Murray Valley Highway – Towong-Wodonga-Yarrawonga-Cobram-Echuca-Kerang-Swan Hill-Robinvale link
- Midland Highway – Geelong-Ballarat-Bendigo-Shepparton-Benalla-Mansfield link
- Maroondah Highway – Mansfield-Alexandra-Melbourne link
- Melba Highway – Yea-Melbourne link
- Great Alpine Road – Wangaratta-Omeo-Bairnsdale link

123 EMV (2020): Potential Impact Reports (by LGA)
124 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
125 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

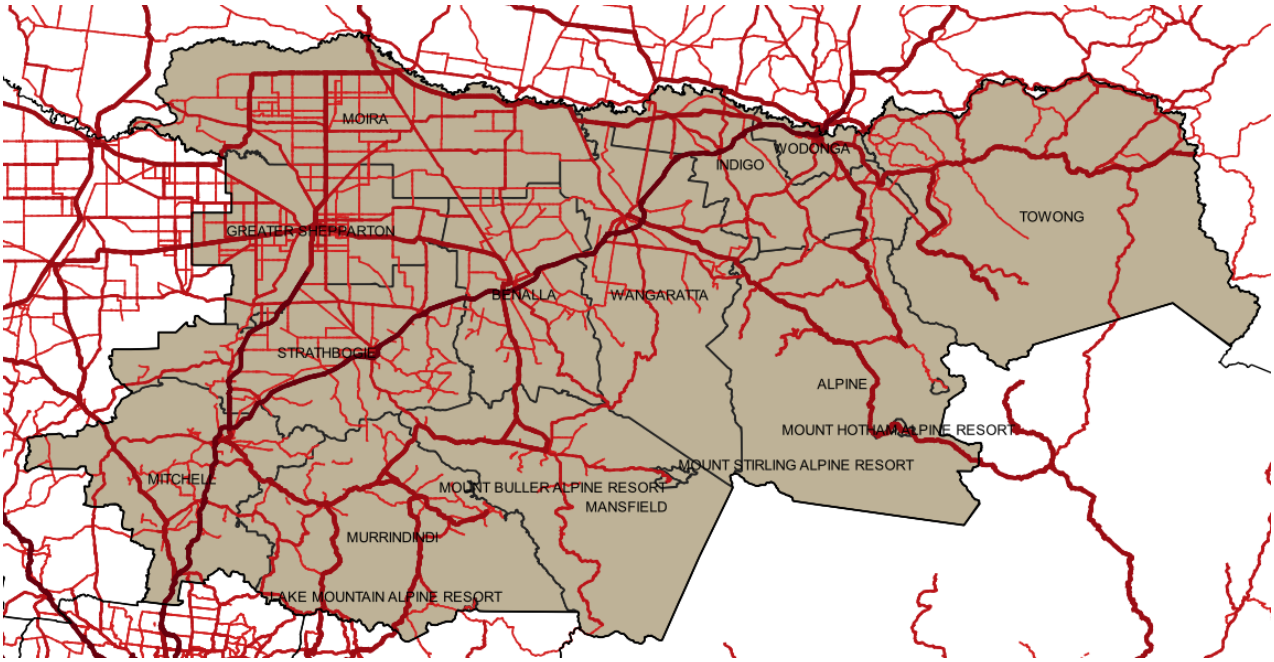


Figure 20. Main roads within the Hume Region[126]

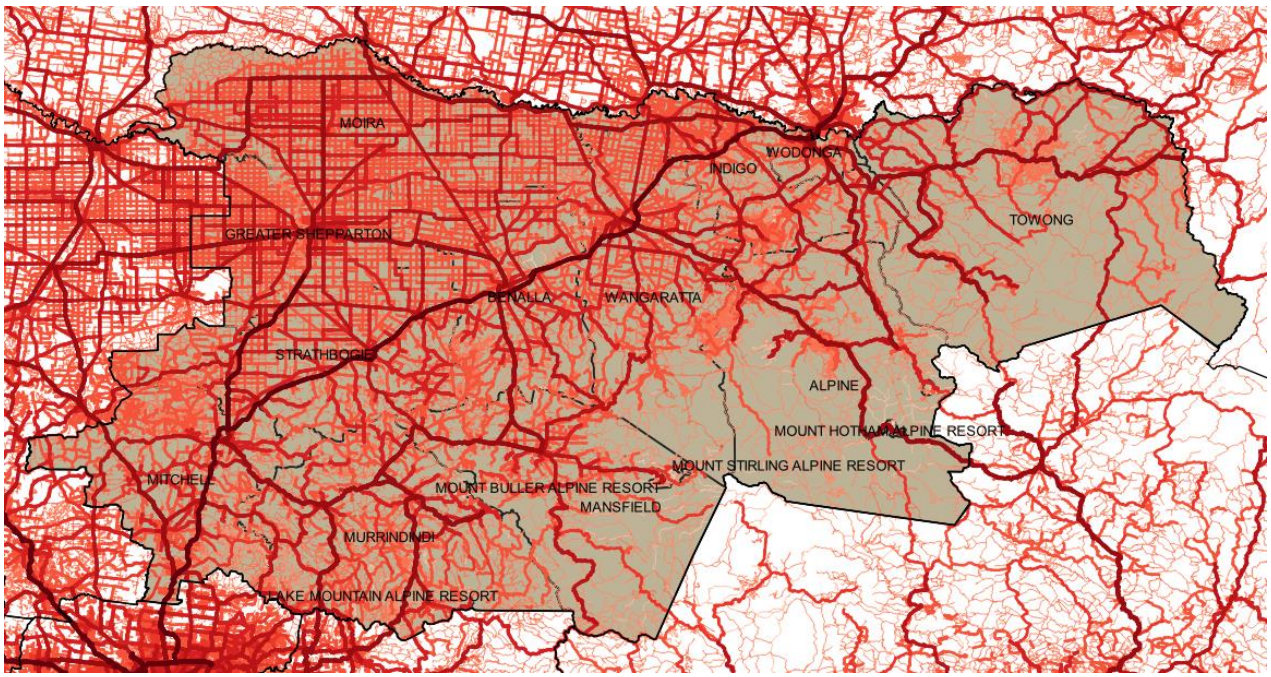


Figure 21. Density of road network within the Hume Region[127]

The calculated road lengths (km) for each LGA in the Hume Region below are based on the Department of Transport's standard categories:

126 Data Vic (2020): https://discover.data.vic.gov.au/dataset/road-network-vicmap-transport
127 Data Vic (2020): https://discover.data.vic.gov.au/dataset/road-network-vicmap-transport

Table 19. Road Lengths (km) in Hume Region by LGA[128]

LGA	Freeway	Highway	Arterial	Sub-Arterial	Collector	Local	2WD	4WD	Walking Track	Bike Path
Alpine Shire	-	151	139	62	46	465	1,915	1,906	354	97
Benalla Rural City	62	55	67	194	8	662	1,065	234	26	-
City of Wodonga	47	48	35	5	8	395	223	64	64	17
Greater Shepparton City	23	114	265	423	42	1,763	1,719	7	72	6
Indigo Shire	48	73	213	98	29	1,187	1,334	573	29	66
Mansfield Shire	-	75	153	74	179	764	1,554	1,271	354	6
Mitchell Shire	179	90	108	273	107	1,247	2,348	336	68	-
Moira Shire	-	174	272	530	124	2,392	2,396	14	23	0
Murrindindi Shire	-	190	126	242	211	1,221	3,400	847	278	37
Strathbogie Shire	243	-	183	552	1	1,456	2,136	55	3	0
Towong Shire	-	169	301	213	91	531	2,569	1,785	159	5
Wangaratta Rural City	116	41	221	252	47	1,481	2,057	525	51	59
Alpine Resorts	-	19	16	15	19	13	48	63	66	124
Hume Total	**719**	**1,200**	**2,098**	**2,933**	**912**	**13,577**	**22,764**	**7,680**	**1,547**	**417**

A listing of the major roads is also provided below:

128 Data Vic (2020): https://discover.data.vic.gov.au/dataset/road-network-vicmap-transport

Table 20. Major roads in Hume Region[129]

LGA	Major Roads	
Alpine Shire – 293.7km	Buckland Valley Rd	Mount Buffalo Tourist Rd
	Buffalo River Rd	Myrtle St
	Dederang Rd	Myrtleford - Yackandandah Rd
	Delany Av	Odonnell Av
	Gavan St	Prince St
	Great Alpine Rd	Running Creek Rd
	Happy Valley Rd	Snow Rd
	Kiewa Valley Hwy	Standish St
	Mount Buffalo Rd	Tawonga Gap Rd
Benalla Rural City – 260.7km	Benalla - Winton - Hume In Ramp	Hume Out - Mansfield Ramp
	Benalla - Tatong Rd	Hume Out - Sydney Ramp
	Benalla - Tocumwal Rd	Maginness St
	Benalla - Winton Rd	Mansfield - Hume In Ramp
	Benalla - Yarrawonga Rd	Mansfield - Hume Out Ramp
	Bridge St East	Mansfield Rd
	Bridge St West	Midland Hwy
	Commercial Rd	Nunn St
	Coster St	Samaria Rd
	Dookie - Devenish Rd	Smythe St
	Hume Fwy	Sydney - Hume Out Ramp
	Hume In - Benalla - Winton Ramp	Sydney Rd
	Hume In - Mansfield Ramp	Tatong - Tolmie Rd
City of Wodonga – 136.1km	Anzac Pde	Hume Out -High Ramp
	Bandiana Link -Hume Out Ramp	Hume Out -Melbourne Ramp
	Bandiana Link Rd	Hume Out -Murray Valley Ramp
	Beechworth - Wodonga Rd	Huon Creek Rd
	Beechworth Rd	Kiewa Valley Hwy
	Bonegilla Rd	Lawrence St
	Brackley St	Lincoln Cswy
	Chapple St	Lindsay Rd
	Elgin Bvd	Melbourne -Hume In Ramp
	High -Hume In Ramp	Melbourne Rd
	High St	Melrose -Hurne Out Ramp
	Hovell St	Murray Valley -Hume In Ramp
	Hume Fwy	Murray Valley -Hurne Out Ramp
	Hume Hwy	Murray Valley Hwy
	Hume In -Bandiana Link Ramp	Osburn St

129 EMV (2020): Potential Impact Reports (by LGA)

LGA	Major Roads	
	Hume In -High Ramp	Thomas Mitchell Dr
	Hume In -Melrose Ramp	Victoria Cross Pde
	Hume In -Murray Valley Ramp	Wodonga -Yackandandah Rd
Greater Shepparton City – 413.0km	Anderson St	Lancaster - Mooroopna Rd
	Balaclava Rd	Wyndham St
	Barmah - Shepparton Rd	Mary St
	Benalla Rd	Mclennan St
	Bendigo - Murchison Rd	Midland Hwy
	Brewer Rd	Murchison - Tatura Rd
	Byrneside - Kyabram Rd	Murchison - Violet Town - Goulburn Valley In Ramp
	Central Kialla Rd	Murchison - Violet Town - Goulburn Valley Out Ramp
	Dookie - Devenish Rd	Murchison - Violet Town Rd
	Dookie - Nalinga Rd	New Dookie Rd
	Dookie - Violet Town Rd	Numurkah Rd
	Dookie Nalinga Rd	Old Grahamvale Rd
	Doyles Rd	Pump Rd
	Echuca Rd	River Rd
	Euroa - Shepparton Rd	Robinson St
	Goulburn Valley Fwy	Ross St
	Goulburn Valley Hwy	Rushworth - Tatura Rd
	Goulburn Valley In - Murchison - Violet Town Ramp	Rushworth Rd
	Goulburn Valley Out - Murchison - Violet Town Ramp	Stevenson St
	Grahamvale Rd	Tatura - Undera Rd
	High Rd	Toolamba Rd
	High St	Wah ring - Murchison East Rd
	Hogan St	Watson St
	Katamatite - Shepparton Main Rd	Waverley Av
Indigo Shire – 344.2km	Albert Rd	Hume Out - Beechworth - Chiltern Ramp Hume Out - Indigo Creek Ramp
	Barnawartha Rd	Indigo Creek - Hume In Ramp
	Beechworth - Chiltern - Hume In Ramp Beechworth - Chiltern - Hume Out Ramp Beechworth - Chiltern Rd	Indigo Creek - Hume Out Ramp
	Beechworth - Stanley Rd	Isaacs Av
	Beechworth -Wangaratta Rd Beechworth - Wodonga Rd	Kerferd Rd
	Bridge Rd	Kiewa East Rd
	Buckland Gap Rd	Kiewa Valley Ct
	Camp St	Kiewa Valley Hwy
	Chiltern - Howlong Rd	Lindsay Rd
	Chiltern - Rutherglen Rd	Lockharts Gap Rd
		Main St
		Moodemere St

LGA	Major Roads	
	Chiltern Howlong Rd	Mt Stanley Rd
	Conness St	Murphy St
	Dederang Rd	Murray Valley Hwy
	Douglas St	Myrtleford - Yackandandah Rd
	Drummond St	North Rd
	Federation Way	Rutherglen - Springhurst Rd
	Foord St	Rutherglen -Wahgunyah Rd
	Ford St	Scott St
	Fortune St	Stanley Rd
	Gaunt St	Sydney Rd
	High St	Victoria St
	Hodge St	William St
	Howlong Rd	Windham St
	Hume Fwy	Wodonga - Yackandandah Rd
	Hume In - Beechworth - Chiltern Ramp Hume In - Indigo Creek Ramp	Yackandandah Rd
Mansfield Shire – 242.3km	Bank St	Merton - Euroa Rd
	Bridge St	Midland Hwy
	Chenery St	Midland Link Hwy
	Euroa - Mansfield Rd	Mt Buller Rd
	High St	Scott St
	Highett St	Shaws Rd
	Malcolm St	Tatong - Tolmie Rd
	Mansfield - Whitfield Rd	Warburton - Matlock Rd
	Mansfield -Woods Point Rd	Warburton -Woods Point Rd
	Maroondah Hwy	
Mitchell Shire – 375.1km	Anzac Av	Upper Goulburn Rd
	Broadford -Flowerdale -Hume In Ramp Broadford -Flowerdale Rd	Wollan -Whittlesea Rd
	Broadford - Kilmore - Hume Out Ramp Broadford - Kilmore Rd	Watson -Hurne Out Ramp
	Broadford -Wandong -Hume In Ramp Broadford -Wandong -Hume Out Ramp	Watson St
	Emily St	Hume In -Old Hume Ramp
	Epping -Kilmore -Hume In Ramp	Hume In -Seymour -Tooborac Ramp
	Epping -Kilmore -Hume Out Ramp	Hume In -Wollan -Whittlesea Ramp
	Epping -Kilmore Rd	Hume In - Watson Ramp
	Foote St	Hume Out - Broadford - Flowerdale Ramp
	Goulburn Valley Fwy	Hume Out -Broadford -Wandong Ramp
	Goulburn Valley Hwy	Hume Out -Epping -Kilmore Ramp
	Heathcote - Redesdale Rd	Hume Out -Lithgow Ramp
	High St	Hume Out -Northern Ramp
		Hume Out -Seymour -Tooborac Ramp
		Kilmore -Lancefield Rd

LGA	Major Roads	
	Hume Fwy	Lancefield -Tooborac Rd
	Hume In -Broadford -Wandong Ramp	Lithgow -Hume In Ramp
	Hume In -Epping -Kilmore Ramp	Lithgow -Hume Out Ramp
	Hume In -Lithgow Ramp	Main Rd
	Hume In - Marchbanks Ramp	Merriang Rd
	Seymour -Tooborac -Hurne Out Ramp Seymour -Tooborac Rd	Northern -Hume In Ramp
	Short St	Northern Highway Bypass
	Stroth Creek Rd	Northern Hwy
	Sydney St	Powlett St
	Tallarook St	Seymour -Tooborac -Hume In Ramp
Moira Shire – 447.6km	Barmah - Shepparton Rd	Hogans Rd
	Barmah Rd	Katamatite - Nathalia Rd
	Barooga Rd	Katamatite - Shepparton Main Rd Katamatite - Shepparton Rd Katamatite - Yarrawonga Rd Melbourne St
	Beek St	Middleton St
	Belmore St	Mookarii St
	Benalla - Tocumwal Rd	Murray Valley Hwy
	Benalla - Yarrawonga Rd	Newell Hwy
	Blake St	Spry St
	Broadway St	Station St
	Burley Rd	Telford St
	Carlisle St	Tungamah Main Rd
	Cobram – Koonoomoo Rd	Wangaratta - Yarrawonga Rd Yarrawonga - Cobram Rd
	Cobram South Rd	
	Elizabeth St	
	Goulburn Valley Hwy	
Murrindindi Shire – 321.6km	Aitken St	Heidelberg -King lake Rd
	Broadford -Flowerdale Rd	High St
	Buxton -Marysville Rd	Maroondah Hwy
	Castella Rd	Maroondah Link Hwy
	Downey St	Melba Hwy
	Fitzgerald St	Munro St
	Flowerdale School Rd	Myers Creek Rd
	Forbes St	North St
	Glover Rd	Station St
	Goulburn Valley Hwy	Taggerty -Thornton Rd
	Grant St	Whittlesea -Kinglake Rd
	Healesville -King lake Rd	Whittlesea -Yea Rd
Strathbogie Shire – 381.8km	Anderson St	Urmston St
	Avenel -Nagambie Rd	Vickers Rd
	Baird St	

LGA	Major Roads	
	Bank St	Wah ring -Murchison East -Goulburn Valley In Ramp Wah ring -Murchison East Rd
	Clifton St	Harrys Creek-Hume In Ramp
	Cowslip St	Harrys Creek Rd
	Doherty Rd	Heathcote -Nagambie Rd
	Dookie -Violet Town Rd	High St
	Euroa -Mansfield Rd	Hume Fwy
	Euroa -Shepparton Rd	Hume In -Euroa Main Ramp
	Euroa Main -Hume In Ramp	Hume In -Harrys Creek Ramp
	Euroa Main -Hume Out Ramp	Hume Out -Euroa Main Ramp
	Euroa Main Rd	Hume Out -Urmston Ramp
	Ewings Rd	Jones St
	Goulburn Valley Fwy	Lily St
	Goulburn Valley Hwy	Livingstone St
	Goulburn Valley Out -Mitchellstown Ramp	Mansfield Rd
	Goulburn Valley Out -Murchison-Violet Town Ramp	Mcdiarmids Rd
	Goulburn Valley Out -Wah ring -Murchison East Ramp	Mitchell St
	Grimwade Rd	Mitchellstown Rd
	Tabilk -Monea -Goulburn Valley In Ramp	Murchison -Violet Town -Goulburn Valley In Ramp
	Tarcombe St	Murchison -Violet Town Rd
	Tulip St	Odwyer Rd
	Urmston - Hume Out Ramp	Queen St
		Scott St
		Sydney - Hume Out Ramp
Towong Shire – 509.0km	Benambra - Corryong Rd	Lockharts Gap Rd
	Brooke St	Main St
	Carlyle St	Murray River Rd
	Cudgewa Valley Rd	Murray Valley Hwy
	Dartmouth Rd	Omeo Hwy
	Granya Rd	Riverina Hwy
	Hansen St	Shelley Rd
	Holbrook Rd	Tintaldra Rd
	Jingellic South Rd	Towong Rd
Wangaratta Rural City – 367.0km	Beechworth -Wangaratta Rd	Hume Out - Rutherglen - Springhurst Ramp
	Bowser Rd	Hume Out - Wangaratta Ramp
	Buckland Gap Rd	Hume Out -Winton - Glenrowan Ramp
	Byrne St	Hume Out Ramp
	Canning Rd	Lucas St
	Edwards St	Mansfield -Whitfield Rd
	Evans St	Meldrum St

LGA	Major Roads	
	Federation Way	Millard St
	Glenrowan - Moyhu - Hume Out Ramp	Murdoch Rd
	Glenrowan - Myrtleford - Hume In Ramp	Murphy St
	Glenrowan Rd	Parfitt Rd
	Great Alpine - Hume In Ramp	Reid St
	Great Alpine - Hume Out Ramp	Rowan St
	Great Alpine Rd	Rutherglen - Springhurst - Hume In Ramp
	Green St	Rutherglen - Springhurst – Hume Out Ramp
	Greta - Hume In Ramp	Rutherglen - Springhurst Rd
	Greta - Hume Out Ramp	Ryley St
	Greta Rd	Snow Rd
	Greta St	Tatong - Tolmie Rd
	Hume Fwy	Tone Rd
	Hume In - Glenrowan - Moyhu Ramp	Wangaratta - Hume In Ramp
	Hume In - Great Alpine Ramp	Wangaratta - Hume Out Ramp
	Hume In - Greta Ramp	Wangaratta -Whitfield Rd
	Hume In - Rutherglen - Springhurst Ramp	Wangaratta - Yarrawonga Rd
	Hume In -Wangaratta Ramp	Warby St
	Hume Out - Glenrowan - Myrtleford Ramp	Winton - Glenrowan - Hume In Ramp
	Hume Out - Great Alpine Ramp	
	Hume Out - Greta Ramp	

7.4.3 Rail

More than 930km of major rail crosses the Hume Region, including stations, lines and hubs.

The rail network is shown in the figure below and includes: [130] [131]

- Direct passenger rail routes from Shepparton, Wodonga and Sydney to Melbourne through Seymour.
- Freight rail connections from Tocumwal to Shepparton and Seymour, and north east line linking Melbourne and Sydney through Wodonga.
- Direct freight route to Oaklands via Yarrawonga which joins the north east line at Benalla.

130 EMV (2020): Potential Impact Reports (by LGA)
131 http://maps.infrastructure.gov.au/KeyFreightRoute/

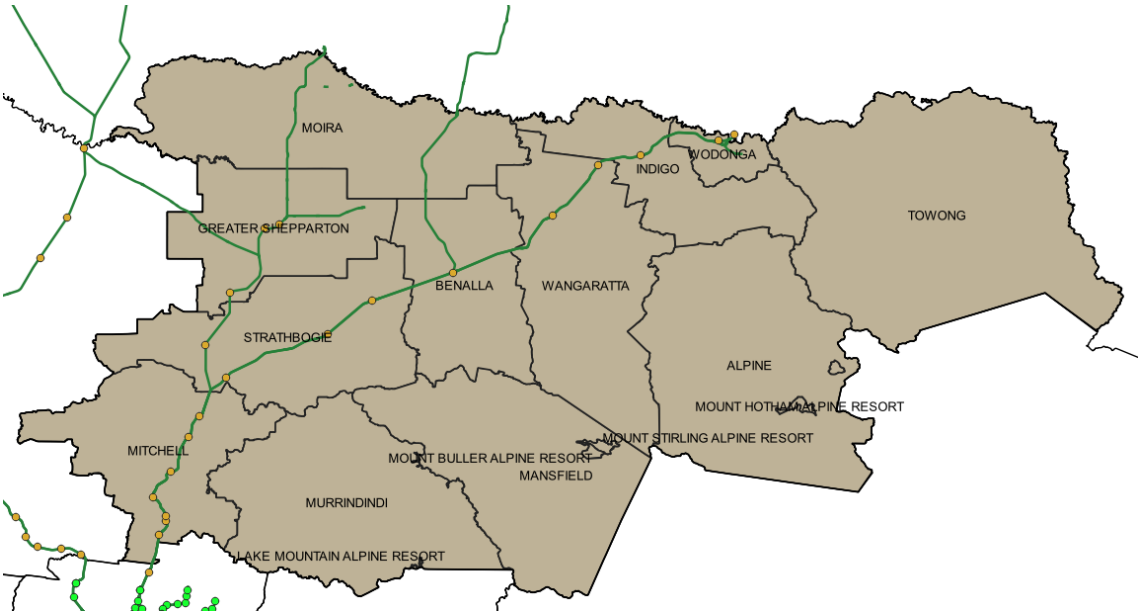


Figure 22. Rail networks in the Hume Region[132]

Train stations

There are 14 train stations in the Hume Region with locations and services as outlined below:

132 Data Vic (2020): https://discover.data.vic.gov.au/dataset/road-network-vicmap-transport

Table 21. Train stations in Hume Region[133] [134]

LGA	No. Train Stations	Station Name(s)	Services	Latitude and Longitude
Alpine Shire	0	Nil	Nil	Nil
Benalla Rural City	1	Benalla Railway Station	V/Line – Albury Line NSW TrainLink Southern	-36.54455; 145.983915
City of Wodonga	1	Wodonga Railway Station	V/Line – Albury Line	-36.105827; 146.871266
Greater Shepparton City	2	Murchison East Railway Station Mooroopna Railway Station Shepparton Railway Station	V/Line – Shepparton Line V/Line – Shepparton Line V/Line – Shepparton Line (Terminus)	-36.613148; 145.240636 -36.399128; 145.358215 -36.383791; 145.406497
Indigo Shire	1	Chiltern Railway Station	V/Line – Albury Line	-36.155637; 146.611375
Mansfield Shire	0	Nil	Nil	Nil
Mitchell Shire	3	Kilmore East Railway Station Seymour Railway Station Wallan Railway Station Heathcote Junction Railway Station Wandong Railway Station Broadford Railway Station Tallarook Railway Station	V/Line – Shepparton Line V/Line – Shepparton Line V/Line – Albury Line NSW TrainLink Southern V/Line – Shepparton Line V/Line – Shepparton Line V/Line – Shepparton Line V/Line – Shepparton Line V/Line – Shepparton Line	-37.29321; 144.983566 -37.024729; 145.137729 -37.416861; 145.005372 -37.371713; 145.028205 -37.354677; 145.026415 -37.2072; 145.043008 -37.092335; 145.102997
Moira Shire	0	Nil	Nil	Nil
Murrindindi Shire	0	Nil	Nil	Nil
Strathbogie Shire	4	Nagambie Railway Station Violet Town Railway Station Euroa Railway Station Avenel Railway Station	V/Line – Shepparton Line V/Line – Albury Line V/Line – Albury Line V/Line – Albury Line	-36.785464; 145.160357 -36.638816; 145.715923 -36.749146; 145.567864 -36.893648; 145.229515
Towong Shire	0	Nil	Nil	Nil
Wangaratta Rural City	2	Springhurst Railway Station Wangaratta Railway Station	V/Line – Albury Line V/Line – Albury Line NSW TrainLink Southern	-36.185893; 146.470417 -36.355101; 146.317038
Total	**14**			

133 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
134 DOT (2020): https://www.vline.com.au/getattachment/f8a1e2c3-5d60-4abe-b608-2bc18e9f8197/V-Line-Network-Map

7.4.4 Air

The Hume Region does not have any major airports. However, it is serviced by several smaller regional airports such as Mangalore Airport, and has access to Albury Airport.

The Hume Region is served by seven airports/aerodromes, with many registered by the Australian Civil Aviation Safety Authority, as outlined below. There are several other air bases used for firefighting and emergency evacuations throughout Hume.

Table 22. Registered airports and aerodromes in Hume region by LGA [135]

LGA	No. Airports	Airport Name	Airport Codes
Alpine Shire	1	Mount Hotham Airport	IATA: MHU; ICAO: YHOT
Benalla Rural City	1	Benalla Airport	IATA: BLN; ICAO: YBLA
City of Wodonga	0	Nil	N/A
Greater Shepparton City	1	Shepparton Airport	IATA: SHT; ICAO: YSHT
Indigo Shire	0	Nil	N/A
Mansfield Shire	0	Nil	N/A
Mitchell Shire	1	Mangalore Airport	IATA: IXE; ICAO: VOML
Moira Shire	1	Yarrawonga Airport	ICAO: YYWG
Murrindindi Shire	0	Nil	N/A
Strathbogie Shire	0	Nil	N/A
Towong Shire	1	Corryong Airport	IATA: CYG; ICAO: YCRG
Wangaratta Rural City	1	Wangaratta Airport	IATA: WGT; ICAO: YWGT
Total	**7**		

7.5 Water and wastewater

Treated water supplies and wastewater services are essential to human health, liveability and the environment. As the population grows and expands across Victoria the criticality of these services and their associated infrastructure will also increase.

7.5.1 Water

The waterways of the Hume Region represent significant environmental and economic assets, providing water supply to one of Australia's major food producing areas. These waterways also feed major water storages and significant irrigation infrastructure which supplies water to settlements, industries and farms, particularly in the food bowl area in the north west of the region.

135 CASA (2020): https://www.casa.gov.au/aerodromes/aerodromes-register/registered-aerodromes

Water security is heavily impacted by both long-term trends – such as increasing population growth, urbanisation and climate change – and sudden events, including floods and oil spills. Some examples of the impacts such events could have include:

- Diminished agricultural production leading to a decline in gross domestic product.
- Health risks, such as blue-green algae outbreaks, which can be triggered by changes in nutrients and salinity, storage volumes, water flow and warmer weather. Large numbers of blue-green algae can produce toxins harmful to humans, animals, birds, livestock and the environment. [136]
- An increasing reliance on groundwater, which in Victoria is primarily used by dairy farms and other livestock, for irrigating crops, power generation and town water supplies.[137] In the Hume Region, groundwater is a significant but variable resource, with the links between rainfall, groundwater levels and salinity meaning it needs it needs to be carefully managed.

In a range of emergencies, including blue-green algae incidents, dam safety issues and disruption to water services, DELWP is charged with responsibility for responding to and mitigating the impact of such events.[138]

Since 2006 the water sector has been identified as an essential service according to an Act of Parliament,[139] which requires Victoria's water organisations to have risk management plans in place which include provisions for terrorist acts. Water resources are also particularly susceptible to all hazard events, including bushfires, drought, floods, earthquakes, cyclones, contamination and epidemics. Individual disruptions to infrastructure in one area can have an impact on the response and recovery efforts in other areas because water is both dependent and interdependent on infrastructure networks across Victoria. For example, water supplies rely on electric power to operate distribution pumps while electric power requires water for electricity generation. So too, the water sector relies on supply chains, including the transport sector, to provide chemicals for water treatment and disinfection and may share common service corridors.[140]

Several government departments and agencies share responsibility for managing and protecting Victoria's bays, rivers and ports, including:

- Parks Victoria
- Fisheries Victoria
- Department of Environment, Land, Water and Planning (DELWP)
- Department of Transport

136 DELWP (2020): https://www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/blue-green-algae
137 DELWP (2020): https://www.water.vic.gov.au/groundwater/victorias-groundwater-resources
138 DELWP (2019): https://www.water.vic.gov.au/managing-dams-and-water-emergencies/emergency-management
139 The Terrorism (Community Protection) Act 2003.community protection
140 Global Terrorism Research Centre (2015): https://www.researchgate.net/publication/275658307_Plan_Prepare_and_Safeguard_Water_Critical_Infrastructure_Protection_in_Australia

- Environmental Protection Agency (EPA)
- Water Police[141]

Key water storages in the Hume region are managed by Goulburn Murray Water.

Reservoirs

There are eight reservoirs in the Hume Region, as outlined below:

Table 23. Reservoirs in Hume Region[142]

LGA	No. Reservoirs	Name(s)	Capacity (ML)	Water Authority
Alpine Shire	1	Lake Buffalo	23,504	Goulburn-Murray Water
Mansfield Shire	2	Lake Eildon Lake Nillahcootie	3,334,158 40,400	Goulburn-Murray Water
Moira Shire	1	Yarrawonga Weir	117,500	Goulburn-Murray Water
Strathbogie Shire	1	Goulburn Weir	25,500	Goulburn-Murray Water
Towong Shire	2	Lake Dartmouth Lake Hume (also Indigo Shire and City of Wodonga)	3,856,232 3,005,157	Goulburn-Murray Water
Wangaratta Rural City	1	Lake William Hovell	13,690	Goulburn-Murray Water
Total	**8**			

For areas with mains drinking water, most of these systems are treated to potable standard meeting the Australian Drinking Water Guidelines. While the main systems are predominately based around surface water supplies from reservoirs, there are also some communities that rely on groundwater for drinking water. Table 24 outlines the areas serviced by water supply systems in the region. These include networks of system storages (tanks and basins), pumping stations and pipes.

In areas where mains drinking water is not available, rural communities rely on local rainwater, groundwater and surface water sources as private water supplies[143]. Understanding where these sources might be is important when looking at the impacts of a range of water quality and contamination events including waterborne diseases, chemical runoff, aquifer contamination and airborne particulates.

141 Parks Victoria (2020): https://www.parks.vic.gov.au/water-management
142 DELWP (2020): https://www.water.vic.gov.au/water-reporting/water-in-your-region
143 https://www2.health.vic.gov.au/public-health/water/private-drinking-water

Table 24. Key water providers and water supply systems [144] [145]

Provider	Supply System	Source
Goulburn Valley Water	Woods Point	Brewery Creek Goulburn River
	Mansfield System	Delatite River
	Merrijig Sawmill Settlement	Delatite River
	Bonnie Doon System Alexandra, Avenel, Bonnie Doon, Congupna, Dookie, Eildon, Goulburn Weir, Katandra West, Kirwan's Bridge, Merrigum, Molesworth, Mooroopna, Murchison, Nagambie, Seymour, Shepparton, Tallarook, Tallygaroopna, Tatura, Thornton, Toolamba	Goulburn River
	Katunga	Groundwater
	Pyalong System	Mollisons Creek
	Barmah, Cobram, Katamatite, Nathalia, Numurkah, Picola, Strathmerton, Wunghnu, Yarroweyah	Murray System
	Longwood System	Nine Mile Creek
	Euroa and Violet Town System	Seven Creeks Mt Hut Creek
	Strathbogie	Seven Creeks
	Marysville and Buxton System	Steavenson River
	Broadford and Kilmore System Broadford, Clonbinane, Heathcote Junction, Kilmore, Wandong, Waterford Park	Sunday Creek Goulburn River
	Yea	Yea River
North East Water	Benalla System	Loombah Reservoir McCall Say Reservoir Ryans Creek Whiskey Creek
	Wangaratta System Wangaratta and Glenrowan	Lake Buffalo Lake William Hovell Oven River King River Groundwater

144 https://www.gvwater.vic.gov.au/Portals/0/GV-Water/Documents/Plans-Strategies/Urban_Water_Strategy_2016-2065.pdf?ver=2019-03-25-160559-823

145 https://www.newater.com.au/supply

Provider	Supply System	Source
North East Water	Wodonga System Bellbridge, Eskdale, Dartmouth, Tallangatta, Wahgunyah, Wodonga	Murray River Mitta Mitta River Hume and Dartmouth Dams Wodonga Creek
	Yarrawonga System Yarrawonga, Bundalong, Devenish, St James, Tungamah, Goorambat	Lake Mulwala Murray River Mitta Mitta River Hume and Dartmouth Dams

7.5.2 Emergency water supply points

Victoria has more than 300 emergency water supply points, overseen by DELWP and managed by various state agencies, for use during drought and bushfires. Some can be used to supply water to firefighting vehicles.[146]

7.5.3 Wastewater

There are also numerous water and wastewater treatment plants across the region, with plants in most towns and multiple plants spread across each LGA. Wastewater treatments plants are regulated by the Victorian Environment Protection Authority (EPA).

Wastewater can be treated to different levels to allow reuse activities and support safe discharge to the receiving environment. Class A is the highest grade of recycled water and can be used in residential areas and to irrigate food crops. Class D is the lowest class and can only be used in areas with low risk of human contact such as irrigation outside of agricultural food production[147]. Most treatment plants in Hume treat water to Class C standard or above for recycled use or discharge to environment[148]. Table 25 summarises the areas in the region serviced by wastewater treatment systems. Local Governments are responsible for the regulation of septic tanks in areas without sewerage systems.

146 DELWP (2020): https://data.aurin.org.au/dataset/vic-govt-delwp-datavic-water-ewsp-na
147 https://ref.epa.vic.gov.au/our-work/licences-and-approvals/~/media/Publications/464%202.pdf
148 http://www.barwonwater.vic.giv.au/water-and-waste/sewage

Table 25. Key sewerage service providers and service areas [149] [150]

Provider	Service area	Treatment Plant
Goulburn Valley Water	Mansfield	Mansfield
	Seymour	Seymour
	Euroa	Euroa
	Yea	Yea
	Marysville	Marysville
	Broadford	Broadford
	Shepparton	Shepparton
	Mooroopna	Mooroopna
	Alexandra and Eildon	Alexandra and Eildon
North East Water	Broken System	Benalla
	Ovens-King System	Moyhu, Glenrowan, Porepunkah, Myrtleford, Wangaratta
	Kiewa System	Mount Beauty, Beechworth, Yackandandah
	Mitta Mitta System	Dartmouth
	Nariel System	Corryong
	Upper Murray System	Walwa
	Murray System	Tallangatta, Bellbridge, Wodonga, Chiltern, Rutherglen, Bundalong, Tungamah, Yarrawonga

7.6 Waste and recycling

7.6.1 Landfill

Landfill – the below ground disposal of waste materials that cannot be recycled – continues to be a part of Victoria's waste management strategy. Many landfill sites are licensed to accept low-hazard (Category C) industrial waste. However, prescribed industrial waste can only be accepted at one hazardous (Category B) landfill in Victoria – this is located in Taylors Road in Dandenong South in the City of Greater Dandenong.[151]

Closed landfills also pose environmental risks, including from:

- Leachate – a liquid formed by decomposing waste and rainwater – which can contaminate groundwater; and

149 https://www.gvwater.vic.gov.au/Portals/0/GV-Water/Documents/Plans-Strategies/Urban_Water_Strategy_2016-2065.pdf?ver=2019-03-25-160559-823

150 https://www.newater.com.au/what-we-do/sewage

151 EPA Victoria (2020): https://ref.epa.vic.gov.au/your-environment/waste/landfills

- Landfill gas – from decomposing waste – which can migrate to the atmosphere.[152]

A study conducted by the Fire Services Commissioner in 2012 found that a series of significant fires in Victorian landfill sites had been costly and resource intensive for fire services to suppress. The need to work more closely with operators of landfill sites was identified as a recommendation to improve operating practices and develop fire management plans.[153]

There are currently 16 sites in the Hume Region listed in the EPA's Priority Sites Register which have been issued a Clean Up Notice or a Pollution Abatement Notice, as the current condition of the sites is incompatible with the current or approved use and poses a risk to human health or the environment.[154] Examples of contamination and pollution issues experienced in the region include former landfill sites, current and former industrial sites and dumped industrial waste.[155]

There are 91 landfill sites across the region, as below:

152 EPA Victoria (2020): https://ref.epa.vic.gov.au/your-environment/waste/landfills/closed-landfills.html
153 EMV (2012): https://www.emv.vic.gov.au/how-we-help/reviews-and-lessons-management/operational-reviews/fire-management-at-landfill-sites
154 EPA Victoria (2020): https://www.epa.vic.gov.au/for-community/environmental-information/land-groundwater-pollution/priority-sites-register
155 EPA Victoria (2020): https://www.epa.vic.gov.au/for-community/environmental-information/land-groundwater-pollution/priority-sites-register

Table 26. Landfill sites in Hume Region[156]

LGA	No. Landfill Sites	Operating Status and Waste Type
Alpine Shire	8	General waste – 1 Tyres, asbestos, solid inert waste, general waste – 1 Closed – 6
Benalla Rural City	4	Tyres, asbestos, solid inert waste, general waste – 1 Closed – 3
City of Wodonga	3	Closed – 3
Greater Shepparton City	10	Closed – 10
Indigo Shire	5	Closed – 5
Mansfield Shire	4	General waste – 1 Closed – 3
Mitchell Shire	10	Tyres, solid inert waste, general waste – 1 General waste – 1 Closed – 8
Moira Shire	11	Tyres, solid inert waste, general waste – 1 Closed – 9
Murrindindi Shire	7	Tyres, asbestos, solid inert waste, general waste – 1 Closed – 6
Strathbogie Shire	4	Closed – 4
Towong Shire	8	Closed – 8
Wangaratta Rural City	17	Foundry sand, asbestos, contaminated soil (Cat. C), tyres, solid inert waste, general waste – 1 Closed – 16
Alpine Resorts	1	Closed – 1
Total	**91**	

156 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

7.6.2 Recycling

There are 54 transfer stations and 122 stockpile sites registered by the EPA (waste in storage for recycling or reuse), across the region as outlined below:

Table 27. Transfer stations and EPA stockpile sites in Hume Region[157] [158]

LGA	No. Transfer Stations	No. EPA Stockpile Sites
Alpine Shire	4	5
Benalla Rural City	1	3
City of Wodonga	1	7
Greater Shepparton City	4	25
Indigo Shire	2	5
Mansfield Shire	2	4
Mitchell Shire	7	14
Moira Shire	9	17
Murrindindi Shire	5	11
Strathbogie Shire	7	15
Towong Shire	1	2
Wangaratta Rural City	8	14
Alpine Resorts	3	-
Total	**54**	**122**

7.7 Government services

REMPs should consider how to ensure the continuation of government services to the community during an emergency – a time when they are likely to need vital support. The coronavirus pandemic of 2020 has already demonstrated the precarious nature of government workforces and the impact that absenteeism as a direct consequence of a disaster can have flow on effects (e.g., health care workers in an emergency department who are required to self-isolate for a period of 14 days following exposure to the virus can lead to the closure of wards or the cessation of elective surgeries which may lead to diversions for Ambulance Victoria and other care settings being required to pick up the slack).

Government services not already covered in this scan include prisons, community correctional services and law courts, which can have their own unique issues in the face of an emergency.

157 https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
158 EMV (2020): Potential Impact Reports (by LGA)

7.7.1 Prisons and community correctional facilities

There are two prisons/community correctional facilities in the Hume Region:

- Dhurringile Prison (in Greater Shepparton)
- Beechworth Correctional Centre (in Indigo Shire)[159]

7.7.2 Law courts

There are nine Magistrates courts in the region, as outlined below:

Table 28. Law courts in Hume Region by LGA[160]

LGA	No. Law Courts	Name
Alpine Shire	1	Myrtleford Magistrates Court
Benalla Rural City	1	Benalla Magistrates Court
City of Wodonga	1	Wodonga Magistrates Court
Greater Shepparton City	1	Shepparton Magistrates Court
Indigo Shire	0	N/A
Mansfield Shire	1	Mansfield Magistrates Court
Mitchell Shire	1	Seymour Magistrates Court
Moira Shire	1	Cobram Magistrates Court
Murrindindi Shire	0	N/A
Strathbogie Shire	0	N/A
Towong Shire	1	Corryong Magistrates Court
Wangaratta Rural City	1	Wangaratta Magistrates Court
Total	**9**	

7.8 Emergency services

The Hume Region is served by 34 ambulance stations, 50 police stations, 236 fire stations, 24 SES units and one Coast Guard flotilla.

159 EMV (2020): Potential Impact Reports (by LGA)
160 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

7.8.1 Ambulance stations

There are 35 ambulance stations across the region. Table 29 outlines the Ambulance response time performance for Code 1 calls across LGAs for Q4 of the 2019-20 reporting period.

Table 29. Ambulance response times for Hume Region[161] [162]

LGA	No. Stations	Locations	Code 1 – % Responses within 15 mins	Code 1 – Average response time (mins)
Alpine Shire	3	Bright, Mount Beauty, Myrtleford	*43.5%*	20:05
Benalla Rural City	1	Benalla	*53.8%*	17:19
City of Wodonga	2	Wodonga, West Wodonga	*85.3%*	11:18
Greater Shepparton City	4	Mooroopna, Murchison, Shepparton, Tatura	*81.8%*	11:28
Indigo Shire	2	Beechworth, Chiltern	*27.3%*	21:58
Mansfield Shire	2	Mansfield, Woods Point	*42.2%*	23:35
Mitchell Shire	3	Kilmore, Seymour, Wallan	*62.3%*	14:51
Moira Shire	3	Cobram, Numurkah, Yarrawonga	*55.0%*	17:38
Murrindindi Shire	5	Alexandra, Eildon, Kinglake, Marysville, Yea	*40.0%*	20:31
Strathbogie Shire	2	Euroa, Nagambie	*43.1%*	19:39
Towong Shire	3	Corryong, Mitta Mitta, Tallangatta	*33.3%*	24:17
Wangaratta Rural City	1	Wangaratta	*70.7%*	14:53
Alpine Resorts	3	Falls Creek, Mount Buller, Mount Hotham	-	-
Total	**34**			

161 Ambulance Victoria (2020): https://www.ambulance.vic.gov.au/about-us/our-performance/
162 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

7.8.2 Police stations

There are 50 police stations across the region as follows:

Table 30. Police stations in Hume Region[163]

LGA	No. Stations	Locations
Alpine Shire	4	Bright, Dederang, Mount Beauty, Myrtleford
Benalla Rural City	1	Benalla
City of Wodonga	1	Wodonga
Greater Shepparton City	5	Dookie, Mooroopna, Murchison, Shepparton, Tatura
Indigo Shire	5	Beechworth, Chiltern, Rutherglen, Tangambalanga, Yackandandah
Mansfield Shire	3	Jamieson, Mansfield, Woods Point
Mitchell Shire	5	Broadford, Kilmore, Pyalong, Seymour, Wallan
Moira Shire	6	Cobram, Katamatite, Nathalia, Numurkah, Tungamah, Yarrawonga
Murrindindi Shire	5	Alexandra, Eildon, Kinglake, Marysville, Yea
Strathbogie Shire	3	Euroa, Nagambie, Violet Town
Towong Shire	5	Bethanga, Corryong, Mitta Mitta, Tallangatta, Walwa
Wangaratta Rural City	4	Glenrowan, Moyhu, Wangaratta, Whitfield
Alpine Resorts	3	Falls Creek, Mount Buller, Mount Hotham
Total	**50**	

163 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

7.8.3 Fire stations, lookouts and refuges

There are 237 fire stations across the region, as well as 3 CFA forest industry brigades, as outlined below:

Table 31. Fire stations in Hume Region by LGA[164]

LGA	No. Stations (and Brigades)	Station locations
Alpine Shire	16 (1 Forest Industry Brigade)	Bright Fire Station Buffalo River Fire Station Dederang Fire Station Dederang Satellite Fire Station (Kancoona) Fire Services Infrastructure - Minimal Gapsted Fire Station Gundowring Fire Station Harrietville Fire Station Hvp Ovens Plantations CFA Forest Industry Brigade Mt Beauty Fire Station Mudgegonga Fire Station Myrtleford Fire Station Ovens-Eurobin Fire Station Porepunkah Fire Station Rosewhite Fire Station Tawonga Fire Station
Benalla Rural City	20 (1 Forest Industry Brigade)	Baddaginnie Fire Station Benalla Fire Station Boweya Fire Station Chesney Vale Fire Station Devenish Fire Station Goomalibee Upotipotpon Fire Station Goorambat Stewarton Fire Station Goorambat Stewarton Satellite Fire Station (Stewarton) Hvp Delatite Plantations CFA Forest Industry Brigade Lima South Fire Station Lurg Fire Station Molyullah Fire Station Samaria Fire Station Swanpool Fire Station Taminick North Winton Fire Station Tatong Fire Station Thoona Fire Station Warrenbayne Fire Station

164 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

LGA	No. Stations (and Brigades)	Station locations
		Whitegate Fire Station
		Winton Fire Station
City of Wodonga	6	Baranduda Fire Station
		Barnawartha Satellite Fire Station (Mclindens Rd)
		Bonegilla Fire Station
		Leneva Fire Station
		Wodonga Fire Station
		Wodonga West Fire Station
Greater Shepparton City	20	Arcadia Fire Station
		Caniambo Fire Station
		Cooma Fire Station
		Cosgrove Pine Lodge Fire Station
		Currawa Fire Station
		Dookie Fire Station
		Karramomus Fire Station
		Katandra Fire Station
		Kialla District Fire Station
		Merrigum Fire Station
		Moorilim Fire Station
		Mooroopna Fire Station
		Murchison Fire Station
		Nw Mooroopna Fire Station
		Shepparton East Fire Station
		Shepparton Fire Station
		Tallygaroopna Fire Station
		Tatura Fire Station
		Toolamba Fire Station
		Undera Fire Station
Indigo Shire	19	Allans Flat Fire Station
		Barnawartha Fire Station
		Barnawartha Satellite Fire Station (Howlong Rd)
		Beechworth Fire Station
		Browns Plains Fire Station
		Carlyle Fire Station
		Chiltern Fire Station
		Cornishtown Fire Station
		Indigo Valley Fire Station
		Kergunyah Fire Station
		Kiewa Fire Station
		Norong Fire Station

LGA	No. Stations (and Brigades)	Station locations
		Rutherglen Fire Station Sandy Creek Charleroi Fire Station Stanley Fire Station Wahgunyah Fire Station Wooragee Fire Station Yackandandah Fire Station Yackandandah Satellite Fire Station (Bruarong)
Mansfield Shire	11	Barjarg Fire Station Bonnie Doon Fire Station Booroolite District Fire Station Glenroy Merrijig Fire Station Goughs Bay - Howes Creek Fire Station Jamieson Fire Station Maindample Fire Station Mansfield Fire Station Merton Fire Station Tolmie District Fire Station Woods Point Fire Station
Mitchell Shire	18	Broadford Fire Station Clonbinane Fire Station Glenaroua Fire Station Hilldene Fire Station Kal Kallo Satellite Fire Station (Beveridge) Kilmore Fire Station Nulla Vale Fire Station Pyalong Fire Station Seymour Fire Station Springfield Satellite Fire Station (Willowmavin) Strath Creek-Reedy Creek Satellite Fire Station (Reedy Creek) Tallarook Fire Station Tooborac Fire Station Trawool Fire Station Wallan Fire Station Wandong Fire Station Whiteheads Creek-Tarcombe Fire Station Whiteheads Creek-Tarcombe Satellite Fire Station (Tarcombe)
Moira Shire	28	Almonds Fire Station Barmah Fire Station Bundalong Fire Station Burramine Fire Station

LGA	No. Stations (and Brigades)	Station locations
		Cobram East Boosey Fire Station Cobram Fire Station Drumanure Fire Station Kaarimba Fire Station Katamatite Fire Station Katunga Fire Station Kotupna Fire Station Muckatah Fire Station Naring Fire Station Nathalia Fire Station Numurkah Fire Station Peechelba Fire Station Picola Fire Station St James District Fire Station Strathmerton Fire Station Strathmerton Satellite Fire Station (Bearii) Tungamah Fire Station Waaia Fire Station Wilby Fire Station Wunghnu Fire Station Yabba North Fire Station Yalca Yielima Fire Station Yarrawonga Fire Station Yarroweyah Fire Station
Murrindindi Shire	24	Acheron Fire Station Alexandra Fire Station Buxton Fire Station Eildon Fire Station Flowerdale Fire Station Glenburn Fire Station Highlands-Caveat Fire Station Homewood Fire Station Kinglake District Fire Station Kinglake West Fire Station Koriella Fire Station Limestone Fire Station Marysville Fire Station Molesworth Fire Station Murrindindi Woodbourne Fire Station Narbethong Fire Station

LGA	No. Stations (and Brigades)	Station locations
		Strath Creek-Reedy Creek Fire Station Taggerty Fire Station Terip Terip Fire Station Thornton Fire Station Toolangi Fire Station Whanregarwen Fire Station Yarck Fire Station Yea Fire Station
Strathbogie Shire	25	Avenel Fire Station Bailieston Fire Station Balmattum Fire Station Boho Fire Station Branjee Fire Station Creightons Creek Fire Station Earlston Fire Station Euroa Fire Station Gooram Fire Station Kelvin View Fire Station Koonda Fire Station Locksley Fire Station Longwood Fire Station Marraweeny Fire Station Miepoll Fire Station Molka Fire Station Nagambie Fire Station Riggs Creek Fire Station Ruffy Fire Station Sheans Creek Fire Station Strathbogie Fire Station Upton Hill Fire Station Violet Town Fire Station Wahring Fire Station Wirrate Fire Station
Towong Shire	21 (1 CFA Forest Industry Brigade)	Berringama Fire Station Bethanga Fire Station Bethanga Satellite Fire Station (Bellbridge) Biggara Fire Station Bullioh Fire Station Burrowye Fire Station Corryong Fire Station

LGA	No. Stations (and Brigades)	Station locations
		Cudgewa Fire Station Dartmouth Fire Station Eskdale Fire Station Granya Fire Station Hvp Shelley Plantations CFA Forest Industry Brigade Mitta Mitta Fire Station Nariel Valley Fire Station Noorongong Fire Station Old Tallangatta Fire Station Talgarno Fire Station Tallangatta Fire Station Tallangatta Valley Fire Station Tintaldra Fire Station Walwa Fire Station
Wangaratta Rural City	25	Bobinawarrah Fire Station Boorhaman Fire Station Bowman-Murmungee Fire Station Bowser Fire Station Carboor Fire Station Cheshunt Fire Station Edi Fire Station Eldorado Fire Station Everton Fire Station Glenrowan Fire Station Greta Fire Station Killawarra Fire Station Laceby West Fire Station Milawa Fire Station Moyhu Fire Station Myrrhee Fire Station Oxley Fire Station Oxley Flats Fire Station South Wangaratta Fire Station Springhurst Fire Station Tarrawingee District Fire Station Wangaratta Fire Station Wangaratta North Fire Station Whitfield District Fire Station Whorouly Fire Station
Alpine Resorts	3	Falls Creek Fire Station

LGA	No. Stations (and Brigades)	Station locations
		Mount Buller Fire Station Mt Hotham – Dinner Plain Fire Station
Total	**236**	

There are 20 fire lookouts across the region, as below:

Table 32. Fire Lookouts in Hume Region[165]

LGA	No. Lookouts	Locations
Alpine Shire	2	Big Hill, Mt Porepunkah
Benalla Rural City	1	Lurg
City of Wodonga	0	Nil
Greater Shepparton City	0	Nil
Indigo Shire	2	Mt Barambogie, Mt Stanley
Mansfield Shire	1	Mt Terrible
Mitchell Shire	4	Mt Hickey, Mt Puckapunyal, Pretty Sally, Strath Tower
Moira Shire	0	Nil
Murrindindi Shire	3	Eildon, Mt Despair, Mt Gordon
Strathbogie Shire	1	Mt Wombat
Towong Shire	3	Mt Benambra, Granya, Mittamatite
Wangaratta Rural City	0	Nil
Alpine Resorts	3	Mt Buller, Mt Hotham, Mt Mckay
Total	**20**	

There are no Community Fire Refuges in the region.[166] However, there are 78 Neighbourhood Safer Places (NSP), as outlined below:

165 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
166 CFA (2020): https://www.cfa.vic.gov.au/plan-prepare/community-fire-refuges

Table 33. Neighbourhood Safer Places in Hume Region[167]

LGA	No. NSPs	Locations
Alpine Shire	10	Bright, Dederang (2), Harrietville, Mount Beauty, Myrtleford (2), Porepunkah (2), Tawonga
Benalla Rural City	6	Devenish, Goorambat, Swanpool, Tatong, Thoona, Winton North
City of Wodonga	3	Wodonga (3)
Greater Shepparton City	0	Nil
Indigo Shire	10	Barnawatha, Beechworth (2), Chiltern, Rutherglen, Sandy Creek, Stanley, Tangambalanga, Yackandandah (2),
Mansfield Shire	12	Bonniee Doon (2), Goughs Bay, Howqua, Jamieson (2), Maindample, Mansfield, Merrijig (Mt Buller), Merton, Tolmie, Woods Point
Mitchell Shire	9	Broadford, Kimore (3), Pyalong, Seymour, Tallarook, Tooborac, Wallan
Moira Shire	2	Cobram, Yarrawonga
Murrindindi Shire	8	Alexandra, Eildon, Flowerdale, Kinglake West, Marysville, Thornton, Yarck, Yea
Strathbogie Shire	8	Avenel, Euroa, Longwood, Mangalore, Nagambie, Ruffy, Strathbogie, Violet Town
Towong Shire	5	Corryong, Cudgewa, Dartmouth, Eskdale, Tallangatta
Wangaratta Rural City	4	Cheshunt, Eldorado, Glenrowan, Whitfield
Alpine Resorts	1	Mount Buller
Total	**78**	

167 CFA (2020): http://www.saferplaces.cfa.vic.gov.au/cfa/search/default.htm

7.8.4 SES

There are 24 SES units across the region, including:

Table 34. SES Units in Hume Region[168]

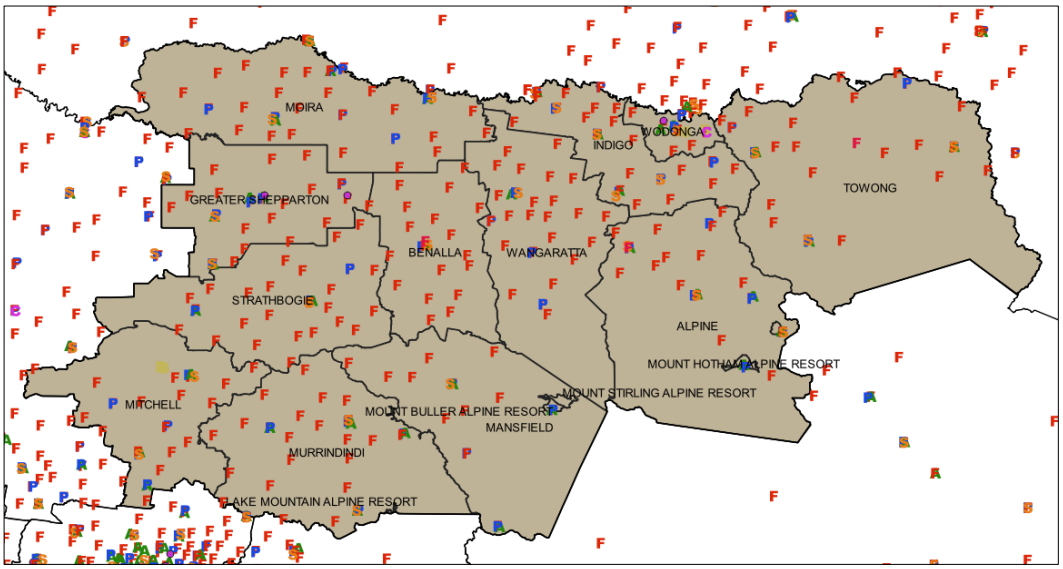
LGA	No. Units	Locations
Alpine Shire	2	Bright, Myrtleford
Benalla Rural City	1	Benalla
City of Wodonga	1	Wodonga
Greater Shepparton City	2	Murchison, Tatura
Indigo Shire	4	Beechworth, Chiltern, Rutherglen, Yackandandah
Mansfield Shire	1	Mansfield
Mitchell Shire	2	Kilmore, Seymour
Moira Shire	2	Numurkah, Yarrawonga, Cobram (Tocumwal)
Murrindindi Shire	3	Alexandra, Kinglake, Marysville
Strathbogie Shire	1	Euroa
Towong Shire	3	Corryong, Mitta Mitta, Tallangatta
Wangaratta Rural City	1	Wangaratta
Alpine Resorts	1	Falls Creek
Total	**24**	

168 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

7.8.5 Volunteer Coast Guard Flotillas

There is one Coast Guard flotilla in the region VF11 Lake Hume in the City of Wodonga.[169]

A map of emergency services is provided in the figure below:



Red = Fire station (CFA and FRV)	Orange = SES
Green = Ambulance station	Light Blue = Life saving
Blue = Police station	Purple = Coast Guard

Figure 23. Emergency services for the Hume Region[170]

7.8.6 Emergency Coordination Facilities

Emergency services agencies are supported by the State Control Centre (SCC) in East Melbourne (the State's primary control centre for the management of Class 1 and Class 2 emergencies), a Regional Control Centre (RCC) in Benalla (a facility that enables the implementation of Command, Control and Coordination arrangements within a set regional boundary) and nine Incident Control Centres (ICCs) – where an Incident Controller and Incident Management Teams can manage response activities in an emergency.[171]

169 Australian Volunteer Coastguard (2020): https://coastguard.com.au/locations/full-flotilla-list/
170 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
171 EMV (2019): https://files-em.em.vic.gov.au/public/Doctrine/ManHand/VIC-EOpsHandbook.pdf

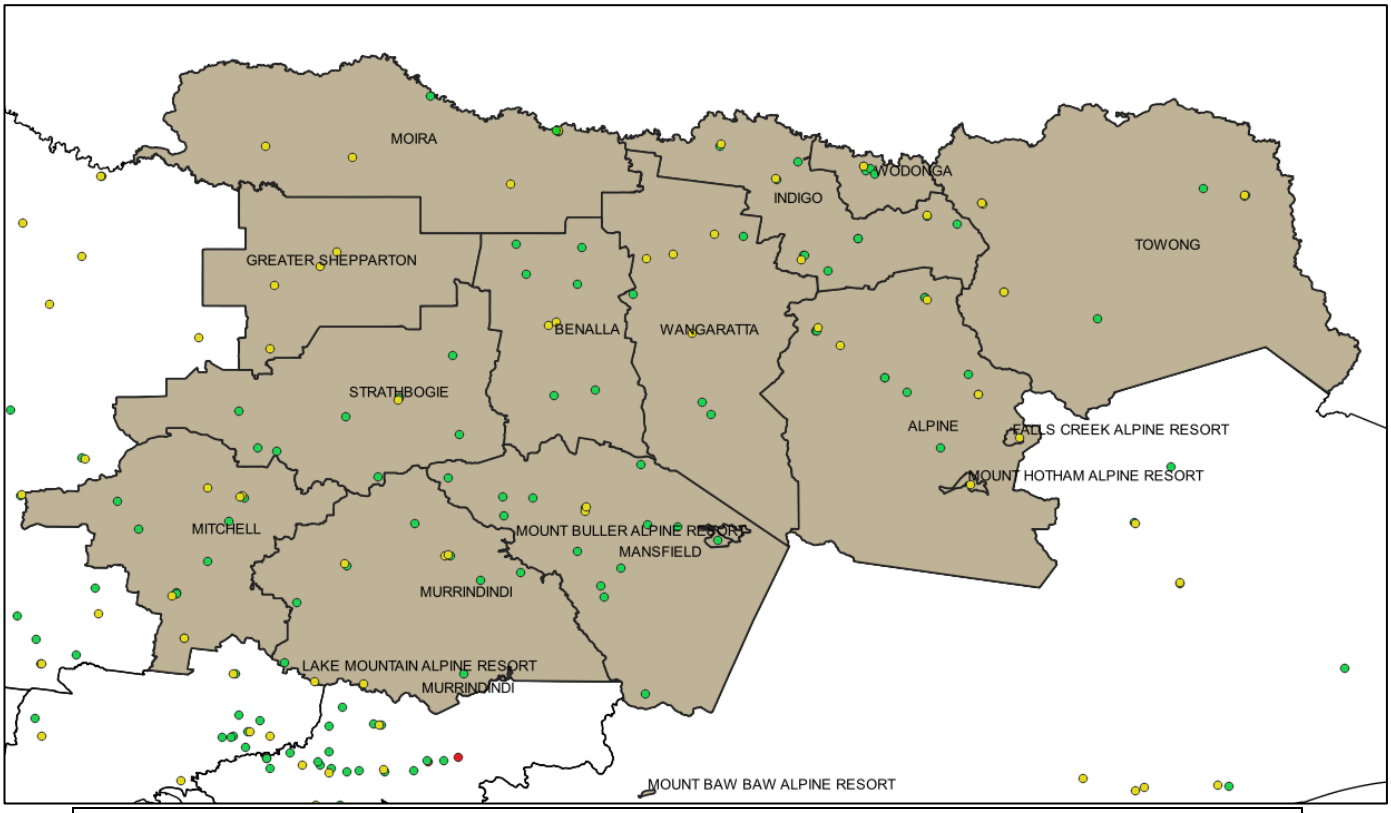
In total, there are 44 emergency coordination centres across the region, including 34 Local Command Facilities (LCF), as outlined below:

Table 35. Emergency Coordination Facilities in Hume Region[172]

LGA	Facility			Locations (RCC, ICC, LCF)
	RCC	ICC	LCF	
Alpine Shire	-	1	3	Ovens Dederang, Mount Beauty, Myrtleford
Benalla Rural City	1	-	1	Hume (CFA) Benalla
City of Wodonga	-	1	1	Wodonga Wodonga West
Greater Shepparton City	-	1	3	Shepparton Mooroopna, Murchison, Tatura
Indigo Shire	-		4	Beechworth, Chiltern, Kiewa, Rutherglen
Mansfield Shire	-	1	1	Mansfield Mansfield
Mitchell Shire	-	1	4	Seymour Kimore, Puckapunyal, Seymour, Wallan
Moira Shire	-		4	Nathalia, Numurkah, Tungamah, Yarrawonga
Murrindindi Shire	-	1	4	Alexandra Alexandra, Kinglake, Toolangi, Yea
Strathbogie Shire	-	-	1	Euroa
Towong Shire	-	2	3	Corryong, Tallangatta Corryong, Eskdale, Tallangatta
Wangaratta Rural City	-	1	3	Wangaratta Moyhu, South Wangaratta, Wangaratta North
Alpine Resorts	-	-	2	Falls Creek, Mount Hotham
Total	**1**	**9**	**34**	**44**

172 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

A map of emergency coordination facilities is provided in the figure below:



Yellow = Emergency Coordination Centres
Red = Community Refuge
Green = Neighbourhood Safer Places

Figure 24. Emergency Coordination facilities, Fire refuges NSPs for Hume Region[173]

7.9 Other infrastructure assets and industries

7.9.1 Infrastructure and industries

Hume Region is home to a number of infrastructure assets and industries, including:

- Abattoirs (9)
    - Benalla Abattoir
    - Game Meats Company Abattoir
    - Gathercole's Tatura Abattoir
    - Gathercole's Wangaratta Abattoir
    - Myrtleford Abattoir
    - Ralph Meats Abattoir

173 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

  - Ryan's Wholesale Meats
  - Tallangatta Meat Processors
  - Wodonga Abattoir
- Backpackers (1)
  - Alpine Sports Lodge
- Food and Grocery Distribution Centres (1)
  - Wodonga Regional DC (temperature controlled and ambient) – temperature centre collocated but physically separated
- Public Housing High Rise Towers
  - Esplanade (in Shepparton)
- Rooming Houses (7)
- Supported Residential Facility (1)
- Major Hazard Facilities[174] (1)
  - Maxam Australia Pty Ltd

7.9.2 Dependencies

The following infrastructure assets are key dependencies for this region:

- Hume Freeway – Melbourne-Seymour-Wodonga-Sydney link
- Goulburn Valley Freeway/Highway – Eildon-Yea-Seymour-Shepparton-Strathmerton link
- Maroondah Highway – Mansfield-Alexandra-Melbourne link
- Great Alpine Road – Wangaratta-Omeo-Bairnsdale link
- Direct passenger rail routes from Shepparton, Wodonga and Sydney to Melbourne through Seymour.
- Freight rail connections from Tocumwal through Shepparton and north east line linking Melbourne and Sydney.
- Wodonga West to Albury Gas Pipeline

174 https://content.api.worksafe.vic.gov.au/sites/default/files/2019-06/ISBN-Licensed-registered-major-hazard-facilities-2019-05.pdf

7.9.3 Tourism infrastructure

Other significant infrastructure includes sites such as event facilities and stadiums, major tourist attractions and shopping centres. These sites are outlined below:

Table 36. Tourism infrastructure in Hume Region by LGA[175]

LGA	Infrastructure category	Name
Alpine Shire	Accommodation Facilities	Dinner Plain Alpine Village Bogong Alpine Village
Benalla Rural City	Event and Entertainment Facilities	Winton Motor Raceway Benalla Racing Club
City of Wodonga	Shopping Centres Other	Wodonga Plaza Shopping Centre Birallee Village Shopping Centre White Box Rise Shopping Centre Gaza Ridge Barracks
Greater Shepparton City	N/A	-
Indigo Shire	N/A	-
Mansfield Shire	N/A	-
Mitchell Shire	Other Event and Entertainment Facilities	Puckapunyal Military Area State Motorcycle Sports Complex
Moira Shire		Cobram sports stadium Nathalia sports stadium Barmah National Park Murray River Park
Murrindindi Shire		Alexandra Racecourse Alexandra Speedway Yea Racecourse
Strathbogie Shire	Event and Entertainment Facilities	Nagambie Lakes Regatta Centre
Towong Shire	N/A	-
Wangaratta Rural City	Event and Entertainment Facilities	Wangaratta Racecourse

7.9.4 Cladding fire safety risk

The Victorian Building Authority (VBA) is in the process of conducting a State-wide audit of non-compliant building materials in Victoria, with a focus on reducing fire safety risks for buildings found to have combustible cladding.[176]

175 https://profile.id.com.au/

176 https://www.vba.vic.gov.au/cladding/audit

- On 25 November 2014, a fire in the 23-storey Lacrosse high-rise building in Docklands highlighted the fire safety risks of non-compliant external wall coverings. The fire, which spread vertically, directly affected approximately 500 residents who required immediate evacuation and accommodation.[177]

To date, more than 2,200 inspections have been undertaken and Hume has been identified to have 8 privately owned buildings with cladding.

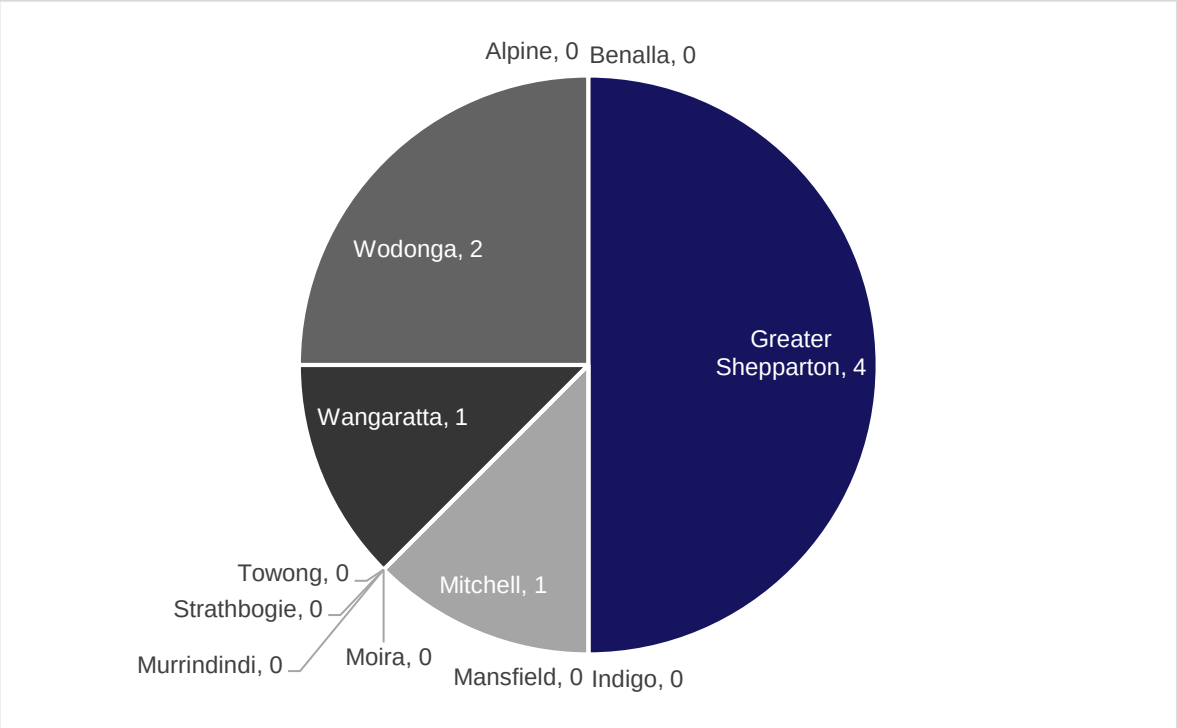


Figure 25. Number of privately owned buildings with cladding by LGA[178]

[177] https://www.melbourne.vic.gov.au/sitecollectiondocuments/mbs-report-lacrosse-fire.pdf

[178] https://www.vba.vic.gov.au/cladding/cladding-by-municipality

8. Social Environment

Social factors that influence the culture and institutions of the Hume Region include demographic characteristics and trends, and the values, norms and customs of the people who reside or work within or travel through the region.

8.1 Population

8.1.1 Current population

Nearly 300,000 people live in the Hume Region, with significant portions of the population located in three LGAs – Greater Shepparton (22%), Mitchell Shire (15%) and City of Wodonga (14%).

Population density in Hume Region ranged between 0.9 persons per km^2 in Towong Shire to 97.2 persons per km^2 in Wodonga, with an average of 7.4 persons per km^2 for the region.

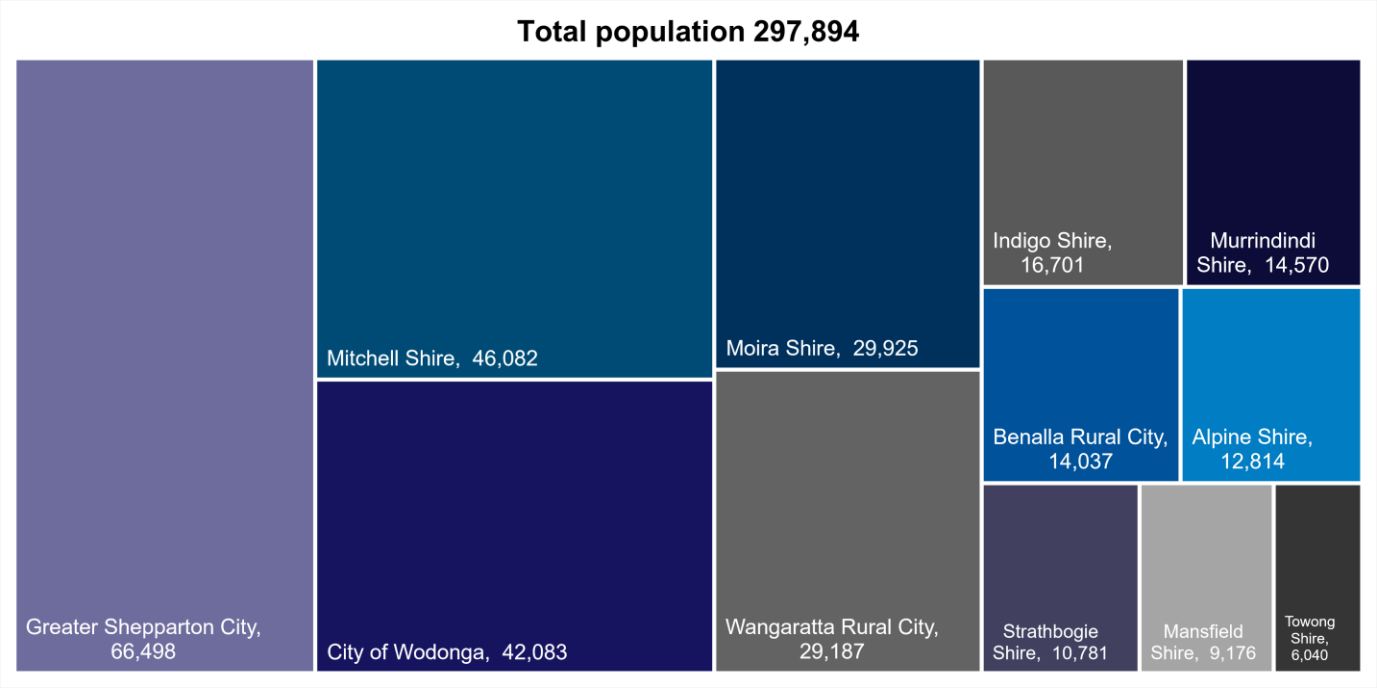


Figure 26. Hume Region Population by LGA (2019) [179]

179 ABS (2016): https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02018-19?OpenDocument

Table 37. Hume Region Population by LGA (2019) [180]

LGA	Total Population	Area (sq km)	Population Density (persons/km^2)
Alpine	12,814	4,788	2.7
Benalla	14,037	2,353	6.0
Greater Shepparton	66,498	2,422	27.5
Indigo	16,701	2,040	8.2
Mansfield	9,176	3,844	2.4
Mitchell	46,082	2,862	16.1
Moira	29,925	4,046	7.4
Murrindindi	14,570	3,880	3.8
Strathbogie	10,781	3,303	3.3
Towong	6,040	6,675	**0.9**
Wangaratta	29,187	3,645	8.0
Wodonga	42,083	433	**97.2**
Hume Region	**297,894**	**40,291**	**7.4**

8.1.2 Population forecast

By 2036, the population of the region is forecast to increase by 93,859 people (32%) to 391,753 people, with the majority taking up residence in the Mitchell Shire (+51,606 people), City of Wodonga (+16,818 people) and Greater Shepparton (+11,195 people).

Refer to the below tables and visualisations for Local Government population breakdowns and forecasts.

180 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Table 38. Hume Estimated Population and Projections by LGA[181]

LGA	Estimated Population and Projections			
	2019[182]	2036[183]	No. Increase	% Growth
Alpine	12,814	13,507	693	*5.4%*
Benalla	14,037	14,659	622	*4.3%*
Greater Shepparton	66,498	77,693	**11,195**	***16.8%***
Indigo	16,701	18,515	1,814	*10.9%*
Mansfield	9,176	10,966	1,790	*19.5%*
Mitchell	46,082	97,688	**51,606**	***112.0%***
Moira	29,925	32,384	2,459	*8.2%*
Murrindindi	14,570	17,020	2,450	*16.8%*
Strathbogie	10,781	12,009	1,228	*11.4%*
Towong	6,040	6,246	206	*3.4%*
Wangaratta	29,187	32,165	2,978	*10.2%*
Wodonga	42,083	58,901	**16,818**	***40.0%***
Hume Total	**297,894**	**391,753**	**93,859**	***31.5%***
VICTORIA	**6,596,039**	**8,722,766**	**2,126,727**	***32.2%***

181 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
182 ABS (2017): https://www.rdv.vic.gov.au/information-portal/table-and-chart
183 VIF2019 projections: https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future/tab-pages/victoria-in-future-data-tables

Table 39. Hume Population by age group (2017) [184]

LGA	Age Group (Years)												
	0-14	15-19	*0-19 Subtotal*	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	*65+ Subtotal*	Total No.
Alpine	2,071	676	2,747	470	1,031	1,420	1,832	2,121	1,712	885	360	2,957	**12,578**
Benalla	2,261	800	3,061	690	1,288	1,352	1,869	2,227	1,933	1,054	508	3,495	**13,982**
Greater Shepparton	13,176	4,443	17,619	3,823	8,298	7,910	8,578	7,860	6,066	3,428	1,490	10,984	**65,072**
Indigo	2,971	963	3,934	635	1,351	1,992	2,475	2,602	1,995	864	317	3,176	**16,165**
Mansfield	1,598	499	2,097	328	722	960	1,151	1,413	1,278	534	191	2,003	**8,674**
Mitchell	8,872	2,948	11,820	2,648	5,537	5,293	5,803	5,012	3,541	1,581	560	5,682	**41,795**
Moira	5,343	1,754	7,097	1,477	2,867	2,990	3,787	4,190	3,876	2,298	904	7,078	**29,486**
Murrindindi	2,292	724	3,016	575	1,233	1,650	2,005	2,387	2,061	836	289	3,186	**14,052**
Strathbogie	1,574	491	2,065	396	878	1,007	1,366	1,823	1,611	859	352	2,822	**10,357**
Towong	992	333	1,325	226	491	594	884	1,013	890	429	194	1,513	**6,046**
Wangaratta	5,298	1,666	6,964	1,391	2,789	3,362	3,851	4,024	3,323	1,911	977	6,211	**28,592**
Wodonga	8,411	2,763	11,174	2,871	5,703	4,924	5,047	4,615	3,322	1,697	747	5,766	**40,100**
Hume Total	**54,859**	**18,060**	**72,919**	**15,530**	**32,188**	**33,454**	**38,648**	**39,287**	**31,608**	**16,376**	**6,889**	**54,873**	**286,899**
%	***19.1%***	***6.3%***	***25.4%***	***5.4%***	***11.2%***	***11.7%***	***13.5%***	***13.7%***	***11.0%***	***5.7%***	***2.4%***	***19.1%***	***100.0%***
VICTORIA	**1,166,502**	**374,125**	**1,540,627**	**466,102**	**991,712**	**849,923**	**809,781**	**705,704**	**532,826**	**294,754**	**130,219**	**957,799**	**6,321,648**
%	***18.5%***	***5.9%***	***24.4%***	***7.4%***	***15.7%***	***13.4%***	***12.8%***	***11.2%***	***8.4%***	***4.7%***	***2.1%***	***15.2%***	***100.0%***

184 ABS (2017): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Table 40. Hume Projected population by age group (2036)

LGA	Age Group (Years)												
	0-14	15-19	*0-19 Subtotal*	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	*65+ Subtotal*	Total No.
Alpine	2,001	650	2,651	579	1,318	1,587	1,761	1,840	1,884	1,395	492	3,771	**13,507**
Benalla	1,905	643	2,548	519	1,220	1,667	1,789	1,767	2,262	2,009	879	5,150	**14,659**
Greater Shepparton	13,610	4,526	18,136	4,485	9,755	9,959	9,401	8,111	8,394	6,543	2,910	17,847	**77,693**
Indigo	2,961	894	3,855	690	1,713	2,356	2,436	2,476	2,526	1,822	641	4,989	**18,515**
Mansfield	1,639	580	2,218	494	1,031	1,075	1,320	1,439	1,535	1,311	543	3,389	**10,966**
Mitchell	21,545	6,567	28,112	6,232	13,413	15,115	12,832	8,706	7,048	4,423	1,807	13,278	**97,688**
Moira	4,969	1,555	6,524	1,607	3,761	3,722	3,360	3,599	4,531	3,644	1,635	9,811	**32,384**
Murrindindi	2,365	761	3,126	652	1,538	1,809	1,827	2,260	2,765	2,128	914	5,807	**17,020**
Strathbogie	1,630	525	2,155	450	1,033	1,267	1,361	1,583	2,019	1,508	633	4,160	**12,009**
Towong	870	226	1,096	169	469	832	739	706	1,009	840	386	2,235	**6,246**
Wangaratta	5,023	1,689	6,712	1,582	3,387	3,687	3,635	3,866	4,309	3,436	1,550	9,295	**32,165**
Wodonga	10,012	3,787	13,799	4,070	7,362	7,141	7,261	6,285	6,306	4,660	2,017	12,983	**58,901**
Hume Total	**68,529**	**22,404**	**90,933**	**21,530**	**46,000**	**50,215**	**47,724**	**42,639**	**44,587**	**33,718**	**14,408**	**92,714**	**391,753**
%	***17.5%***	***5.7%***	***23.2%***	***5.5%***	***11.7%***	***12.8%***	***12.2%***	***10.9%***	***11.4%***	***8.6%***	***3.7%***	***23.7%***	***100.0%***
VICTORIA	**1,484,771**	**511,324**	**1,996,095**	**585,796**	**1,232,559**	**1,266,034**	**1,146,896**	**886,495**	**771,700**	**568,029**	**269,162**	**2,948,620**	**8,722,766**
%	***17.0%***	***5.9%***	***22.9%***	***6.7%***	***14.1%***	***14.5%***	***13.1%***	***10.2%***	***8.8%***	***6.5%***	***3.1%***	***33.8%***	***100.0%***

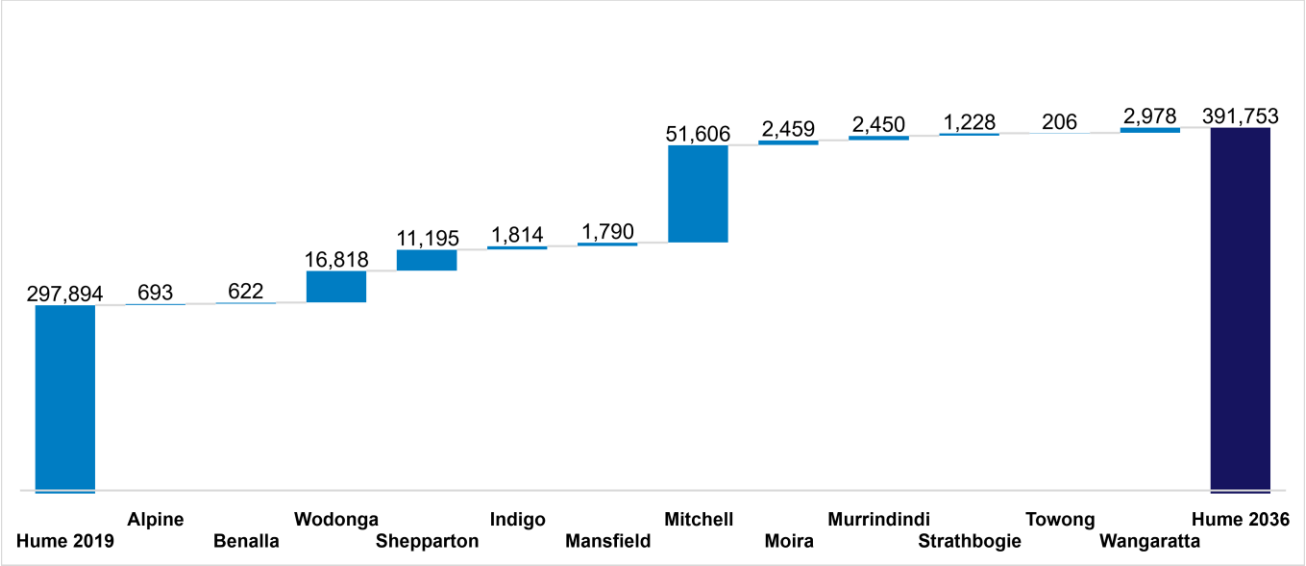


Figure 27. Population growth in Hume Region by LGA (2019-2036)[185]

8.2 Vulnerability indicators

In emergency management there are many population vulnerability indicators that have a geographical distribution and are relevant to natural hazard risk analysis. These include:

- The young, the elderly and those needing assistance, who may be dependent on others for care;
- Single parents, who may lack support for their dependent children;
- Income and public housing residency, which are indicators of socio-economic disadvantage and can have an impact on a household's ability to recover from a disaster;
- Education level and proficiency in English, which can limit understanding of warnings, risks and preparation advice;
- Car ownership, which may have an impact on a household's ability to evacuate;
- Unoccupied dwellings, which may reduce owners' engagement levels with the local community and reduce the likelihood that relevant preparations will be undertaken for their properties.[186]

Some of these indicators for Hume Region are summarised below. Of note, more than a quarter (25.4% of Hume Region households were lone person and fewer than 20% of the population (18.6%) indicated they had no internet connection at home in 2016.

185 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/regional-snapshot
186 Inspector General for Emergency Management (2019): Review of emergency management for high-risk Victorian communities.

Table 41. Vulnerable Communities Indicators for Hume Region by LGA (2016)[187]

	Vulnerability Indicators (%)						
LGA	**Population aged 65+**	**Lone person households**	**People with a disability**	**People with poor English proficiency**	**Estimated homeless population**	**Population with no motor vehicles**	**Population with no internet connection at home**
Alpine	*24.5%*	*25.7%*	*5.3%*	*1.0%*	*0.3%*	*3.0%*	*17.9%*
Benalla	*26.1%*	*28.7%*	*6.8%*	*0.3%*	*0.3%*	*5.0%*	*21.3%*
Greater Shepparton	*17.5%*	*23.7%*	*6.0%*	*3.3%*	*0.6%*	*4.8%*	*18.0%*
Indigo	*20.6%*	*22.7%*	*4.9%*	*0.2%*	*0.1%*	*2.7%*	*16.1%*
Mansfield	*24.0%*	*27.4%*	*4.5%*	*0.5%*	*0.2%*	*2.0%*	*17.4%*
Mitchell	*14.2%*	*18.8%*	*4.9%*	*0.9%*	*0.3%*	*3.0%*	*14.0%*
Moira	*25.0%*	*25.6%*	*6.7%*	*0.6%*	*0.2%*	*4.0%*	*22.2%*
Murrindindi	*23.7%*	*26.6%*	*5.6%*	*0.3%*	*0.3%*	*2.1%*	*17.2%*
Strathbogie	*28.4%*	*29.0%*	*6.8%*	*0.4%*	*0.3%*	*3.0%*	*21.7%*
Towong	*25.7%*	*26.9%*	*5.6%*	*0.3%*	*0.1%*	*2.2%*	*21.3%*
Wangaratta	*22.5%*	*27.1%*	*5.7%*	*0.6%*	*0.3%*	*4.5%*	*20.1%*
Wodonga	*14.9%*	*23.1%*	*5.8%*	*0.8%*	*0.4%*	*4.7%*	*15.4%*
Hume Average	***22.3%***	***25.4%***	***5.7%***	***0.8%***	***0.3%***	***3.4%***	***18.6%***

187 https://blog.id.com.au/2020/population/demographic-trends/interactive-chart-is-your-community-demographically-vulnerable/#chart

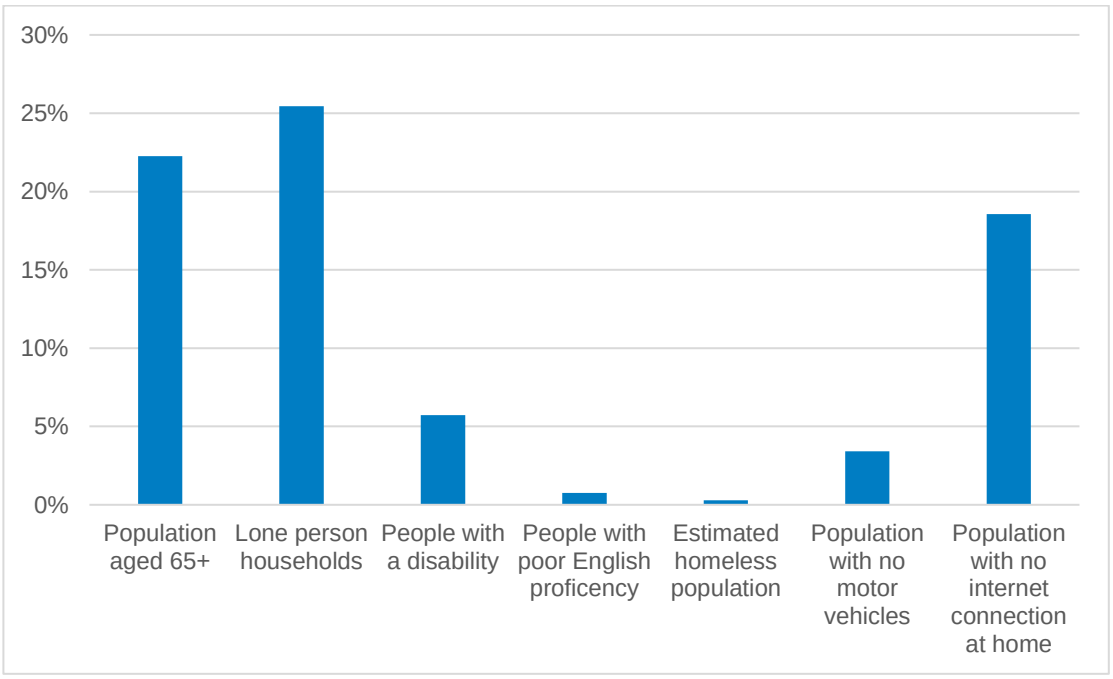


Figure 28. Vulnerable Communities Indicators for Hume (2016) [188]

8.2.1 The young and the elderly

Within the Hume Region, 25% of the population was aged 19 years or younger in 2018, while 20% was aged 65 years or older.

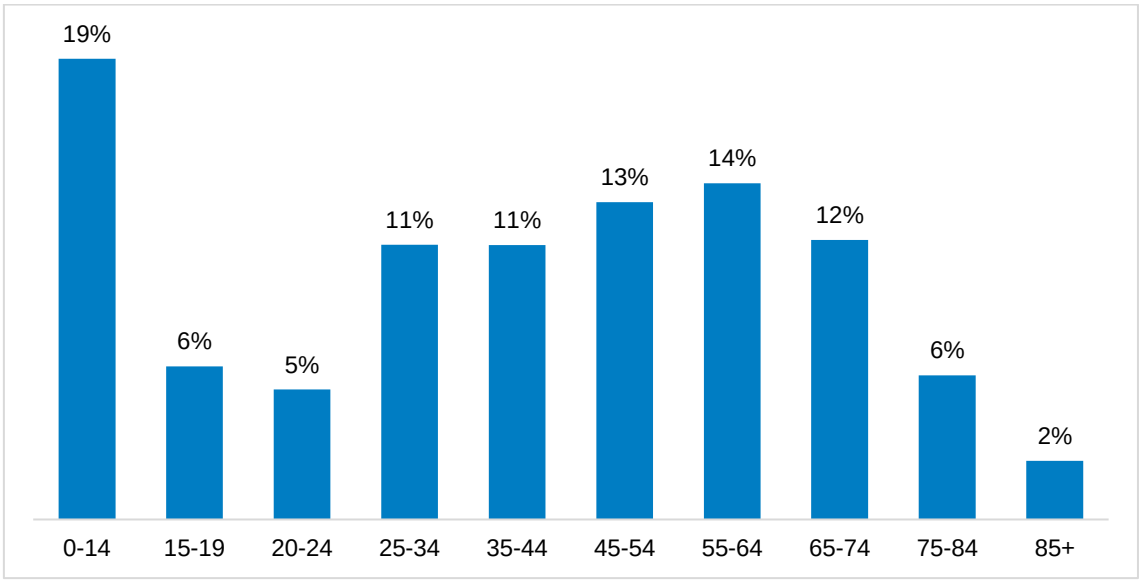


Figure 29. Population breakdown by age for Hume Region (2018) [189]

188 https://blog.id.com.au/2020/population/demographic-trends/interactive-chart-is-your-community-demographically-vulnerable/#chart
189 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

However, these vulnerable groups were not evenly distributed across the region, with Mitchell Shire having the highest proportion of people aged 0-19 years (28%), while Strathbogie Shire (20%) had the lowest proportion of people aged 0-19 years. Conversely, Strathbogie Shire had the highest proportion of people aged 65+ years (28%), while Mitchell City had the lowest proportion of people aged 65+ years (14%).

Table 42. Proportion of population in Hume Region by age and LGA (2018)[190]

LGA	19 years or younger (%)	65 years + (%)
Alpine Shire	*22%*	*24%*
Benalla Rural City	*22%*	*26%*
City of Wodonga	*27%*	*15%*
Greater Shepparton City	*27%*	*18%*
Indigo Shire	*24%*	*21%*
Mansfield Shire	*24%*	*24%*
Mitchell Shire	***28%***	***14%***
Moira Shire	*24%*	*25%*
Murrindindi Shire	*21%*	*23%*
Strathbogie Shire	***20%***	***28%***
Towong Shire	*22%*	*26%*
Wangaratta Rural City	*25%*	*23%*

8.2.2 Those needing assistance

When it comes to assistance with core activities, approximately 6.3% of the population of the Hume Region have a need – in real terms representing 16,267 people. However, the number of people in need varies according to LGA, from just 4.9% of the population of Indigo Shire (385 people) in 2016 to 7.5% of the population of Benalla Rural city (946 people).

190 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Table 43. Need for assistance with core activities in Hume Region by LGA (2016) [191]

LGA	Total	Percentage
Alpine Shire	658	*5.8%*
Benalla Rural City	946	***7.5%***
City of Wodonga	2,295	*6.3%*
Greater Shepparton City	3,828	*6.6%*
Indigo Shire	776	*5.3%*
Mansfield Shire	385	***4.9%***
Mitchell Shire	2,000	*5.3%*
Moira Shire	1,955	*7.3%*
Murrindindi Shire	765	*6.1%*
Strathbogie Shire	694	*7.4%*
Towong Shire	338	*6.1%*
Wangaratta Rural City	1,627	*6.2%*
Total Hume	**16,267**	***6.3%***

8.3 Diversity

8.3.1 Birthplaces and languages spoken

Ethnic and cultural indicators reflect a population's composition and can be useful indicators of socio-economic status. These characteristics can help inform decision-makers about a population's ability to access services and information and assist service providers determine the need to communicate in languages other than English.

The population of Hume is less culturally diverse than metro regions with about 12% of the population born overseas. However, the populations of Alpine Shire and The City of Greater Shepparton are slightly higher than the rest of Hume with each LGA above 15% born overseas, while the population of the Benalla Rural City 8.66 % were born overseas. Refer Table 44.

In Hume the most common countries of birth (other than Australia) were:

- England – which featured in the top three for all 12 of the 12 LGAs
- New Zealand – which featured in the top three for 11 of the 12 LGAs
- Germany – which featured in the top three for 5 of the 12 LGAs

More than 8% of the population of Hume speaks a language other than English at home.

191 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

In all LGAs, except for the City of Greater Shepparton, the number of people who speak only English at home were above 90%. The City of Greater Shepparton observed about 83% of the population only speaks English at home. Refer Table 45.

The variety of most common languages spoken at home other than English is observed to be somewhat diverse in Hume with 9 languages listed as common language to speak at home for the 12 LGAs.

In Hume the most common languages spoken (other than English) were:

- Italian – which featured in the top three languages for 10 of the 12 LGAs
- German – which featured in the top three for 9 of the 12 LGAs
- Mandarin – which featured in the top three for 5 of the 12 LGAs

As a proportion of Hume, Aboriginal and Torres Strait Islanders represent 2.2% of the total Hume population. Ranging between 0.8% of the population in the Shire of Mansfield to 2.6% and 3.7% of the population in the Rural City of Wodonga and the City of Greater Shepparton respectfully.

There are many Aboriginal languages. However, they do not have geographic boundaries. The most widespread in Victoria are the Kulin languages.[192]

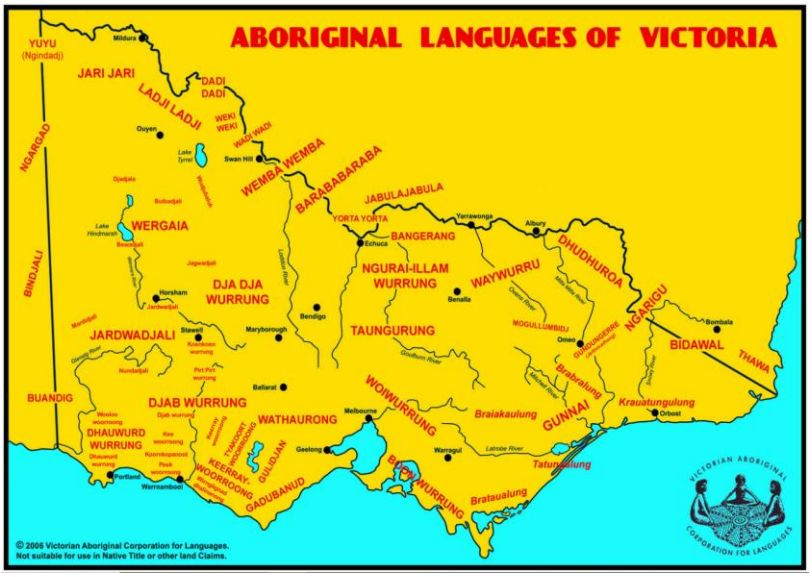


Figure 30. Map of Aboriginal languages of Victoria[193]

192 https://www.vcaa.vic.edu.au/Documents/alcv/History.pdf
193 https://cv.vic.gov.au/stories/aboriginal-culture/our-story/vacl-language-map-of-victoria/

Table 44. Hume Population by Aboriginal and Torres Strait Islander (ATSI) status and birthplace and LGA (2016)

LGA	Birthplace						Total		Top 3 Countries of Birth (other than Australia)[194]		
	Australia				Elsewhere						
	ATSI		All								
	No.	% *Hume*	No.	%	No.	%	No.	%	1	2	3
Alpine	104	*0.94%*	9,419	*84.7%*	1,702	*15.3%*	11,121	*100.0%*	**England**	Italy	**New Zealand**
Benalla	220	*1.75%*	11,455	*91.3%*	1,086	*8.7%*	12,541	*100.0%*	**England**	**Germany**	**New Zealand**
Greater Shepparton	2,186	*3.77%*	48,492	*83.6%*	9,494	*16.4%*	57,986	*100.0%*	India	**England**	Italy
Indigo	204	*1.38%*	13,450	*90.8%*	1,365	*9.2%*	14,815	*100.0%*	**England**	**New Zealand**	**Germany**
Mansfield	63	*0.81%*	6,800	*87.9%*	934	*12.1%*	7,734	*100.0%*	**England**	**New Zealand**	**Germany**
Mitchell	650	*1.75%*	32,349	*87.3%*	4,713	*12.7%*	37,062	*100.0%*	**England**	**New Zealand**	India
Moira	500	*1.89%*	23,745	*89.8%*	2,681	*10.1%*	26,426	*100.0%*	**England**	**New Zealand**	Italy
Murrindindi	183	*1.48%*	10,869	*87.8%*	1,516	*12.2%*	12,385	*100.0%*	**England**	**New Zealand**	Netherlands
Strathbogie	113	*1.22%*	8,341	*90.3%*	900	*9.7%*	9,241	*100.0%*	**England**	**New Zealand**	**Germany**
Towong	87	*1.60%*	4,954	*91.2%*	480	*8.8%*	5,434	*100.0%*	**England**	**New Zealand**	**Germany**
Wangaratta	377	*1.45%*	23,717	*91.2%*	2,274	*8.7%*	25,991	*100.0%*	**England**	Italy	**New Zealand**
Wodonga	975	*2.66%*	32,682	*89.2%*	3,952	*10.8%*	36,634	*100.0%*	**England**	**New Zealand**	India
Hume Total	**5,662**	**2.20%**	**226,273**	***87.9%***	**31,097**	***12.1%***	**257,370**	***100.0%***			

194 .id (2020): profile.id.com.au

Table 45. Hume Population by language spoken at home (2016)

LGA	Language Spoken at Home								
	English Only		Other Language		Total		Top 3 Languages Spoken (other than English)[195]		
	No.	%	No.	%	No.	%	1	2	3
Alpine	10,382	*91.6%*	946	*8.3%*	11,328	*100.0%*	**Italian**	**German**	French
Benalla	12,351	*96.9%*	393	*3.1%*	12,744	*100.0%*	**German**	**Italian**	**Mandarin**
Greater Shepparton	49,035	*83.9%*	9,397	*16.1%*	58,432	*100.0%*	**Italian**	Arabic	Punjabi
Indigo	14,470	*97.6%*	364	*2.4%*	14,834	*100.0%*	**German**	**Italian**	French
Mansfield	7,589	*95.7%*	343	*4.3%*	7,932	*100.0%*	**German**	**Mandarin**	French
Mitchell	34,686	*92.17%*	2,948	*7.8%*	37,634	*100.0%*	**Italian**	**Mandarin**	Punjabi
Moira	25,554	*95.0%*	1,335	*5.0%*	26,889	*100.0%*	**Italian**	Arabic	Punjabi
Murrindindi	12,157	*96.6%*	432	*3.4%*	12,589	*100.0%*	**Italian**	Greek	**German**
Strathbogie	9,111	*96.4%*	340	*3.6%*	9,451	*100.0%*	**Italian**	**German**	**Mandarin**
Towong	5,397	*97.2%*	155	*2.8%*	5,552	*100.0%*	**German**	Malayalam	**Italian**
Wangaratta	24,913	*95.0%*	1,302	*5.0%*	26,215	*100.0%*	**Italian**	**German**	**Mandarin**
Wodonga	34,577	*93.6%*	2,364	*6.4%*	36,941	*100.0%*	Nepali	**German**	Punjabi
Hume Total	**180,732**	**91.6%**	**16,653**	**8.4%**	**197,385**	***100.0%***			

195 .id (2020): profile.id.com.au

8.3.2 Income and housing

According to Socio-Economic Indexes for Areas (SEIFA), which measure the relative level of socio-economic advantage or disadvantage based on a range of Census characteristics (where higher scores indicate lower levels of disadvantage), LGAs within the Hume Region were ranked as follows:

Table 46. SEIFA scores and rankings for Hume Region by LGA (2016)[196]

LGA	SEIFA Score	Ranking (Most Disadvantaged)
Alpine Shire	994	39th
Benalla Rural City	951	16th
City of Wodonga	977	27th
Greater Shepparton City	948	14th
Indigo Shire	1,016	**57th**
Mansfield Shire	1,015	56th
Mitchell Shire	997	47th
Moira Shire	951	15th
Murrindindi Shire	996	45th
Strathbogie Shire	974	26th
Towong Shire	992	38th
Wangaratta Rural City	983	32nd
Hume Average	**983**	**-**
VICTORIA Average	**997**	**-**

Greater Shepparton ranked as the most disadvantaged LGA in Hume Region (and the 14th most disadvantaged in Victoria) while Indigo Shire was the least disadvantaged (and the 57th most disadvantaged of 79 LGAs in Victoria). Overall, Hume Region is more disadvantaged than the average for Victoria.

Other indicators of socio-economic status include income and housing. In the Hume Region in 2016:

- There were 111,970 occupied private dwellings, with an average of 2.5 persons per dwelling.
- 4.9% of households had no vehicle.

Refer also Table 47.

196 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Table 47. Socio-economic indicators for Hume Region (2016) [197]

Indicators	Total	Percentage
Low income households with rental stress	7,184	*28.6%*
Low income households with mortgage stress	3,569	*9.9%*
Home ownership	74,199	*73.2%*
Separate houses	-	*89.6%*
Occupied private dwellings	111,970	-
Households with internet connected	81,801	*80.2%*

These findings provide an indication of the number of properties that could be impacted in the event of an emergency and the relative ease with which people might be able to leave their dwellings by motor vehicle as well. It also indicates the availability of personal financial resources to support any actions required in the event of an emergency.

8.4 Education

8.4.1 Educational institutions

There are 201 schools and 46,681 enrolments in the region, with government schools making up 73% of all schools and 62% of all enrolments:

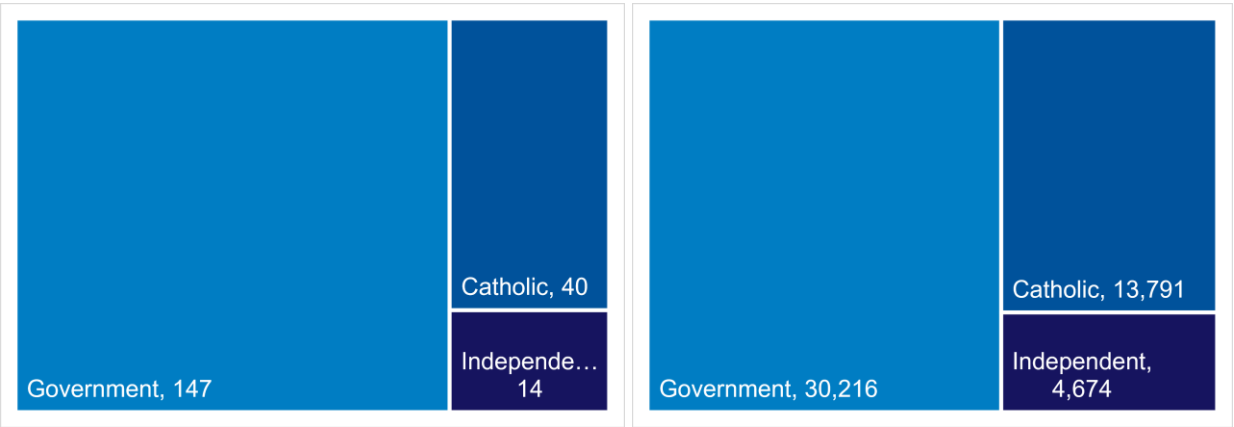


Figure 31. Schools and enrolments in Hume Region[198]

197 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
198 DET (2020): https://www.education.vic.gov.au/about/department/Pages/factsandfigures.aspx

The number of schools and full-time enrolments in the region are distributed across LGAs as follows, with Greater Shepparton having the highest number of schools (43) and the largest number of full-time enrolments (11,831):

Table 48. Schools and full-time enrolments in Hume Region by LGA (2016) [199]

LGA	No. Schools	Full-time Enrolments
Alpine Shire	11	1,791
Benalla Rural City	9	1,681
City of Wodonga	16	8,234
Greater Shepparton City	**43**	**11,831**
Indigo Shire	17	1,962
Mansfield Shire	7	1,608
Mitchell Shire	19	7,741
Moira Shire	23	4,893
Murrindindi Shire	14	1,656
Strathbogie Shire	8	1,062
Towong Shire	10	1,003
Wangaratta Rural City	24	5,221
Total Hume Region	**201**	**48,681**

There are two universities and two TAFEs with multiple campuses across the region, including:

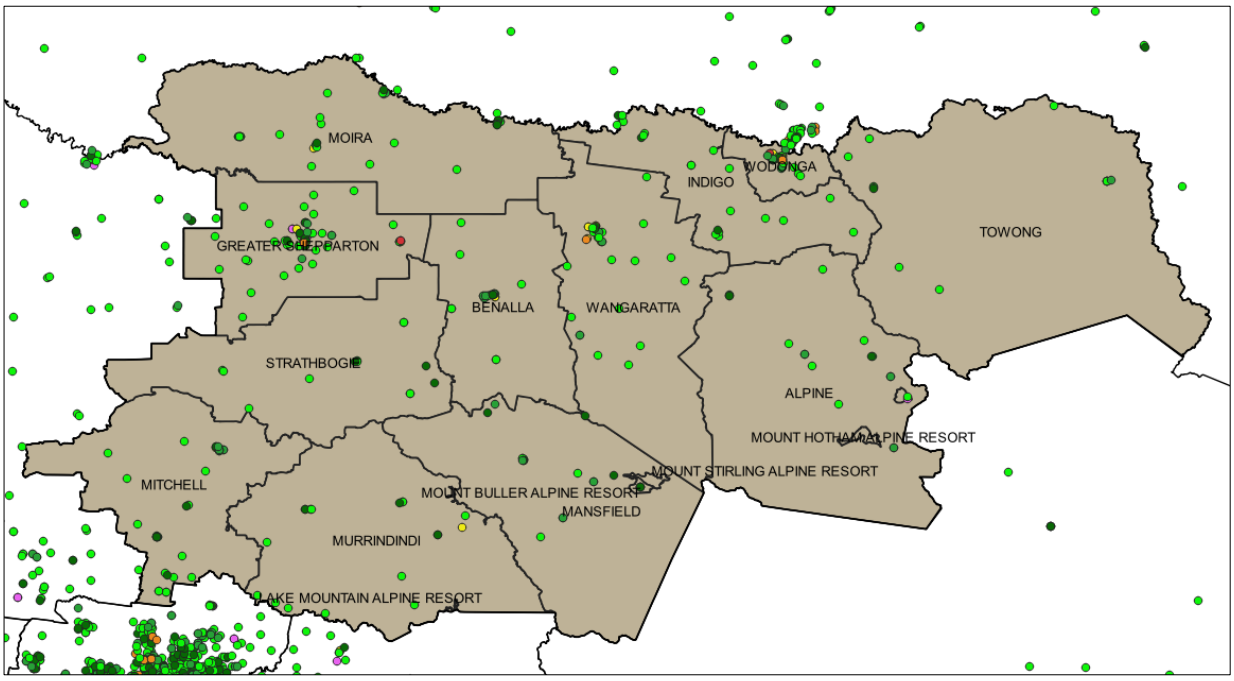
Table 49. Universities and TAFEs in Hume Region[200]

University/TAFE	Campuses
University of Melbourne	Dookie, Shepparton
Latrobe University	Albury-Wodonga, Shepparton
Goulburn Ovens Institute of TAFE	Shepparton, Wangaratta, Seymour, Benalla, Wallan
Wodonga Institute of TAFE	Wodonga

There are also 256 childcare facilities across the region (including childcare centres, pre-schools and kindergartens).[201]

The below figure shows the location of educational facilities in the Hume Region:

199 DET (2020): https://www.education.vic.gov.au/about/department/Pages/factsandfigures.aspx
200 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
201 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest



Light Green = Primary school	Orange = Further education
Mid-green = Primary/secondary school	Yellow = Tertiary institution
Dark Green = Secondary school	Red = University
Pink = Special school	

Figure 32. Map of Educational Facilities within the Hume Region[202]

8.4.2 Education Level

Nearly 1 in 3 persons (28.4%) of people over 15 years of age in the Hume Region have a bachelor's degree or higher non-school qualification, however nearly 60% of persons did not complete Year 12.

Table 50. Education level in Hume Region (2016)[203]

Education Level	Total	Percentage
People over 15 with bachelor's degree or higher non-school qualification	28,621	*28.4%*
Did not complete Year 12	120,349	*58.8%*
15-19 years old not in school or employment	991	*5.6%*

8.5 Health

The State Health Emergency Response Plan outlines arrangements for managing health emergencies (i.e., incidents requiring a significant and coordinated response from the health system, the Department of Health and Human Services and the emergency management sector, in partnership with the community) to ensure an effective response and ease adverse consequences.[204] Practitioners, health professionals, service

202 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
203 DJPR (2020) https://www.rdv.vic.gov.au/information-portal/table-and-chart
204 DHHS (2020): https://www2.health.vic.gov.au/emergencies/shera

organisations and government agencies may also be required to respond to local emergencies to care for the injured or unwell directly affected.

In an emergency, vulnerable populations such as those in hospitals, health care facilities and retirement villages, may require significant and coordinated priority interventions, responses and support for their safety.

There were 118 General Medical Practitioners per 100,000 people in Hume Region in 2011.[205]

8.5.1 Hospitals and health centres

There are 25 hospitals, five community health centres and 18 maternal and child health services across the region, as outlined below:

Table 51. Hospitals and health centres in Hume Region[206]

LGA	Hospitals	Community Health Centres	Maternal and Child Health Services
Alpine Shire	3	0	0
Benalla Rural City	1	0	0
City of Wodonga	2	0	0
Greater Shepparton City	3	0	0
Indigo Shire	1	0	7
Mansfield Shire	1	0	0
Mitchell Shire	2	0	2
Moira Shire	4	0	0
Murrindindi Shire	2	4	1
Strathbogie Shire	2	0	4
Towong Shire	2	1	4
Wangaratta Rural City	2	0	0
Total Hume Region	**25**	**5**	**18**

Details of the 25 hospitals across the Hume Region are further outlined below:

205 DJPR (2020) https://www.rdv.vic.gov.au/information-portal/table-and-chart
206 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

Table 52. Hospitals in Hume Region[207]

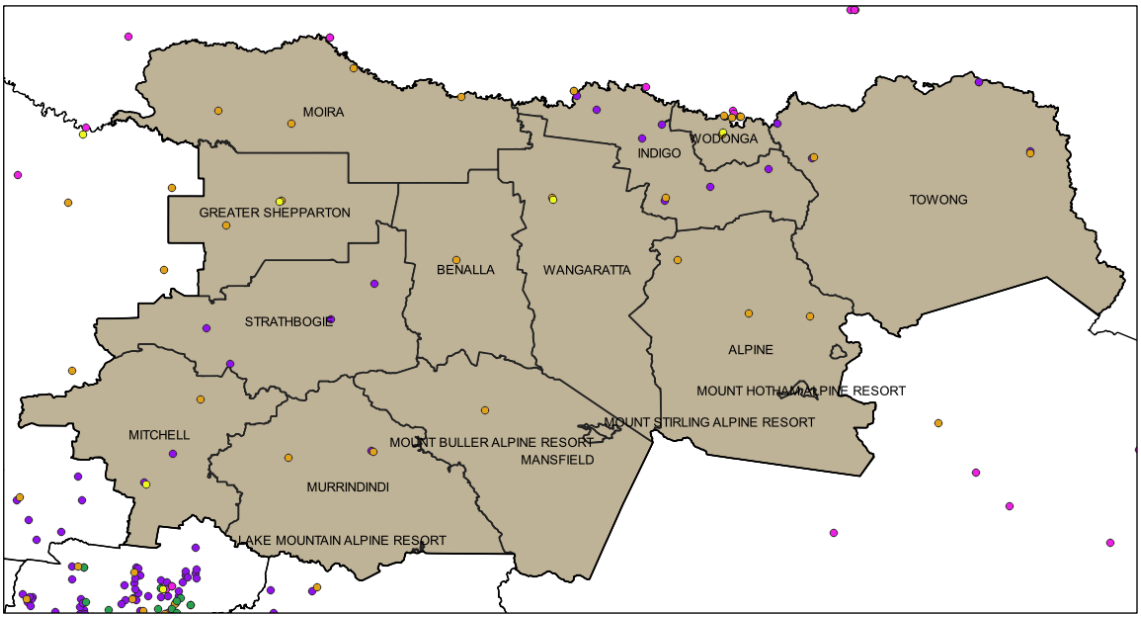
LGA	No. Hospitals	Names
Alpine Shire	3	Bright Public Hospital Mount Beauty Public Hospital Myrtleford Public Hospital
Benalla Rural City	1	Benalla Public Hospital
City of Wodonga	2	Murray Valley Private Hospital Wodonga Public Hospital
Greater Shepparton City	3	Shepparton Private Hospital Goulburn Valley Health Tatura Public Hospital
Indigo Shire	1	Beechworth Public Hospital
Mansfield Shire	1	Mansfield Public Hospital
Mitchell Shire	2	Kilmore Public Hospital Seymour Public Hospital
Moira Shire	4	Cobram Public Hospital Nathalia Public Hospital Numurkah Public Hospital Yarrawonga Public Hospital
Murrindindi Shire	2	Alexandra Public Hospital Yea Public Hospital
Strathbogie Shire	2	Euroa Health Nagambie Healthcare
Towong Shire	2	Corryong Public Hospital Tallangatta Public Hospital
Wangaratta Rural City	2	Wangaratta Private Hospital Wangaratta Base Hospital
Total Hume Region	**25**	

In Hume, there are two hospitals with an intensive care unit and a total of 18 ICU beds available:

- Goldburn Valley Health (10)
- Wangaratta Base Hospital (8)

The below figure shows the location of the above healthcare services, with hospitals centred around larger towns.

207 DHHS (2017): http://data-dhs.opendata.arcgis.com/datasets/5000b3c446ed419eb590baa3832eb8f7_0



Pink = Community health centre Purple = Maternal/child health centre Green = Day procedure centre	Orange = General hospital Yellow = General hospital (emergency)

Figure 33. Map of hospitals and health care facilities in the Hume Region[208]

208 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

8.5.2 Aged Care

There are 65 aged care facilities across the region, as outlined below:

Table 53. Aged Care facilities in Hume Region by LGA[209]

LGA	No. Aged Care Facilities
Alpine Shire	7
Benalla Rural City	4
City of Wodonga	3
Greater Shepparton City	13
Indigo Shire	5
Mansfield Shire	2
Mitchell Shire	5
Moira Shire	10
Murrindindi Shire	4
Strathbogie Shire	3
Towong Shire	4
Wangaratta Rural City	5
Total Hume Region	**65**

The locations of these facilities are also provided below:

209 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

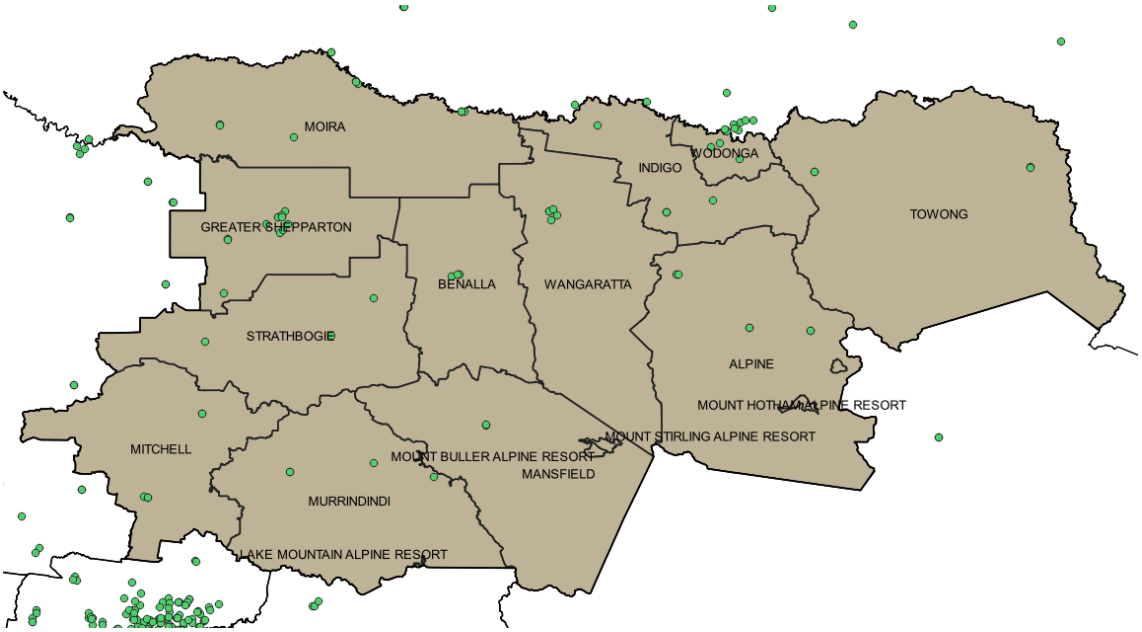


Figure 34. Map of aged care facilities in the Hume Region[210]

The number of people in the Hume Region who access aged care support at some stage during the 2018-19 reporting period is outlined in the following table. This number forms part of the total number of people in the community who may need some form of assistance during an evacuation or emergency.

Table 54. Aged Care Support in Hume Region (2018-2019) [211]

Age Bracket	Home Care	Residential Care	Transition Care	Total
0–49	2	6	0	**8**
50–54	20	10	0	**30**
55–59	45	17	1	**63**
60–64	54	46	0	**100**
65–69	202	90	4	**296**
70–74	382	174	7	**563**
75–79	434	275	13	**722**
80–84	542	484	15	**1,041**
85–89	460	714	17	**1,191**
90–94	228	625	10	**863**
95–99	45	242	2	**289**
100+	10	46	0	**56**
Total	**2,424**	**2,729**	**69**	**5,222**

210 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
211 https://www.gen-agedcaredata.gov.au/Resources/Access-data/2020/March/GEN-data-People-using-aged-care

In 2016 there were 85.3 residential care places per 100,000 population aged 70 years and over in Hume Region.[212]

8.6 Cultural values and assets

The Hume Region includes the traditional lands of the Yorta Yorta and Taungurung peoples,[213] and contain important cultural heritage assets.

8.6.1 Aboriginal cultural heritage assets

Important heritage sites in the lands of the Yorta Yorta people include Kow Swamp near Gunbower, Gunbower National Park and Pericoota State Forest (NSW) on the state border, Kanyapella Wildlife Reserve, Loch Gary Wildlife Reserve, and Gemmill Swamp Wildlife Reserve. The Murray and Goulburn Rivers are both important assets to the Yorta Yorta people. Key sites include the sand hills in Barmah National Park near the New South Wales border.[214]

Important sites in the land of the Taungurung people include Marnong, or Mount Buller. This area was used for both food and traditional ceremony purposes, and archaeological artefacts and scar trees can be found on both Mount Buller and the nearby Mount Stirling. Lake Eildon is a key site, with a history of fishing and a large number of scar trees in the area. The Taungurung Clans, through the Taungurung Land and Water Council, own Camp Jungai and the adjoining parcel of land in Rubicon. It has been identified as an Aboriginal Keeping Place and has both deep historical values and operates as a youth education site.[215]

8.6.2 Other cultural assets

Other significant cultural assets in the Hume region include art galleries and museums, as outlined below:

Table 55. Significant Cultural Assets in Hume Region[216]

LGA	Art Galleries and Museums
Alpine Shire	Bright Art Gallery and Cultural Centre Bright Museum Clover Arboretum Myrtleford Museum National Alpine Museum of Australia
Benalla Rural City	Benalla Art Gallery Benalla Aviation Museum

212 Victorian Health Information Surveillance System (VHISS): http://vhiss.reporting.dhhs.vic.gov.au/ViewContent.aspx?TopicID=1
213 ACHRIS (2020): https://achris.vic.gov.au/weave/wca.html
214 Infrastructure Victoria (2019): https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/Aither-Central-Highlands-Regional-Profile-March-2019.pdf
215 Infrastructure Victoria (2019): https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/Aither-Wimmera-Southern-Mallee-Regional-Profile-March-2019.pdf
216 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

LGA	Art Galleries and Museums
	Benalla Costume and Pioneer Museum
City of Wodonga	Arts Space Wodonga Bandiana Army Museum
Greater Shepparton City	Merrigum District Historical Society Museum Mooroopna Museum and Gallery Murchison And District Historical Society Shepparton Art Gallery Tatura Irrigation and Wartime Camps Museum The Shepparton Heritage Centre Museum
Indigo Shire	Burke Museum Chiltern Athenaeum Museum Forestry Museum Rutherglen Historical Society Museum Yackandandah Museum
Mansfield Shire	N/A
Mitchell Shire	Army Tank Museum Broadford District Historical Society Melbourne Tramway Museum Seymour And District Historical Society Seymour Railway Heritage Centre
Moira Shire	Antique Clock Museum Katamatite Museum Barmah Forest Heritage and Education Centre G.R.A.I.N Store
Murrindindi Shire	Alexandra Timber Tramway and Museum
Strathbogie Shire	Farmers Arms Museum
Towong Shire	The Man From Snowy River Folk Museum
Wangaratta Rural City	Eldorado Museum Kelly Homestead Museum Wangaratta Art Gallery Wangaratta Historical Society And Museum

The region also hosts a number of major events and festivals throughout the year, including:

Table 56. Major Events in Hume Region

LGA	Major events and festivals
Alpine Shire	Bright Autumn Festival
Benalla Rural City	Benalla Festival, Supercar Championships at Winton Raceway, Benalla Gold Cup
City of Wodonga	Nil
Greater Shepparton City	Shepparton Festival
Indigo Shire	Rutherglen Winery Walkabout
Mansfield Shire	Mansfield High Country Festival
Mitchell Shire	Nil
Moira Shire	Numurkah Foodbowl Festival, Cod Classic, Rod Run, Show Us Ya Wheels, Nathalia New Years Eve Carnival
Murrindindi Shire	Alexandra Truck Ute and Rod Show, Alexandra Rodeo, Marysville jazz Festival,
Strathbogie Shire	APS Head of the River Lake Nagambie
Towong Shire	Nil
Wangaratta Rural City	Wangaratta Festival of Jazz

Figure 35 shows two layers that represent areas of cultural and heritage sensitivity. The first in Orange, shows the areas of cultural heritage sensitivity that are known or likely to contain places and objects of significance to Aboriginal cultural heritage. These are defined in the *Aboriginal Heritage Regulations 2018* and include areas around designated watercourses and waterways, areas surrounding known Aboriginal cultural heritage places and areas with landforms and soil types that are similar to known cultural heritage places. While the areas shown are more likely to contain a higher number of cultural heritage places and objects, these places can be found all over Victoria where Aboriginal people have lived.[217] The areas in blue highlight locations that have been included in the Victorian Heritage Register showing places, objects and shipwrecks that are currently protected under the *Heritage Act 2017*.[218]

217 https://www.aboriginalvictoria.vic.gov.au/cultural-heritage-sensitivity
218 https://vhd.heritagecouncil.vic.gov.au/

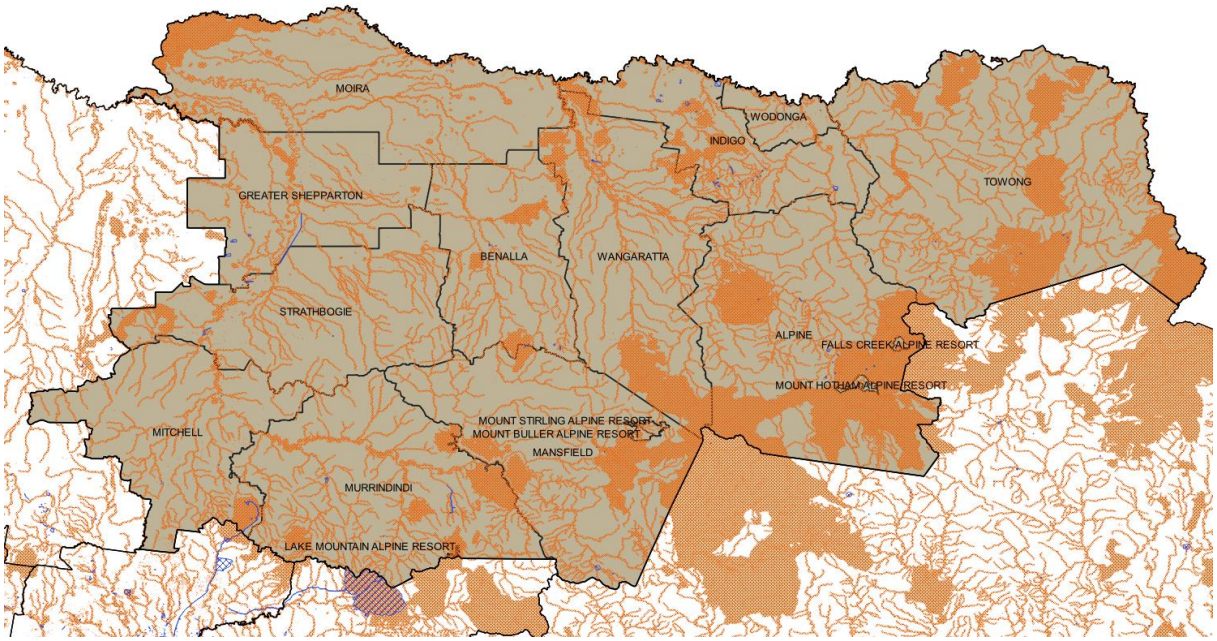


Figure 35. Areas of cultural and heritage significance[219] [220]

8.7 Volunteerism

An indication of a region's level of community volunteering is also an important vulnerability factor because volunteers and their social networks can be of assistance during emergencies.

In 2016, 151,539 people (or 26.6%) in Hume Region indicated that they volunteered. [221]

According to the Ministerial Council for Volunteers (2017), approximately 4% of volunteers work for an emergency services organisation[222] and EMV estimates over 100,000 people in Victoria volunteer across a wide range of emergency management agencies.[223]

- As at 1 July 2020, CFA Victoria noted its volunteer membership at 53,311 people, with an additional 1,486 junior members.[224]

Volunteering is evolving in Victoria, particularly with respect to growing expectations around community responsibility for emergency preparedness, the impact on operations of new communications technology, and the characteristics of volunteers. For example, volunteering styles are becoming more diverse, but also more episodic, while physical locations and office hours are becoming less of a constraint to people

219 https://discover.data.vic.gov.au/dataset/areas-of-cultural-heritage-sensitivity
220 https://discover.data.vic.gov.au/dataset/victorian-heritage-register
221 DJPR (2020) https://www.rdv.vic.gov.au/information-portal/table-and-chart
222 Ministerial Council for Volunteers (2017): https://iepcp.org.au/wp-content/uploads/2018/11/MCV-Volunteers-in-Victoria-report.pdf
223 EMV (2015): https://www.emv.vic.gov.au/volunteerstatement
224 CFA (2020): https://www.cfa.vic.gov.au/about/cfa-at-a-glance

volunteering their time and staying connected. However, in their series of reports, Emergency Volunteering 2030,[225] the authors found that:

- Community sector groups anticipate a serious shortage of volunteers in the future, mounting expectations to deliver emergency services, a rise in costs and poorer outcomes for communities.
- Volunteerism managers foresee growing regulation and corporatisation impacting negatively on volunteer sustainability.
- Local government managers have flagged the need to examine how resourcing and funding options and restrictions may be hindering the emergency management sector's ability to respond to the changing landscape of volunteering.

9. Economic Environment

An understanding of the Hume Region's economic resilience can play an important role in emergency management planning by providing some context to how adversity might affect local economies and the degree to which different communities are likely to cope with the ongoing effects of emergencies.

The Goulburn sub-region is characterised by a high concentration of agriculture and food product manufacturing industries, as well as construction associated with growth in the peri-urban fringe. The Ovens Murray sub-region is focused on manufacturing, agriculture and service industries, while also possessing strong tourism assets.

9.1 Economic situation

The Hume Region's economy is based on access to natural resources, such as water and productive agricultural land (including extensive irrigated areas), environmental assets, heritage assets and the national road and rail transport corridors which traverse the region. The economy is reliant on agriculture, as well as a significant manufacturing industry.[226]

New modelling from the Department of Treasury and Finance suggests the coronavirus pandemic has had a potentially unprecedented impact on Victoria's economy. It is likely the State will record negative economic growth for the current and next financial years.

- Gross regional product (GRP) is expected to drop by 14% in the June and September quarters as a consequence of lower incomes, loss of consumer and business confidence and disruptions to global supply chains.

225 DIIS (2019): https://emergencyvolunteeringau.dropmark.com/594398?q=%23Emergency-Volunteering-2030-study%20%23report
226 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf

- Unemployment is expected to rise to 11% in the September quarter and the number of jobs has already fallen by almost 7% across Victoria since March 2020. [227]

While the true extent of the impact on the Hume Region is unclear, it is likely to reflect the economic trends for Victoria.

9.1.1 Key economic indicators

Key economic indicators across the Hume Region for the period 2018-19 are summarised below:[228]

Gross Regional Product (GRP) reflects the region's contribution to the broader State economy and the value of the regional economy.

- Overall, the Hume Region contributed $14.3 billion to the Victorian economy, which was 3.1% of the total for the State (Gross State Product is estimated at $454.6 billion).

GRP per worker provides an indication of workforce participation.

- Overall, the Hume Region had a lower than average rate of productivity at $115,627 compared with $166,496 per worker for Victoria.

Table 57. Economic Indicators for Hume Region[229] [230]

Economic Indicators	
Gross Regional Product ($ million) (2019)	$14,342m
Gross Regional Product per worker ($) (2018)	$115,627
10-year average annual GRP growth rate (2009-2019)	*1.01%*
Total Jobs (2019)	124,038
Annual jobs growth rate (2018-2019)	*1.20%*
5-year average annual jobs growth rate (2014-2019)	*1.24%*
10-year average annual jobs growth rate (2009-2019)	*0.98%*

The number of local jobs reflects the health of the labour market.

- Overall, the Hume Region provided over 120,000 jobs, which was 4.5% of the total number of jobs for the state (2.73 million jobs).

227 DTF (2020): https://www.dtf.vic.gov.au/economic-and-financial-updates/coronavirus-economic-outlook
228 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
229 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
230 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Labour force participation measures an economy's active workforce, while the unemployment rate measures the loss of productive resources to the economy.

- Overall, the Hume Region's labour force participation rate in 2016 was 61.7%, which is higher than the Victorian average (60.5%)
- The unemployment rate (3.97%) in 2019 Q4, was below the State average (4.8%).

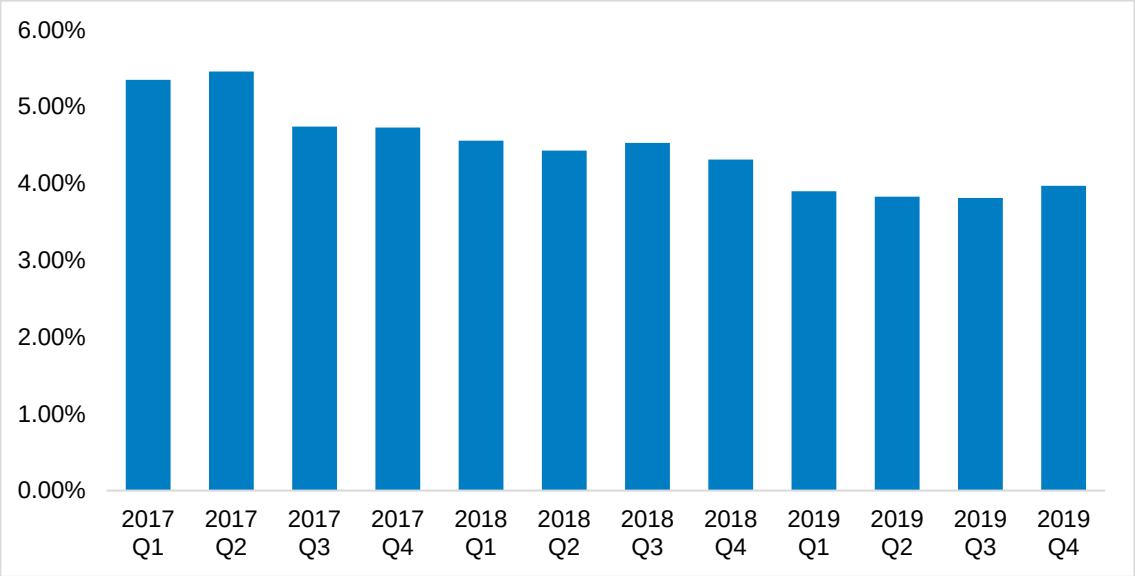


Figure 36. Quarterly Unemployment Rate % for Hume Region (2017-2019)

Table 58. Labour Force Indicators for Hume Region[231]

Indicators	Total	Percentage
Labour force participation (2016)	130,448	*61.7%*
Participation at 65 years plus	*7,814*	*13.9%*
People receiving an unemployment benefit (2016)	11,023	*6.6%*
Receiving an unemployment benefit for more than 180 days	*9,323*	*5.6%*
Youth unemployment (ages 15-24) (2016)	2,272	*10.4%*

9.1.2 Industry and employment

The main industries by number of jobs in the Hume Region overall in 2016 were Health Care and Social Assistance (15% of all jobs), Retail Trade (11% of all jobs) and Manufacturing (10% of all jobs), as shown below: [232]

231 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
232 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

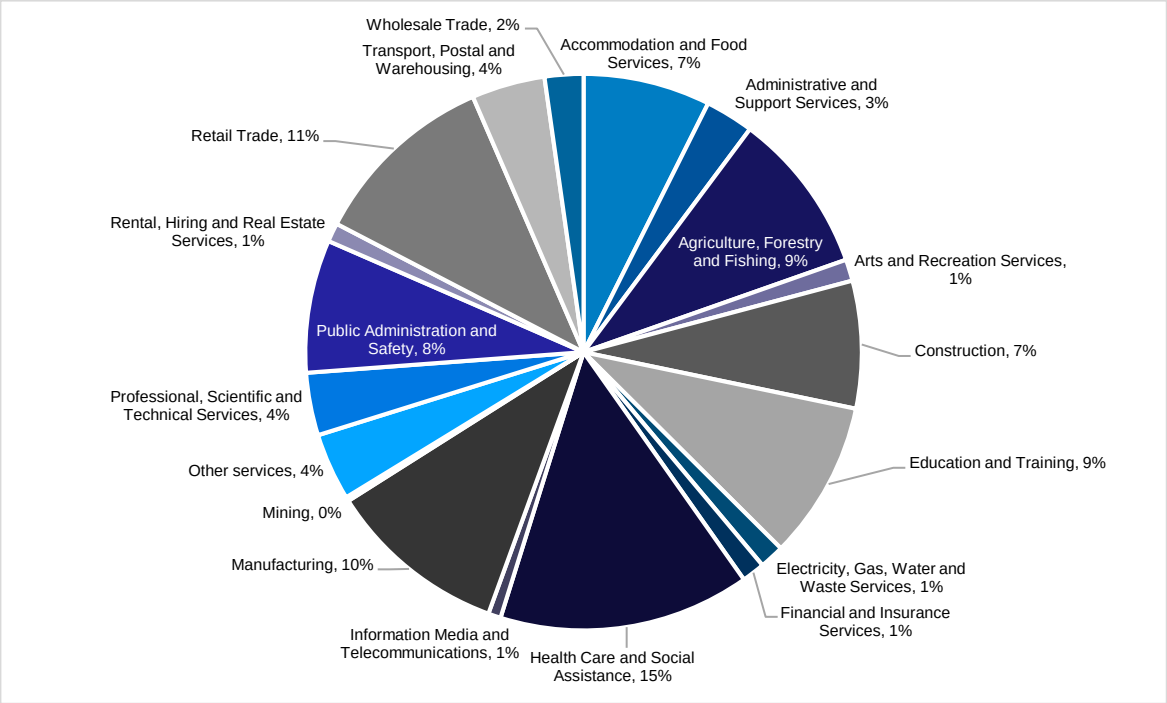


Figure 37. Jobs by Industry for Hume Region (2016)

The main industries by number of businesses in the Hume Region overall in 2019 were Agriculture, Forestry and Fishing (25% of all businesses), Construction (18% of all businesses) and Rental, Hiring and Real Estate services (8% of all businesses):[233]

233 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

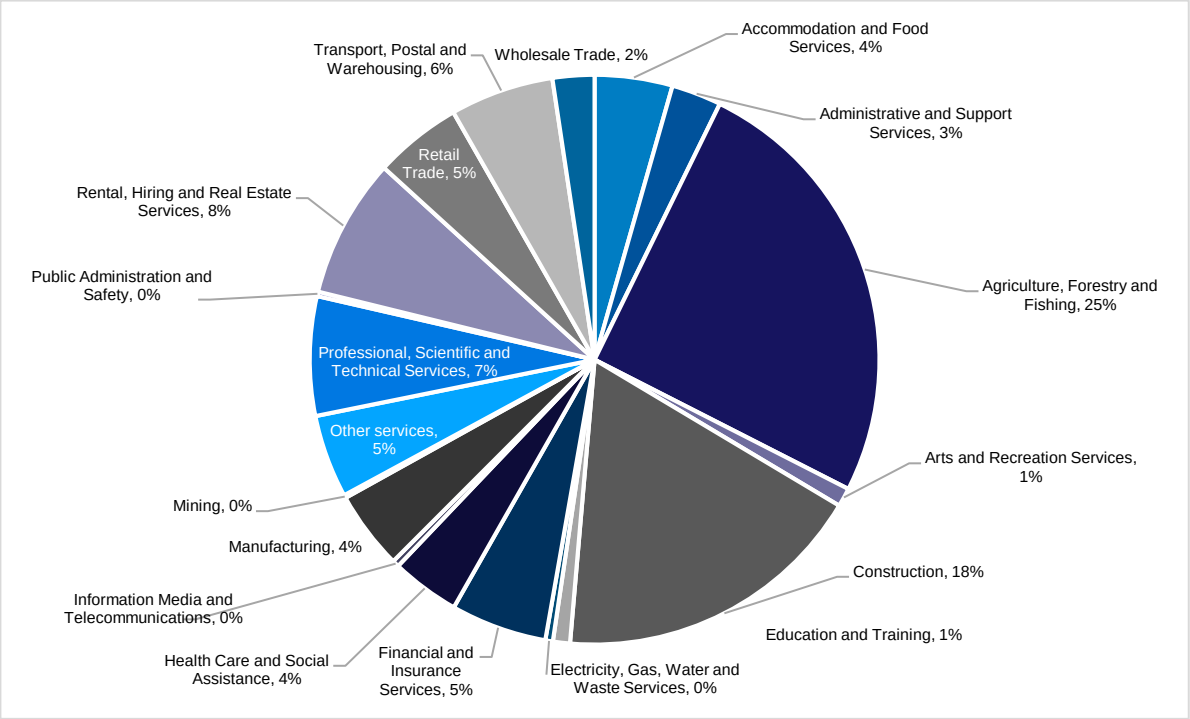


Figure 38. Businesses by Industry for Hume Region (2019)

Of the 29,091 businesses in the region, over 60% are non-employing businesses, while nearly 35% are small businesses with less than 20 employees.

Table 59. Businesses by size in Hume Region (2018) [234]

Business Size	Percentage
Large businesses (200+ employees)	*0.06%*
Medium businesses (20-199 employees)	*1.87%*
Small businesses (<20 employees)	*34.73%*
Non-employing businesses	*63.34%*

9.2 Political and legal factors

There are eight electoral Regions in Victoria. Five Members of Parliament (MPs) represent each Region in the Victorian Parliament's Legislative Council (Upper House). The principal role of people who are elected to represent a Region is to review legislation that has been passed by the Lower House. Hume sits within the Northern Victorian Region.

A breakdown of state and federal electoral divisions can be found below. The Victorian Electoral Commission and the Federal Electoral Commission use different borders distinctions that Emergency

234 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Management Regions due to the need to separate groups by population.[235] Therefore, the list below includes all divisions that cross into Hume Region:

State electorates:

- Benambra
- Eildon
- Euroa
- Ovens Valley
- Shepparton

Federal Divisions:

- Bendigo
- Indi
- McEwen
- Murray

[235] Victorian Electoral Commission Map of districts: https://www.parliament.vic.gov.au/findelectorate/

10. Operational Learnings

The Victorian emergency management sector supports a culture of continuous improvement by:

- Encouraging the sector to share lessons, both positive actions to sustain and areas for improvement
- Encouraging learning from both assurance activities and contemporary good practice
- Focusing on systems of work, rather than the performance of individuals
- Recognising that identifying and implementing sustainable solutions takes time, resources and opportunity

In November 2015, Victoria's first sector-wide lessons management framework, EM-LEARN, was approved. This framework further supports the development of a culture of continuous improvement and outlines a model for lessons management and how it will be implemented into the sector, particularly operational activities initially.

Lessons management involves the identification and learning of lessons captured through assurance and learning activities (including debriefing, monitoring and reviews) occurring before, during and after emergencies. This process of moving from identifying lessons to learning lessons is guided by the lessons management life cycle within the EM-LEARN framework, and should inform emergency management planning to ensure ongoing continuous improvement.

Operational learnings identified from across the State over the past 12 months include:

Declarations

- It was observed that there was little discussion / communications with the regions regarding the State of Disaster declaration for the summer fires, which resulted in confusion around what arrangements were required to be put in place at the regional level to support this. However, the declaration did result in the appointment of a State Relief Coordinator to support relief activities at the regional level and the State Response Controller at the State level which was viewed positively.
- Observations indicate that during the lead-up to a Code Red Declaration on 21 November 2019, there were issues with responding agencies accessing timely intelligence, information and predictions to enhance their operations due to how quickly the data was being updated. Specifically, accessing EM-COP was highlighted as challenging at times.

IT

- IMT's highlighted the difficulties encountered with IT systems, connecting to networks and the hardware in operational facilities. Observations indicate that there are challenges in accessing and using multiple systems including EM-Drive, Webmail, EM-COP, IMS, Fireweb and FIRS.

Evacuation

- Observations indicate that Controllers were hesitant to consider robust evacuation planning until the exact location of the towns requiring evacuation was known. Evacuation planning highlighted the need for targeted messaging to people within evacuation areas, and the importance of having local agencies (i.e. CFA) involved in the evacuation planning process and ensuring that relief centres are located in 'safe' areas.
- Observations indicate that it is difficult to plan for or assume where people will want to go post evacuation or assuming what their needs might be. It is also very important that local councils are involved in the planning and implementation of any evacuation or reception centres.

Planning

- Early identification of potential storm/flood hazards allowed for planning and pre-positioning of storm and flood teams in IMT's. The adoption of standard processes for assuring the implementation of safety alerts related to thunderstorms worked well.

Information Management and Intelligence

- Observations indicate that relief information on VicEmergency was not always consistent with information distributed via community newsletters and other channels and that community communications need to be clear and targeted to the audience.
- Observations indicate that communications between the incident, regional and State tiers could be improved, in terms of building relationships, information sharing and reporting - and that all tiers need to be proactive and take responsibility for ensuring this is done in a clear and timely manner.
- Observations indicate that the lack of an intelligence unit within IMT's and Sector Commanders in the field impedes data collection at the incident level. There is value in establishing an intelligence within ICCs to centrally and consistently coordinate and manage damage assessment and other data which is collected from sources in various formats.
- It was observed that the SCC experienced difficulties in obtaining sufficient intelligence from across the incident and regional tiers. At times there was a divergence of views between the State and incident tiers regarding what the priority intelligence requirements were, which was exacerbated by

the fact that the State tier implemented new requirements - which were added to the existing procedures and products during times of peak operational demand on intelligence teams across all levels.

Personnel

- Fatigue management is a continuing issue. Personnel have concerns on shift length, rostering principles, rostering practices, entitlements and their general understanding of how to self-manage fatigue in relation to assigned shifts.
- Observations indicate staff are being activated into functional roles when they do not necessarily have the right accreditation or experience to perform the role effectively. In addition to being a potential safety issue of having unaccredited staff performing functional roles in an emergency, it also places pressure on others within the functional cell to cover the knowledge/experience gap and can cause frustration across the entire IMT.

11. Data sources

Table 60. Metadata

Item	Details
Report section	5. Regional Context 6. Natural Environment 7. Built Environment 8. Social Environment 9. Economic Environment
Data set	Regional Development Victoria Information Portal
Data source	Online
Location	https://www.rdv.vic.gov.au/information-portal/table-and-chart
Data accessed	July 2020
Data type	Geospatial database
Custodian	DJPR
Publisher	DJPR
Coverage	Victoria
Frequency	Approx. every four years

Item	Details
Report section	6. Natural Environment
Data set	Mean monthly and mean annual temperature data - maximum, minimum and mean (based on standard 30-year period 1961-1990)
Data source	Online
Location	http://www.bom.gov.au/jsp/ncc/climate_averages/temperature/index.jsp
Data accessed	August 2020
Data type	Geospatial database
Custodian	BOM
Publisher	BOM
Coverage	Australia
Frequency	Unknown

Item	Details
Report section	6. Natural Environment
Data set	Mean monthly, seasonal and annual rainfall data (based on standard 30-year period 1981-2010)
Data source	Online
Location	http://www.bom.gov.au/jsp/ncc/climate_averages/rainfall/IDCraingrids.jsp
Data accessed	August 2020
Data type	Geospatial database
Custodian	BOM
Publisher	BOM
Coverage	Australia
Frequency	Unknown

Item	Details
Report section	6. Natural Environment
Data set	Design Rainfall Data System
Data source	Online
Location	http://www.bom.gov.au/water/designRainfalls/revised-ifd/
Data accessed	August 2020
Custodian	BOM
Publisher	BOM
Coverage	Australia
Frequency	Unknown

Item	Details
Report section	6. Natural Environment
Data set	Average annual and monthly days of rain
Data source	Online
Location	http://www.bom.gov.au/jsp/ncc/climate_averages/raindays/index.jsp?period=anandproduct=5mm#maps
Data accessed	August 2020
Custodian	BOM
Publisher	BOM
Coverage	Australia
Frequency	Unknown

Item	Details
Report section	6. Natural Environment
Data set	Bushfire Prone Areas
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/designated-bushfire-prone-area-bpa
Date produced	Last updated 24/3/2020 – produced 07/09/2011
Data accessed	09/05/2020
Data type	Geospatial database
Custodian	DELWP
Publisher	DELWP
Coverage	Victoria
Frequency	Unknown

Item	Details
Report section	6. Natural Environment
Data set	Major River Basins of Victoria
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/awrc-major-river-basins-of-victoria
Date produced	Last updated 05/09/2020 – produced 01/08/2014
Data accessed	August 2020
Data type	Geospatial database
Custodian	DELWP
Publisher	DELWP
Coverage	Victoria
Frequency	Unknown

Item	Details
Report section	6. Natural Environment
Data set	Vicmap Lite: Statewide data series depicting major features, public land, vegetation, hydrology, transport and administrative data
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/vicmap-lite
Date produced	Last updated 05/09/2020 – produced 01/08/2014
Data accessed	August 2020
Data type	Geospatial database
Custodian	DELWP
Publisher	DELWP
Coverage	Victoria
Frequency	As required

Item	Details
Report section	6. Natural Environment
Data set	1 in 100 year flood extent
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/1-in-100-year-flood-extent
Date produced	Last updated 11/4/2020 – produced 01/08/2014
Data accessed	August 2020
Data type	Geospatial database
Custodian	DELWP
Publisher	DELWP
Coverage	Victoria
Frequency	As required

Item	Details
Report section	6. Natural Environment
Data set	Flood Warning Catchment Areas
Data source	Online
Location	http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900441?template=full
Data accessed	August 2020
Data type	Geospatial database
Custodian	BOM
Publisher	BOM
Coverage	Australia
Frequency	Unknown

Item	Details
Report section	7. Built Environment
Data set	Potential Impact Reports (by LGA)
Data source	EM-COP
Location	EM-COP
Date produced	May 2020
Data accessed	July 2020
Data type	Geospatial database
Custodian	EMV
Publisher	EMV
Coverage	Victoria

Frequency	As required

Item	Details
Report section	7. Built Environment
Data set	FOI – Point – Vicmap Features of Interest
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
Date produced	Last updated 28/05/2020 – produced 1/05/2009
Data accessed	July 2020
Data type	Geospatial database
Custodian	DELWP
Publisher	DELWP
Coverage	Victoria
Frequency	As required

Item	Details
Report section	7. Built Environment
Data set	Electricity
Data source	Online
Location	https://data.gov.au/dataset/ds-aurin-aurin%3Adatasource-AU_Govt_GA-UoM_AURIN_DB_national_major_power_stations_2016/details?g=Major%20Power%20Stations
Date produced	Last updated December 2016
Data accessed	August 2020
Data type	Geospatial database
Custodian	Australian Government
Publisher	Australian Government
Coverage	Australia
Frequency	As required

Item	Details
Report section	7. Built Environment
Data set	PTV Public Transport
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/public-transport-a-collection-of-ptv-datasets
Date produced	Last updated 30/1/2020 – produced 07/06/2012
Data accessed	09/05/2020
Data type	Geospatial database
Custodian	Public Transport Victoria
Publisher	Public Transport Victoria
Coverage	Victoria
Frequency	Quarterly

Item	Details
Report section	7. Built Environment
Data set	Roads
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/road-network-vicmap-transport
Date produced	Last updated 05/09/2020 – produced 1/08/2014
Data accessed	August 2020
Data type	Geospatial database

Custodian	DELWP
Publisher	DELWP
Coverage	Victoria
Frequency	As required

Item	Details
Report section	7. Built Environment
Data set	EPA Victoria Landfill Register
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/epa-victoria-victorian-landfill-register-vlr-location-polygons
Date produced	11/01/2020
Data accessed	09/05/2020
Data type	Geospatial database
Custodian	EPA
Publisher	EPA
Coverage	Victoria
Frequency	As required

Item	Details
Report section	7. Built Environment
Data set	Emergency Services
Data source	Ambulance Victoria Data Sets
Location	https://www.ambulance.vic.gov.au/ambulance-victoria-data-sets/
Data accessed	August 2020
Data type	Database
Custodian	AV
Publisher	AV
Coverage	Victoria
Frequency	Annually

Item	Details
Report section	8. Social Environment
Data set	Population
Data source	Australian Bureau of Statistics
Location	https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02018-19?OpenDocument
Data accessed	August 2020
Data type	Database
Custodian	ABS
Publisher	ABS
Coverage	Australia
Frequency	As needed – next issue expected for release on 30/03/2021

Item	Details
Report section	8. Social Environment
Data set	Hospital locations
Data source	Online
Location	http://data-dhs.opendata.arcgis.com/datasets/5000b3c446ed419eb590baa3832eb8f7_0
Date produced	Last updated 20/11/2019 – produced 28/07/2016
Data accessed	09/05/2020
Data type	Spatial

Custodian	DHHS
Publisher	DHHS
Coverage	Victoria
Frequency	Unknown

Item	Details
Report section	8. Social Environment
Data set	School enrolments
Data source	Online
Location	https://www.education.vic.gov.au/about/department/Pages/factsandfigures.aspx
Date produced	Last updated 01/07/2019 – produced 01/01/2010
Data accessed	16/06/2020
Data type	Spreadsheet
Custodian	DET
Publisher	DET
Coverage	Victoria
Frequency	Six-monthly

Item	Details
Report section	8. Social Environment
Data set	Aged Care
Data source	Online
Location	https://www.gen-agedcaredata.gov.au/Resources/Access-data/2020/March/GEN-data-People-using-aged-care
Date produced	Last updated 03/03/2020
Data accessed	August 2020
Data type	Spreadsheet
Custodian	Australian Institute of Health and Welfare
Publisher	GEN Aged Care Data
Coverage	Australia
Frequency	Unknown

Item	Details
Report section	8. Social Environment
Data set	Areas of Aboriginal cultural heritage sensitivity
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/areas-of-cultural-heritage-sensitivity
Date produced	Last updated 11/07/2020 – produced 23/05/2018
Data accessed	06/08/2020
Data type	Shapefile
Custodian	DPC
Publisher	DPC
Coverage	Victoria
Frequency	Quarterly

Item	Details
Report section	8. Social Environment
Data set	Victorian Heritage Register
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/victorian-heritage-register
Date produced	Last updated 05/09/2020 – produced 11/05/2016

Data accessed	06/08/2020
Data type	Geospatial database
Custodian	DELWP
Publisher	DELWP
Coverage	Victoria
Frequency	Fortnightly

Item	**Details**
Report section	8. Social Environment
Data set	Areas of Cultural Heritage Sensitivity
Data source	Online
Location	https://discover.data.vic.gov.au/dataset/areas-of-cultural-heritage-sensitivity
Date produced	Last updated 18/05/2020 – produced 20/06/2019
Data accessed	06/08/2020
Data type	Geospatial database
Custodian	DPC
Publisher	DPC
Coverage	Victoria
Frequency	Quarterly

Item	**Details**
Report section	Natural Environment
Data set	Climate average maps reference period 1961 - 1990
Data source	Online
Location	http://www.bom.gov.au/climate/averages/maps.shtml
Data accessed	1/07/2020
Data type	ASCII grid
Custodian	Bureau of Meteorology
Publisher	Bureau of Meteorology
Coverage	Victoria
Frequency	Fortnightly

12. List of Abbreviations

Table 61. List of Abbreviations

Acronym	Description
ABC	Australian Broadcasting Corporation
ABS	Australian Bureau of Statistics
ACHRIS	Aboriginal Cultural Heritage Register and Information System
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
ARI	Average Reference Interval
BOM	Bureau of Meteorology
CFA	Country Fire Authority
CMA	Catchment Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAWE	Department of Agriculture, Water and the Environment
DELWP	Department of Environment, Land, Water and Planning (VIC)
DET	Department of Education and Training (VIC)
DHHS	Department of Health and Human Services (VIC)
DISER	Department of Industry, Science, Energy and Resources
DJPR	Department of Jobs, Precincts and Regions (VIC)
DOT	Department of Transport
DTF	Department of Treasury and Finance
EMLA	Emergency Management Legislation Amendment
EMV	Emergency Management Victoria
EPA	Environment Protection Authority
FDP	Fire Danger Period
FFMV	Forest Fire Management Victoria
GRP	Gross Regional Product
ICC	Incident Control Centre
ICU	Intensive Care Unit
IFD	Intensity-Frequency-Duration
LGA	Local Government Area
MEMP	Municipal Emergency Management Plan
NWMR	North West Metro Region
PTV	Public Transport Victoria
RCC	Regional Control Centre
REMP	Regional Emergency Management Plan
REMPC	Regional Emergency Management Planning Committee
SCC	State Control Centre
SEIFA	Socio-Economic Indexes for Areas
SEMP	State Emergency Management Plan
SES	State Emergency Service (VIC)
SLS	Surf Life Saving (VIC)
SSIP	State Significant Industrial Precinct

13. Document information

Document details

Criteria	Details
Document title:	Environmental Scan Report: Hume Region
Document owner:	Information Management and Intelligence Team, EMV

Version control

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0.1	14/05/2020	Initial template created	C. Jolly
0.2	10/07/2020	First draft	B. McIntosh
0.3	27/07/2020	Second Draft	C. Murphy
0.4	05/08/2020	Third Draft	M. Frew
1.0	06/08/2020	Draft for initial consultation	C. Jolly
1.1	06/09/2020	Updated based on feedback from IREMPCs	M. Frew, M. Brereton, W. Stephenson, M. Slavtcheva, C. Jolly
1.2	9/09/2020	Proof reading	J. Kaye, T. Penfold
2.0	14/09/2020	Final release	C. Jolly

Document approval

This document requires the following approval:

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