Environmental Scan Report

Gippsland 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.

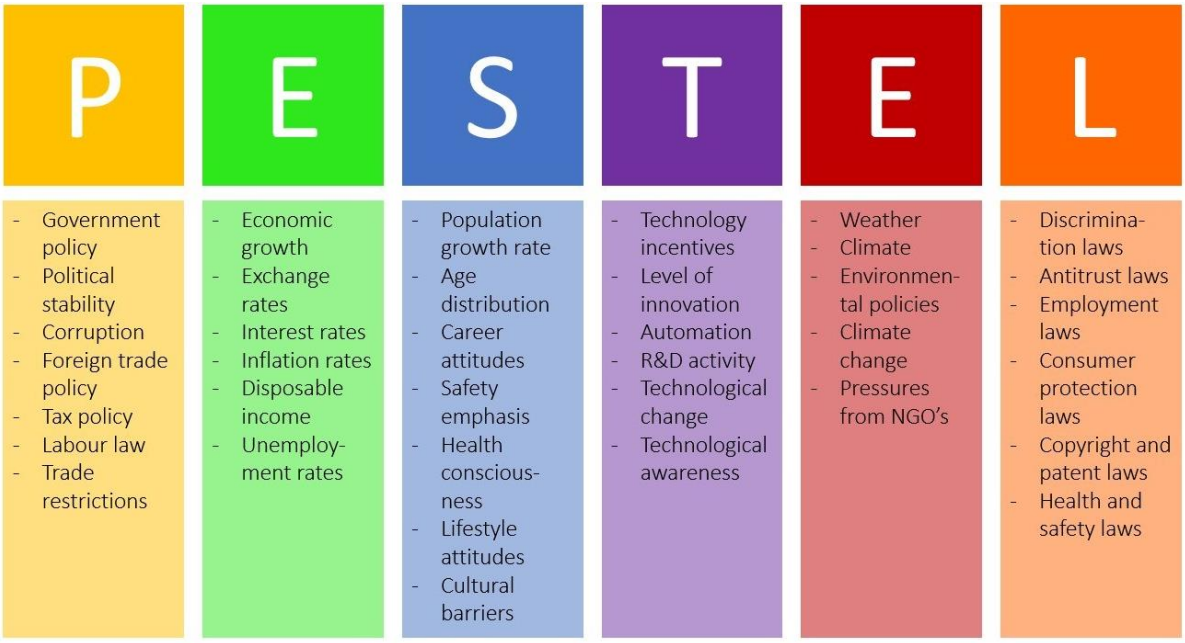


Figure 1. PESTEL analysis[1]

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 Gippsland Region includes the traditional lands of the Gunaikurnai people[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

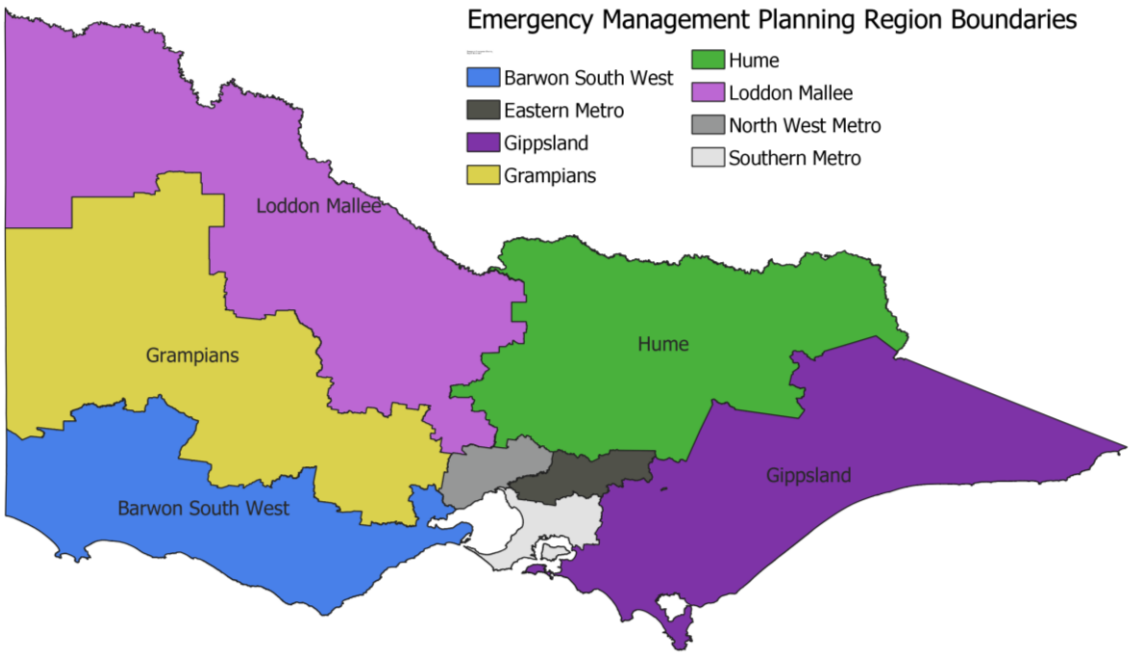


Figure 2. Victorian Emergency Management Regions

The Gippsland Region shares boundaries with the Hume, Eastern and Southern Metropolitan Regions. It covers 41,373 square kilometres (18% of Victoria) and includes 6 local government areas (LGAs).

Figure 3. Gippsland Region including LGA boundaries[3]

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

The LGAs located within the Gippsland Region, and their corresponding populations, are:

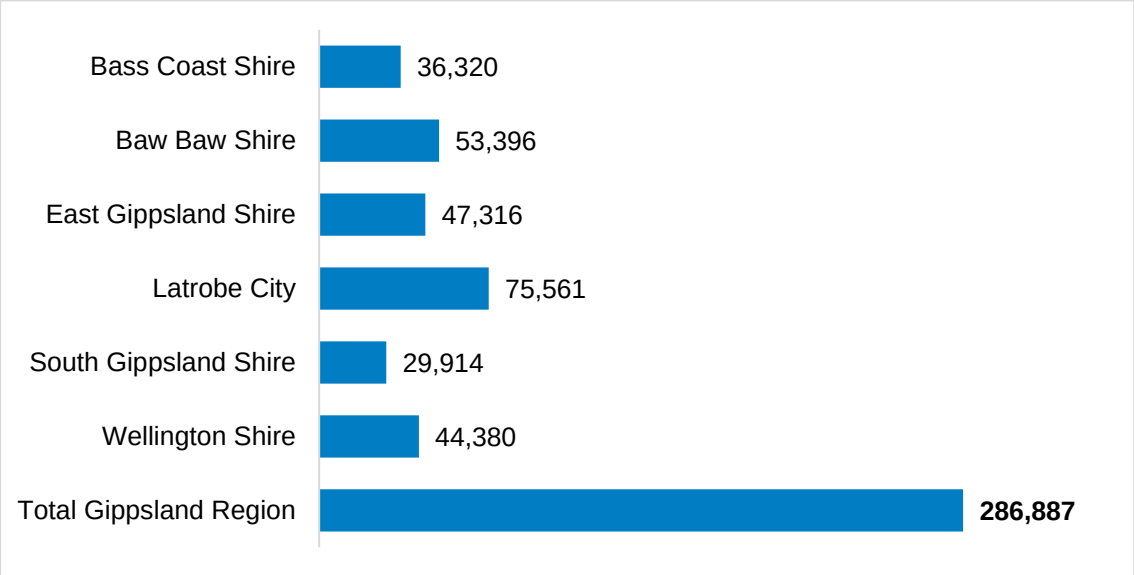


Figure 4. Gippsland Region population by LGA (2019) [4]

The Gippsland Region extends from its western edge in the East Gippsland LGA to the fringe of Melbourne, while the eastern part forms the southern extent of the Australian seaboard. Latrobe City functions as the regional hub, with the large population centres of Moe, Morwell and Traralgon.

Gippsland is one of the five regions which borders metropolitan Melbourne, with some areas in the west 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 there are fewer development pressures, with land use predominantly dedicated to national parks and smaller towns.

6. Natural Environment

The Gippsland Region combines a broad variety of natural and environmental assets, including alpine and mountainous regions, forested land, woodlands and coastal towns. Nearly 60% of the land in the Gippsland Region is parkland and thus protected as either state or national parks. Many of these natural assets are important tourist attractions, including the Alpine and High Country areas, Gippsland Lakes Area, Wilsons Promontory National Park, Phillip Island and Croajingolong National Park.

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

6.1 Climate

6.1.1 Average Temperatures

In the Gippsland Region summers are mild to warm, with average maximum temperatures of between 21° and 25°.[5] In winter, average maximum temperatures are between 12° and 15° near the coast, while it is cooler further inland in the foothills and cold in the mountains with frequent frosts and snow.[6]

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 Gippsland Region[7]

LGA	Summer (°C)		Winter (°C)	
	Max	Min	Max	Min
Bass Coast Shire	23.2	13.5	13.8	7.0
Baw Baw Shire	23.8	11.0	11.3	3.6
East Gippsland Shire	23.4	11.0	11.9	2.0
Latrobe City	23.6	11.6	12.2	3.9
South Gippsland Shire	22.7	12.1	12.7	5.3
Wellington Shire	23.6	11.2	11.7	3.1
Average	**23.4**	**11.7**	**12.3**	**4.2**

6.1.2 Rainfall

Average annual rainfall in the Gippsland Region is comparatively high, though varies across the region – the southern side of the Great Dividing Range, the Strzelecki Ranges and the eastern and south-western parks of the region receive average annual rainfall of between 1,000 and 1,600mm per year, which falls as snow on the higher peaks in winter.[8] In the central part of the region rainfall decreases to below 600mm per year, due to the rain shadow of Wilsons Promontory and the Strzelecki Ranges.

5 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf
6 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf
7 BOM (2020): http://www.bom.gov.au/climate/averages/maps.shtml
8 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf

Table 2. Annual and seasonal average rainfalls for Gippsland Region[9]

LGA	Mean Rainfall (mm)				
	Annual	Summer	Autumn	Winter	Spring
Bass Coast Shire	899.3	151.7	238.1	276.8	232.7
Baw Baw Shire	1,135.6	209.0	272.8	327.3	326.4
East Gippsland Shire	940.4	204.5	229.9	244.0	262.0
Latrobe City	892.7	171.4	220.0	249.5	251.7
South Gippsland Shire	1,016.7	169.2	263.9	314.6	268.9
Wellington Shire	837.0	171.4	212.9	223.3	229.4
Average	**953.6**	**179.5**	**239.6**	**272.6**	**261.9**

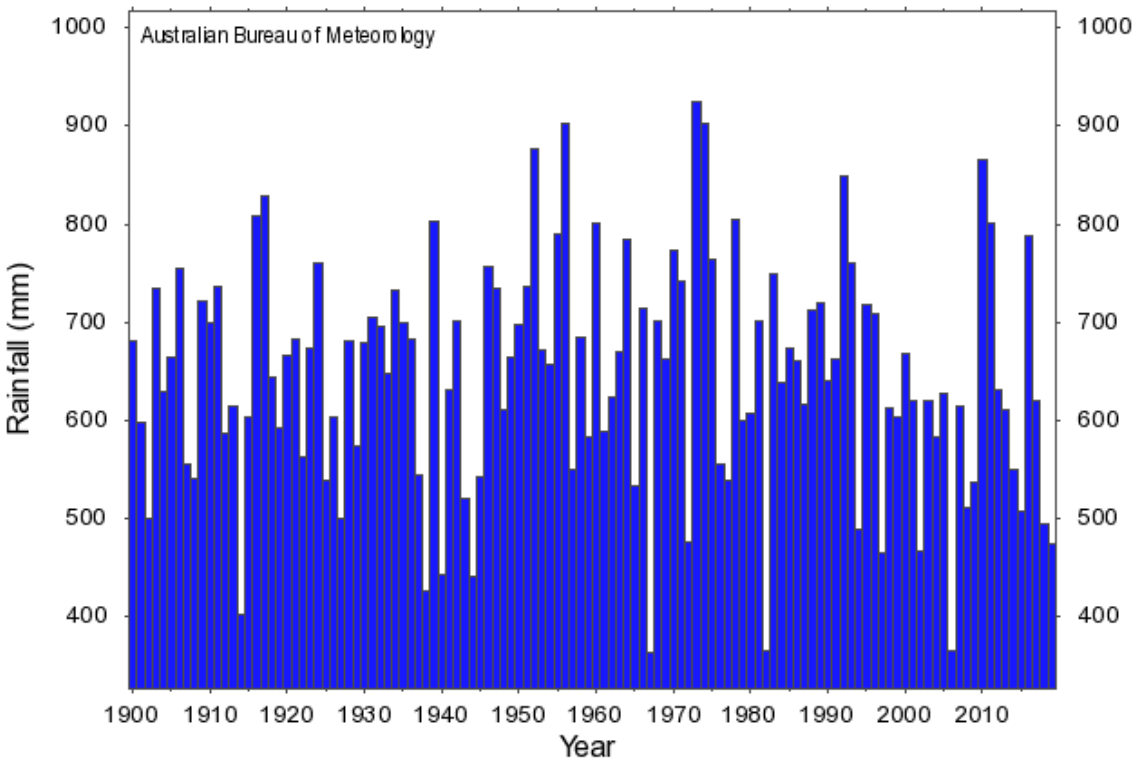


Figure 5. Annual rainfall Victoria (1900 to 2019)[10]

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

9 BOM (2020): http://www.bom.gov.au/climate/averages/maps.shtml
10 Bureau of Meteorology
http://www.bom.gov.au/climate/change/index.shtml#tabs=Trackerandtracker=timeseriesandtQ=graph%3Drain%26area%3Dvic%26season%3D0112%26ave_yr%3D0

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.[11] 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 3. Gippsland Design 5 rainfalls by LGA – 5 min[12] [13]

LGA	5 min 10% AEP (mm)				5 min 1% AEP (mm)			
	Mean	Min	Max	Range	Mean	Min	Max	Range
Bass Coast Shire	8.7	7.9	9.4	1.4	13.3	12.2	14.6	2.4
Baw Baw Shire	8.9	7.8	10.3	2.5	14.0	12.1	17.6	5.6
East Gippsland Shire	10.2	8.1	12.6	4.4	16.5	13.0	20.7	7.7
Latrobe City	9.0	8.1	10.4	2.4	14.9	13.0	18.2	5.2
South Gippsland Shire	8.1	7.7	9.1	1.5	12.7	11.7	14.5	2.8
Wellington Shire	9.5	8.3	10.9	2.6	15.9	12.4	19.7	7.3

Table 4. Gippsland Design rainfalls by LGA – 1hr [14] [15]

LGA	1hr 10% AEP (mm)				1hr 1% AEP (mm)			
	Mean	Min	Max	Range	Mean	Min	Max	Range
Bass Coast Shire	27.8	25.5	30.1	4.5	42.7	39.6	47.0	7.4
Baw Baw Shire	28.2	24.6	32.9	8.3	44.3	38.3	56.4	18.1
East Gippsland Shire	32.1	25.1	41.0	15.9	51.5	40.7	67.1	26.4
Latrobe City	28.7	25.7	33.2	7.6	47.6	41.5	58.4	16.9
South Gippsland Shire	26.4	24.5	30.0	5.5	41.7	38.1	48.2	10.1
Wellington Shire	30.1	26.5	34.7	8.3	50.6	40.1	63.0	22.9

11 Further values can be obtained from: http://www.bom.gov.au/water/designRainfalls/revised-ifd/
12 BOM (2016): http://www.bom.gov.au/water/designRainfalls/revised-ifd/
13 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
14 BOM (2016): http://www.bom.gov.au/water/designRainfalls/revised-ifd/
15 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. Gippsland Design rainfalls by LGA – 1 Day [16] [17]

LGA	1 day 10% AEP (mm)				1 day 1% AEP (mm)			
	Mean	Min	Max	Range	Mean	Min	Max	Range
Bass Coast Shire	76.6	71.5	88.0	16.5	125.2	115.5	145.1	29.7
Baw Baw Shire	101.0	72.6	156.0	83.4	167.1	121.4	242.6	121.2
East Gippsland Shire	120.6	78.4	170.5	92.1	190.9	113.2	284.1	170.9
Latrobe City	90.7	70.6	156.4	85.8	151.2	117.4	262.9	145.5
South Gippsland Shire	84.1	71.2	129.0	57.8	139.7	117.3	214.4	97.1
Wellington Shire	106.4	75.9	156.2	80.3	170.0	122.9	261.8	138.9

For the Gippsland Region, there is little variation in the shorter duration events which are generally driven by convective activity apart from East Gippsland Shire. Statistical analysis shows that that patterns of heavy rainfall from these storm events are similar across the other regions. 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 regions with variable topography experience higher rainfall.

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 heavy rainfall patterns have a high natural variability and some sites are seeing a larger increase in heavy rainfall for shorter duration events that may increase the risk of flash flooding.[18]

For the Gippsland 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.[19]

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 west and wetter around the elevated areas.

16 BOM (2016): http://www.bom.gov.au/water/designRainfalls/revised-ifd/
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
18 BOM (2020): http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml
19 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0018/60741/Grampians.pdf

Table 6. Rain Days >5mm by LGA[20] [21]

LGA	Rain Days >5mm (days)			
	Mean	Max	Min	Range
Bass Coast Shire	63	61	66	5
Baw Baw Shire	73	55	96	41
East Gippsland Shire	46	37	77	40
Latrobe City	59	46	73	27
South Gippsland Shire	64	52	73	21
Wellington Shire	53	35	92	57
Gippsland Average	**59.7**	**47.7**	**79.5**	**31.8**

6.1.3 Climate Change

The Gippsland 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:[22]

- Temperatures to continue to increase year-round;
- More frequent and intense downpours;
- Less rainfall in winter and spring;
- Fewer frosts;
- More hot days and warm spells;
- Harsher fire weather and longer fire seasons;
- Increased frequency and height of extreme sea level events;
- Warmer and more acidic oceans; and
- Rising sea level.

By 2050, as a result of these changes, the climate of Traralgon and Moe are expected to be more like the climate of Tenterfield currently, while the climate of Wonthaggi will be more like the current climate of Lakes Entrance.[23]

20 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.

21 BOM (2016): http://www.bom.gov.au/jsp/ncc/climate_averages/raindays/index.jsp?period=anandproduct=5mm#maps

22 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf

23 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf

Figure 6. Gippsland climate in 2050[24]

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:[25]

Primary production

The impacts on primary production are likely to be acutely felt in the Gippsland Region, where agribusiness is a significant employer and economic driver. Coupled with significant dairy, grazing and horticultural industries, the region and its sectors are highly sensitive to a reduction in water supply. Intensive animal industries will also need to provide increased protection for stock from extreme temperatures.

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 also be increasingly exposed to periodic flooding and increased landslips, while long hot spells will weaken road surfaces and increase maintenance costs. Sea level rise in coastal communities will also present significant challenges, with up to 78% of the Gippsland coast subject to coastal erosion.

24 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf
25 DELWP (2015): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf

Health and community

An ageing population, coupled with high rates of obesity, chronic disease, disability and high-risk health 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

Changes in climate may affect tourism through reduced snow cover, harsher fire weather and warmer conditions. 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.

Environment

The region's environment is under threat from warmer and drier conditions, with reduced stream flows, more severe droughts, extreme weather events and harsher fire weather all contributing to reduced ecosystem health. A loss of biodiversity due to climate change will increase pressure on social and economic wellbeing in the region, which is largely dependent on nature-based tourism and a healthy environment.

6.2 Land Use

Land use in the Gippsland Region is dominated by parkland, with large forested public lands and national parks, as well as natural water courses and floodplains.[26] These natural assets are supportive of the strong tourism industry with key sites such as Gippsland Lakes, Phillip Island, Wilsons Promontory, far east Gippsland and the alpine country including Mt Baw Baw Alpine Resourt.

Land use across other parts of the region is more varied, with the Latrobe Valley being strongly associated with and possessing the majority of Victoria's coal reserves, and the eastern part of Gippsland containing vast timber resources which support commercial forestry. The region is also a significant commercial and recreational fishing centre.

Victoria's forestry and wood products industry are one of Australia's largest. In Victoria, it accounts for 9 million cubic metres or 27.5% of Australia's log harvest volume.[27] It accounts for approximately $7.3 billion or 31% of Australia's forest product manufacturing sales and service income.[28] [29] Forestry is a key component of Gippsland Region's economic growth and a key driver in employment. Gippsland is home to approximately 6,170 businesses in the agriculture, forestry and fishing industries, creating a total of 9,129 jobs for the region.[30]

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

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

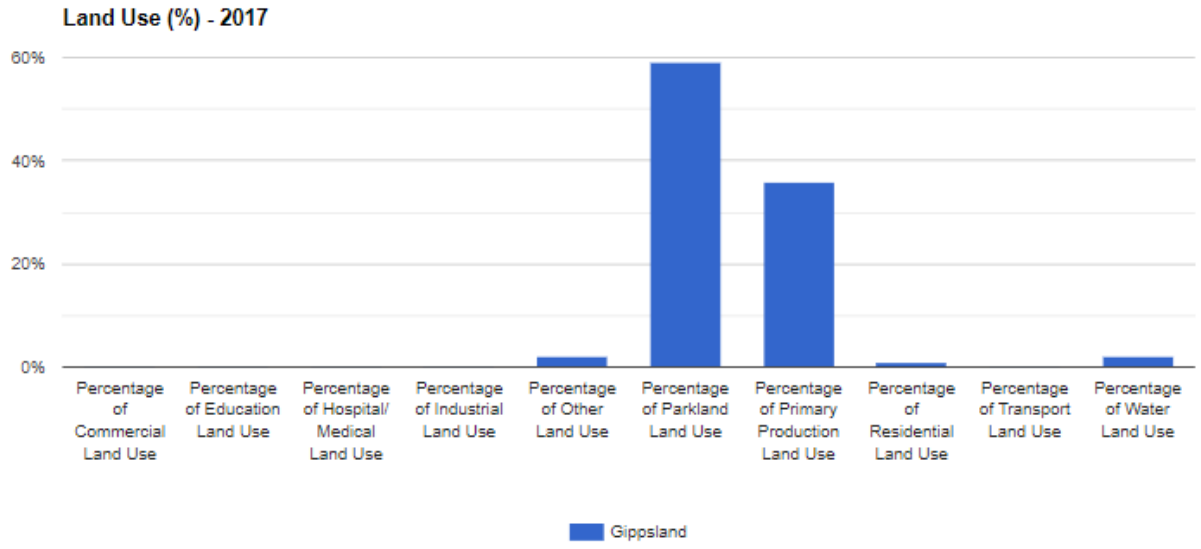
28 DJPR (2020) https://djpr.vic.gov.au/__data/assets/pdf_file/0008/1924811/DJPR-Inclusion-Forestry-Plan-1.pdf

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

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

Table 7. Land usage by type across the Gippsland Region (2017)[31]

Land Use Type	Area (km²)	% Area
Parkland	24,535	*59.0%*
Primary Production	15,072	*36.3%*
Other	1,051	*2.5%*
Residential	416	*1.0%*
Water	416	*1.0%*
Industrial	54	*0.1%*
Commercial	12	*0.0%*
Transport	0	*0.0%*
Education	0	*0.0%*
Hospital/Medical	0	*0.0%*
Total	**41,373**	***100.0%***



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

Figure 7. Land use across Gippsland Region (2017)

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

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

Table 8. State and National Parks in Gippsland Region[32]

LGA	State and National Parks
Bass Coast Shire	Bunurong Marine National Park, Churchill Island Marine National Park, Philip Island Nature Reserve
Baw Baw Shire	Baw Baw National Park, Bunyip State Park (part), Moondarra State Park, Mount Worth State Park, Tyers Park, Tanjil State Forest, Mt Baw Baw Alpine Resort.
East Gippsland Shire	Alfred, Alpine, Coopracambra, Croajingalong, Errindurra, Lind, Mitchell River, Snowy River and Lakes National Parks
Latrobe City	N/A
South Gippsland Shire	Wilsons Promontory National Park, Cape Liptrap Coastal Park
Wellington Shire	Tarra-Bulga National Park, Won Wron State Park, Gelliondale State Forest, Stony State Forest, Glenmaggie State Forest, Ben Cruachan State Forest, Mt Useful State Forest, Valencia State Forest, Freestone State Forest, Carey State Forest, Birregun State Forest

6.3 Bushfire Risk

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

There are many high bushfire hazard areas which intersect with settlements and areas that are experiencing rural residential and tourism expansion.[33]

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.[34]

Smoke from fires, including from planned burns, can also be a hazard within the Gippsland 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.[35]

The 2019/20 bushfire season saw large areas of East Gippsland affected by bushfire over a prolonged period of time. In January 2020, smoke from these bushfires (and from New South Wales) rendered Melbourne's air quality the worst in the world[36] with the smoke haze estimated to cost the cities of Melbourne, Sydney and Canberra over $500 million.[37]

32 https://profile.id.com.au/
33 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0026/94544/Gippsland-Regional-Growth-Plan-May-2014.pdf
34 FFMV (2020): https://www.ffm.vic.gov.au/permits-and-regulations/fire-restriction-dates
35 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
36 The Guardian (2020): https://www.theguardian.com/australia-news/2020/jan/14/melbourne-choked-by-hazardous-smoke-as-bushfires-continue-to-burn-across-victoria
37 City of Melbourne (2020): https://www.melbourne.vic.gov.au/about-council/vision-goals/eco-city/Pages/adapting-to-climate-change.aspx

6.3.1 Bushfire prone areas

Bushfire prone areas are subject to or likely to be subject to bushfires, and to which specific bushfire construction standards apply.[38] Nearly all of the land in the Gippsland Region is a designated bushfire area.

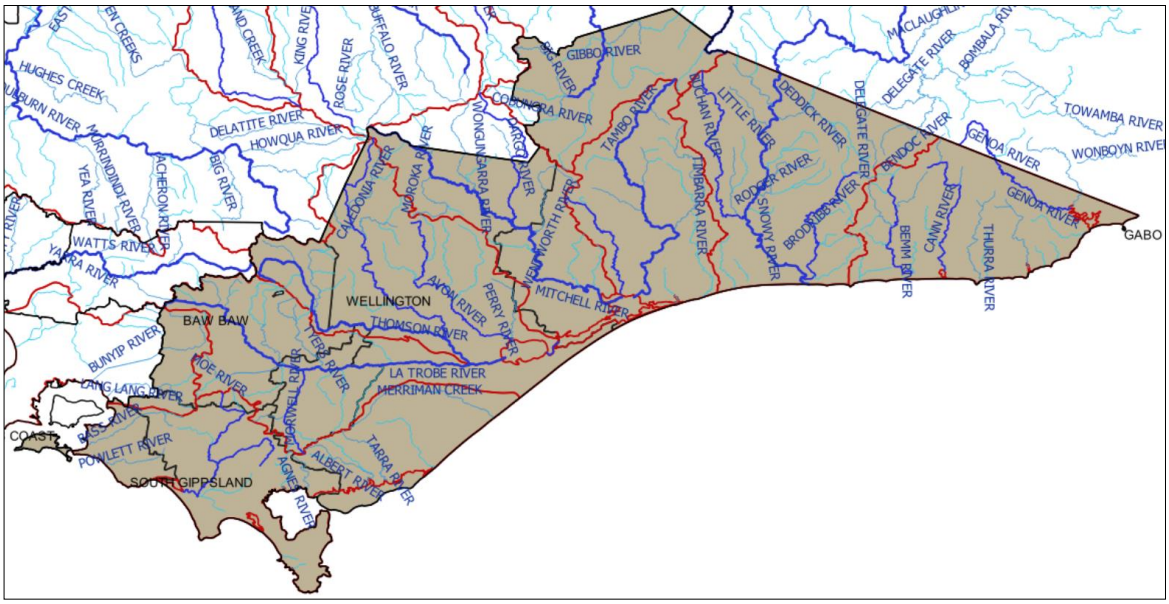
Table 9. Bushfire Risk for Gippsland Region by LGA[39]

LGA	Bushfire Prone Area (km^2)[40]	Total Area (km^2)[41]	% Area Bushfire Prone	Plan Number
Bass Coast Shire	833	866	96.2%	LEGL./20-099
Baw Baw Shire	4,003	4,028	99.4%	LEGL./20-100
East Gippsland Shire	20,619	20,940	98.5%	LEGL./19-144
Latrobe City	1,384	1,426	97.1%	LEGL./20-108
South Gippsland Shire	3,255	3,296	98.8%	LEGL./19-222
Wellington Shire	10,686	10,817	98.8%	LEGL./19-225
Gippsland Total	**40,780**	**41,373**	**98.6%**	

6.4 Waterways

The Gippsland Region has a number of key waterways and related assets along its 700km of coastline, including Western Port, Wilsons Promontory, Corner Inlet, Ninety Mile Beach and the waterways of the Gippsland Lakes. The Gippsland Lakes and adjoining wetlands occupy approximately 600 square kilometres in a catchment that comprises almost 10% of the land area of Victoria. The region also contains all or part of 13 significant river catchments – the Genoa, Thurra, Cann, Snowy, Tambo, Nicholson, Mitchell, Avon, Thomson, Latrobe, Tarwin, Bass and Bunyip rivers. Of these, there are nine heritage rivers and numerous nationally and internationally significant wetlands.

38 DELWP (2020): https://www.planning.vic.gov.au/policy-and-strategy/bushfire-protection/building-in-bushfire-prone-areas
39 DELWP (2020): https://discover.data.vic.gov.au/dataset/designated-bushfire-prone-area-bpa
40 DELWP (2020): https://discover.data.vic.gov.au/dataset/designated-bushfire-prone-area-bpa
41 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart



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

Figure 8. Natural waterways in the Gippsland Region[42] [43]

Natural waterways across the Gippsland Region are in better condition than waterways in the west of Victoria, with the Mitchell River, Snowy River and East Gippsland basins rated as having the best waterway condition in Victoria, as shown in the figure below.[44]

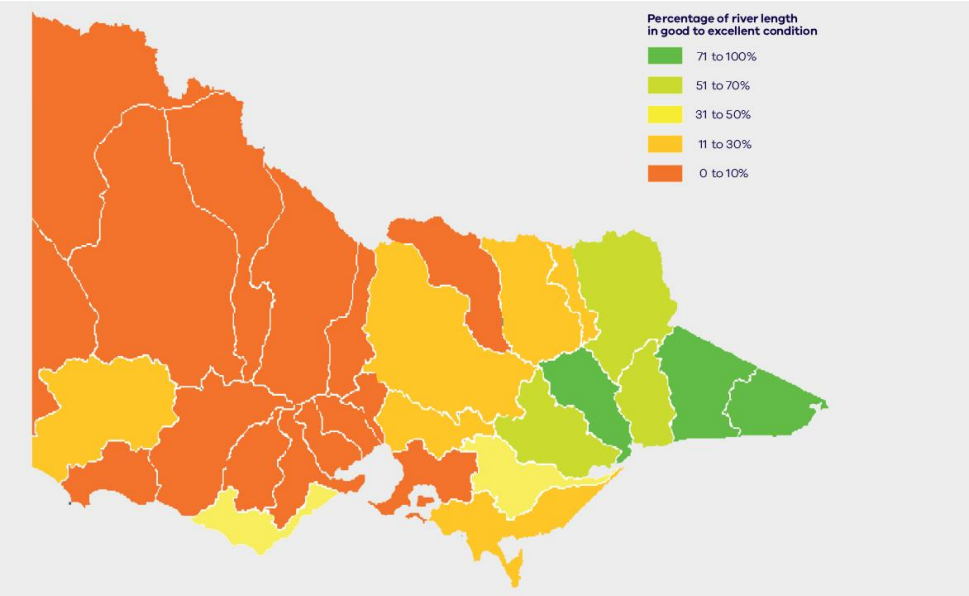


Figure 9. River length condition for Victoria[45]

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

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

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

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

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.[46]

Table 10. Managed waterways across the Gippsland Region[47]

LGA	Number of Waterways	Waterway Name	Appointed Waterway Manager
Baw Baw Shire	1	Blue Rock Lake	Gippsland and Southern Rural Water Corporation
East Gippsland Shire	9	Bemm River within the Shire of East Gippsland	East Gippsland Council
		Mueller Inlet within the Croajingolong National Park	DELWP
		Sydenham Inlet	DELWP
		Tamboon Inlet	DELWP
		Wingan Inlet within the Croajingolong National Park	DELWP
		Local Port of Gippsland Lakes	Gippsland Ports Committee of Management
		Local Port of Snowy River	
		Local Port of Mallacoota	
		Lake Tyers	
Latrobe City	2	Lake Narracan	Latrobe City
		Hazelwood Cooling Pond	Latrobe City
South Gippsland Shire	5	Waters within Wilsons Promontory National Park	DELWP
		Bass Strait – South Gippsland – Cape Liptrap	Director, Transport Safety Victoria
		Local Port of Anderson Inlet	Gippsland Ports Committee of Management
		Local Port of Corner Inlet and Port Albert	
		Shallow Inlet	
Wellington Shire	3	Lake Reeve	DELWP
		Cowwarr Weir	Southern Rural Water Corporation
		Lake Glenmaggie	Southern Rural Water Corporation
Total	**20**		

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

46 DOT (2020): https://transportsafety.vic.gov.au/maritime-safety/ports-and-waterways
47 DOT (2020): https://transportsafety.vic.gov.au/maritime-safety/ports-and-waterways/waterway-managers

6.4.1 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.[48] 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.

Riverine and coastal floods represent significant threats in the Gippsland Region, with urban and agricultural development having occurred on floodplains which lie at the bottom of narrow mountain valleys.[49] Similarly, much urban development has occurred around the coast, coastal lakes, inlets and estuaries which are at risk of storm surge.

Flood management guidelines, including prevention, response and recovery activities, are provided in the *State Emergency Response Plan Flood Sub-Plan*, published in 2016. [50] This strategy relies on the combined efforts of various agencies including local government, SES, Catchment Management Authorities and community partnerships.[51]

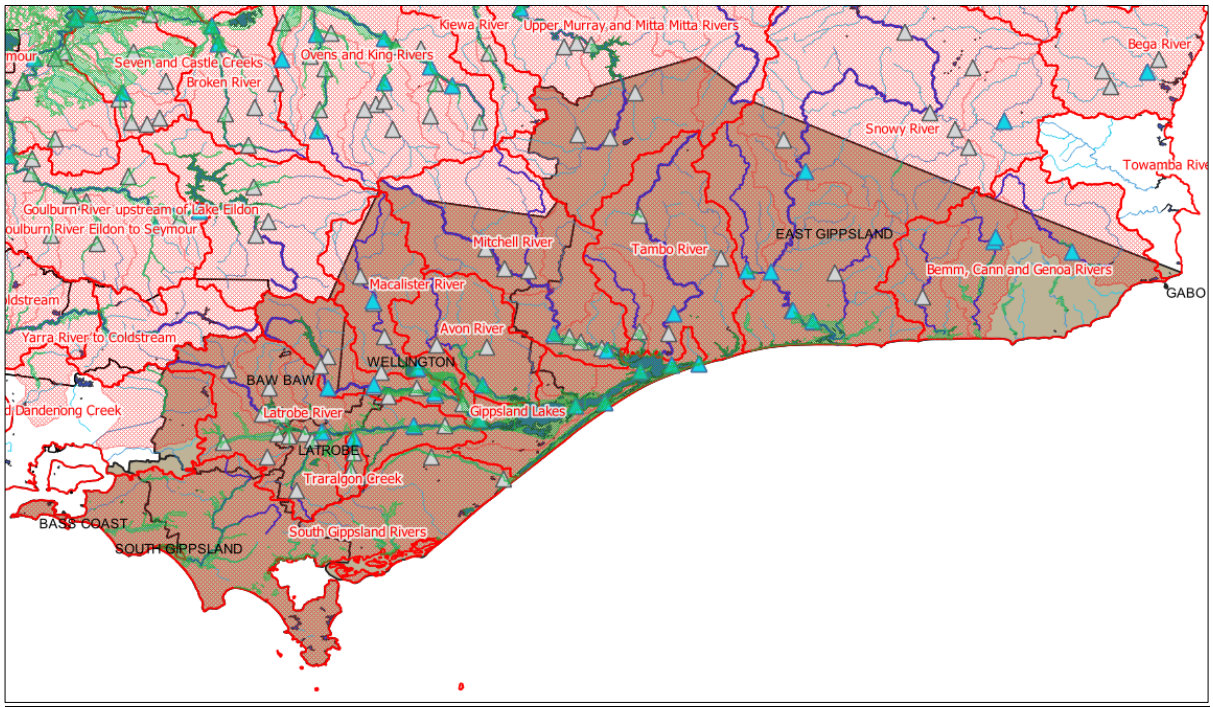
The Bureau of Meteorology is responsible for providing a flood warning service for riverine flooding resulting from heavy rainfall in Victoria in cooperation with other government, water and emergency management agencies[52]. The coverage of this flood warning service is shown in Figure 10 with both the Flood Watch and Flood Warning catchment shown. The products from the Service Level Specification that cover the catchments in Gippsland Region are listed in Table 11.The river observations sites when flood levels are defined are shown as blue triangles and are shown in Figure 10.

48 Flood Victoria (2020): https://www.floodvictoria.vic.gov.au/
49 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0026/94544/Gippsland-Regional-Growth-Plan-May-2014.pdf
50 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
51 DELWP (2016): https://www.water.vic.gov.au/managing-floodplains/new-victorian-floodplain-management-strategy
52 http://www.bom.gov.au/water/floods/document/National_Arrangements_V4.pdf

Table 11. Flood Warning products and Flood Warning Locations in Gippsland Region[53]

Product	Warning Area	Site	Minor	Moderate	Major
IDV36110	Flood Warning for the Cann and Genoa	Cann River (East) at Chandlers Creek	2.0	2.3	2.8
		Cann River (West) at Weeragua	3.0	3.5	4.0
		Genoa River at The Gorge	2.2	2.9	3.5
IDV36120	Flood Warning for the Snowy Flood Warning for the Buchan	Snowy River at McKillops Bridge	2.5	6.0	8.0
		Snowy River D/S Basin Ck	3.5	5.5	6.6
		Buchan River at Buchan	2.5	3.5	4.0
		Snowy River at Jarrahmond	4.1	6.2	7.4
		Snowy River at Orbost	4.2	6.0	7.0
IDV36130	Flood Warning for the Tambo River	Tambo River D/S Ramrod Creek	4.1	6.9	10.0
IDV36140	Flood Warning for the Mitchell River	Mitchell River at Glenaladale	3.0	4.5	5.5
		Mitchell River at Bairnsdale	4.0	5.5	6.5
IDV36205	Flood Warning for the Gippsland Lakes	McLennans Strait at Hollands Landing	0.7	-	0.9
		Loch Sport Marina	0.9	-	1.4
		McMillan Strait at Paynesville	0.7	-	1.3
		Metung Marina	0.8	-	1.9
		Cunningham Arm at Bullock Island (Lakes Entrance)	0.9	-	1.3
IDV36210	Flood Warning for the Avon River	Avon River at Stratford	4.5	6.0	6.5
IDV36220	Flood Warning for the Macalister River	Macalister River at Licola	2.7	3.2	3.6
		Macalister River D/S Lake Glenmaggie	2.4	4.3	5.4
IDV36230	Flood Warning for the Thomson River	Thomson River at Cooper Ck	2.3	3.5	5.0
		Thomson River at Wandocka	6.2	6.5	6.7
		Thomson River at Sale Wharf	2.4	3.0	4.0
		Thomson River U/S Cowwarr Weir	3.7	4.5	5.5
IDV36240	Flood Warning for the Latrobe River Flood Warning for the Tanjil River Flood Warning for the Moe River Flood Warning for the Morwell River	Latrobe River at Rosedale (Main Stream)	4.0	4.8	5.5
		Latrobe River at Thoms Bridge	4.0	5.0	6.5
IDV36245	Flood Warning for the Traralgon Creek	Traralgon Creek at Traralgon	3.5	4.0	4.8
IDV36610	Flood Warning for the Mitta Mitta River				
IDV36330	Flood Warning for the Maribyrnong River and Jacksons Creek				

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



Red Boundaries – Bureau of Meteorology Flood Watch areas	Red Shading – Bureau of Meteorology Flood Warning Catchments
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 10. Flood warning and 1:100-year ARI inundation for Gippsland Region[54] [55] [56] [57] [58] [59]

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 10. There is a one percent chance (1% annual exceedance probability (AEP)) of these areas experiencing flooding of this level in any given year[60] based on flood modelling results from flood 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.

54 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900441?template=full
55 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900561?template=full
56 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900563?template=full
57 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900564?template=full
58 https://discover.data.vic.gov.au/dataset/1-in-100-year-flood-extent
59 Data Vic (2020): https://discover.data.vic.gov.au/dataset/vicmap-lite
60 http://arr.ga.gov.au/arr-guideline

Table 12. Areas in Gippsland Region potentially impacted by flooding inundation[61]

LGA	% included in 1:100 ARI area	Main Localities with Affected Built Up Areas
Bass Coast	*6.93%*	Inverloch
Baw Baw	*2.73%*	Warragul
East Gippsland	*3.16%*	Bairnsdale, Boole Poole, Cann River, Eagle Point, East Bairnsdale, Eastwood, Goon Nure, Kalimna, Lake Bunga, Lakes Entrance, Loch Sport, Lucknow, Marlo, Metung, Newlands Arm, Orbost, Paynesville, Raymond Island, Wy Yung
Latrobe	*8.40%*	Glengarry, Hazelwood North, Moe, Morwell, Newborough, Toongabbie, Traralgon, Yinnar
South Gippsland	*5.71%*	Leongatha, Venus Bay
Wellington	*8.46%*	Flamingo Beach, Glomar Beach, Golden Beach, Goon Nure, Heyfield, Hollands Landing, Loch Sport, Maffra, Port Albert, Rosedale, Sale, Seaspray, Stratford

6.5 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 eastern side of Victoria experienced volcanic activity significantly earlier than in the west. [62] 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.[63]

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

62 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

63 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

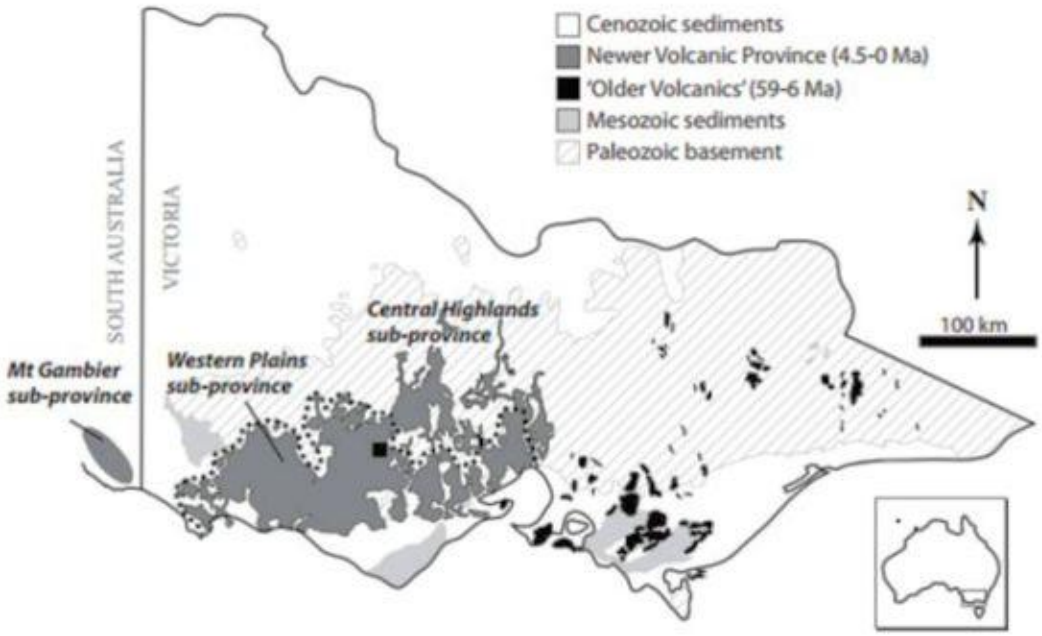


Figure 11 Map of Victoria with Volcanic overlay[64]

On average, there are approximately 100 earthquakes in Australia per year that register above 3 magnitude.[65] As a nation, Australia experiences significantly less earthquakes than other parts of the world near tectonic boundaries, where large earthquakes occur more often. [66] 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. [67] Included below is a table that lists earthquakes in Victoria with a magnitude over 4.5 since records began with damage reported:

64 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

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

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

67 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 [68] [69]

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 Portarlington – aftershock 4.7 magnitude
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

Gippsland Region has relatively high rates of natural seismicity in comparison to the rest of the state. The region has recorded an above 5 magnitude earthquake every 15 to 25 years. The most recent was a 5.4 magnitude earthquake recorded on 19 July 2012 16km south-west of Moe. This earthquake was the strongest recorded since a 5.4 magnitude earthquake in Wonnangatta in 1984. Using Table 10 above, it is possible that the spread of urban areas is contributing to the relative increase in damage occurring with each earthquake. As urbanisation continues, another high magnitude earthquake occurring in a town centre may result in extensive damage. Historical precedent suggests that Gippsland is more susceptible to higher magnitude earthquakes and hence has a higher chance of an earthquake epicentre being located near a residential area.

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

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

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

from streams or indirectly from other aquifers.[70] 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.[71] In areas where groundwater may be replenished on a regular basis (through rainfall), extraction can be managed on a 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.[72]

Gippsland accounts for approximately 36 per cent of the total groundwater use in Victoria with close to 100GL of groundwater used annually. Since 1997, regulation and management of groundwater has increased alongside periods of low rainfall.[73] Over 90 per cent of licenses for groundwater use in Gippsland are for agribusinesses. Groundwater levels are declining across the north western and centre areas of the middle aquifers. These reserves are extensively used by agribusinesses and industrial users (including mine dewatering). Furthermore, the deeper lower aquifers and basement are currently not being recharged quicker or at the same rate as extraction.[74] There is some conjecture that there is potential sea water intrusion due to aquifer depressurisation and cross aquifer contamination due to faulty or poorly constructed bores.[75] There is mild concern that earthquakes or other environmental disasters could cause long-term consequences for the usability of groundwater in Gippsland.

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.[76] 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.[77] The minimum rainfall intensity required to extinguish a peat fire is roughly 4mm/h.[78] Gippsland has peat deposits in Wilson's Prom, near Sale, Bairnsdale, and along the east coast. 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.

70 Southern Rural Water – Groundwater Atlas (2012) http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf
71 Geology Australia (2020) https://www.ga.gov.au/scientific-topics/water/groundwater/basics/what-is-groundwater
72 Geology Australia (2020) https://www.ga.gov.au/scientific-topics/water/groundwater/basics/what-is-groundwater
73 Southern Rural Water – Groundwater Atlas (2012) http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf
74 Southern Rural Water – Groundwater Atlas (2012) http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf
75 Southern Rural Water – Groundwater Atlas (2012) http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf
76 Lin and Huang (2020) https://www.sciencedirect.com/science/article/abs/pii/S0048969720319811
77 Lin and Huang (2020) https://www.sciencedirect.com/science/article/abs/pii/S0048969720319811
78 Lin and Huang (2020) https://www.sciencedirect.com/science/article/abs/pii/S0048969720319811

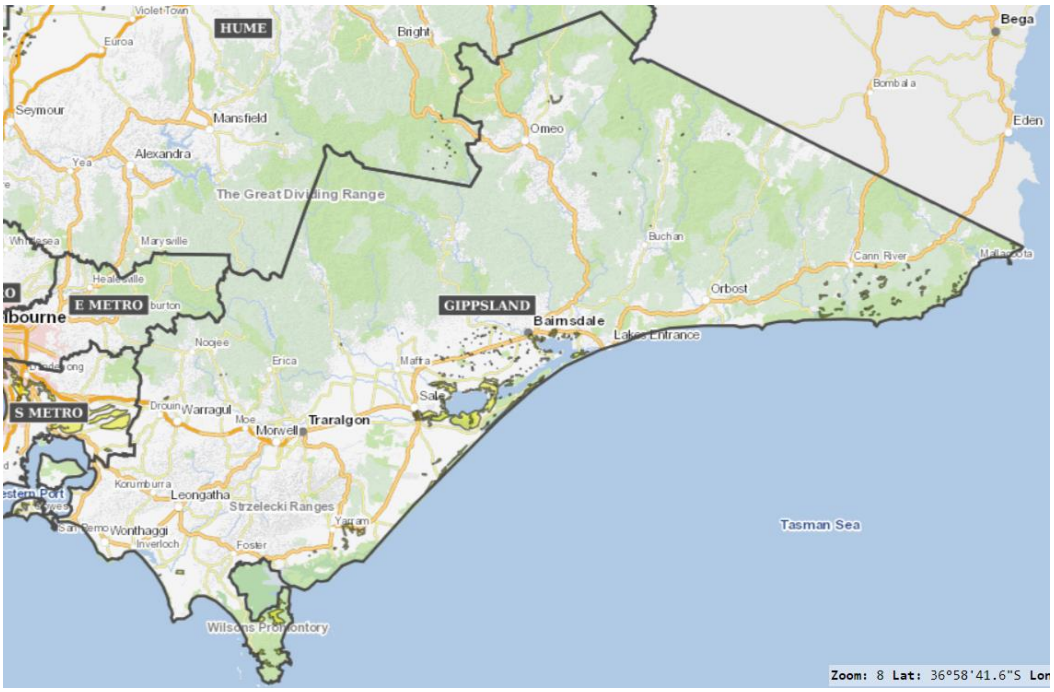


Figure 12 EM-COP layer depicting peat deposits in Gippsland[79]

6.6 Marine

Gippsland Region includes a portion of Western Port, Phillip Island and extends to the eastern border of Victoria. There is a significant length of coastline with limited access in areas and minimal safe harbours. The region has substantial commercial shipping in close proximity to the coast, commercial ports that support fishing as well as oil and gas production. This region averages approximately 200 Volunteer MSAR responses annually. Between 1880 and 2015, the sea level along Gippsland's coast rose by approximately 225mm, presenting significant risk of extreme sea level events and coastal erosion.[80] Sea surface temperatures have risen faster here than elsewhere on the Australian coastline.[81]

Local risk factors include:

- Exposed coastline to foul weather
- History of notable offshore rescues
- Minimal safe ports
- Frequent flood events
- Limited port access in poor weather
- Significant fast flowing rivers in region

79 EM-COP – Peat Overlay Layer

80 Climate Ready Victoria – Gippsland (2015) https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf

81 Climate Ready Victoria – Gippsland (2015) https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0021/60744/Gippsland.pdf

- Significant shipping close to shore
- Major thoroughfare for yachts
- Substantial oil rig fields offshore

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 Gippsland 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.[82]

Key assets and infrastructure include:

- Networks – copper, hybrid fibre-coaxial, fibre-optic cable
- Towers – mobile telephone, wireless internet (e.g., 3G, 4G)
- Satellites
- 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 Gippsland Region the quality of digital infrastructure, including fixed broadband and mobile access, is highly variable. While for cities and large towns such as Traralgon and Morwell, access is generally

82 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf

comparable to metropolitan Melbourne, smaller towns and localities such as Dargo, Licola and Venus Bay generally have less capacity and reliability.[83]

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

Table 14. Communications infrastructure in Gippsland Region[84]

LGA	Radio Broadcast	Television Broadcast	Radio Communication	Telephone Exchanges
Bass Coast Shire	1	0	2	16
Baw Baw Shire	4	0	5	31
East Gippsland Shire	23	67	41	41
Latrobe City	9	29	3	13
South Gippsland Shire	3	14	4	40
Wellington Shire	4	5	15	36
Mount Baw Baw Alpine Resort	0	0	0	0
Total	**44**	**115**	**70**	**177**

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.[85]

The Gippsland Region is strongly associated with coal mining and electricity generation, with Victoria's primary energy source being electricity generated from brown coal in the Latrobe Valley, and natural gas sourced from the Gippsland Basin.[86]

7.2.1 Energy distribution

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

83 Infrastructure Victoria (2019): https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/Aither-Gippsland-Regional-Profile-March-2019.pdf
84 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
85 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
86 DELWP (2020): https://www.energy.vic.gov.au/

Table 15. Gippsland Energy distribution (km) by LGA [87]

LGA	Major Electricity Transmission Lines	Oil Pipelines	Gas Pipelines
Bass Coast Shire	75.6	0.0	56.4
Baw Baw Shire	440.3	49.9	99.0
East Gippsland Shire	294.6	0.0	234.2
Latrobe City	503.9	39.0	116.4
South Gippsland Shire	203.5	0.0	39.2
Wellington Shire	371.2	41.6	235.5
Total	**1,889.1**	**130.5**	**780.7**

For the energy sector overall, key risks include:

- Fire
- Severe weather
- Extreme temperatures
- Cyber-attack
- 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).[88]

Key dependencies for the energy sector include:

- Production infrastructure
- Supporting infrastructure (e.g., energy supplies for operations)
- Water and wastewater
- Transport infrastructure
- Human resources and management systems
- Information technology and communications[89]

87 EMV (2020): Potential Impact Reports (by LGA)
88 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
89 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf

7.2.2 Electricity

The key assets and infrastructure for the electricity sector include generators, high and low voltage transmission and distribution systems.[90]

The Gippsland Region holds the largest power station by capacity in Victoria. Approximately 22% of Victoria's electricity is generated by brown coal generators in the Latrobe Valley,[91] while the Loy Yang A and B sites located near Traralgon together generate another 50% of Victoria's electricity requirements.

Terminal stations are key centres for receiving high voltage electricity from transmission lines and converting it to lower voltages for distribution to zone substations.[92] 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.[93]

Within the Gippsland Region, there are 13 terminal stations and 28 zone substations which are owned and maintained by AusNet Services[94], as outlined below:

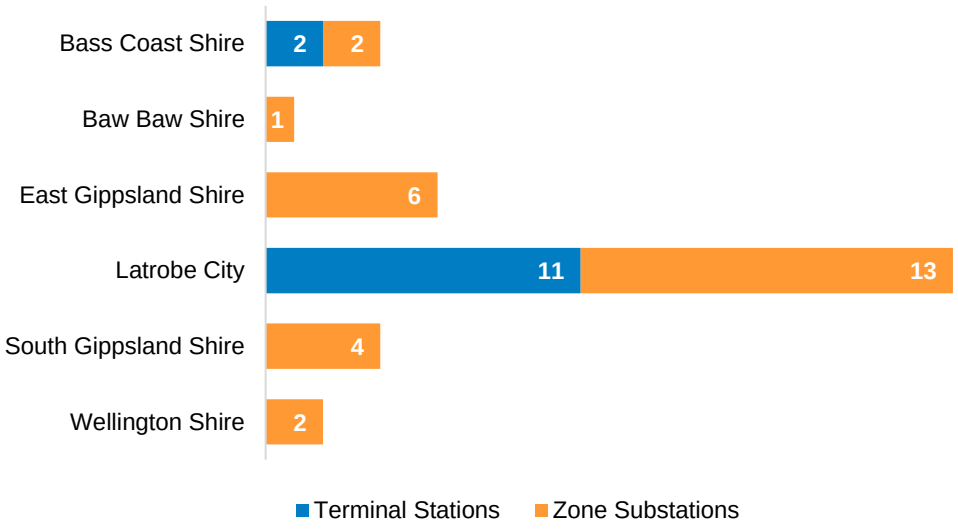
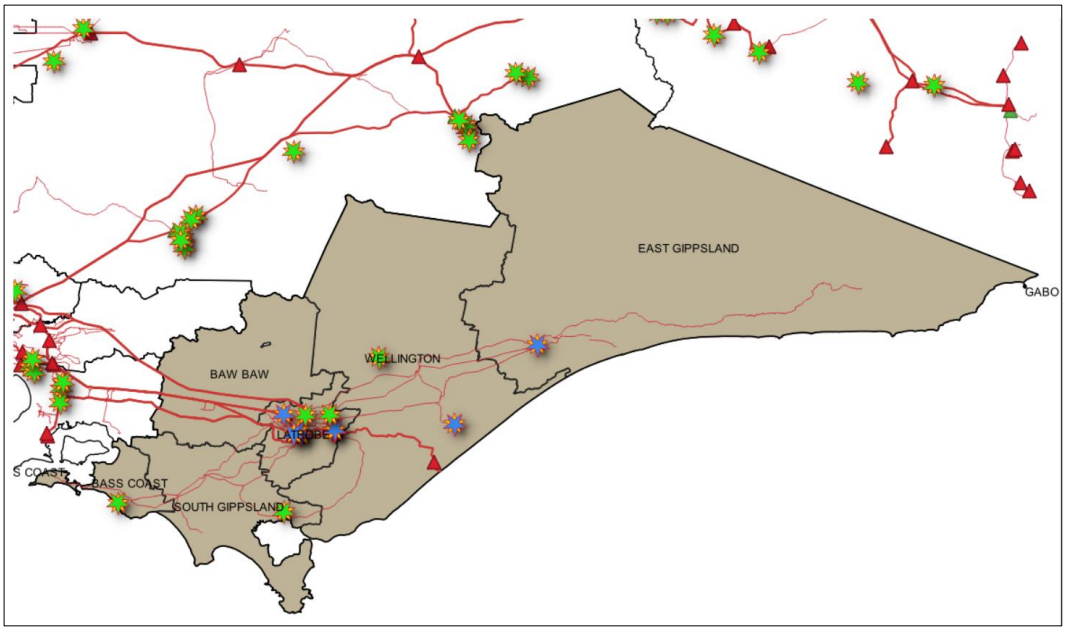


Figure 13. Terminal stations and zone substations in Gippsland Region by LGA[95]

90 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
91 DELWP (2020): https://www.energy.vic.gov.au/electricity/about-the-electricity-sector
92 https://dapr.ausnetservices.com.au/
93 https://dapr.ausnetservices.com.au/
94 https://www.energy.vic.gov.au/electricity/electricity-distributors
95 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 14. Electricity transmission lines within Gippsland Region[96] [97] [98]

96 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

97 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

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

7.2.3 Solar and Wind

The Gippsland Region's energy production is closely linked to brown coal mining and electricity generation, however there are wind farms located at Toora, Wonthaggi and Bald Hills, while hydroelectricity generation also occurs at Thomson Dam.[99]

There are three wind farms and one solar farm in the Gippsland Region:

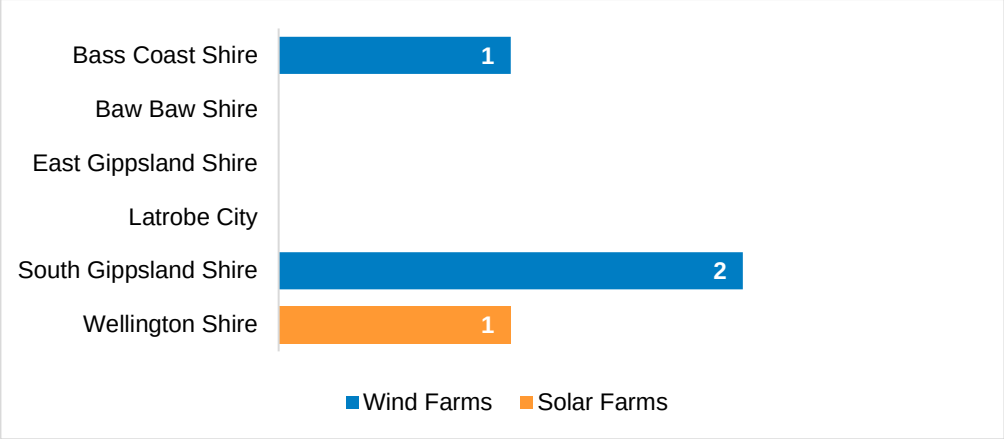


Figure 15. Wind and solar farms in Gippsland Region[100]

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.[101]

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).[102]

99 https://www.rdv.vic.gov.au/__data/assets/pdf_file/0011/1663544/Gippsland-Regional-Plan-2015_web.pdf
100 eMap Potential Impact Reports May 2019
101 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
102 DELWP (2017): https://www.energy.vic.gov.au/gas/about-the-gas-sector

Approximately 780km of gas pipelines traverse the Gippsland Region, including:

Table 16. Main gas pipelines in Gippsland Region[103]

LGA	Gas Pipelines (km)	Location/Route
Bass Coast Shire	56.4	Bass Gas – Leongatha and Wonthaggi Bass Gas Pipeline
Baw Baw Shire	99.0	Longford to Dandenong (Northern) Morwell to Dandenong Supply to Anderson St, Warragul
East Gippsland Shire	234.2	Eastern Gas Pipeline
Latrobe City	116.4	Longford to Dandenong (Northern) Longford to Tyers Morwell to Dandenong Morwell to Tramway Road Tyers to Morwell
South Gippsland Shire	39.2	Bass Gas – Leongatha and Wonthaggi Bass Gas Pipeline
Wellington Shire	235.5	Eastern Gas Pipeline Longford to Dandenong (Northern) Longford to Maffra Longford to Tyers Tasmania Gas Pipeline (onshore)
Total	**780.7**	

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

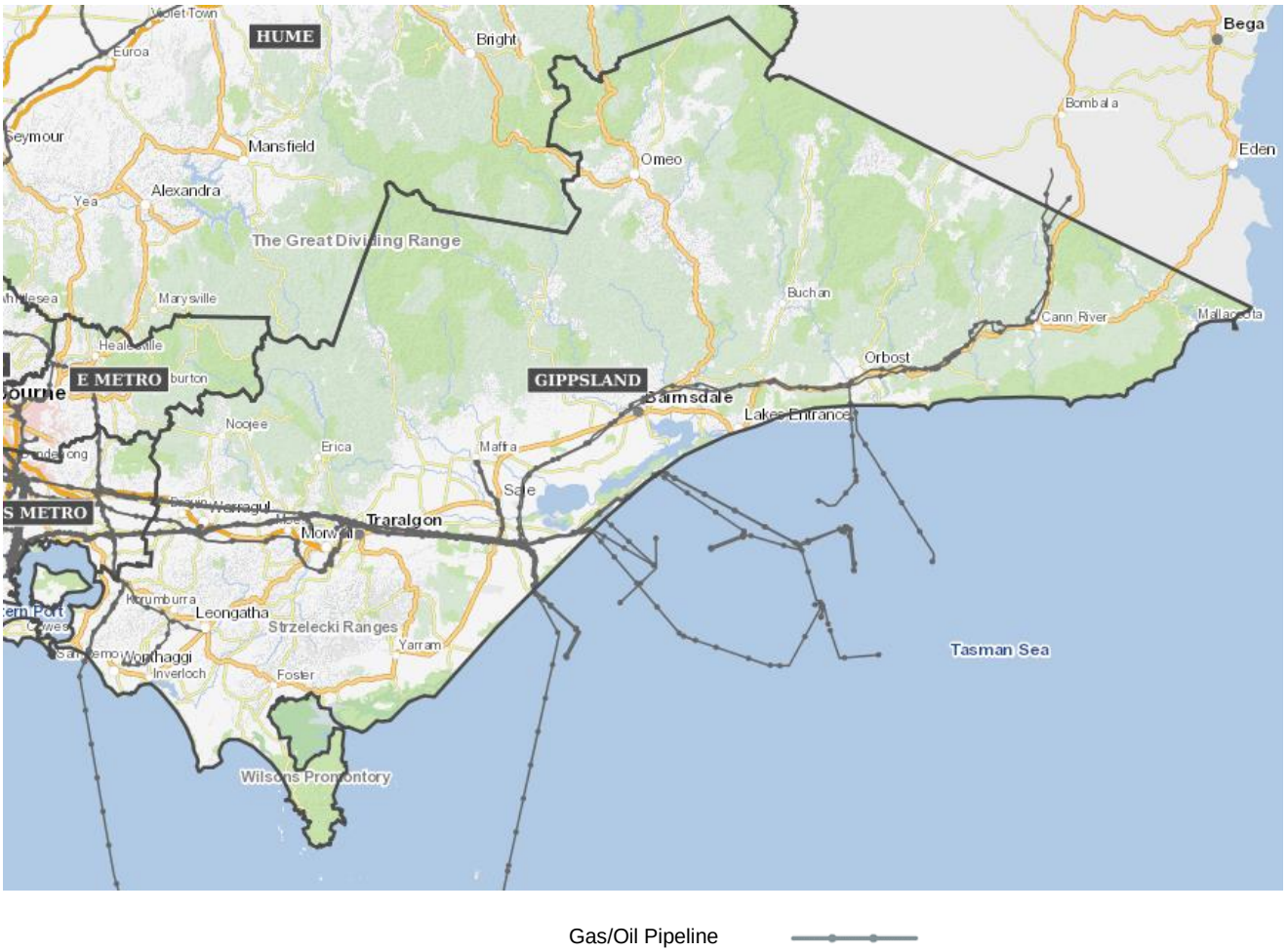


Figure 16. Natural gas and oil pipelines within the Gippsland Region[104]

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.[105]

There are no oil refineries located in the Gippsland Region, with only two refineries situated in Victoria – at Altona (Mobil) and Geelong (Viva Energy).[106]

104 EM-COP – Gas Pipelines Overlay Layer
105 EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
106 Australian Institute of Petroleum (2017): https://aip.com.au/sites/default/files/download-files/2017-09/At%20a%20Glance%20Australian%20Oil%20Refineries.pdf

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.[107]

Several large manufacturing businesses have their home bases in the Gippsland Region including:[108]

- Burra Foods dairy processing facility in Korumburra
- Patties Foods in Bairnsdale
- Vegco food products supplier in Bairnsdale
- Lion dairy processing facility in Morwell
- Fonterra dairy processing facility at Darnum
- Saputo Dairy Australia plants in Leongatha and Maffra
- Select Produce

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."[109] 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

107 DJPR (2020): https://djpr.vic.gov.au/about-us/overview/strategies-and-initiatives/advancing-victorian-manufacturing
108 https://www.rdv.vic.gov.au/__data/assets/pdf_file/0011/1663544/Gippsland-Regional-Plan-2015_web.pdf
109 DAWR (2020): https://www.agriculture.gov.au/ag-farm-food/food/food-chain-resilience

- Food or water contamination
- Power, water or communications outage

Figure 17 provides an overview of the food supply chain and its dependencies.

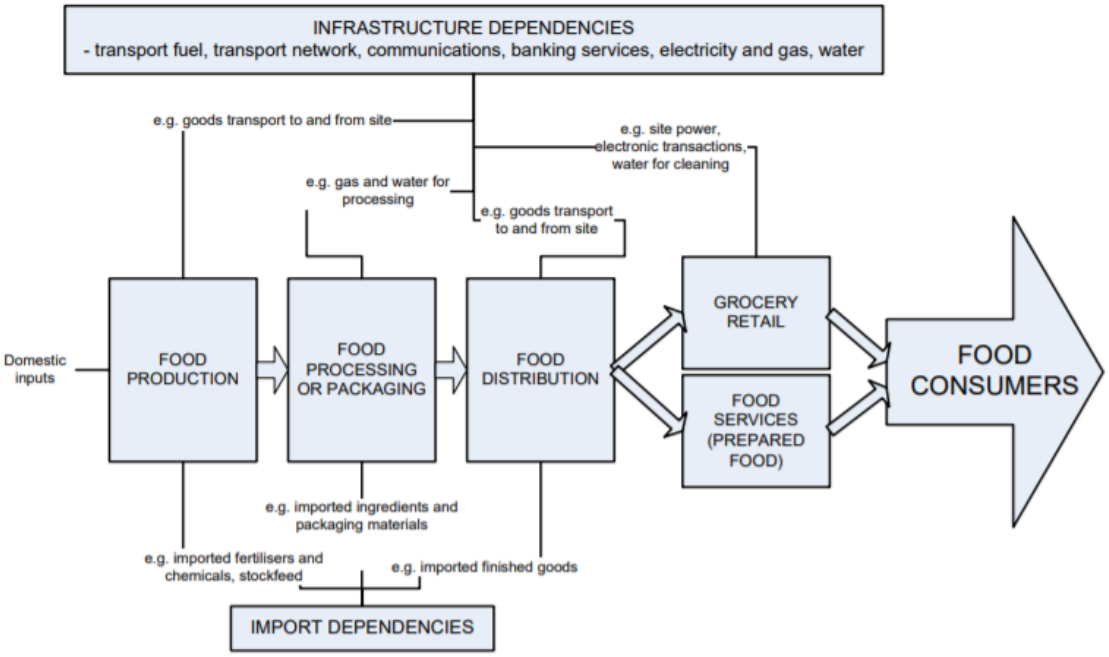


Figure 17. Overview of food supply chain and dependencies[110]

Due to the dependence on the Princes Highway for transport through Gippsland, disruption to the Highway can significantly disrupt food and other supply chains to the east of the region.

7.4 Transport

Transport links in the Gippsland Region are largely oriented east-west, with the Princes Highway and Bairnsdale rail line defining the principal corridor connecting most major settlements. North-south movement in Gippsland is facilitated by the South Gippsland, Bass and Strzelecki highways, while rail transport includes V/Line passenger trains and freight that link to and beyond Melbourne and its ports.[111]

Across the Gippsland 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 Gippsland Region is outlined below, and discussed further by mode in the following sections:

110 DAFF (2012): https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/ag-food/food/national-food-plan/submissions-received/resilience-food-supply.pdf
111 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0026/94445/Central-Highlands-Regional-Growth-Plan-May-2014.pdf

Table 17. Transport infrastructure (km) by LGA (2015) [112]

LGA	Major Roads[113]	Major Rail[114]	Distance to Melbourne CBD[115]	% Population close to Public Transport[116]
Bass Coast Shire	119.1	0	130	*36.7%*
Baw Baw Shire	438.9	90.8	102	*20.9%*
East Gippsland Shire	1,076.7	36.8	275	*19.7%*
Latrobe City	395.4	61.0	161	*63.5%*
South Gippsland Shire	449.3	48.0	130	*8.4%*
Wellington Shire	740.1	71.9	212	*26.6%*
Total	**3,219.5**	**308.4**		

7.4.2 Roads

More than 3,200km of major roads traverse the Gippsland 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:

- Princes Highway – Melbourne-Latrobe-Bairnsdale-Sydney link
- Great Alpine Road – Bairnsdale-Omeo-Wangaratta link
- South Gippsland Highway – Melbourne-Leongatha-Morwell link
- Strzelecki Highway – Leongatha-Morwell link
- Bass Highway – Lang Lang-Grantville-Wonthaggi-Leongatha link
- Monaro Highway – Cann River-Cooma-Canberra link
- Phillip Island Road – Cowes-Anderson link

112 EMV (2020): Potential Impact Reports (by LGA)
113 EMV (2020): Potential Impact Reports (by LGA)
114 Department of Transport asset database
115 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
116 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart

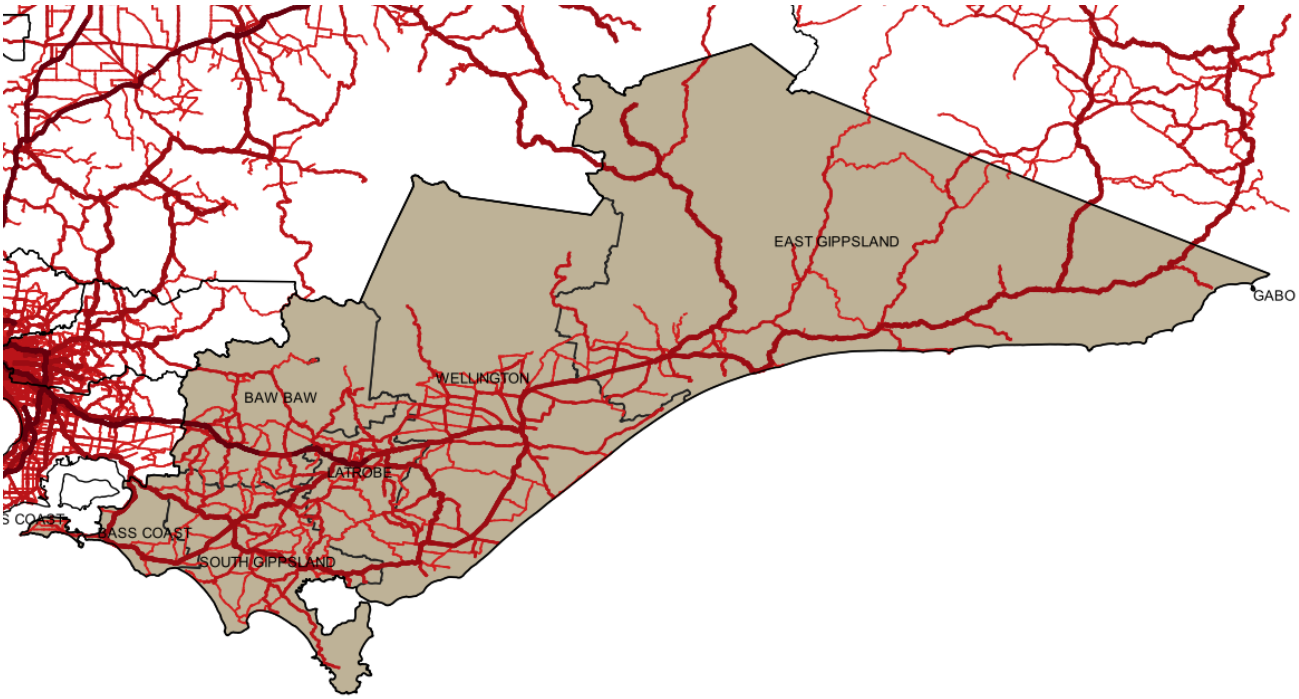


Figure 18. Main roads within the Gippsland Region[117]

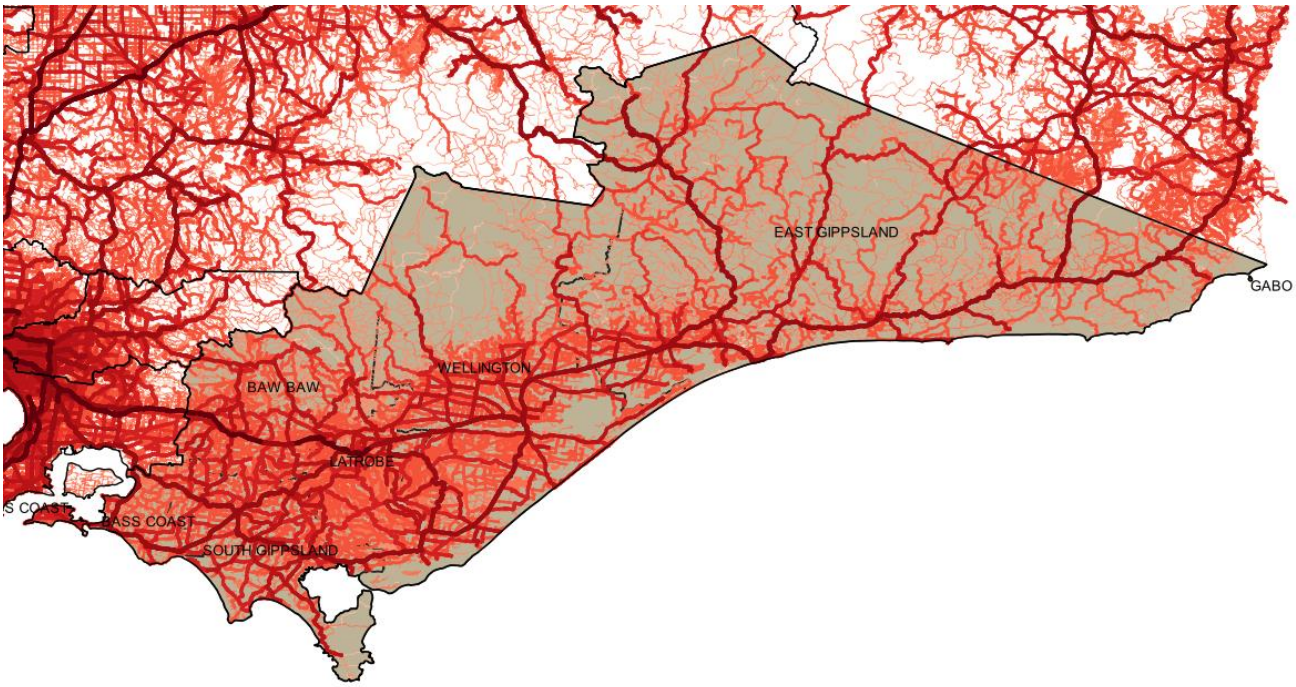


Figure 19. Density of road network within the Gippsland Region[118]

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

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

Table 18. Road Lengths (km) in Gippsland Region by LGA[119]

LGA	Freeway	Highway	Arterial	Sub-Arterial	Collector	Local	2WD	4WD	Walking Track	Bike Path
Bass Coast Shire	-	104	25	100	48	605	933	2	117	0
Baw Baw Shire	69	22	329	330	192	1,786	2,042	1,771	235	26
East Gippsland Shire	-	441	413	248	407	3,366	5,296	6,526	459	105
Latrobe City	62	77	256	188	7	1,452	2,866	165	103	0
South Gippsland Shire	-	153	254	361	-	1,141	2,111	60	247	-
Wellington Shire	-	188	485	501	337	3,017	6,410	2,702	451	-
Mt Baw Baw Alpine Resort	0	0	0	7	0	1	2	2	7	7
Total	**132**	**985**	**1,762**	**1,735**	**990**	**11,367**	**19,660**	**11,228**	**1,620**	**138**

A listing of the major roads is also provided below:

Table 19. Major roads in Gippsland region[120]

LGA	Major Roads	
Bass Coast Shire – 119.1km	Bass Hwy	South Gippsland Hwy
	Graham St	Thompson Av
	Mckenzie St	White Rd
	Phillip Island Rd	Wonthaggi Rd
Baw Baw Shire – 438.9km	Alfred St	Mt Baw Baw Tourist Rd
	Ashby St	Old Sale Rd
	Bloomfield Rd	Princes Av
	Bona Vista Rd	Princes Fwy
	Brandy Creek Rd	Princes Hwy
	Darnum-Shady Creek-Princes Out Ramp	Princes In - Darnum - Shady Creek Ramp
	Drouin -Korumburra Rd	Princes In -Drouin -Warragul Ramp Princes In -Korumburra -Warragul Ramp
	Drouin -Warragul -Princes In Ramp Drouin -Warragul -Princes Out Ramp Drouin -Warragul Rd	Princes Out -Darnum -Shady Creek Ramp
	Drouin Rd	Princes Out -Drouin -Warragul Ramp Princes Out -Korumburra -Warragul Ramp
	Graham -Princes In Ramp	Princes Way

119 Data Vic (2020): https://discover.data.vic.gov.au/dataset/road-network-vicmap-transport
120 EMV (2020): Potential Impact Reports (by LGA)

LGA	Major Roads	
	Henty St	Queen St
	Howitt St	Sand Rd
	Knotts Siding Rd	Seven Mile Rd
	Korumburra -Warragul -Princes In Ramp	Smith St
	Korumburra -Warragul -Princes Out Ramp	Thomson Valley Rd
	Korumburra -Warragul Rd	Thorpdale Rd
	Landsborough St	Tooronga Rd
	Longwarry-Drouin Rd	Tyers -Walhalla Rd
	Mackey St	Victoria St
	Main Neerim Rd	Walhalla Rd
	Main South Rd	Warburton -Woods Point Rd
	Mirboo North -Trafalgar Rd	Waterloo Rd
	Moe - Rawson Rd	Wellwood Rd
	Moe -Walhalla Rd	Westernport Rd
	Moe -Willow Grove Rd	Willow Grove Rd
	Moore St	Varro Junction -Noojee Rd
	Morwell -Thorpdale Rd	
East Gippsland Shire – 1,076.7km	Bairnsdale - Darga Rd	Main Rd
	Benambra -Corryong Rd	Main St
	Benambra Rd	Mallacoota - Genoa Rd
	Bengworden Rd	Mallacoota Rd
	Bilton St	Marine Pde
	Bonang Rd	Marlo -Conran Rd
	Bruthen - Buchan Rd	Marlo Rd
	Bruthen - Nowo Nowo Rd	Metung Rd
	Bullumwoal Rd	Monaro Hwy
	Calvert St	Nicholson St
	Cape Conran Rd	Omeo Hwy
	Collins St	Paynesville Rd
	Combienbar Rd	Princes Hwy
	Day Av	Red Knob Rd
	East Cape Rd	Riverine St
	Esplanade	Scott St
	Forge Creek Rd	Service St
	Gelantipy Rd	Snowy River Rd
	Genoa - Mallacoota Rd	Swan Reach Rd
	Gibbo St	Sydenham Inlet Rd
	Great Alpine Rd	Timbarra Rd
	Lindenow- Glenaladale Rd	Victoria St
	Lochiel St	West Cape Rd

LGA	Major Roads	
Latrobe City – 395.4km	Alexanders Rd	Monash Way
	Anzac St	Moore St
	Argyle St	Morwell -Thorpdale Rd
	Bank St	Morwell -Traralgon Rd
	Bartons Lane	Narracan Dr
	Boldings Rd	Old Gippstown -Princes In Ramp
	Boolarra -Churchill Rd	Old Melbourne Rd
	Boolarra -Foster Rd	Old Sale Rd
	Boolarra -Mirboo North Rd	Princes Dr
	Boolarra South -Mirboo North Rd Brown Coal mine Rd	Princes Fwy
	Bulga Park Rd	Princes Hwy
	Commercial -Princes In Ramp Commercial Rd	Princes In - John Field Ramp
	De Campo Dr	Princes In -Marretts Ramp
	Firmins Lane	Princes In -Monash Ramp
	Foster Rd	Princes In -Old Gippstown Ramp Princes In - Strzelecki Ramp
	George St	Princes Out -Commercial Ramp Princes Out - Haunted Hills Ramp
	Glengarry West Rd	Princes Out -John Field Ramp
	Grand Ridge Rd	Princes Out -Marretts Ramp
	Grey St	Princes Out -Monash Ramp
	Haigh St	Princes Out - Morwell - Traralgon Ramp Princes Out -Strzelecki Ramp
	Haunted Hills -Princes Out Ramp Haunted Hills Rd	Princes Out -Tramway Ramp
	Hazelwood Rd	Princes St
	High St	Sanders Rd
	Hyland Hwy	Shakespeare St
	John Field -Princes In Ramp	Strzelecki -Princes Out Ramp
	John Field -Princes Out Ramp	Strzelecki Highway Bypass
	John Field Dr	Strzelecki Hwy
	Latrobe Rd	Tanjil East Rd
	Latrobe River Rd	Tarwin St
	Lloyd -Princes Out Ramp	Third St
	Lloyd St	Thompsons Rd
	Main Rd	Tramway - Princes In Ramp
	Main St	Tramway Rd
	Marretts -Princes In Ramp	Traralgon - Balock Rd
	Marretts -Princes Out Ramp	Traralgon - Maffra Rd
	Maryvale Rd	Traralgon Creek Rd
	Mattingley Hill Rd	Traralgon West Rd
	Miners-Princes In Ramp	Two Mile - Princes In Ramp
	Moe -Walhalla Rd	Tyers - Walhalla Rd
	Monash -Princes In Ramp	

LGA	Major Roads	
	Monash -Princes Out Ramp	Tyers Rd
South Gippsland Shire – 449.3km	Anderson St	Yarragon Rd
	Bair St	Leach Rd
	Baromi Rd	Leongatha Rd
	Barry Rd	Lewis St
	Bass Hwy	Lorimer St
	Boolarra - Foster Rd	Loves Lane
	Boolarra - Mirboo North Rd	Main St
	Boolarra South - Mirboo North Rd Brennan St	Mordan Rd
	Commercial St	Mccartin St
	Drouin - Korumburra Rd	Meeniyan - Mirboo North Rd
	Drouin Rd	Meeniyan - Promontory Rd
	Elizabeth St	Mirboo North - Trafalgar Rd
	Fish Creek - Foster Rd	Mount Oberon Carpark Rd
	Foster - Promontory Rd	Nerrena Rd
	Foster Rd	Ogilvy St
	Grand Ridge East Rd	Old Mordan Rd
	Grand Ridge Rd	Port Welsh pool Rd
	Grand Ridge West	Ranceby Rd
	Inglis Av	Ridgway
	Inverloch - Venus Bay Rd	River Dr
	Koonwarra Rd	Roughead St
	Korumburra - Warragul Rd	South Gippsland Hwy
	Waratah Rd	Strzelecki Hwy
	Warragul Rd	Tarwin Lower Rd
	Whitelaw St	Telegraph Trk
	Wilsons Promontory Rd	Thorpdale Rd
		Victoria Rd
Wellington Shire – 740.1km	Aerodrome Rd	Main Rd
	Bairnsdale - Darga Rd	Main St
	Balloong Rd	Mary St
	Bengworden Rd	Mcloughlins Beach Rd
	Briagolong Rd	National Park Rd
	Broughton St	Old Port Foreshore Rd
	Bulga Park Rd	Powerscourt St
	Carrajung - Woodside Rd	Prince St
	Cherry Tree Rd	Princes Hwy
	Church Rd	Raglan St
	Cliff St	Rosedale - Heyfield Rd
	Commercial Rd	Rosedale - Longford Rd
	Dargo High Plains Rd	Sale - Heyfield Rd

LGA	Major Roads	
	Dargo Rd	Sale Rd
	Davis St	Sanctuary Rd
	Dawson St	Seaspray Rd
	Duke St	South Gippsland Hwy
	Forbes St	South St
	Foster St	Stratford - Bengworden Rd
	Garretts Rd	Stratford - Maffra Rd
	Government Rd	Tarra Valley Rd
	Grand Ridge Rd	Tarraville Rd
	High St	Traralgon - Ba look Rd
	Hyland Hwy	Traralgon- Maffra Rd
	Johnson St	Turnbull St
	Lawrence St	Tyers St
	Licola Rd	Victoria St
	Lind Av	Warren St
	Longford - Loch Sport Rd	Wharf St
	Lyons St	WonWron Rd
	Maffra - Briagolong Rd	Woodside Beach Rd
	Maffra - Rosedale Rd	Yarram- Port Albert Rd
	Maffra - Sa le Rd	York St
	Maffra Rd	York St South

7.4.3 Rail

Approximately 300km of major rail crosses the Gippsland Region, including stations, lines and hubs.

The rail network is shown in the figure below and includes direct passenger and freight rail routes from Bairnsdale to Melbourne through the Latrobe and Baw Baw LGAs.[121]

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

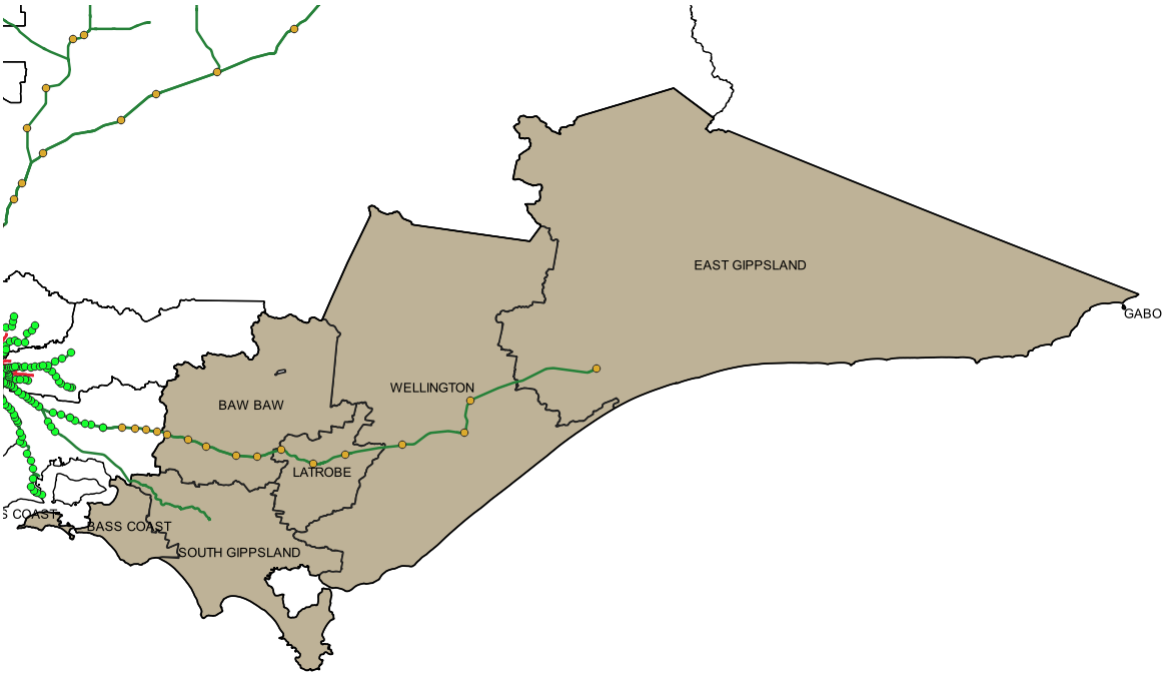


Figure 20. Rail networks in the Gippsland Region[122]

Train stations

There are 12 train stations in the Gippsland Region with locations and services as outlined below:

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

Table 20. Train stations in Gippsland Region[123,124]

LGA	No. Train stations	Station name(s)	Services	Latitude and Longitude
Bass Coast Shire	0	Nil	Nil	Nil
Baw Baw Shire	5	Trafalgar Railway Station	V/Line – Traralgon Line	-38.198885; 146.537882
		Yarragon Railway Station	V/Line – Traralgon Line	-38.203158; 146.063063
		Warragul Railway Station	V/Line – Traralgon Line	-38.165224; 145.933085
			V/Line – Bairnsdale Line	-38.136452; 145.855947
		Drouin Railway Station	V/Line – Traralgon Line	-38.110992; 145.76686
		Longwarry Railway Station	V/Line – Bairnsdale Line	
			V/Line – Traralgon Line	
East Gippsland Shire	1	Bairnsdale Railway Station	V/Line – Bairnsdale Line	-37.82872; 147.627614
Latrobe City	3	Traralgon Railway Station	V/Line – Traralgon Line	-38.198885; 146.537882
			V/Line – Bairnsdale Line	
			V/Line – Traralgon Line	-38.236719; 146.396753
		Morwell Railway Station	V/Line – Bairnsdale Line	-38.176909; 146.260572
			V/Line – Traralgon Line	
		Moe Railway Station	V/Line – Bairnsdale Line	
South Gippsland Shire	0	Nil	Nil	Nil
Wellington Shire	3	Sale Railway Station	V/Line – Bairnsdale Line	-38.103103; 147.054805
		Stratford Railway Station	V/Line – Bairnsdale Line	-37.967047; 147.081469
		Rosedale Railway Station	V/Line – Bairnsdale Line	-38.156404; 146.786966
Total	**12**			

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

7.4.4 Air

The Gippsland Region does not have any major airports. However, the region is serviced by several smaller regional airports as well as hosting the East Sale Royal Australian Air Force base.

Airports and Aerodromes

The Gippsland Region is served by nine 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 Gippsland.

Table 21. Registered airports and aerodromes in Gippsland Region[125]

LGA	No. Airports	Airport Name	Airport Codes
Bass Coast Shire	0	Nil	Nil
Baw Baw Shire	0	Nil	Nil
East Gippsland Shire	3	Bairnsdale Airport Mallacoota Airport Orbost Airport	IATA: BSJ; ICAO: YBNS IATA: XMC; ICAO: YMCO IATA: RBS; ICAO: YORB
Latrobe City	1	Latrobe Regional Airport	IATA: TGN; ICAO: YLTV
South Gippsland Shire	1	Leongatha Airport	ICAO: YLEG
Wellington Shire	4	West Sale Airport Yarram Airport Coongulla Airport RAAF Base East Sale (Military)	IATA: SXE; ICAO: YWSL ICAO: YYRM Nil ICAO: YMES
Total	**9**		

7.4.5 Sea

Ports and their associated infrastructure are important gateways for the import and export of goods. Indeed, it is estimated that Australia conducts 98% of its trade through ports, which play a pivotal role in the national's supply chain.[126]

Key risks to the sector include:

- Disruptions to human resources.
- Disruptions to electricity supply or liquid fuel.
- Transport infrastructure emergencies.
- Disruptions to major non-transport infrastructure.

125 CASA (2020): https://www.casa.gov.au/aerodromes/aerodromes-register/registered-aerodromes
126 Ports Australia (2020): https://www.portsaustralia.com.au/resources/trade-statistics

- Security events.[127]

There are no major commercial ports located in the Gippsland Region however there are 5 local ports. These local ports provide services to the commercial fishing industry, charter boats and recreational fishing and boating interests, while being key recreation and tourist assets which provide significant contributions to local economies.[128] Barry Beach Marine Terminal at Corner Inlet is also an important regional port terminal supporting the offshore oil and gas industry in Bass Strait.

Local ports in the region are outlined below, all of which are managed by the Gippsland Ports Committee of Management Inc:

- Local Port of Anderson Inlet
- Local Ports of Corner Inlet and Port Albert
- Local Port of Gippsland Lakes
- Local Port of Snowy River
- Local Port of Mallacoota

Figure 21. Local Ports in Victoria[129]

127 EMV (2019): https://www.emv.vic.gov.au/publications/victorias-critical-infrastructure-all-sectors-resilience-report-2018
128 DOT (2020): https://transport.vic.gov.au/ports-and-freight/about-victorias-local-ports
129 DOT (2020): https://transport.vic.gov.au/ports-and-freight/about-victorias-local-ports

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

Water catchments and storage reservoirs in the region provide supply for Gippsland's urban, rural, recreational and industrial users and make a significant contribution to Melbourne's water supply. Thomson Dam supplies 60% of Melbourne's drinking water, while the region is also home to the Wonthaggi Desalination Plant, which is able to support Melbourne's water supply.

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. [130]
- 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.[131] In the Gippsland 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.[132]

Since 2006 the water sector has been identified as an essential service according to an Act of Parliament,[133] 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

130 DELWP (2020): https://www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/blue-green-algae
131 DELWP (2020): https://www.water.vic.gov.au/groundwater/victorias-groundwater-resources
132 DELWP (2019): https://www.water.vic.gov.au/managing-dams-and-water-emergencies/emergency-management
133 The Terrorism (Community Protection) Act 2003.community protection

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.[134]

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
- Environmental Protection Agency (EPA)
- Water Police[135]

Key water storages in the Gippsland region are managed by South Gippsland Water, Melbourne Water, Westernport Water, Gippsland Water and Southern Rural Water.

Reservoirs

There are nine reservoirs in the Gippsland Region, as outlined below:

Table 22. Key reservoirs and storage basins in Gippsland Region[136]

LGA	No. Reservoirs	Reservoir name(s)	Capacity (ML)	Water Authority
Bass Coast Shire	2	Lance Creek Reservoir	4,200	South Gippsland Water
		Candowie Reservoir	4,463	Westernport Water
Baw Baw Shire	4	Tarago Reservoir	37,580	Melbourne Water
		Thomson Reservoir	1,068,000	
		Moondarra Reservoir	30,458	Gippsland Water
		Blue Rock Lake	198,280	Southern Rural Water
Latrobe City	1	Lake Narracan	7,230	Southern Rural Water
South Gippsland Shire	1	Leongatha Storages	1,910	South Gippsland Water
Wellington Shire	1	Lake Glenmaggie	177,640	Southern Rural Water
Total	**9**			

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

134 Global Terrorism Research Centre (2015): https://www.researchgate.net/publication/275658307_Plan_Prepare_and_Safeguard_Water_Critical_Infrastructure_Protection_in_Australia
135 Parks Victoria (2020): https://www.parks.vic.gov.au/water-management
136 DELPW (2020): https://www.water.vic.gov.au/water-reporting/water-in-your-region

water supplies from reservoirs, there are also some communities that rely on groundwater for drinking water. Table 23 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[137]. 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.

Table 23. Key water providers and water supply systems [138] [139] [140] [141]

Provider	Supply System	Source
East Gippsland Water	Mitchell System Bairnsdale, Paynesville, Lindenow, Lindenow South, Eagle Point, Newlands Arm, Raymond Island, Banksia Peninsular, Granite Rock, Wy Yung, Bruthen, Sarsfield, Nicholson, Johnsonville, Swan Reach, Metung, Lakes Entrance, Lake Bunga, Lake Tyers, Lake Tyers Beach, Nowa Nowa	Michell River (Glenaladale)
	Orbost, Newmerella, Marlo	Rocky River Brodribb River
	Bemm River	Bemm River
	Buchan	Buchan River
	Mallacoota	Betka River Groundwater bores
	Cann River	Cann River
	Omeo	Butchers Creek
	Swifts Creek	Tambo River
	Dinner Plain	Groundwater bores
Gippsland Water	Briagolong System	Groundwater bore
	Erica-Rawson System	Trigger Creek
	Latrobe Yarragon, Trafalgar, Willow Grove, Moe, Yallourn	Moondara Reservoir (Tyers River) Blue Rock lake (Tanjil River)

137 https://www2.health.vic.gov.au/public-health/water/private-drinking-water
138 https://www.egwater.vic.gov.au/customer-info/water-supply-systems/
139 https://www.gippswater.com.au/application/files/6814/9931/0017/Gippsland_Water_-_Urban_Water_Strategy_2017.pdf
140 http://www.sgwater.com.au/wp-content/uploads/2014/04/Urban-Water-Strategy.pdf
141 https://www.westernportwater.com.au/wp-content/uploads/2017/05/WPW-2017-Urban-Water-Strategy.pdf

Provider	Supply System	Source
	North, Morwell, Yinnar, Boolarra, Churchill, Hazelwood North, Traralgon, Traralgon South, Tyers, Glengarry, Rosedale, Toongabbie, Cowwarr, Darnum, Thorpdale.	Narracan Creek
	Mirboo North	Little Morwell River
	Sale, Wurruk	Boisdale Aquifer
	Seaspray	Mirrimans Creek
	Tarago Warragul, Drouin, Buln Buln, Rokeby, Darnum, Nilma, Nerrim South, Noojee	Pederson Weir (Tarago River) Rokeby Pumpstation Tarago Reservoir
	Thomson-Macalister Heyfield, Coongulla, Glenmaggie, Maffra, Boisdale, Stratford.	Thompson River Macalister River
South Gippsland Water	Poowong, Loch, Nyora	Little Bass River
	Korumburra	Coalition Creek
	Leongatha, Koonwarra	Ruby Creek Groundwater
	Wonthaggi, Cape Paterson, Inverloch	Lance Creek
	Dumbalk	Tarwin River East Branch
	Meeniyan	Tarwin River
	Foster	Deep Creek/Foster Dam
	Fish Creek	Battery Creek
	Toora, Welshpool, Port Welshpool, Port Franklin, Barry Beach Port	Agnes River
	Yarrum, Alberton, Port Albert, Devon North	Tarra River
Westernport Water	Grantville, Corinella, Coronet Bay, San Remo, Phillip Island, Kilcunda, Dalyston, Archies Creek	Bass River Candowie Reservoir Corinella Aquifer
	Melbourne Water	Greater Yarra System Thomson River Pool Wonthaggi Desalination Plant

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.[142]

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[143]. Most treatment plants in Gippsland treat water to Class C standard or above for recycled use or discharge to environment[144]. Table 24 summarises the areas in the region serviced by wastewater treatment systems. These systems comprise gravity pipes, access points, pump stations and rising mains. Local Governments are responsible for the regulation of septic tanks in areas without sewerage systems.

Table 24. Key sewerage service providers and service areas [145] [146] [147] [148]

Provider	Service area	Treatment Plant
East Gippsland Water	Mitchell System	Bairnsdale, Lindenow, Nicholson, Johnsonville, Eagle Point, Paynesville, Newlands Arm, Metung, Bruthen, Swan Reach, Lakes Entrance, Lake Tyers,
	Orbost, Marlo	Orbost, Marlo
	Bemm River	Bemm River
	Mallacoota	Mallacoota
	Cann River	Cann River
	Omeo	Omeo
	Dinner Plain	Dinner Plain
Gippsland Water	Drouin	Drouin

142 DELWP (2020): https://data.aurin.org.au/dataset/vic-govt-delwp-datavic-water-ewsp-na

143 https://ref.epa.vic.gov.au/our-work/licences-and-approvals/~/media/Publications/464%202.pdf

144 http://www.barwonwater.vic.giv.au/water-and-waste/sewage

145 https://www.egwater.vic.gov.au/customer-info/water-supply-systems/

146 https://www.gippswater.com.au/application/files/6814/9931/0017/Gippsland_Water_-_Urban_Water_Strategy_2017.pdf

147 http://www.sgwater.com.au/wp-content/uploads/2014/04/Urban-Water-Strategy.pdf

148 https://www.westernportwater.com.au/wp-content/uploads/2017/05/WPW-2017-Urban-Water-Strategy.pdf

	Gippsland Water Factory	GWF Domestic GWF Industrial
	Heyfield	Heyfield
	Maffra	Maffra
	Mirboo North	Mirboo North
	Moe	Moe
	Morwell (West)	Morwell (West)
	Neerim South	Neerim South
	Rawson	Rawson
	Sale and Lochsport	Sale and Lochsport
	Seaspray	Seaspray
	Stratford	Stratford
	Saline Water Outflow Pipeline	Saline Water Outflow Pipeline
	Warragul	Warragul
	Willow Grove	Willow Grove
South Gippsland Water	Northern	Korumburra, Korumburra Trade Waste , Leongatha, Leongatha Trade Waste,
	Southern	Inverloch, Wonthaggi, Cape Paterson,
	Central	Meeniyan, Foster, Toora, Welshpool, Waratah Bay,
	Eastern	Tarraville,
Westernport Water	Westernport region	Cowes Kings Road

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.[149]

Closed landfills also pose environmental risks, including from:

- Leachate – a liquid formed by decomposing waste and rainwater – which can contaminate groundwater; and
- Landfill gas – from decomposing waste – which can migrate to the atmosphere.[150]

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.[151]

There are currently 35 sites in the Gippsland 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.[152] Examples of contamination and pollution issues experienced in the region include former landfill sites, current and former industrial sites and dumped industrial waste.[153]

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

There are 120 landfill sites across the region, as below:

Table 25. Landfill sites in Gippsland Region[154]

LGA	No. Landfill Sites	Operating status and waste type
Bass Coast Shire	8	Ceramic-based fibres, tyres, asbestos, solid inert waste and general waste – 1 Closed – 7
Baw Baw Shire	8	Asbestos, contaminated soil (Cat. C), tyres, solid inert waste and general waste – 1 Closed – 7
East Gippsland Shire	43	General waste and solid inert waste – 1 Asbestos, contaminated soil (Cat. C), tyres, solid inert waste and general waste – 1 Tyres, solid inert waste and general waste – 1 Closed – 40
Latrobe City	18	Ceramic-based fibres, asbestos, ashing waste – 1 Leached ash – 1 General waste – 1 Paper pulp, solid inert waste – 1 Tyres, asbestos, solid inert waste, general waste – 1 Closed – 13
South Gippsland Shire	9	Asbestos, contaminated soil (Cat. C), tyres, solid inert waste and general waste – 1 Closed – 8
Wellington Shire	33	Prescribed industrial waste (asbestos and radioactive materials) – 1 General waste, solid inert waste, asbestos, tyres – 1 General waste, solid inert waste – 1 Ceramic-based fibres, asbestos, immobilised prescribed industrial waste, contaminated soil (Cat. C), industrial washwaters, NOS, food waste – 1 General waste – 2 Closed – 27
Mount Baw Baw Alpine Resort	1	Closed – 1
Total	**120**	

7.6.2 Recycling

There are 38 transfer stations and 122 stockpile sites registered by the EPA (waste in storage for recycling or reuse), across the region as outlined below:

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

Table 26. Transfer stations and EPA stockpile sites in Gippsland Region

LGA	No. Transfer Stations[155]	No. EPA Stockpile Sites[156]
Bass Coast Shire	5	13
Baw Baw Shire	4	17
East Gippsland Shire	12	43
Latrobe City	4	27
South Gippsland Shire	7	9
Wellington Shire	6	13
Mount Baw Baw Alpine Resort	0	-
Total	**38**	**122**

7.7 Government services

Regional emergency management plans 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.

7.7.1 Prisons and community correctional facilities

There is one prison/community correctional facility in the Gippsland Region: Fullham Correctional Centre (Wellington Shire).[157]

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

7.7.2 Law courts

There is one County Court and eight Magistrates courts in the region, as outlined below:

Table 27. Law Courts in Gippsland Region[158]

LGA	No. Courts	Name
Bass Coast Shire	1	Wonthaggi Magistrates Court
Baw Baw Shire	0	N/A
East Gippsland Shire	3	Bairnsdale Magistrates Court Omeo Magistrates Court Orbost Magistrates Court
Latrobe City	2	Moe Magistrates Court Morwell Magistrates Court
South Gippsland Shire	1	Korumburra Magistrates Court
Wellington Shire	1	Sale Magistrates Court
Total	**8**	

7.8 Emergency services

The Gippsland Region is served by 30 ambulance stations, 39 police stations, 170 fire stations, 24 SES units, 11 Life Saving Victoria (LSV) units and 6 Coast Guard flotillas.

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

7.8.1 Ambulance Stations

There are 30 ambulance stations across the region.

Ambulance response time performance for Code 1 calls across LGAs is provided below:

Table 28. Ambulance stations and Code 1 call response time performance[159][160]

LGA	No. Stations	Locations	Code 1 – % Responses within 15 mins	Code 1 – Average Response Time (mins)
Bass Coast Shire	3	Cowes, Grantville, Wonthaggi	*66.5%*	14:32
Baw Baw Shire	3	Drouin, Neerim South, Warragul	*68.1%*	14:23
East Gippsland Shire	9	Bairnsdale, Cann River, Lakes Entrance, Mallacoota, Omeo, Orbost, Paynesville, Swifts Creek, Tambo Valley	*59.4%*	16:19
Latrobe City	4	HEMS2, Moe, Morwell, Traralgon	*79.8%*	11:41
South Gippsland Shire	4	Foster, Korumburra, Leongatha, Mirboo North	*45.1%*	18:33
Wellington Shire	6	Heyfield, Loch Sport, Maffra, Rosedale, Sale, Yarram	*61.9%*	15:13
Mt Baw Baw Alpine Resort	1	Mount Baw Baw Ambulance Station		
Total	**30**			

7.8.2 Police Stations

There are 39 police stations across the region as follows:

Table 29. Police stations in Gippsland Region:[161]

LGA	No. Stations	Locations
Bass Coast Shire	4	Cowes, Inverloch, San Remo, Wonthaggi
Baw Baw Shire	5	Drouin, Neerim South, Rawson, Trafalgar, Warragul
East Gippsland Shire	10	Bairnsdale, Bendoc, Bruthen, Buchan, Cann River, Lakes Entrance, Mallacoota, Omeo, Orbost, Swifts Creek
Latrobe City	5	Boolarra, Churchill, Moe, Morwell, Traralgon
South Gippsland Shire	7	Foster, Korumburra, Leongatha, Loch, Meeniyan, Mirboo, Toora
Wellington Shire	8	Briagolong, Heyfield, Loch Sport, Maffra, Rosedale, Sale, Stratford, Yarram
Mt Baw Baw Alpine Resort	0	Nil
Total	**39**	

159 Ambulance Victoria (2019): https://www.ambulance.vic.gov.au/ambulance-victoria-data-sets/
160 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest
161 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 170 fire stations across the region, as well as one CFA forest industry brigade, as outlined below:

Table 30. Fire stations and Forest Industrr Brigades in Gippsland Region[162]

LGA	No. Stations (and (Brigades)	Locations
Bass Coast Shire	13	Bass Fire Station Corinella Fire Station Dalyston Fire Station Glen Alvie Fire Station Inverloch Fire Station Kernot-Grantville Fire Station Kernot-Grantville Satellite Fire Station (Kernot) Kilcunda Fire Station Phillip Island Fire Station Pound Creek Fire Station San Remo Fire Station Wonthaggi Fire Station Wonthaggi Satellite Fire Station (Cape Paterson)
Baw Baw Shire	20	Allambee Fire Station Darnum Ellinbank Fire Station Drouin Fire Station Drouin West Fire Station Erica District Fire Station Erica District Satellite Fire Station (Walhalla) Hallora District Fire Station Hallora District Satellite Fire Station (Lardner) Longwarry District Fire Station Longwarry District Satellite Fire Station (Labertouche) Neerim South Fire Station Nilma North Fire Station Noojee Fire Station Thorpdale Fire Station Trafalgar Fire Station Trida Fire Station Warragul Fire Station Westbury Fire Station Willowgrove Fire Station Yarragon Fire Station

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

LGA	No. Stations (and (Brigades)	Locations
East Gippsland Shire	42	Bairnsdale Fire Station Bemm Fire Station Benambra Fire Station Bendoc Fire Station Bengworden Fire Station Bonang Fire Station Bonang Satellite Fire Station (Delegate River) Bruthen Fire Station Buchan Fire Station Cann Valley Fire Station Ensay Fire Station Fernbank Fire Station Flaggy Creek Fire Station Gelantipy Fire Station Glenaladale Fire Station Goongerah Fire Station Hillside Fire Station Johnsonville Fire Station Kalimna West Fire Station Lakes Entrance Fire Station Lindenow South Fire Station Lindenow South Satellite Fire Station (Lindenow South) Mallacoota Fire Station Mallacoota Satellite Fire Station (Gipsy Point) Marlo Fire Station Metung Fire Station Mossi - Tambo Fire Station Mount Taylor Fire Station Newmerella Fire Station Omeo Fire Station Omeo Satellite Fire Station (Anglers Rest) Omeo Satellite Fire Station (Cobungra) Orbost Fire Station Paynesville Fire Station Paynesville Satellite Fire Station (Newlands Arm) Paynesville Satellite Fire Station (Raymond Island) Sarsfield Fire Station Sarsfield Satellite Fire Station (Clifton Creek) Swifts Creek Fire Station Toorloo Fire Station

LGA	No. Stations (and (Brigades)	Locations
		Toorloo Satellite Fire Station (Toorloo Arm) Wairewa Fire Station
Latrobe City	25 (1 Forest Industry Brigade)	Boolarra Fire Station Boolarra Satellite Fire Station (Boolarra South) Callignee Fire Station Churchill Fire Station Driffield Fire Station Flynn Fire Station Glengarry Fire Station Hazelwood North Fire Station Hvp Gippsland Plantations CFA Forest Industry Brigade Latrobe West Fire Station Maryvale Fire Station Moe Fire Station Moe South Fire Station Morwell Fire Station Newborough Fire Station Tanjil Fire Station Toongabbie Fire Station Traralgon East Fire Station Traralgon Fire Station Traralgon South Fire Station Traralgon West Fire Station Tyers Fire Station Yallourn North Fire Station Yinnar Fire Station Yinnar South Fire Station
South Gippsland Shire	26	Berrys Creek Fire Station Dumbalk Fire Station Fish Creek District Fire Station Fish Creek District Satellite Fire Station (Sandy Point) Foster Fire Station Hallston-Mt Eccles Fire Station Hedley Fire Station Kongwak District Fire Station Koonwarra Fire Station Korumburra Fire Station Leongatha Fire Station Leongatha South Fire Station Loch Fire Station

LGA	No. Stations (and (Brigades)	Locations
		Loch Satellite Fire Station (Nyora) Meeniyan Stony Creek Fire Station Milford Fire Station Mirboo North Fire Station Nerrena Fire Station Poowong Fire Station Ruby Fire Station Tarwin Lower District Fire Station Tarwin Lower District Satellite Fire Station (Venus Bay) Tarwin Lower District Satellite Fire Station (Walkerville) Toora Fire Station Welshpool Fire Station Yanakie Fire Station
Wellington Shire	43	Alberton West Fire Station Boisdale Fire Station Briagolong Fire Station Carrajung Fire Station Clydebank Fire Station Coongulla Fire Station Cowwarr Fire Station Dargo Fire Station Devon North Fire Station Giffard West Fire Station Glengarry East Fire Station Glenmaggie Fire Station Golden Beach Fire Station Heyfield Fire Station Jack River Fire Station Jack River Satellite Fire Station (Binginwarri) Licola Fire Station Loch Sport Fire Station Longford Fire Station Maffra Fire Station Meerlieu Fire Station Munro Fire Station Nambrok Fire Station Newry Fire Station Perry Bridge Fire Station Port Albert Fire Station Rosedale Fire Station

LGA	No. Stations (and (Brigades)	Locations
		Sale Fire Station Sale Satellite Fire Station (Wurruk) Seaspray Fire Station Seaton Fire Station Stradbroke Fire Station Stratford Fire Station Tinamba Fire Station Valencia Creek Fire Station Willung Fire Station Willung South Fire Station Willung South Satellite Fire Station (Gormandale) Winnindoo Fire Station Won Wron Fire Station Woodside Fire Station Woranga Fire Station Yarram Fire Station
Mount Baw Baw Alpine Resort	1	Mount Baw Baw Fire Service (minimal)
Gippsland Total	**170**	

There are 24 fire lookouts across the region, as below:

Table 31. Fire lookouts in Gippsland Region[163]

LGA	No. Lookouts	Locations
Bass Coast Shire	0	Nil
Baw Baw Shire	2	Mt Tanjil, Mt Toorongo
East Gippsland Shire	13	Mt Bemm (Mt Cann), Mt Buck, Mt Delegate, Mt Jersey West, Mt Maramingo, Mt Mcleod, Mt Nowa Nowa, Mt Nugong, Mt Raymond, Mt Sam, Mt Seldom Seen, Mt Taylor, Mt Waldron
Latrobe City	1	Yallourn
South Gippsland Shire	0	Nil
Wellington Shire	8	Carrajung, Flynn, Holey Hill, Mt Blackwarry, Mt Useful, Pinnacles, Stockdale
Gippsland Total	**24**	

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

There are no Community Fire Refuges in the region.[164] However, there are 23 Neighbourhood Safer Places (NSP), as outlined below:

Table 32. Neighbourhood Safer Places[165]

LGA	No. NSPs	Locations
Bass Coast Shire	6	Cape Paterson, Cape Woolamai, Cowes, Grantville, Inverloch, Pioneer Bay
Baw Baw Shire	0	Nil
East Gippsland Shire	12	Bemm River, Benambra, Bendoc, Bonang, Buchan, Cann River, Mallacoota, Omeo, Orbost Paynesville, Raymond Island, Swan Reach
Latrobe City	2	Boolarra, Yinnar
South Gippsland Shire	1	Sandy Point
Wellington Shire	2	Loch Sport, Port Albert
Gippsland Total	**23**	

7.8.4 SES

There are 24 SES units across the region, including:

Table 33. SES Units in Gippsland Region[166]

LGA	No. Units	Locations
Bass Coast Shire	4	Inverloch, Phillip Island, San Remo, Wonthaggi
Baw Baw Shire	2	Erica, Warragul
East Gippsland Shire	8	Bairnsdale, Bendoc, Bruthen, Buchan, Cann River, Mallacoota, Orbost, Tambo Valley
Latrobe City	2	Moe, Morwell
South Gippsland Shire	2	Foster, Leongatha
Wellington Shire	6	Loch Sport, Maffra, Rosedale, Sale, Stratford, Yarram
Gippsland Total	**24**	

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

7.8.5 Life Saving Victoria

There are 11 Life Saving Victoria (LSV) Surf Life Saving Clubs (SLSC) in the region, as outlined below:

Table 34. Life Saving Victoria Surf Life Saving Clubs in Gippsland Region[167]

LGA	No. Units	Locations
Bass Coast Shire	4	Woolamai Beach SLSC Cape Patterson SLSC Wonthaggi LSC Inverloch SLSC
East Gippsland Shire	2	Lakes Entrance SLSC Mallacoota SLSC
South Gippsland Shire	2	Venus Bay SLSC Waratah Beach SLSC
Wellington Shire	2	Woodside Beach SLSC Seaspray SLSC
Gippsland Total	**11**	

7.8.6 Volunteer Coast Guard

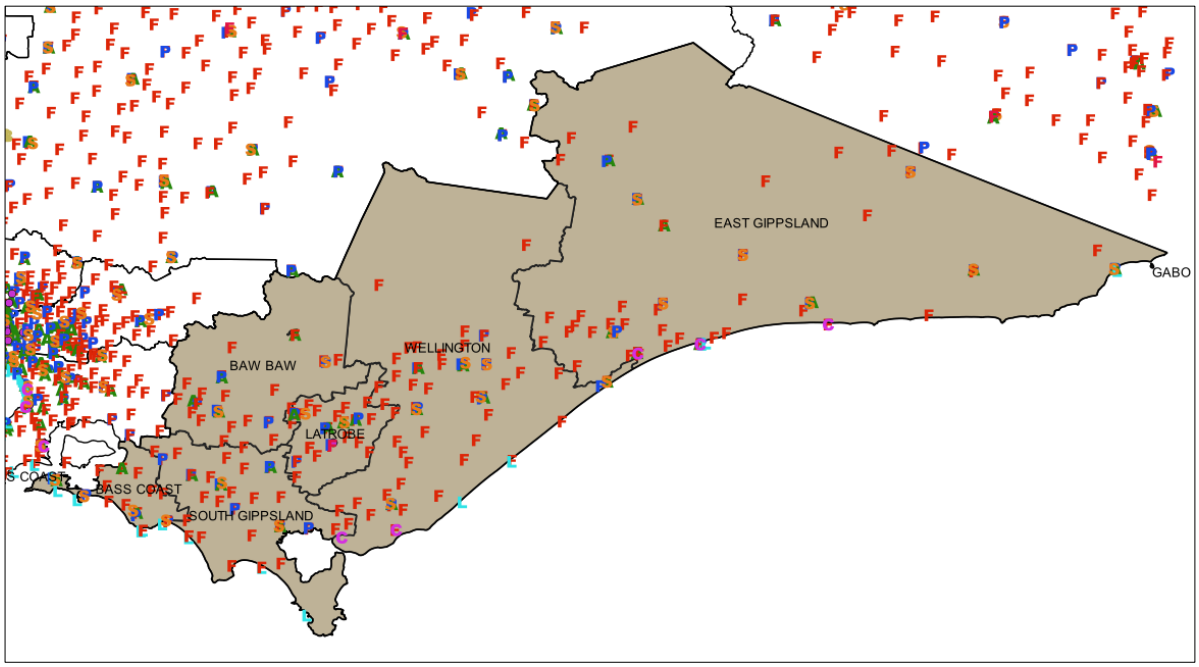
There are six Coast Guard flotillas in the region, as outlined below:

Table 35. Coast Guard Flotillas in Gippsland Region[168]

LGA	No. Flotillas	Name/Location
East Gippsland Shire	4	VF15 Mallacoota VF18 Lakes Entrance VF21 Marlo VF22 Paynesville
South Gippsland Shire	1	VF20 Welshpool
Wellington Shire	1	VF19 Port Albert
Gippsland Total	**6**	

167 Surf Lifesaving Australia (2020): https://sls.com.au/club-directory/
168 Australian Volunteer Coastguard (2020): https://coastguard.com.au/locations/full-flotilla-list/

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 22. Emergency services for the Gippsland Region[169]

7.8.7 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) and a Regional Control Centre (RCC) in Latrobe City (a facility that enables the implementation of Command, Control and Coordination arrangements within a set regional boundary) and 11 Incident Control Centres (ICCs), where an Incident Controller and Incident Management Teams can manage response activities in an emergency.[170] In total there are 37 emergency coordination centres across the region, including 25 Local Command Facilities (LCF), as outlined below:

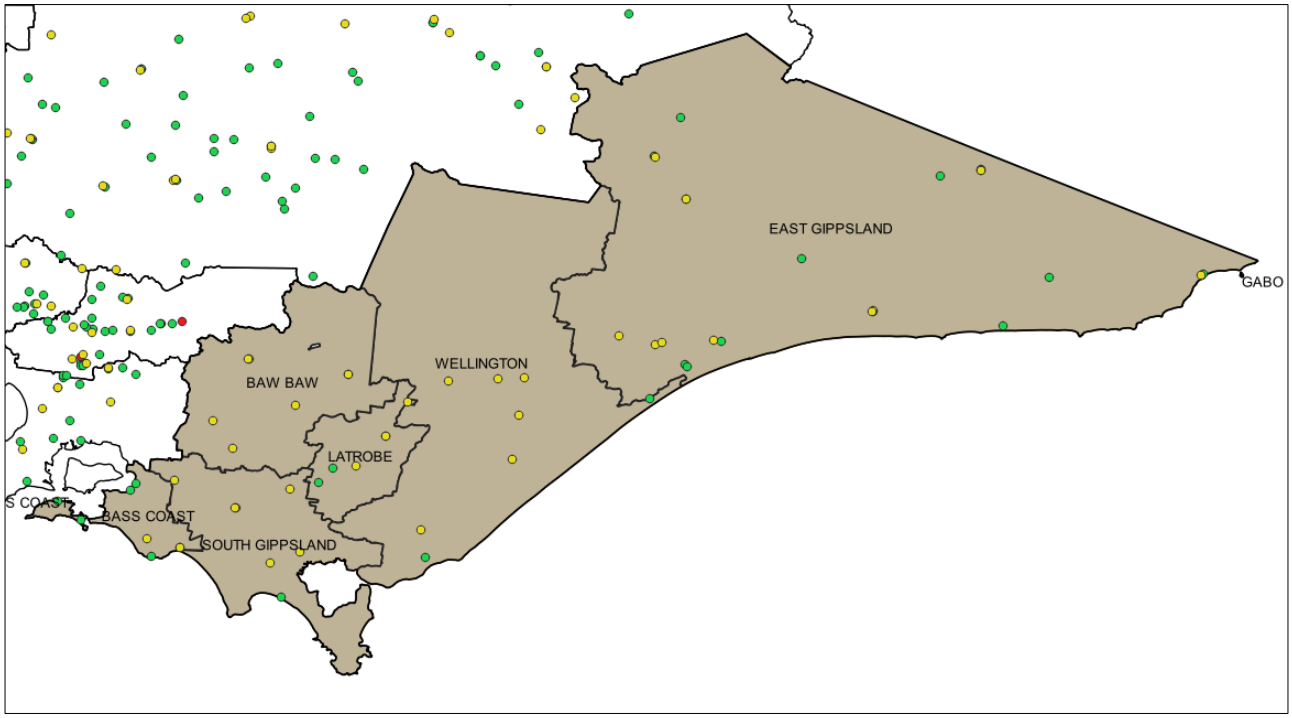
169 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-line-vicmap-features-of-interest
170 EMV (2019): https://files-em.em.vic.gov.au/public/Doctrine/ManHand/VIC-EOpsHandbook.pdf

Table 36. Emergency Coordination Facilities in Gippsland Region[171]

LGA	Facility			Locations (RCC, ICC, LSF)
	RCC	ICC	LCF	
Bass Coast Shire	-	-	2	Inverloch, Wonthaggi
Baw Baw Shire	-	3	4	Ellinbank, Erica, Noojee Drouin, Erica, Noojee, Willow Grove
East Gippsland Shire	-	4	8	Bairnsdale, Bendoc, Orbost, Swifts Creek Bairnsdale, Bendoc, Johnsonville, Lindenow South, Mallacoota, Omeo, Orbost, Swifts Creek
Latrobe City	1	1	2	Traralgon (CFA) Traralgon Churchill, Toongabbie
South Gippsland Shire	-	1	5	Leongatha Fish Creek, Foster, Leongatha, Loch, Mirboo North
Wellington Shire	-	2	4	Heyfield, Sale Maffra, Stradbroke, Stratford, Yarram
Total	**1**	**11**	**25**	**37**

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

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



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

Figure 23. Emergency Coordination facilities, Fire Refuges and NSPs for the Gippsland Region[172]

7.9 Other infrastructure assets and industries

7.9.1 Infrastructure and industries

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

- Abattoirs (10)
  - Eastern Abattoirs
  - GBP Australia Abattoir
  - Gippsland Meats
  - Gordyn Abattoirs
  - HY Moe Meat Pty Ltd
  - Radford Meats
  - Tabro Meat
  - Thalia Park – Gippsland Farmed Rabbits Slaughterhouse
  - Turkey Slaughterhouse

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

- Victoria Valley Meat Exports
- Backpackers
  - Philip Island YHA
- Rooming Houses (25)
- Supported Residential Facilities (4)
- Infrastructure Assets
  - Longford Gas Plants
  - Jeeralang AandB Power Stations
  - Yallourn Power Station
  - Loy Yang A
  - Loy Yang B
- Major Hazard Facilities[173] (3)
  - Paper Australia Pty Ltd
  - Esso Australia Pty Ltd
  - APA Orbost Gas Plant Pty Ltd

7.9.2 Dependencies

The following infrastructure assets are key dependencies for this region:

- Loy Yang A and B sites near Traralgon generate 50% of Victoria's electricity requirements. The state is reliant on the electricity generated in Gippsland
- Approximately 22% of Victoria's electricity is generated by brown coal generators in the La Trobe Valley
- Princes Highway – Melbourne-Latrobe-Bairnsdale-Sydney link (freight, private vehicles)
- Great Alpine Road – Bairnsdale-Omeo-Wangaratta link (freight, private vehicles)
- Longford Gas Processing Facility – processes gas from Gippsland Basin – all regions are reliant on gas extracted and processed in Gippsland.
- Morwell to Dandenong gas line – supplies gas to Southern Metro region.

173 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. In Gippsland Region these sites include:

- Philip Island Grand Prix Circuit (Bass Coast Shire)
- Lardner Park
- West Gippsland Arts Centre (Baw Baw Shire) [174]

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.[175]

- 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.[176]

To date, more than 2,200 inspections have been undertaken and Gippsland Region has been identified to have 7 privately owned buildings with cladding. Refer Figure 24.

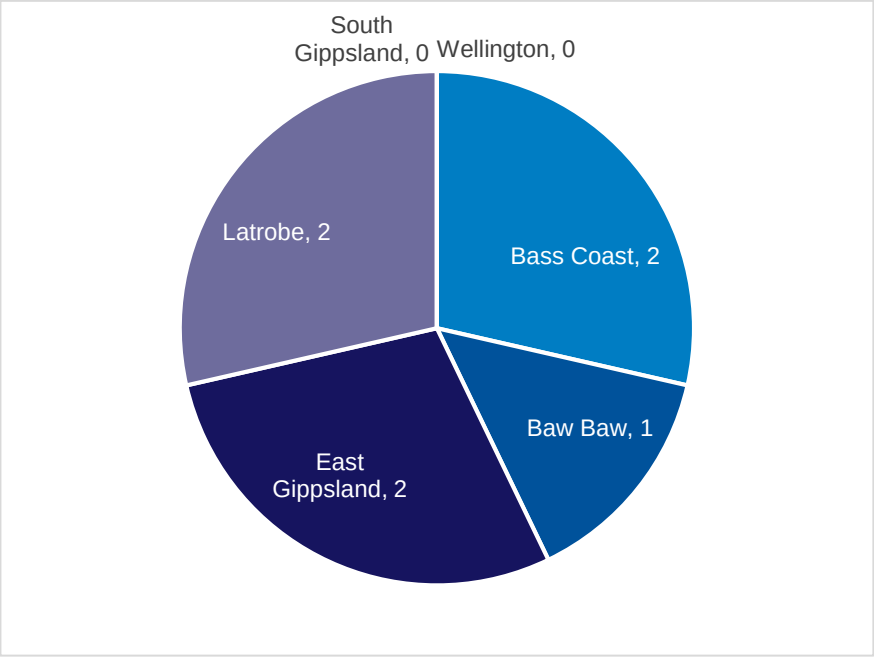


Figure 24. Number of privately owned buildings with cladding by LGA[177]

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

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

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

177 https://www.vba.vic.gov.au/cladding/cladding-by-municipality

8. Social Environment

Social factors that influence the culture and institutions of the Gippsland 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 290,000 people live in the Gippsland Region, with a significant portion of the population (26%) living in Latrobe City.

Population density for Gippsland Region ranged from 4.1 persons per km^2 in Wellington Shire to 53.0 persons per km^2 in Latrobe Shire, with an average of 6.9 persons per km^2 across the region.

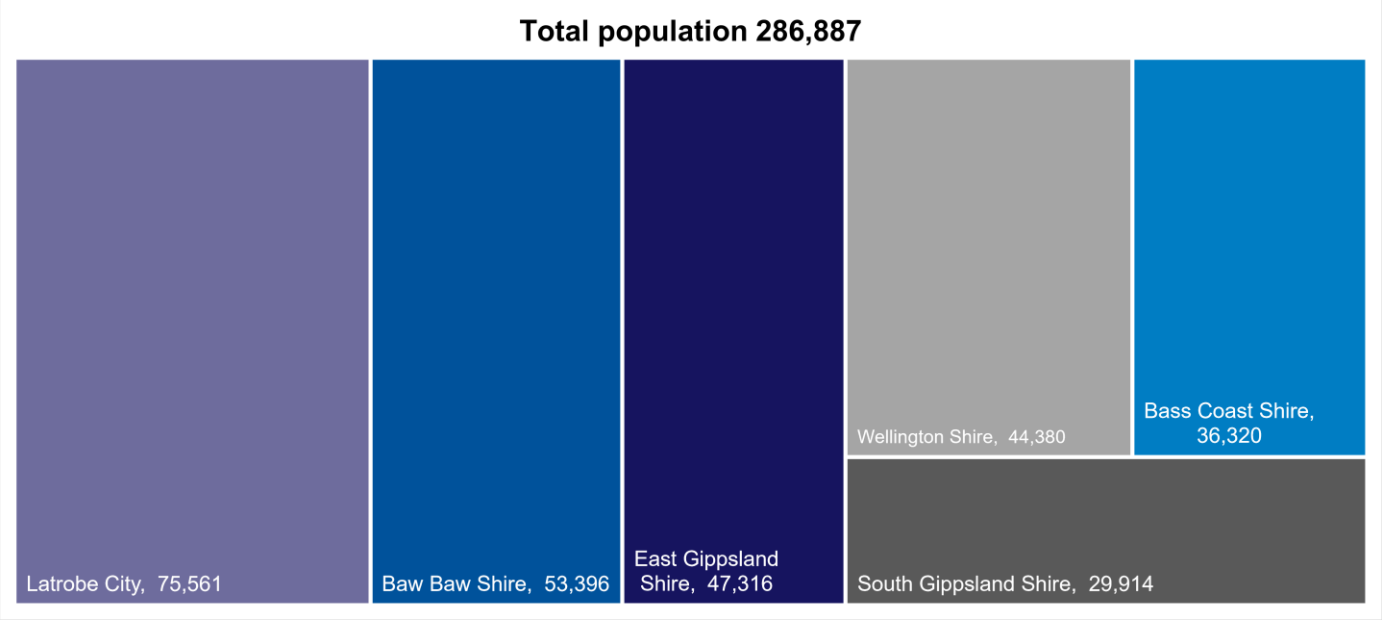


Figure 25. Gippsland Region Population by LGA (2019) [178]

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

Table 37. Gippsland Population Density by LGA (2019)[179] [180]

LGA	Total Population	Area (km^2)	Population Density (persons/km^2)
Bass Coast	36,320	866	41.9
Baw Baw	53,396	4,028	13.3
East Gippsland	47,316	20,940	2.3
Latrobe	75,561	1,426	**53.0**
South Gippsland	29,914	3,296	9.1
Wellington	44,380	10,817	**4.1**
Gippsland Total	**286,887**	**41,373**	**6.9**

8.1.2 Population forecast

By 2036, the population of the region is forecast to increase by 59,211 people (21%) to 346,098 people, with the majority taking up residence in Baw Baw Shire (+22,423 people), Bass Coast Shire (+11,825 people) and East Gippsland Shire (+8,640 people).

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

Table 38. Gippsland Estimated Population and Projections by LGA

LGA	Estimated Population and Projections			
	2019[181]	2036[182]	No. Increase	% Growth
Bass Coast	36,320	48,145	**11,825**	***32.6%***
Baw Baw	53,396	75,819	**22,423**	***42.0%***
East Gippsland	47,316	55,956	8,640	*18.3%*
Latrobe	75,561	83,195	7,634	*10.1%*
South Gippsland	29,914	33,926	4,012	*13.4%*
Wellington	44,380	49,057	4,677	*10.4%*
GIPPSLAND	**286,887**	**346,098**	**59,211**	***20.6%***
VICTORIA	**6,596,039**	**8,722,766**	**2,126,727**	***32.2%***

179 ABS (2020): https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02018-19?OpenDocument
180 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/table-and-chart
181 ABS (2017): https://www.rdv.vic.gov.au/information-portal/table-and-chart
182 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. Gippsland Region's population by age group (2017)

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.**
Bass Coast	5,579	1,628	7,207	1,228	3,131	3,447	4,272	5,180	5,224	2,620	1,155	8,999	33,464
Baw Baw	9,669	3,074	12,743	2,685	5,608	5,537	6,518	6,641	5,627	2,866	1,071	9,564	49,296
East Gippsland	7,535	2,349	9,884	1,967	4,062	4,379	5,793	7,143	7,337	3,711	1,324	12,372	45,600
Latrobe	13,813	4,522	18,335	5,105	9,568	8,480	9,765	10,022	7,460	4,135	1,752	13,347	74,622
South Gippsland	5,340	1,641	6,981	1,233	2,719	3,101	3,984	4,493	3,942	1,885	784	6,611	29,122
Wellington	7,931	2,576	10,507	2,276	5,129	5,052	5,740	6,399	4,970	2,460	997	8,427	43,530
Gippsland Total	**49,867**	**15,790**	**65,657**	**14,494**	**30,217**	**29,996**	**36,072**	**39,878**	**34,560**	**17,677**	**7,083**	**59,320**	**275,634**
%	***18.1%***	***5.7%***	***23.8%***	***5.3%***	***11.0%***	***10.9%***	***13.1%***	***14.5%***	***12.5%***	***6.4%***	***2.6%***	***21.5%***	***100.00***
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%***

Table 40. Gippsland Region's 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.
Bass Coast	6,730	2,387	9,117	2,094	4,375	4,141	4,950	6,567	8,338	5,948	2,615	16,901	48,145
Baw Baw	13,561	4,898	18,460	4,125	7,980	8,746	9,333	8,523	9,104	6,779	2,770	18,653	75,819
East Gippsland	8,400	2,806	11,206	2,233	4,738	5,656	5,983	6,874	9,132	7,067	3,066	19,265	55,956
Latrobe	12,446	4,385	16,831	4,562	8,933	9,948	10,398	9,742	10,722	8,300	3,759	22,781	83,195
South Gippsland	5,157	1,840	6,997	1,497	2,802	3,418	4,091	4,533	5,243	3,818	1,528	10,589	33,926
Wellington	7,455	2,668	10,123	2,233	4,896	5,856	6,492	6,201	6,339	4,928	1,988	13,256	49,057
GIPPSLAND	**53,750**	**18,984**	**72,734**	**16,744**	**33,725**	**37,764**	**41,246**	**42,440**	**48,879**	**36,841**	**15,727**	**101,446**	**346,098**
%	***15.5%***	***5.5%***	***21.0%***	***4.8%***	***9.7%***	***10.9%***	***11.9%***	***12.3%***	***14.1%***	***10.6%***	***4.5%***	***29.3%***	***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%***

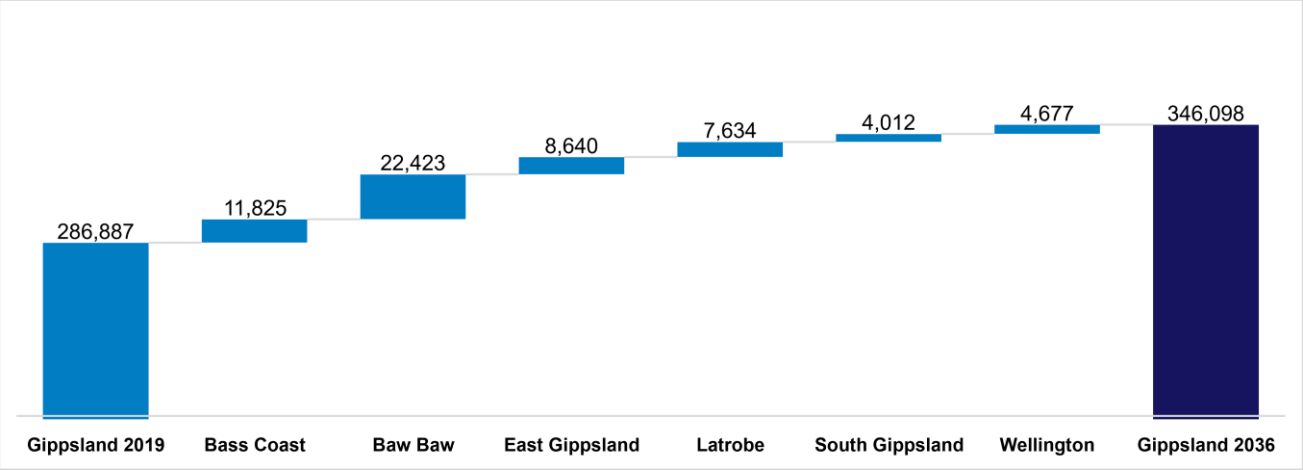


Figure 26. Population growth by LGA (2019-2036)[183]

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.

Some of these indicators for the Gippsland Region are summarised below. Of note, more than a quarter (26.4%) of Gippsland Region households were lone person and fewer than 1 in 5 households (15.2%) indicated they had no internet connection at home in 2016.

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

Table 41. Vulnerable Communities Indicators for Gippsland Region by LGA (2016)[184]

LGA	Vulnerability Indicators (%)						
	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
Bass Coast Shire	*27.8%*	*29.0%*	*6.6%*	*0.6%*	*0.1%*	*2.9%*	*18.9%*
Baw Baw Shire	*20.1%*	*22.5%*	*5.6%*	*0.5%*	*0.2%*	*3.1%*	*15.7%*
East Gippsland Shire	*28.2%*	*27.1%*	*6.8%*	*0.4%*	*0.5%*	*3.5%*	*20.4%*
Latrobe City	*18.6%*	*27.6%*	*7.0%*	*0.9%*	*0.3%*	*6.1%*	*0.0%*
South Gippsland Shire	*23.7%*	*25.6%*	*5.5%*	*0.4%*	*0.2%*	*2.6%*	*17.8%*
Wellington Shire	*20.2%*	*26.3%*	*5.9%*	*0.5%*	*0.2%*	*3.7%*	*18.5%*
Gippsland	***23.1%***	***26.4%***	***6.2%***	***0.6%***	***0.3%***	***3.7%***	***15.2%***

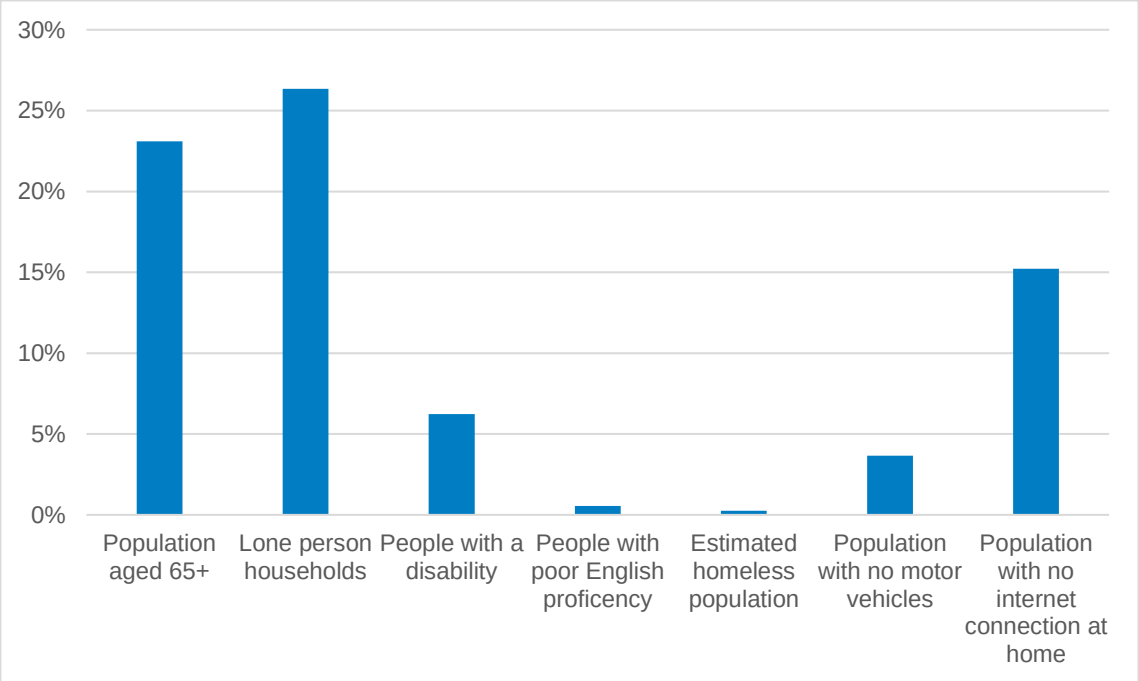


Figure 27. Vulnerable Communities Indicators for Gippsland Region (2016)

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

8.2.1 The young and the elderly

Within the Gippsland Region, 24% of the population was aged 19 years or younger in 2018, while 23% was aged 65 years or older.

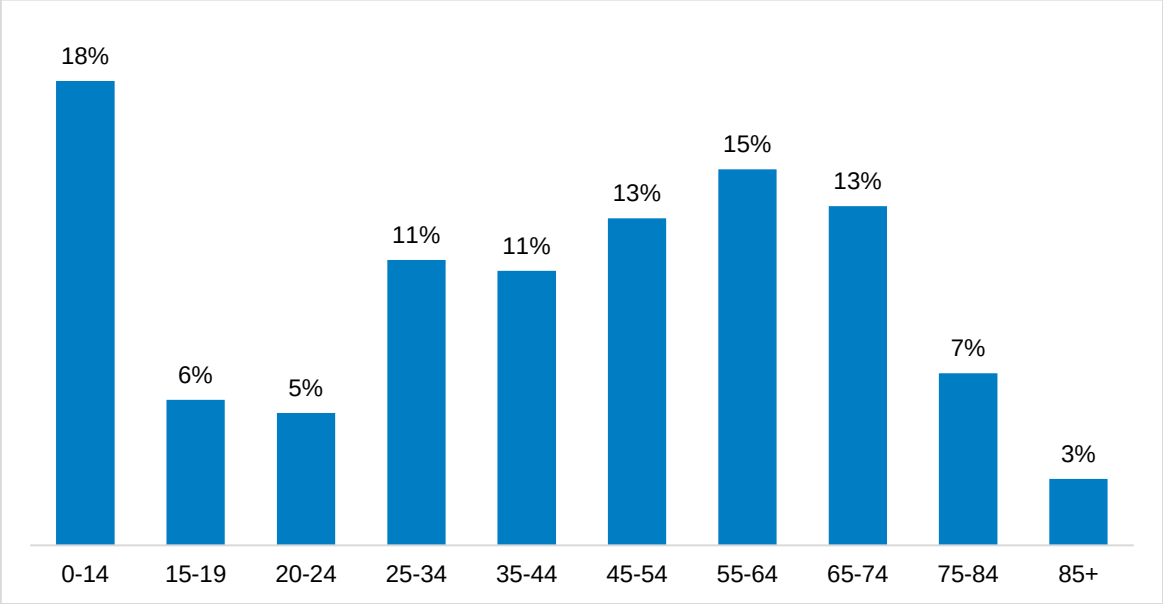


Figure 28. Gippsland Region population breakdown by age (2018)[185]

However, these vulnerable groups were not evenly distributed across the region, with Baw Baw Shire having the highest proportion of people aged 0-19 years (26%), while Bass Coast Shire (21%) had the lowest proportion of people aged 0-19 years. Conversely, East Gippsland Shire had the highest proportion of people aged 65+ years (28%), while Latrobe City had the lowest number of people aged 65+ years (19%).

Table 42. Proportion of population by age group and LGA (2018)[186]

LGA	19 years or younger (%)	65 years + (%)
Bass Coast Shire	***21%***	*27%*
Baw Baw Shire	***26%***	*20%*
East Gippsland Shire	*22%*	***28%***
Latrobe City	*24%*	***19%***
South Gippsland Shire	*24%*	*24%*
Wellington Shire	*24%*	*20%*

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

8.2.2 Those needing assistance

When it comes to assistance with core activities, approximately 6.9% of the population of the Gippsland Region have a need – in real terms representing 17,142 people. However, the number of people in need varies according to LGA, from just 6% of the population of South Gippsland Shire (2,694 people) in 2016 to 9.0% of the population of Baw Baw Shire (3,055 people).

Table 43. Need for assistance with core activities (no.) in Gippsland Region (2016) [187]

LGA	Total	Percentage
Bass Coast Shire	2,155	*7.1%*
Baw Baw Shire	**2,694**	***9.0%***
East Gippsland Shire	3,055	*7.5%*
Latrobe City	5,109	*7.6%*
South Gippsland Shire	**1,586**	***6.0%***
Wellington Shire	2,543	*6.6%*
Total Gippsland Region	**17,142**	***6.9%***

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 Gippsland is less culturally diverse than metro regions with 12.83% of the population born overseas. However, the population of Bass Coast is slightly higher than the rest of Gippsland with the LGA above 15% born overseas while the population of the Shire of Wellington 11.64 % were born overseas. Refer Table 37.

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

- England – which featured in the top three for all 6 of the 6 LGAs
- New Zealand – which also featured in the top three for all LGAs
- Netherlands – which featured in the top three for 5 of the 6 LGAs

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

Approximately 5% of the population of Gippsland Region speaks a language other than English at home. In all LGAs, except for Latrobe, the number of people who speak only English at home was above 94%. In the Shire of Latrobe about 93% of the population only speaks English at home.

The variety of most common languages spoken at home other than English is observed to be somewhat diverse in Gippsland with five languages listed as common for the six LGAs.

In Gippsland the most common language spoken (other than English) was:

- Italian – which featured in the top three for all 6 of the 6 LGAs
- Mandarin – which featured in the top three of 4 of the 6 LGAs

As a proportion of Gippsland, Aboriginal and Torres Strait Islanders represent 1.6% of the total Gippsland population. Ranging between 1.01% of the population in Bass Coast to 3.18% of the population in the Shire of East Gippsland.

There are many Aboriginal languages. However, they do not have geographic boundaries. The most widespread in Victoria are the Kulin languages.[188] Refer Figure 29.

Figure 29. Map of Aboriginal languages of Victoria[189]

188 https://www.vcaa.vic.edu.au/Documents/alcv/History.pdf

189 https://cv.vic.gov.au/stories/aboriginal-culture/our-story/vacl-language-map-of-victoria/

Table 44. Population by Aboriginal and Torres Strait Islander (ATSI) status and birthplace and LGA (2016) [191]

LGA	Birthplace						Total		Top 3 Countries of Birth (other than Australia)[190]		
	Australia				Elsewhere						
	ATSI		All								
	No.	%	No.	%	No.	%	No.	%	1	2	3
Bass Coast	303	*1.0%*	25,150	*84.2%*	4,715	*15.8%*	29,865	*100.0%*	**England**	**New Zealand**	Italy
Baw Baw	484	*1.1%*	39,413	*88.2%*	5,257	*11.8%*	44,670	*100.0%*	**England**	**New Zealand**	**Netherlands**
East Gippsland	1,288	*3.2%*	35,616	*88.0%*	4,872	*12.0%*	40,488	*100.0%*	**England**	**New Zealand**	**Netherlands**
Latrobe	1,184	*1.8%*	57,398	*86.3%*	9,120	*13.7%*	66,518	*100.0%*	**England**	**Netherlands**	**New Zealand**
South Gippsland	274	*1.0%*	22,965	*88.0%*	3,142	*12.0%*	26,107	*100.0%*	**England**	**New Zealand**	**Netherlands**
Wellington	640	*1.6%*	34,626	*88.4%*	4,562	*11.6%*	39,188	*100.0%*	**England**	**New Zealand**	**Netherlands**
Gippsland Region	**4,173**	**1.7%**	**215,168**	***87.2%***	**31,668**	***12.8%***	**246,836**	***100.0%***			

190 .id (2020): profile.id.com.au
191 ABS Census 2016: https://www.rdv.vic.gov.au/information-portal/table-and-chart

Table 45. Population by language spoken at home (2016) [192]

LGA	Language Spoken at Home								
	English Only		Other Language		Total		Top 3 Languages Spoken (other than English)[193]		
	No.	%	No.	%	No.	%	1	2	3
Bass Coast	28,847	*94.8%*	1,577	*5.2%*	30,424	*100.0%*	**Italian**	Greek	German
Baw Baw	43,359	*95.8%*	1,922	*4.2%*	45,281	*100.0%*	**Italian**	**Mandarin**	Dutch
East Gippsland	39,557	*96.1%*	1,589	*3.9%*	41,146	*100.0%*	**Italian**	German	**Mandarin**
Latrobe	62,594	*92.8%*	4,837	*7.2%*	67,431	*100.0%*	**Italian**	Greek	**Mandarin**
South Gippsland	25,512	*96.3%*	972	*3.7%*	26,484	*100.0%*	**Italian**	German	Dutch
Wellington	37,355	*95.8%*	1,621	*4.2%*	38,976	*100.0%*	**Italian**	**Mandarin**	Dutch
Gippsland Region	**237,224**	***95.0%***	**12,518**	***5.0%***	**249,742**	***100.0%***			

192 ABS (2016): https://www.rdv.vic.gov.au/information-portal/table-and-chart
193 .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 Gippsland Region were ranked as follows:

Table 46. SEIFA Index Rankings (Most Disadvantaged) for Gippsland Region[194]

LGA	SEIFA Score	Ranking (Most Disadvantaged)
Bass Coast Shire	967	22nd
Baw Baw Shire	**997**	**46th**
East Gippsland Shire	958	19th
Latrobe City	**931**	**4th**
South Gippsland Shire	992	35th
Wellington Shire	974	25th
Gippsland Average	**970**	**-**
VICTORIA Average	**997**	**-**

Within Gippsland Region, Latrobe City was rated the most disadvantaged (and was the 4th most disadvantaged LGA in Victoria) and Baw Baw Shire was the least disadvantaged (and was the 46th most disadvantaged of 79 Victorian LGAs). Overall, Gippsland Region is more disadvantaged than the average for Victorian LGAs.

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

- There were 111,584 occupied private dwellings, with an average of 2.4 persons per dwelling
- 5.6% of households had no vehicle
- Almost 1 in 3 (32.9%) low income households were facing rental stress, while 1 in 10 (10.2%) low income households were facing mortgage stress.
- 90.7% of residential properties were separate houses
- 79.9% of all households were connected to the internet

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

194 DJPR (2020): https://www.rdv.vic.gov.au/information-portal/regional-snapshot

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 179 schools and 44,213 full-time enrolments in the region, with government schools making up 79% of all schools and 70% of all full-time school enrolments.

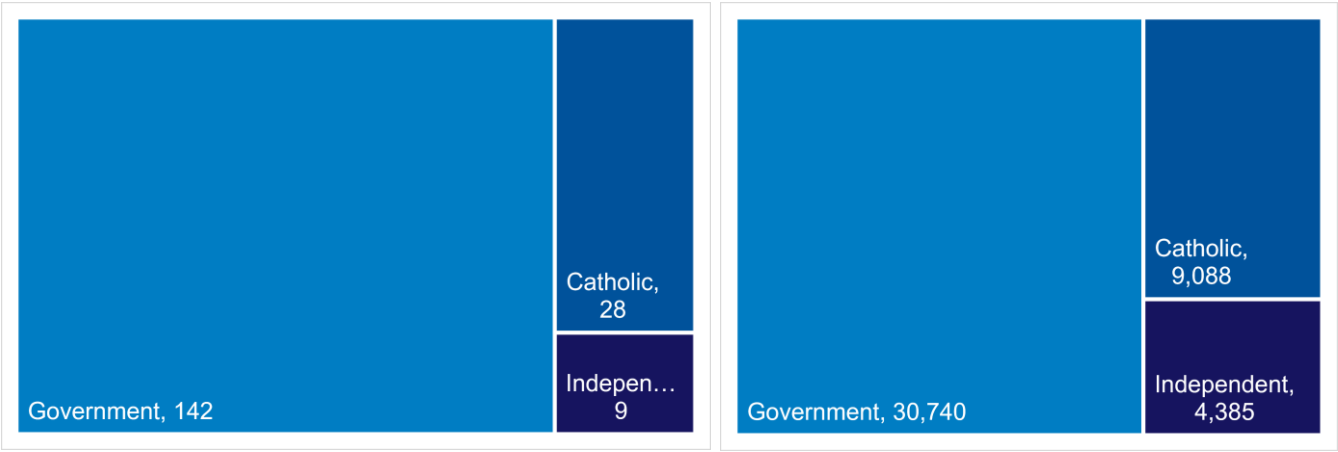


Figure 30. Number of schools and full-time enrolments in Gippsland Region[195]

The number of schools and full-time enrolments in the region are distributed across LGAs as follows, with the largest number of full-time enrolments in Latrobe City (11,434):

Table 47. Schools and full-time enrolments in Gippsland Region by LGA (2019) [196]

LGA	No. Schools	No. Full-time Enrolments
Bass Coast Shire	14	4,844
Baw Baw Shire	37	9,567
East Gippsland Shire	37	6,460
Latrobe City	35	11,434
South Gippsland Shire	22	4,943
Wellington Shire	34	6,965
Total Gippsland Region	**179**	**44,213**

195 DET (2020): https://www.education.vic.gov.au/about/department/Pages/factsandfigures.aspx
196 DET (2020): https://www.education.vic.gov.au/about/department/Pages/factsandfigures.aspx

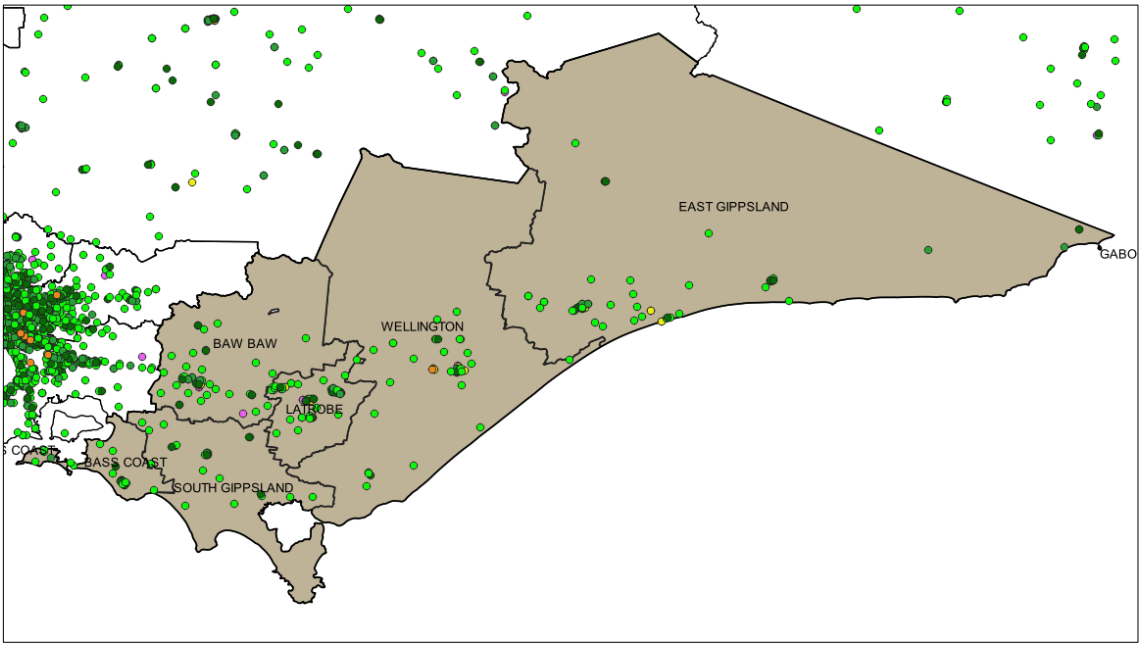
There is one university and two TAFEs with multiple campuses across the region, including:

Table 48. Universities and TAFEs in Gippsland Region[197]

University/TAFE	Campuses
Federation University	Gippsland (Churchill)
TAFE Gippsland	Bairnsdale, Forestec (Kalmina West), Lakes Entrance (Seamec), Leongatha, Morwell, Traralgon, Warragul, Yallourn and Sale
Chisholm Institute of TAFE	Wonthaggi

There are also 194 childcare facilities across the region (including childcare centres, pre-schools and kindergartens).[198]

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



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

Figure 31. Map of Educational Facilities within the Gippsland Region[199]

8.4.2 Educational Level

Approximately 1 in 3 persons (27.1%) of people over 15 years of age in the Gippsland Region have a bachelor's degree or higher non-school qualification, however over 60% did not complete Year 12.

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

Table 49. Education levels attained in Gippsland Region (2016)[200]

Education Level	Total	Percentage
People over 15 with bachelor's degree or higher non-school qualification	26,844	27.14%
Did not complete Year 12	112,879	60.29%
15-19 years old not in school or employment	1,122	7.27%

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.[201] Practitioners, health professionals, service organisations and government agencies may also be required to respond to local emergencies to care for the injured or unwell directly affected.

In Gippsland Region in 2011 there were 119 General Medical Practitioners per 100,000 people.[202]

8.5.1 Hospitals and health centres

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 are 15 hospitals, eight community health centres and one maternal and child health service across the region, as outlined below:

Table 50. Hospitals and Health Centres in Gippsland Region by LGA[203]

LGA	Hospitals	Community Health Centres	Maternal and Child Health Services
Bass Coast Shire	1	0	0
Baw Baw Shire	2	0	1
East Gippsland Shire	3	6	0
Latrobe City	2	1	0
South Gippsland Shire	3	0	0
Wellington Shire	4	1	0
Total Gippsland Region	**15**	**8**	**1**

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

Details of the 15 hospitals across the Gippsland Region are further outlined below:

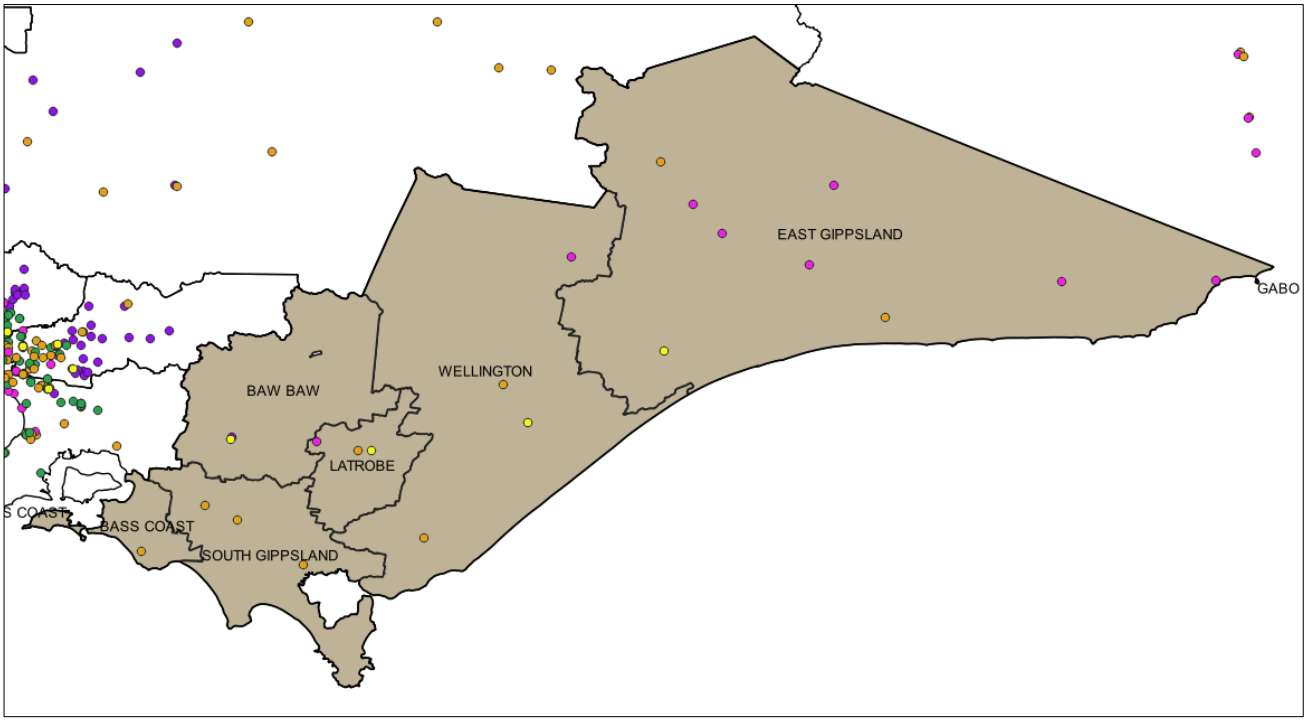
Table 51. Hospitals in Gippsland Region by LGA[204]

LGA	No. Hospitals	Hospital Names
Bass Coast Shire	1	Wonthaggi Public Hospital
Baw Baw Shire	2	Neerim District Health Services Warragul Public Hospital
East Gippsland Shire	3	Bairnsdale Public Hospital Omeo Public Hospital Orbost Public Hospital
Latrobe City	2	Maryvale Private Hospital Latrobe Regional Hospital
South Gippsland Shire	3	Foster Public Hospital Korumburra Public Hospital Leongatha Public Hospital
Wellington Shire	4	Heyfield Hospital Maffra Public Hospital Sale Public Hospital Yarram Public Hospital
Total Gippsland Region	**15**	

Gippsland Region has two hospitals with intensive care units with a total of 20 ICU beds available at Latrobe Regional Hospital (14 ICU beds) and Sale Public Hospital (6 ICU beds).

The below figure shows the location of the above healthcare services, with hospitals centred closer to larger towns, while community health centres are located in more remote areas.

204 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 32. Map of hospitals and health care facilities in the Gippsland Region[205]

8.5.2 Aged Care

There are 60 aged care facilities across the region, as outlined below:

Table 52. Number of Aged Care Facilities in Gippsland Region[206]

LGA	No. Facilities
Bass Coast Shire	7
Baw Baw Shire	8
East Gippsland Shire	15
Latrobe City	14
South Gippsland Shire	7
Wellington Shire	9
Total Gippsland Region	**60**

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

The locations of these facilities are also provided below:

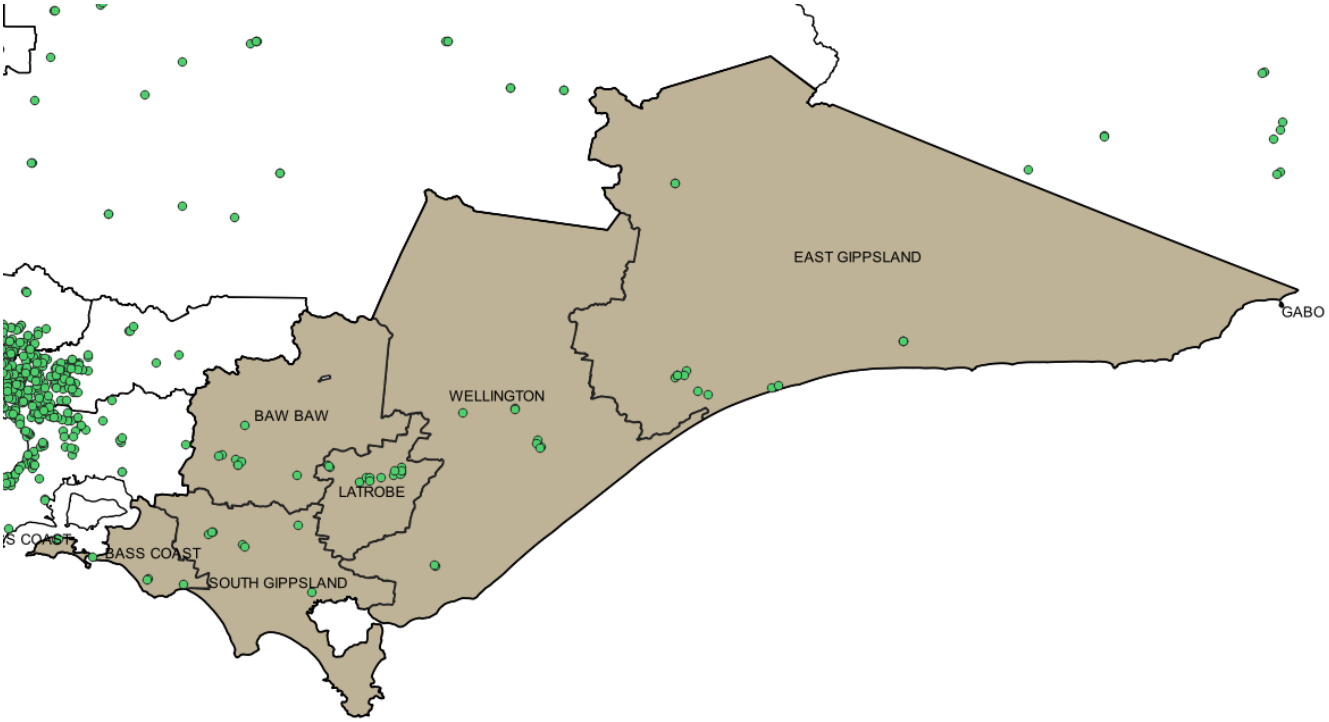


Figure 33. Map of aged care facilities in the Gippsland Region[207]

The number of people in the Gippsland 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.

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

Table 53. Aged Care Support in Gippsland (2018-2019)[208]

Age Bracket	Home Care	Residential Care	Transition Care	Total
0–49	1	21	2	**24**
50–54	18	24	0	**42**
55–59	33	29	1	**63**
60–64	44	57	1	**102**
65–69	133	129	3	**265**
70–74	238	209	3	**450**
75–79	328	316	5	**649**
80–84	429	523	10	**962**
85–89	339	724	5	**1,068**
90–94	180	702	3	**885**
95–99	41	256	0	**297**
100+	4	44	0	**48**
Total	**1,788**	**3,034**	**33**	**4,855**

There were 81.7 residential care places per 100,000 population aged 70 years and over in Gippsland Region in 2016.[209]

8.6 Cultural values and assets

The Gippsland Region includes the traditional lands of the Gunaikurnai people[210] and comprises important cultural heritage assets.

8.6.1 Aboriginal cultural heritage assets

Important heritage sites in the land of the Gunaikurnai people include ten parks and reserves which are managed in partnership between the Gunaikurnai Land and Waters Aboriginal Corporation and the Victorian Government through the Gunaikurnai and Victorian Government Joint Management Plan 2018. These include Tarra-Bulga National Park, Mitchell River National Park, the Lakes National Park, the New Guinea Cave in the Snowy River National Park, Corringle Foreshore Reserve, and the Knob Reserve on the Avon River in Stratford. There are numerous ancient middens marking important meeting places along the Cape Conron coastline. Prior to European settlement, the Sale wetlands were an important source of food and raw materials. There are multiple scar trees in the Gippsland Region, which are protected under the

208 https://www.gen-agedcaredata.gov.au/Resources/Access-data/2020/March/GEN-data-People-using-aged-care
209 Victorian Health Information Surveillance System (VHISS): http://vhiss.reporting.dhhs.vic.gov.au/ViewContent.aspx?TopicID=1
210 ACHRIS (2020): https://achris.vic.gov.au/weave/wca.html

Aboriginal Heritage Act 2006. Other important sites include the Den of Nargun cave and waterfall on the Mitchell River, the Buchan Caves, and Burnt Bridge Reserve near Lake Tyers.[211]

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

Table 54. Significant Cultural Assets in Gippsland Region by LGA[212]

LGA	Art Galleries and Museums
Bass Coast Shire	Bunerong Environment Centre Churchill Island Agricultural Museum National Vietnam Veterans Museum State Coal Mine Museum Wonthaggi Art Space Philip Island Nature Park Penguin Parade
Baw Baw Shire	Station Gallery and Community Arts Hub Walhalla Museum Walhalla Post Office Museum Warragul And District Historical Society Museum Farm World Beyond the Valley Music Festival
East Gippsland Shire	Bairnsdale Historical Museum East Gippsland Art Gallery Great Alpine Gallery Lakes Entrance Regional History Centre and Museum Omeo Historical Park and Museum
Latrobe City	Boolarra Museum Brown Coal Mine Museum Latrobe Regional Gallery
South Gippsland Shire	Coal Creek Community Park and Museum Foster and District Historical Society Leongatha Art Gallery Meeniyan Art Gallery Port Welshpool And District Maritime Museum Stockyard Art Gallery Toora Village Artist Collective and Studio Gallery
Wellington Shire	Avonward Gallery Briagolong Art Gallery Gippsland Armed Forces Museum

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

LGA	Art Galleries and Museums
	Maffra Exhibition Space
	Maffra Sugar Beet Museum
	Port Albert Maritime Museum
	Regional Arts Victoria
	Sale Museum
	Stratford Historical Society and Museum
	The Gippsland Vehicle Collection
	Victoria Park Water Tower Museum
	Yarram and District Historical Society Museum
	Yarram Courthouse Gallery

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

- International Tennis ATP Challenger Championships (LaTrobe City)
- Southern Lights Festival (South Gippsland Shire)
- Maffra Mardi Gras (Wellington Shire)[213]

Figure 34 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.[214] 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*.[215]

213 https://profile.id.com.au/
214 https://www.aboriginalvictoria.vic.gov.au/cultural-heritage-sensitivity
215 https://vhd.heritagecouncil.vic.gov.au/

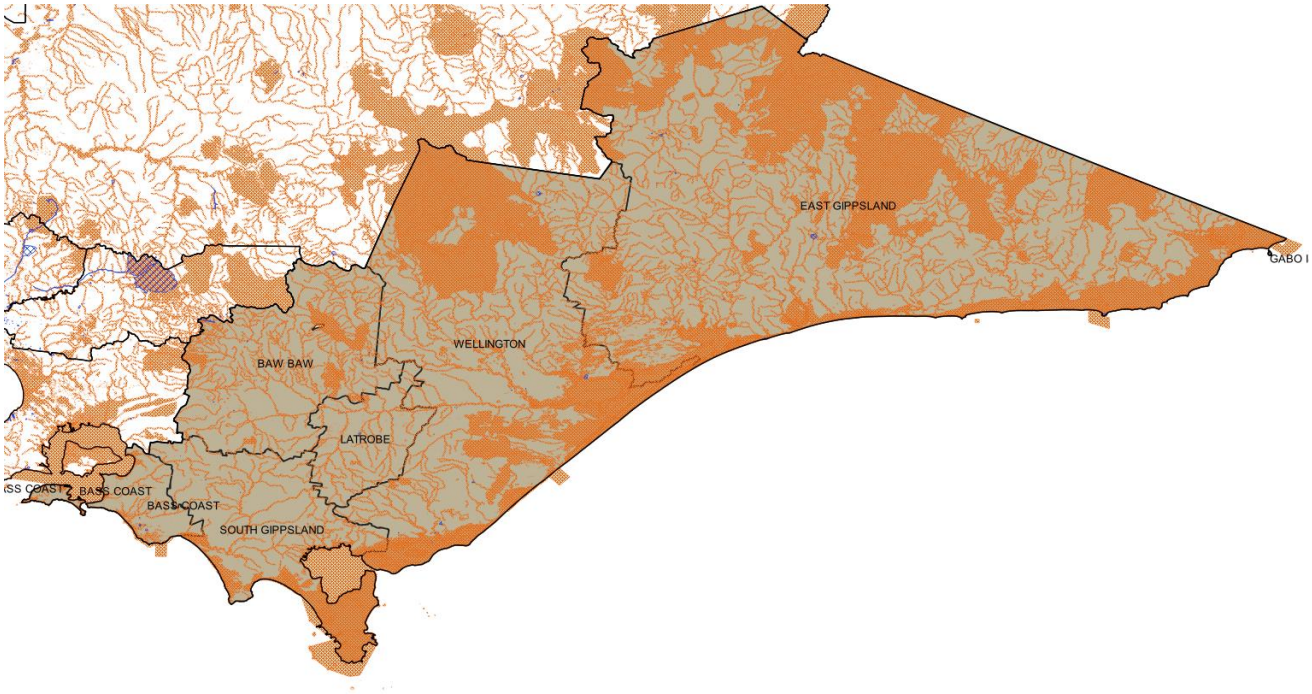


Figure 34. Areas of cultural and heritage significance[216] [217]

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, 148,191 people indicated that they volunteered in Gippsland Region, representing approximately 26.1% of the population. [218]

According to the Ministerial Council for Volunteers (2017), approximately 4% of volunteers work for an emergency services organisation[219] and EMV estimates over 100,000 people in Victoria volunteer across a wide range of emergency management agencies.[220]

- As at 1 July 2020, CFA Victoria noted its volunteer membership at 53,311 people, with an additional 1,486 junior members.[221]

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

216 https://discover.data.vic.gov.au/dataset/areas-of-cultural-heritage-sensitivity
217 https://discover.data.vic.gov.au/dataset/victorian-heritage-register
218 DJPR (2020) https://www.rdv.vic.gov.au/information-portal/table-and-chart
219 Ministerial Council for Volunteers (2017): https://iepcp.org.au/wp-content/uploads/2018/11/MCV-Volunteers-in-Victoria-report.pdf
220 EMV (2015): https://www.emv.vic.gov.au/volunteerstatement
221 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*,[222] 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 Gippsland 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.

9.1 Economic situation

The Gippsland economy is based on access to natural resources such as water and productive land, environmental assets, proximity to major transport links and electricity supply. Agriculture and tourism are important industry sectors.[223]

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.
- 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. [224]

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

222 DIIS (2019): https://emergencyvolunteeringau.dropmark.com/594398?q=%23Emergency-Volunteering-2030-study%20%23report
223 DJPR (2014): https://www.planning.vic.gov.au/__data/assets/pdf_file/0021/94611/Hume-Regional-Growth-Plan-May-2014.pdf
224 DTF (2020): https://www.dtf.vic.gov.au/economic-and-financial-updates/coronavirus-economic-outlook

9.1.1 Key economic indicators

Key economic indicators across the Gippsland Region for the period 2018-19 are summarised below: [225]

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

- Overall, the Gippsland Region contributed $15.8 billion to the Victorian economy, which was 3.5% 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 Gippsland Region had a lower than average rate of productivity at $136,363 compared with $166,496 per worker for Victoria.

Table 55. Economic Indicators for Gippsland Region[226] [227]

Economic Indicators	
Gross Regional Product ($ million) (2019)	$15,852m
Gross Regional Product per worker ($) (2018)	$136,363
10-year average annual GRP growth rate (2009-2019)	*-0.20%*
Total Jobs (2019)	116,247
Annual jobs growth rate (2018-2019)	*1.60%*
5-year average annual jobs growth rate (2014-2019)	*1.65%*
10-year average annual jobs growth rate (2009-2019)	*1.14%*

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

- Overall, the Gippsland Region provided over 116,000 jobs, which was 4.2% of the total number of jobs for the state (2.73 million jobs).

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

- Overall, the Gippsland Region's labour force participation rate in 2016 was 57.7%, which is below the Victorian average (60.5%)
- The unemployment rate (3.8%) in 2019 Q4, was below the State average (4.8%).

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

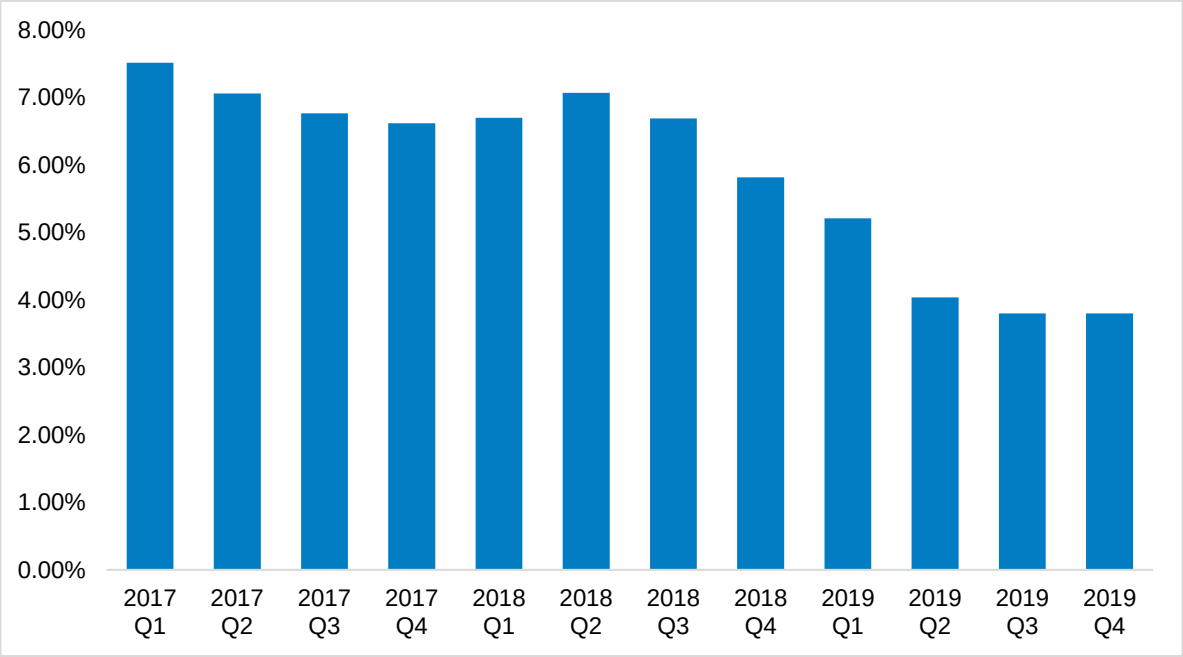


Figure 35. Quarterly Unemployment Rate for Gippsland Region (2017-2019)

Table 56. Employment indicators for Gippsland Region[228]

Indicators	Total	Percentage
Labour force participation	118,631	*57.7%*
Participation at 65 years plus	*7,334*	*12.1%*
People receiving an unemployment benefit	12,976	*8.2%*
Receiving an unemployment benefit for more than 180 days	*11,016*	*6.9%*
Youth unemployment (ages 15-24)	2,457	*12.6%*

9.1.2 Industry and employment

The main industries by number of jobs in the Gippsland Region overall in 2016 were Health Care and Social Assistance (15% of all jobs), Retail Trade (12% of all jobs) and Agriculture, Forestry and Fishing (10% of all jobs), as shown below:

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

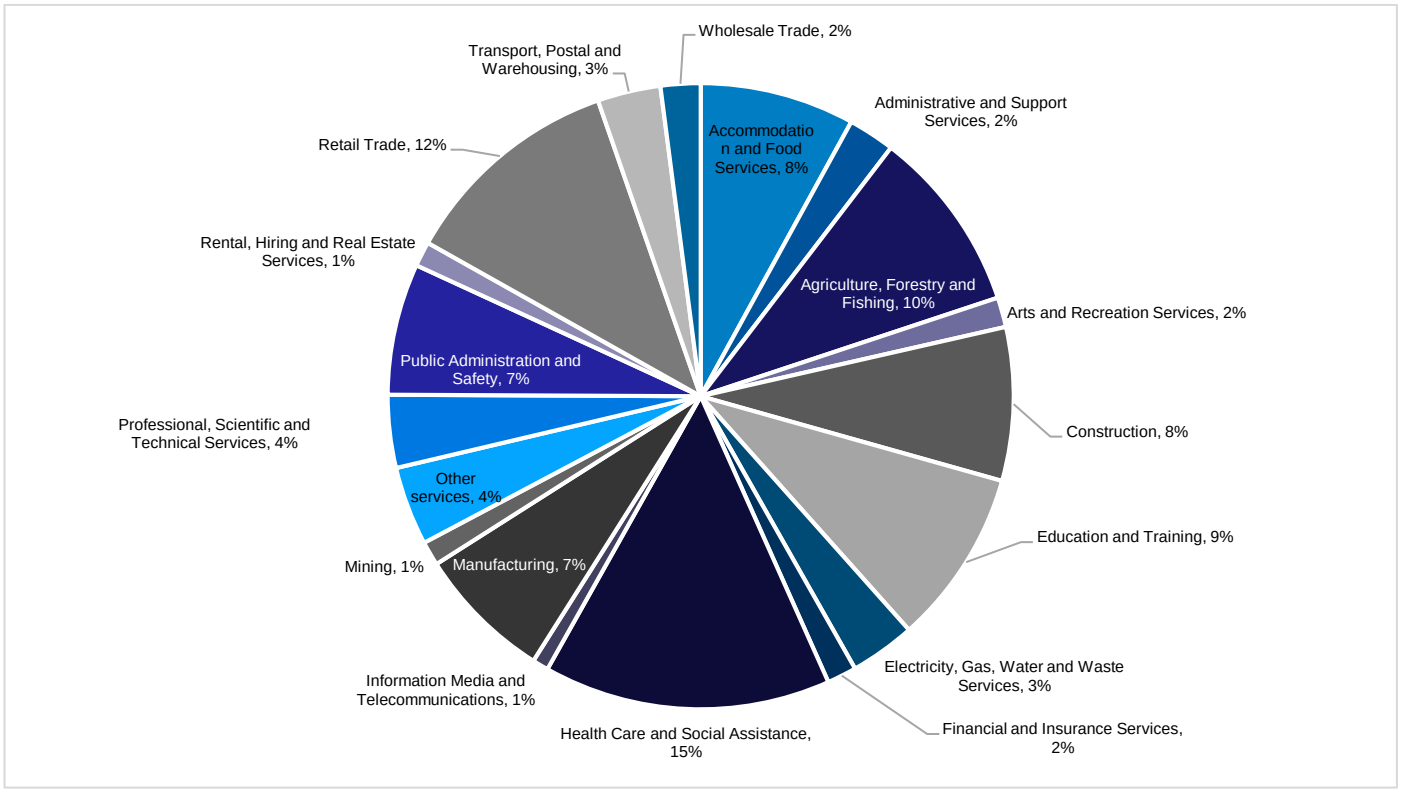


Figure 36 Jobs by Industry for Gippsland Region (2016)[229]

The main industries by number of businesses in the Gippsland Region overall in 2019 were Agriculture, Forestry and Fishing (30% of all businesses), Public Administration and Safety (10% of all businesses) and Electricity, Gas, Water and Waste services (8% of all businesses), as shown below:

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

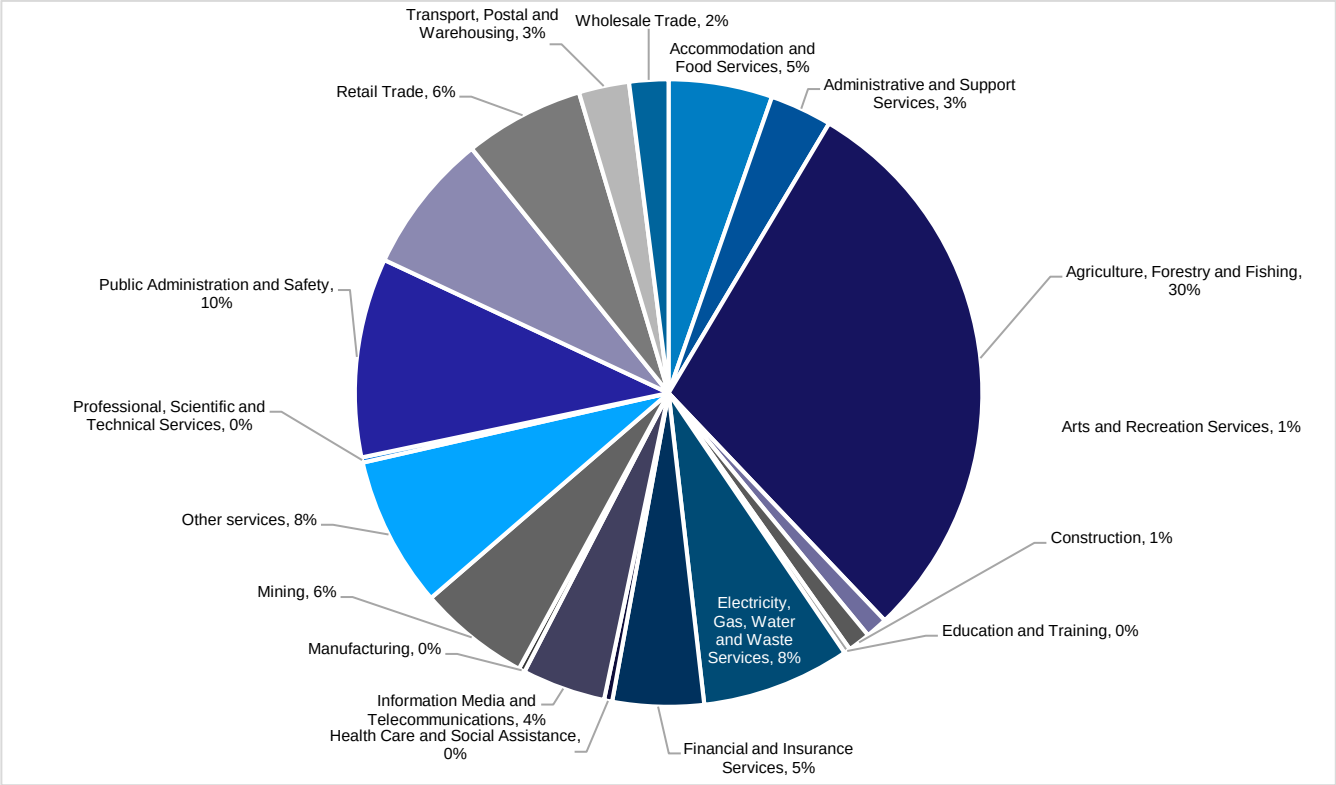


Figure 37. Business by Industry for Gippsland Region (2019)[230]

Of the 116,247 businesses in the region, nearly 65% are non-employing businesses, while nearly 34% are small businesses with fewer than 20 employees.

Table 57. Businesses by Size in Gippsland Region (2018) [231]

Business Size	Percentage (%)
Large (200+ employees)	*0.0%*
Medium (20-199 employees)	*1.8%*
Small (<20 employees)	*33.8%*
Non-employing businesses	*64.4%*

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. Gippsland sits within the Eastern Victorian Region.

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

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 Management Regions due to the need to separate groups by population.[232] Therefore, the list below includes all divisions that cross into Gippsland Region:

State electorate:

- Bass
- Gippsland East
- Gippsland South
- Morwell
- Narracan

Federal Division:

- Flinders (part)
- Gippsland
- McMillan

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.

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

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.

Operational learnings identified within this Region over the past 12 months include:

Wellington LGA

- EMLO activation is an important part of council EM response. It improves situational awareness which is required for consequence management and Emergency Management Team (EMT) engagement.
- The triggers for Emergency Relief Centre (ERC) activation need to be clear. ICC should request ERC via the MERC.
- Council is well placed to support ICC in the arrangement of public meetings.

11. Data sources

Table 58. 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?q=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 59. 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
DAFF	Department of Agriculture
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: Gippsland Region
Document owner:	Information Management and Intelligence Team, EMV

Version control

Version	Date	Description	Author
0.1	14/05/2020	Initial template created	C. Jolly
0.2	07/07/2020	First draft	M. Slavtcheva
0.3	27/07/2020	Second draft	C. Murphy
0.4	05/07/2020	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	10/09/2020	Proof reading	J. Kaye, T. Penfold
2.0	14/09/2020	Final release	C. Jolly

Document approval

This document requires the following approval:

Name	Title	Organisation
Debra Abbott	Deputy Emergency Management Commissioner	EMV
Andrew Crisp	Emergency Management Commissioner	EMV