Environmental Scan Report

Southern Metro 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 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 updated 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 regional emergency management plans. 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 format for this analysis is a PESTEL analysis (Political, Economic, Social, Technological, Environmental and Legal). These categories 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.

P	E	S	T	E	L
- Government policy - Political stability - Corruption - Foreign trade policy - Tax policy - Labour law - Trade restrictions	- Economic growth - Exchange rates - Interest rates - Inflation rates - Disposable income - Unemployment rates	- Population growth rate - Age distribution - Career attitudes - Safety emphasis - Health consciousness - Lifestyle attitudes - Cultural barriers	- Technology incentives - Level of innovation - Automation - R&D activity - Technological change - Technological awareness	- Weather - Climate - Environmental policies - Climate change - Pressures from NGO's	- Discrimination laws - Antitrust laws - Employment laws - Consumer protection laws - Copyright and patent laws - Health and safety laws

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.

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1 B2U (2020): https://www.business-to-you.com/scanning-the-environment-pestel-analysis/

5. Regional Context

Southern Metro Region (SMR) is the traditional home of the Bunurong/Boon Wurrung people of the Kulin nation, and one of eight regions for emergency management in Victoria, declared under Section 63 of the *Emergency Management Act 2013*.
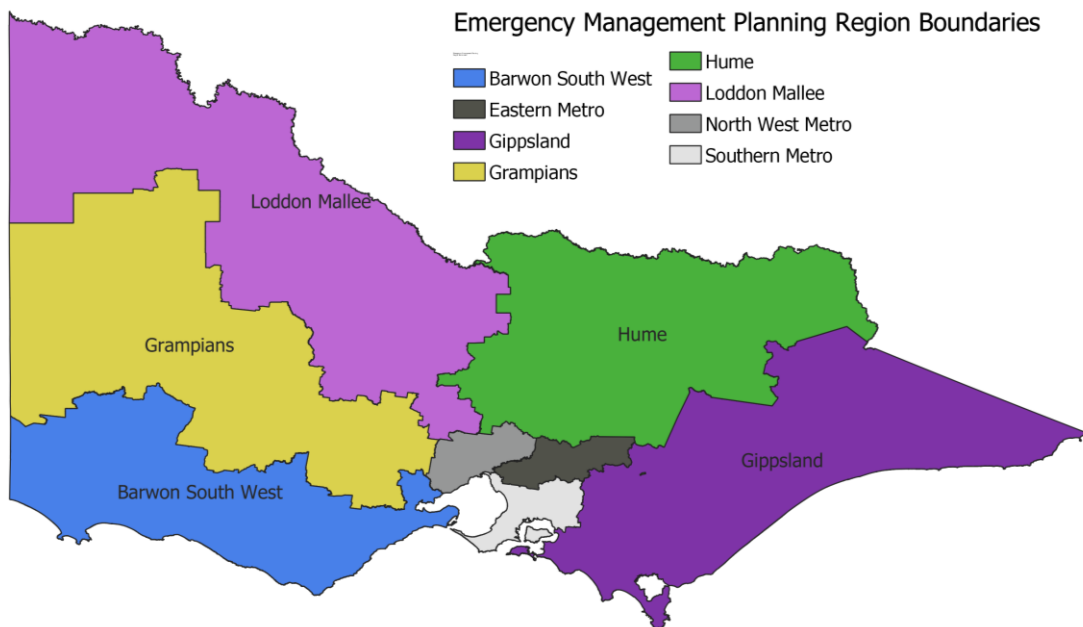
Figure 2. Victorian Emergency Management Regions

SMR shares boundaries with three other regions, covers 2,886 square kilometres and includes 214 suburbs or townships across 10 local government areas (LGAs) and one unincorporated area (French Island). The profiles of these LGAs are diverse, covering communities within both the inner and outer suburbs of Melbourne and townships on the coast.

Figure 3. South Metro Region Map including LGA boundaries[2]

The LGAs located within SMR are:

- Bayside City

- Cardinia Shire

- Casey City

- Frankston City

- French Island[3]

- Glen Eira City

- Greater Dandenong City

- Kingston City

- Mornington Peninsula Shire

- Port Phillip City

- Stonnington City

The three LGAs that occupy SMR's outer suburbs – Cardinia, Casey, Mornington Peninsula – categorise themselves as 'interface councils.' That is, "municipalities that form a ring around metropolitan Melbourne [and believe their] communities face exceptional liveability challenges as a result of increasingly rapid population growth, changing demographics and the impact of historic underfunding."[4]

While this environmental scan for SMR considers all 10 LGAs and French Island as a whole in many of its analyses it should be noted that on occasion the profiles of the metropolitan LGAs will be quite different to those of the interface councils and unincorporated areas. Emergency management planning

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2 Victorian Multicultural Commission (2020): https://www.multiculturalcommission.vic.gov.au/vmc-regional-advisory-councils

3 French Island is an unincorporated area but is considered to be part of South Metro Region for the purposes of REMPs.

4 Interface Councils of Victoria (2019): https://www.interfacecouncils.com.au/about

in this context therefore needs to be mindful of, and account for, the different circumstances encountered across LGAs within SMR.

6. Natural Environment

The landscape character of the Southern Metro Region is defined by bayside settlements around Port Phillip Bay and the richly fertile soils of the Casey and Cardinia LGAs. In some locations, the quality of the soil (for example, Koo Wee Rup) is of State significance and despite residential encroachment, this region has substantial rural areas.

Environmentally and culturally significant landscapes abound, from the sought-after beachside towns along the Mornington Peninsula on Port Phillip and Westernport Bay to the Cranbourne Gardens, Bunyip State Park, Emerald hinterland, Cape Schanck, Arthurs Seat and the rolling agricultural lands of Red Hill.

Key tourist destinations include the beaches of Port Phillip Bay and Westernport Bay, Cranbourne Botanic Garden, McCelland Sculpture Park and Gallery, Myuna Farm, Arthurs Seat, Heronswood and the wineries of the Mornington Peninsula.[5]

6.1 Climate

The Region has mild to warm summers with an average maximum temperature of around 23 °C near the coast, and 24 to 25°C in the Melbourne area and further inland. In winter, average maximum temperatures are mostly around 13 to 14°C and frosts occur inland but are rare near the coast.

The annual average rainfall across the region is approximately 750 mm. Lower annual totals or around 650mm are observed in LGAs in the city around Melbourne and higher rainfall is observed to the south east with annual averages of 800mm for French Island, Casey and Mornington Peninsular while the elevated areas of Cardinia Shire recorded an annual maximum rainfall of nearly 1400mm.[6]

The climate of Victoria is highly variable and influenced by large-scale climate drivers that occur on interannual timescales in the oceans surrounding Australia, such as the El Niño–Southern Oscillation and the Indian Ocean Dipole[7]. In addition to this natural climate variability, increasing concentrations of GHGs are causing rising surface and ocean temperature and decreasing cool-season rainfall.

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5 https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/SGS-Economic-social-and-environmental-profile-Southern-Metro-Region-April-2019.pdf

6 https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0019/60742/Greater-Melbourne.pdf

7 https://www.ces.vic.gov.au/reports/state-environment-2018/climate-change-impacts

6.1.1 Average Temperatures

According to the Bureau of Meteorology (BOM)[8], SMR falls within a temperate climate zone with no dry season and a warm summer.

Like the rest of Victoria, peri-urban areas of SMR are prone to bushfires, particularly whenever grassland vegetation and forest litter become very dry.

- 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.[9]

- Melbourne's 'fire days' are projected to increase by 42% per year by 2050.[10]

Smoke from fires, including from planned burns, can also be a hazard within SMR. 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.[11]

- In January 2020, smoke from bushfires across Victoria (and from New South Wales) rendered Melbourne's air quality the worst in the world[12] with the smoke haze estimated to cost the cities of Melbourne, Sydney and Canberra over $500 million.[13]

Average maximum (max) and minimum (low) temperatures from a 30-year climate period from (1961-1990) are outlined below:[14]

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8 BOM (2020): http://www.weather-climate.com/victoria.html

9 FFMV (2020): https://www.ffm.vic.gov.au/permits-and-regulations/fire-restriction-dates

10 CSIRO (2019):
https://www.climatechangeinaustralia.gov.au/media/ccia/2.1.6/cms_page_media/508/Vic%20Climate%20Projections%202019%20Regional%20Report%20-%20Greater%20Melbourne.pdf

11 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

12 The Guardian (2020): https://www.theguardian.com/australia-news/2020/jan/14/melbourne-choked-by-hazardous-smoke-as-bushfires-continue-to-burn-across-victoria

13 City of Melbourne (2020): https://www.melbourne.vic.gov.au/about-council/vision-goals/eco-city/Pages/adapting-to-climate-change.aspx

14 BOM (2020): http://www.bom.gov.au/climate/averages/maps.shtml

Table 1. Average seasonal temperatures for SMR[15]

		Temperature (°C)			
		Summer		Winter	
	LGA	Max	Low	Max	Low
	Bayside City	25.0	13.9	14.2	6.7
	Cardinia Shire	24.7	12.1	13.1	4.5
	Casey City	24.8	12.9	13.7	5.5
	Frankston City	24.2	13.2	13.6	6.3
	French Island	23.7	13.3	13.9	6.6
	Glen Eira City	25.1	13.8	14.2	6.7
	Greater Dandenong City	25.0	13.2	13.9	6.2
	Kingston City	24.9	13.6	14.0	6.6
	Mornington Peninsula Shire	22.7	13.6	13.2	7.3
	Port Phillip City	25.3	14.1	14.4	6.8
	Stonnington City	25.2	13.8	14.1	6.8
Average	**Metro**	25.0	13.7	14.1	6.6
	Interface	24.0	13.0	13.5	6.0
	SMR	**24.6**	**13.4**	**13.8**	**6.4**

6.1.2 Rainfall

The main rain source for inland Victoria is from eastward moving frontal systems crossing the Southern Ocean. Localised flash flooding may occur in any part of the region.[16]

- Melbourne is expected to experience a drop in rainfall during spring of approximately 20% by 2050.[17] This will likely have flow-on effects for summer bushfire seasons.

- On average, the Melbourne region experiences 15 days of thunderstorms per year, most likely in the late spring and early summer months.

- In 2018, Melbourne experienced a 1 in 1,000-year rainfall event: 50mm of rain fell within 15 minutes, resulting in flash flooding, the suspension of train lines and power outages across the city.

- In 2019, Melbourne recorded 374mm of rainfall compared to its average of 630mm.[18]

- Victoria's winter rainfall has decreased by an average of approximately 100mm since 1990.[19]

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[15] BOM (2020): http://www.bom.gov.au/climate/averages/maps.shtml

16 BOM (2020): http://www.weather-climate.com/victoria.html

17 City of Melbourne (2020): https://www.melbourne.vic.gov.au/about-council/vision-goals/eco-city/Pages/adapting-to-climate-change.aspx

18 City of Melbourne (2020): https://www.melbourne.vic.gov.au/about-council/vision-goals/eco-city/Pages/adapting-to-climate-change.aspx

19 Environment Victoria (2019): https://environmentvictoria.org.au/our-campaigns/safe-climate/victoria-heatwaves-climate-change/#:~:text=In%20Victoria%2C%20the%20two%20worst,continued%20to%20tumble%20since%20then.&text=In%20January%202018%20Bendigo%20experienced,days%2C%20set%20in%202014).

Average rainfall for each season and annual average rainfall from a 30 year climate period from (1961-1990) are outlined in Table 2:[20] Figure 4 shows the significant variability in the annual rainfall timeseries for Victoria.

Table 2. Annual and seasonal average rainfalls for SMR[21]

	LGA	Mean Rainfall (mm)
	LGA	Annual	Summer	Autumn	Winter	Spring
	Bayside	668.2	654.5	700.4	149.2	144.5
	Cardinia	**952.9**	797.9	1370.8	181.7	154.8
	Casey	803.9	765.7	947.9	160.3	147.4
	Frankston	760.9	723.2	783.3	151.7	147.7
	French Island	821.7	777.2	866.7	147.7	142.4
	Glen Eira	691.7	656.0	748.4	154.6	149.4
	Greater Dandenong	745.1	714.0	806.2	156.7	149.5
	Kingston	706.3	698.0	721.1	153.4	150.3
	Mornington Peninsula	801.3	692.8	914.3	143.8	127.9
	Port Phillip	**634.4**	598.1	657.0	147.1	141.1
	Stonnington	677.2	657.0	761.6	153.7	151.1
Average	**Metro**	697.7	671.5	739.7	152.3	147.7
	Interface	845.0	758.4	1024.9	158.4	143.1
	SMR	**751.2**	**703.1**	**843.4**	**154.5**	**146.0**
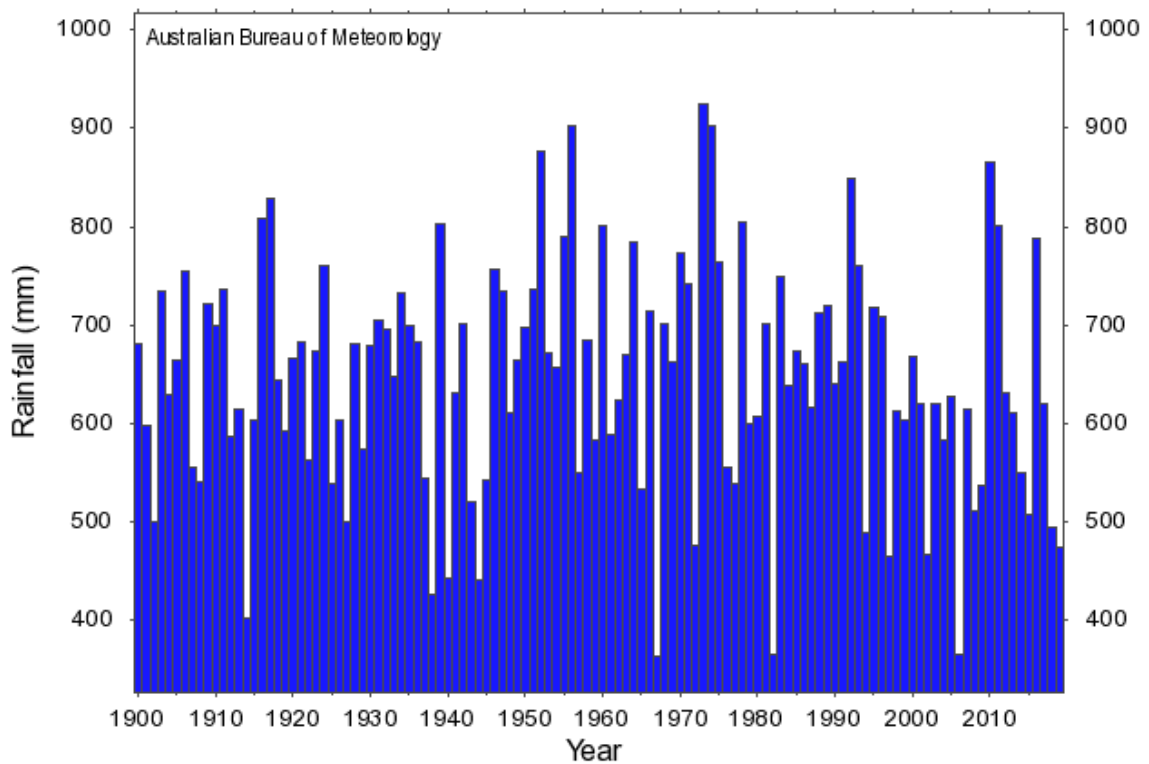
Figure 4. Annual rainfall Victoria (1900 to 2019) [22]

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

The following tables summarise the design rainfalls that could be of interest for critical infrastructure planning. They give an indication of heavy rainfall probability across the region and can be used as potential triggers for response based on observed or forecast rainfall. [23]

Table 3. Design Rainfalls by LGA – 5 min[24]

	Design Rainfalls[25]							
	5 min 10% AEP (mm)				5 min 1% AEP (mm)			
LGA	Mean	Minimum	Maximum	Range	Mean	Minimum	Maximum	Range
Bayside	9.4	9.4	9.5	0.1	14.8	14.5	15.0	0.4
Cardinia	8.8	8.2	9.4	1.2	13.5	12.2	14.6	2.5
Casey	9.2	8.8	9.4	0.7	14.3	13.4	15.1	1.7
Frankston	8.9	8.5	9.3	0.7	13.9	12.9	14.7	1.8
French Island	8.9	8.3	9.6	1.3	13.4	12.0	14.9	2.9
Glen Eira	9.4	9.3	9.4	0.1	15.1	15.0	15.3	0.3
Greater Dandenong	9.4	9.3	9.5	0.2	15.0	14.5	15.2	0.6
Kingston	9.4	9.3	9.5	0.2	14.9	14.7	15.0	0.3
Mornington Peninsula	7.9	7.6	8.7	1.1	11.7	11.2	13.2	2.0
Port Phillip	9.3	9.3	9.3	0.1	15.3	15.1	15.4	0.3
Stonnington	9.3	9.3	9.4	0.1	15.3	15.2	15.4	0.3

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

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

Table 4. Design Rainfalls by LGA – 1 hr[26]

LGA	Design Rainfalls[27]							
	1 hr 10% AEP (mm)				1 hr 1% AEP (mm)			
	Mean	Minimum	Maximum	Range	Mean	Minimum	Maximum	Range
Bayside	29.4	29.2	29.5	0.3	46.2	45.5	46.9	1.4
Cardinia	27.8	26.1	30.1	4.0	42.4	38.8	47.0	8.2
Casey	28.3	27.1	29.2	2.1	44.1	41.3	46.3	5.0
Frankston	27.5	26.2	28.5	2.4	42.7	39.3	45.1	5.8
French Island	28.2	25.9	30.9	5.0	42.6	37.6	48.2	10.6
Glen Eira	29.2	29.0	29.4	0.4	47.2	46.9	47.7	0.8
Greater Dandenong	29.0	28.7	29.3	0.7	46.2	45.0	46.6	1.7
Kingston	29.3	28.7	29.5	0.8	46.3	45.9	46.6	0.7
Mornington Peninsula	24.1	22.9	26.8	3.9	35.6	34.0	40.6	6.6
Port Phillip	28.9	28.8	29.1	0.3	47.9	47.4	48.2	0.9
Stonnington	29.0	28.8	29.2	0.4	47.8	47.1	48.1	1.0

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

27 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. Design Rainfalls by LGA – 1 day[28]

	Design Rainfalls[29]							
	1 day 10% AEP (mm)				1 day 1% AEP (mm)			
LGA	Mean	Minimum	Maximum	Range	Mean	Minimum	Maximum	Range
Bayside	81.2	79.9	81.6	1.7	126.0	124.1	126.6	2.5
Cardinia	87.7	73.6	123.2	49.5	143.1	118.4	200.1	81.7
Casey	78.0	72.5	92.7	20.3	123.5	115.0	148.0	33.0
Frankston	77.7	75.7	81.7	6.0	122.6	119.1	129.5	10.4
French Island	74.1	72.2	77.6	5.3	118.5	114.9	124.4	9.5
Glen Eira	82.5	81.8	83.0	1.3	128.0	126.7	129.3	2.6
Greater Dandenong	78.8	76.5	83.5	7.0	123.4	120.0	130.4	10.3
Kingston	79.7	76.5	82.3	5.8	124.0	119.9	127.9	7.9
Mornington Peninsula	78.7	71.5	94.0	22.5	126.7	114.7	152.5	37.8
Port Phillip	82.1	81.6	82.6	0.9	128.8	127.3	129.7	2.5
Stonnington	82.5	82.0	83.1	1.1	128.7	128.2	129.2	1.1

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

The largest difference is observed in the longer duration events, where orographic enhancement from larger synoptic systems generally leads to higher rainfall in elevated areas based on the prevailing wind direction. This is particularly evident in the LGAs of Cardinia, Casey and the Mornington Peninsular.

It is expected that the impact of climate change will be fewer days with rain, but higher intensity rain events when those 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 witnessing a larger increase in heavy rainfall for shorter duration events that may increase the risk of flash flooding.[30]

Table 7 shows the number of days in an average year that exceed 5mm of rainfall. This 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,

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

29 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.

30 BOM (2020): http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml

which is used to estimate soil moisture as a surrogate for heavy fuel availability in fires. There are significantly more rain days in Cardinia, but this region also exhibits more variability due to size and topography. On average, there are a lower number of rain days reported in the LGAs close to Melbourne.

Table 6. Rain Days >5 mm by LGA [31] [32]

	LGA	Rain Days >5 mm (days)			
		Mean	**Minimum**	**Maximum**	**Range**
	Bayside	43.9	41	46	5
	Cardinia	**62.3**	55	82	27
	Casey	54.5	54	55	1
	Frankston	52.7	49	54	5
	French Island	54.8	54	55	1
	Glen Eira	45.4	43	49	6
	Greater Dandenong	50.4	48	54	6
	Kingston	48.2	43	53	10
	Mornington Peninsula	52.2	45	57	12
	Port Phillip	40.9	37	43	6
	Stonnington	44.1	41	49	8
Average	**Metro**	46.5	43	50	7
	Interface	56.0	52	62	10
	SMR	**49.9**	**46**	**54**	**8**

6.1.3 Climate Change

Climate change is a global challenge: it is estimated that by 2030 the world will be 1.5°C warmer than pre-industrial times, with studies suggesting this could rise to 4.0°C or more by 2100[33]. The United Nations has warned that any temperature rise above 1.5°C will lead to irreversible damage to our ecosystems.[34] Increased droughts in southern Australia with wildfires, storms and biodiversity loss are likely to become more common and more severe.[35]

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31 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.

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

33 CSIRO (2019): https://www.csiro.au/en/Showcase/ANO

34 United Nations (2020): https://www.un.org/en/sections/issues-depth/climate-change/

35 Commissioner for Environmental Sustainability Victoria (2012): https://www.ces.vic.gov.au/sites/default/files/publication-documents/1-62.pdf

Figure 5 shows the anomaly for the average Victorian summer maximum temperature and the average Victorian winter minimum temperature compared to the standard climate baseline period 1961 – 1990. From here the warming trend can be seen above the natural climate variability with increased warmer than average summer temperatures and fewer below average winter overnight temperatures. These general trends are indicative of the broad scale warming across Victoria.

Summer Maximum Temperature Anomaly   **Winter Minimum Temperature Anomaly**
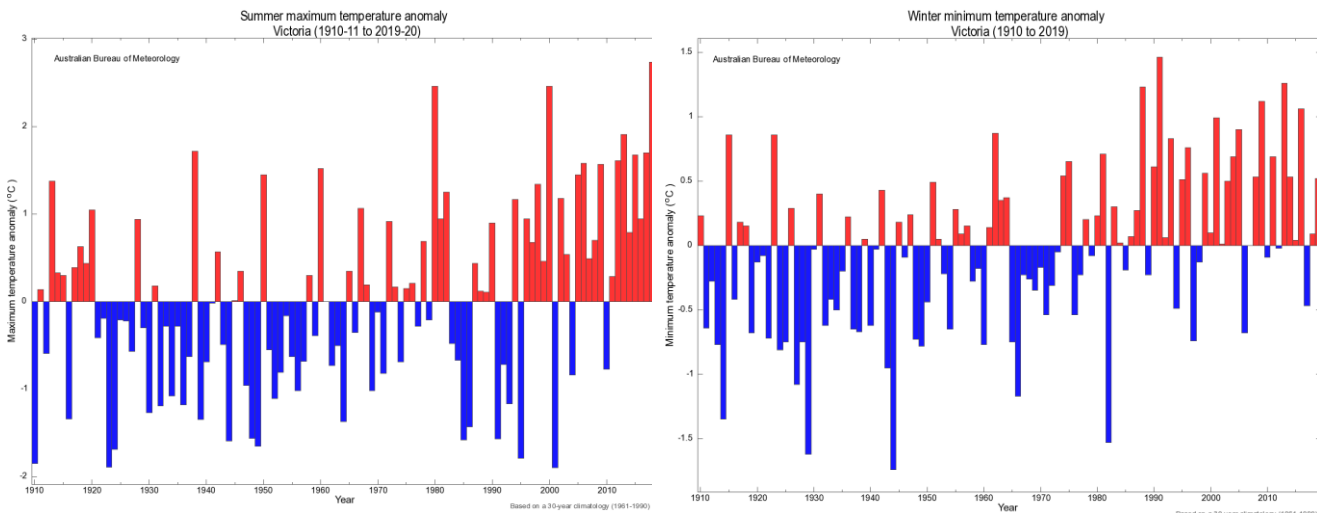
Figure 5. Summer (Max) and Winter (Min) Temperature Anomalies (1900 to 2019) [36]

In Victoria, the climate has already warmed by 1.0°C.[37] This means hotter summers and longer and more frequent heatwaves.

- Victoria's worst heatwaves have occurred in the last decade – January/February 2009 and January 2014.

Extreme heat is a very serious health risk to the Victorian population: heatwaves are responsible for more deaths per year than any other type of natural disaster and our emergency and health services can become strained by cases of heat stroke, exhaustion, dehydration, cardiac conditions and respiratory illnesses.[38]

- In the summer of 2009, Ambulance Victoria emergency callouts in Melbourne increased by 46% and emergency department presentations increased by 12% during a week of extremely

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36http://www.bom.gov.au/climate/change/index.shtml#tabs=Tracker&tracker=timeseries&tQ=graph%3Drain%26area%3Dvic%26season%3D0112%26ave_yr%3D0

37 DELWP (2019): https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0029/442964/Victorias-Climate-Science-Report-2019.pdf

38 Environment Victoria (2019): https://environmentvictoria.org.au/our-campaigns/safe-climate/victoria-heatwaves-climate-change/#:~:text=In%20Victoria%2C%20the%20two%20worst,continued%20to%20tumble%20since%20then.&text=In%20January%202018%20Bendigo%20experienced,days%2C%20set%20in%202014).

hot weather where maximum temperature were 12-15 degrees above average. A total of 374 excess deaths were recorded – an increase of 62% on the previous year.[39]

Climate change is also having an impact on critical infrastructure, including energy, water and transport. Power outages are more likely during a heatwave, for example, as energy consumption due to air-conditioner use increases. Smaller health service providers, such as nursing homes and medical centres, may not be equipped with backup energy and water supplies. Disruptions to public transport can impede the ability for people to travel to hospitals or cooler places.[40]

6.2   Land Use

When considered as a whole, land in SMR is predominantly used for residential (48.8%), primary production (17.1%) and parkland (13.9%) purposes. However, land use across SMR varies considerably by LGA, and significant differences are evident according to whether an area is classified as a metropolitan or interface LGA.

Victoria's forestry and wood products industry is one of Australia's largest. In Victoria, it accounts for 9 million cubic metres or 27.5% of Australia's log harvest volume.[41] It accounts for approximately $7.3 billion or 31% of Australia's forest product manufacturing sales and service income.[42] [43] SMR is home to over 4,100 businesses in the agriculture, forestry and fishing industries, creating an approximate total of 5,219 jobs for the region.[44]

Table 7 shows that in 2016 for example:

- Only 3.5% of land in SMR was dedicated to commercial use and was concentrated in Port Phillip (8.2%), Greater Dandenong (7.6%) and Stonnington (7.3%).

- Only 1.7% of land in SMR was dedicated to educational purposes – most of this was located within Stonnington (3.0%) and Bayside (2.9%).

  o SMR is home to Monash University, Holmesglen Institute of TAFE, Swinburne University of Technology, Chisholm Institute of TAFE and Federation University, in addition to more than 626 schools and pre-schools.

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39 Climate Council (2016): https://www.climatecouncil.org.au/uploads/b6cd8665c633434e8d02910eee3ca87c.pdf

40 Climate Council (2016): https://www.climatecouncil.org.au/uploads/b6cd8665c633434e8d02910eee3ca87c.pdf

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

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

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

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

- The City of Glen Eira had the most land dedicated to hospitals and/or medical purposes (0.6%), while in Interface LGAs this was negligible (0.0%).

- Industrial land use was concentrated in Greater Dandenong (20.8%) and Kingston (15.2%).

  - The strongest industry sectors within SMR include agriculture, forestry and fishing, manufacturing, wholesale and retail trade, health and education

  - In 2017, Plan Melbourne identified five significant industrial precincts across Victoria. Three of these – Southern, Hastings and Officer/Pakenham – fall predominantly within SMR.

  - The Southern State Significant Industrial Precinct (SSIP) is constrained in terms of vacant land supply, which is estimated to become exhausted in the mid-2020s. Refer Figure 6. Victoria's Significant Industrial Precincts.

- Mornington Peninsula had a higher proportion of land use categorised as 'other' (19.9%) compared with other LGAs within SMR (which was 7.1% on average across the region).

  - Part of this allocation is likely due to nature conservations that are not readily discriminated by a characteristic land cover pattern,.

- Parkland features in all LGAs but is more apparent in Port Phillip (23.1%) and Kingston (20.8%).

- Almost half of the land in interface LGAs was used for primary production (48.4%). For Cardinia, primary production utilised almost two thirds of their land (64.5%).

  - Land used for primary production included fruit and vegetable growing, farming of dairy and beef and small-scale orchards, market gardens and egg producers.[45]

- More than half of SMR's metropolitan LGA land was devoted to residential use (60.0%), far more than interface LGAs (22.6%).

- The City of Kingston dedicated more land to transport use (3.4%) than any other LGA within SMR (where the average for the region was 0.9%).

- Water was not a major feature of land use across SMR, with an average of just 0.2%.

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45 id (2020): https://economy.id.com.au/cardinia/infrastructure

Table 7. SMR Land use by LGA (2016) [46]

	Land Use Type										
LGA	**Commercial**	**Education**	**Hospital/Medical**	**Industrial**	**Other**	**Parkland**	**Primary Production**	**Residential**	**Transport**	**Water**	**Total %**
Bayside	2.2%	*2.9%*	0.1%	2.3%	0.0%	18.1%	0.0%	*74.3%*	0.1%	0.0%	100.0%
Cardinia	0.3%	0.1%	0.0%	0.3%	12.2%	14.3%	*64.5%*	7.2%	0.0%	*1.0%*	100.0%
Casey	1.0%	1.1%	0.1%	2.4%	10.8%	10.9%	34.1%	39.1%	0.5%	0.1%	100.0%
Frankston	1.1%	1.9%	0.2%	11.2%	8.6%	16.9%	8.6%	51.4%	0.1%	0.0%	100.0%
French Island	-	-	-	-	-	-	-	-	-	-	-
Glen Eira	2.8%	2.3%	*0.6%*	0.8%	0.0%	8.5%	0.0%	*85.0%*	0.1%	0.0%	100.0%
Greater Dandenong	*7.6%*	2.1%	0.1%	*20.8%*	12.1%	8.6%	17.3%	29.7%	1.8%	0.0%	100.0%
Kingston	4.1%	1.6%	0.2%	*15.2%*	7.6%	*20.8%*	0.0%	46.4%	*3.4%*	0.6%	100.0%
Mornington Peninsula	0.5%	0.4%	0.0%	2.1%	*19.9%*	8.9%	*46.5%*	21.3%	0.0%	0.4%	100.0%
Port Phillip	*8.2%*	1.5%	0.0%	11.2%	0.0%	*23.1%*	0.0%	55.2%	0.7%	0.3%	100.0%
Stonnington	*7.3%*	*3.0%*	0.3%	0.1%	0.0%	8.8%	0.0%	*78.0%*	2.6%	0.0%	100.0%
Avg. Metro	4.7%	2.2%	0.2%	*8.8%*	4.0%	15.0%	*3.7%*	*60.0%*	1.2%	0.1%	100.0%
Avg. Interface	0.6%	0.6%	0.0%	*1.6%*	14.3%	11.3%	*48.4%*	*22.6%*	0.2%	0.5%	100.0%
Avg. SMR	*3.5%*	*1.7%*	0.2%	6.6%	7.1%	*13.9%*	*17.1%*	*48.8%*	0.9%	0.2%	100.0%

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46 ABS Cat 1270.0.55.003: https://www.rdv.vic.gov.au/information-portal/table-and-chart
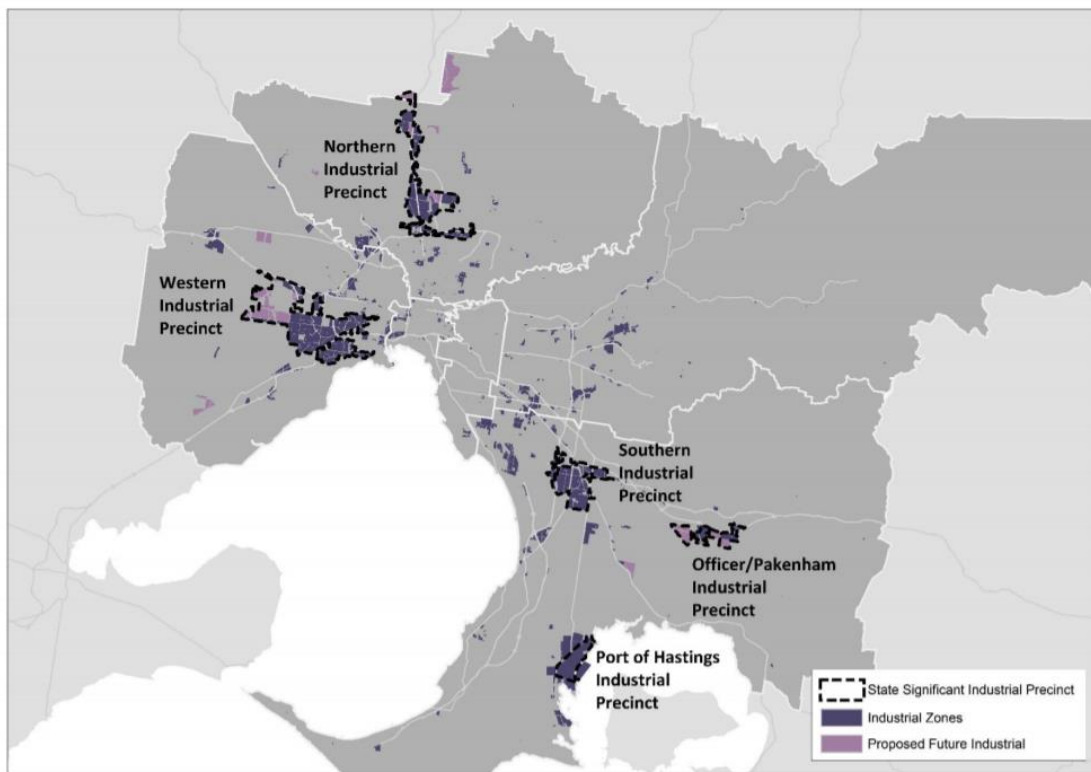
Sources: Department of Environment, Land, Water and Planning, Plan Melbourne – 2017 to 2050.

Figure 6. Victoria's Significant Industrial Precincts[47]

6.2.1 Bushfire Risk

Bushfire prone areas are designated areas which are subject to or likely to be subject to bushfires, and to which specific bushfire construction standards apply.[48] Four LGAs within the Southern Metro region are not located within bushfire prone area, however they do sometimes attract large grassfires with the potential to heavily impact built urban developments[49]. Of those LGA's that are within a bushfire prone area it is the metropolitan interface areas that see the highest percentage of area covered. The metropolitan interface areas are at a particularly high risk for bushfire given large populations and total percentage within a bushfire prone area[50]

Table 8 highlights the large area of bushland and urban interface zone in the Cardinia, Mornington Peninsular, Casey, and Frankston LGAs. All of French Island is also classed as being a bushfire risk area.

47 DELWP (2017): https://www.planning.vic.gov.au/__data/assets/pdf_file/0023/115187/Final_2017_Industrial_UDP_Report.pdf
https://www.planning.vic.gov.au/__data/assets/pdf_file/0024/101787/Urban-Development-Program-SSIP-2016.pdf
48 DELWP (2020): https://www.planning.vic.gov.au/policy-and-strategy/bushfire-protection/building-in-bushfire-prone-areas
49 Deakin University https://this.deakin.edu.au/society/is-melbournes-urban-sprawl-creating-more-bushfire-risk
50 DELWP (2018) https://www.planning.vic.gov.au/__data/assets/pdf_file/0035/97685/Demographics-for-Bushfire-Risk-Analysis-web.pdf

Table 8. Bushfire Risk by LGA[51]

LGA	Bushfire Risk			
	BPA Area (km²)	Total Area (km²)	%	Plan Number
Bayside	0	37	*0%*	-
Cardinia	1,243	1,283	*97%*	LEGL./20-102
Casey	258	409	*63%*	LEGL./20-103
Frankston	79	130	*61%*	LEGL./18-239
French Island	170	170	*100%*	LEGL./13-153
Glen Eira	0	39	*0%*	-
Greater Dandenong	32	130	*25%*	LEGL./17-716
Kingston	6	91	*7%*	LEGL./14-158
Mornington Peninsula	640	724	*88%*	LEGL./19-152
Port Phillip	0	21	*0%*	-
Stonnington	0	26	*0%*	-

6.3   Waterways

SMR occupies 2 major river catchments that supply fresh water to the Greater Metropolitan regions as well as neighbouring regions such as Gippsland.

Natural waterways local to SMR include:

- Dandenong catchment

- Westernport catchment

There are also numerous wetlands throughout the region, including Doongalla Forest in the Dandenong Ranges and flows approximately 53 kilometres south into Mordialloc Creek and Patterson River as well as the Upper Bunyip and Tarago system. which are important tourism assets. They include:

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51 DELWP (2020): https://discover.data.vic.gov.au/dataset/designated-bushfire-prone-area-bpa

- Blind Creek
- Bungalook Creek
- Bunyip River
- Cannibal Creek
- Cardinia system
- Corhanwarrabul Creek
- Dobsons Creek
- Eastern Contour Drain
- Eel Race Drain
- Eumemmerring Creek
- Ferntree Gully Creek

- French and Phillip Islands systems
- Hallam Valley Creek
- Kananook Creek
- Labertouche Creek
- Mast Gully Creek
- Mile Creek
- Monbulk Creek
- Mornington Peninsula system
- Rodds Drain
- Tarago River
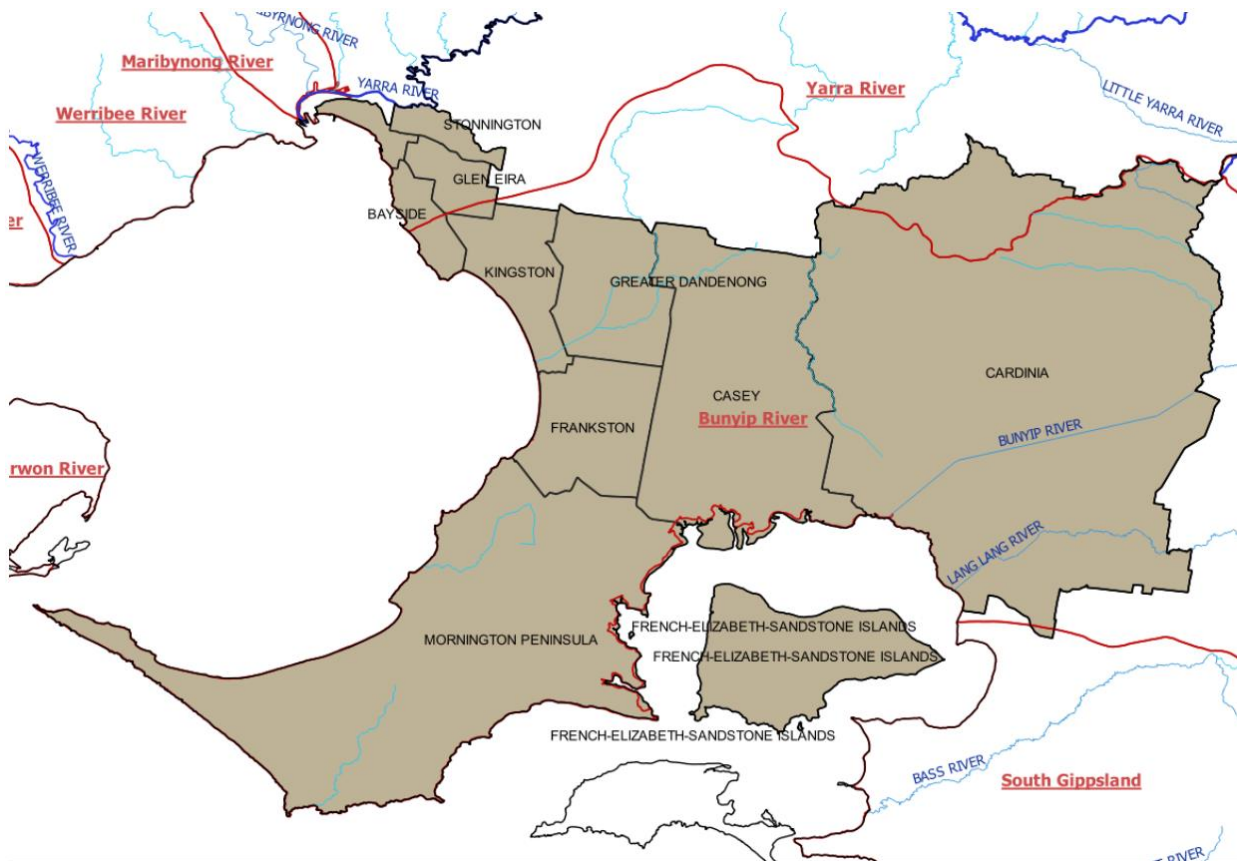
Figure 7. Natural waterways in SMR[52] [53]

Key waterways in SMR are managed by Melbourne Water, while the EPA also has a monitoring role.

Victoria also has 10 catchment and land protection regions, each responsible for planning and managing the land, water and biodiversity within their region. SMR's 10 LGAs fall within the remit of the Port Phillip and Westernport Catchment Management Agency (CMA). [54]

Declared water supply catchments and reservoirs located within SMR include:

- The Dandenong catchment, including the Dandenong Creek.

- The Westernport catchment covers 3,721 square kilometres and contains 2,232 kilometres of rivers and creeks

- Sugarloaf Reservoir (dam, catchment and adjacent area) – an off-stream reservoir located in Christmas Hills that can hold approximately 96 billion litres of water and supplies the northern, western and central suburbs of Melbourne.

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

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

54 DELWP (2020): https://www.water.vic.gov.au/waterways-and-catchments/our-catchments/catchment-management-framework

- Cardinia Reservoir – A 287 gigalitre reservoir, the second largest reservoir in the Greater Metropolitan region, supplies fresh water to most parts of Metropolitan Melbourne. It receives water from Silvan Reservoir, as well as the Victorian Desalination Plant (when in operation).

- Devilbend Reservoir – Does not supply fresh water to the region, however does provide a tourism opportunities such as fishing and bird watching, Since 2010 the reservoir has been stocked with more than 14,000 rainbow trout and 21,000 brown trout, including 125 browns in October 2012 that averaged 1.8kg each[55].

Although they are not located in SMR, some of Victoria's other reservoirs supply water to communities within SMR, such as:

- Thomson Reservoir, located in Thomson (West Gippsland Shire), which may be utilised in times of drought to supply residents across Melbourne with water.

6.3.1 Floods

Floods cause more damage – including loss of life and livelihoods and damage to property and infrastructure – than any other type of natural disaster in Australia.[56] 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.

- In December 2018, the City of Melbourne was subjected to over 37 mm of rain within 15 minutes, causing flash flooding across inner Melbourne. The SES received 515 calls for help, including 22 calls from stranded motorist trapped in their cars in floodwaters near Altona and South Melbourne. The EPA also warned Melburnians against swimming at bayside beaches following an inundation of litter, animal waste and chemicals flushed by heavy rains into Port Phillip Bay.[57]

Flood management guidelines, including prevention, response and recovery activities, are provided in *State Emergency Response Plan Flood Sub-Plan*, published in 2016.[58] The Victorian Government also issued a Victorian Floodplain Management Strategy in 2016 designed to assist communities to better

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55 https://vfa.vic.gov.au/recreational-fishing/fishing-locations/devilbend-reservoir

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

57 ABC News (2018): https://web.archive.org/web/20190428031008/https://www.abc.net.au/news/2018-12-14/victorian-forecasters-predicting-more-rain/10617864

58 EMV (2016): State Flood Sub-Plan SES (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

prepare for future floods. This strategy relies on the combined efforts of various agencies including local government, SES, CMAs and community partnerships.[59]

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[60]. For Metro regions around Melbourne, Melbourne Water owns and operates the flood warning system and provides warnings for the Bureau to disseminate[61]. The coverage of this flood warning service is shown in Figure 8 with both the Flood Watch and Flood Warning catchment shown. The products from the Service Level Specification that cover the catchments in Southern Metro are listed in Table 9[62].
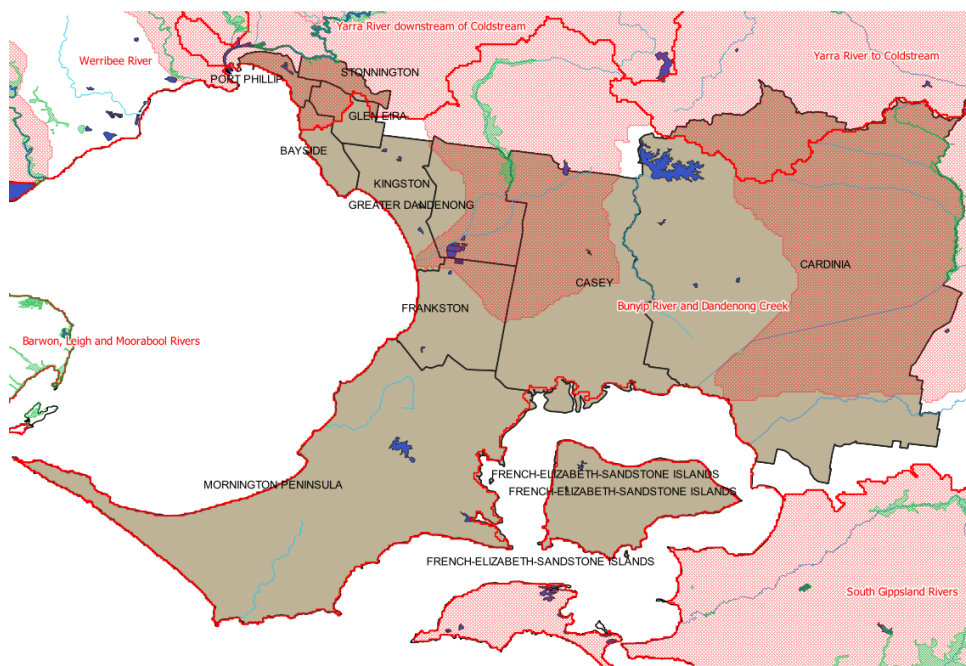
Red Boundaries – Bureau of Meteorology Flood Watch areas	Red Shading – Bureau of Meteorology Flood Warning Catchments
Dark Blue areas – Lakes and dams	Blue lines – rivers and streams
Green areas – 1:100 year ARI modelled inundation area	Triangles – River observations sites

Figure 8. Flood warning and 1:100 year ARI inundation[63][64][65][66][67][68]

59 DELWP (2016): https://www.water.vic.gov.au/managing-floodplains/new-victorian-floodplain-management-strategy

60 http://www.bom.gov.au/water/floods/document/National_Arrangements_V4.pdf

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

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

63 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900441?template=full

64 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900561?template=full

65 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900563?template=full

66 http://www.bom.gov.au/metadata/catalogue/19115/ANZCW0503900564?template=full

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

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

Table 9. Flood Warning products[69].

Product	Warning Area	Responsible Agency
IDV36320	Flood Warning for the Dandenong Creek	Melbourne Water
IDV36330	Flood Warning for the Bunyip River and Westernport Catchments	Melbourne Water

The flood risk and area impacted by flooding varies around the region. Table 10 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 8. There is a one percent chance (1% annual exceedance probability (AEP)) of these areas experiencing flooding of this level in any given year[70] 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.

Table 10. Areas potentially impacted by flooding inundation[71]

LGA	Percent Included In 1:100 ARI Area	Main Localities with Affected Built Up Areas
Bayside	0.00%	
Cardinia	0.29%	
Casey	0.29%	Dandenong, Doveton, Endeavour Hills
Frankston	0.00%	
Glen Eira	0.00%	
Greater Dandenong	1.99%	Dandenong, Dandenong North, Doveton, Mulgrave
Kingston	0.00%	
Mornington Peninsula	0.00%	
Port Phillip	0.00%	Docklands, Melbourne, South Wharf, Southbank
Stonnington	2.15%	Burnley, Cremorne, Hawthorn, Melbourne, Richmond, South Yarra, Toorak

6.4 Geology

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

There is an extensive area of volcanism in Victoria. Large basaltic formations (formed after the rapid cooling of lava) are present along the western coast of Victoria. The time of the last volcanic eruption in Victoria is contested by volcanologists, however common consensus is that it occurred approximately

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

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

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

7000 years ago at Mount Napier. In volcanology terms, this classifies the Western Victorian Volcanic Plains as an active volcanic region, with many volcanologists considering the area dormant rather than extinct.[72] The plains span approximately 2.3 million hectares or 10% of the state's land mass. The eastern side of Victoria experienced volcanic activity significantly earlier than in the west. [73] Older Volcanic Plains are scattered throughout eastern Victoria and as a whole experienced an estimated 400 eruptions that were sporadic, relatively low volume and widespread.[74]
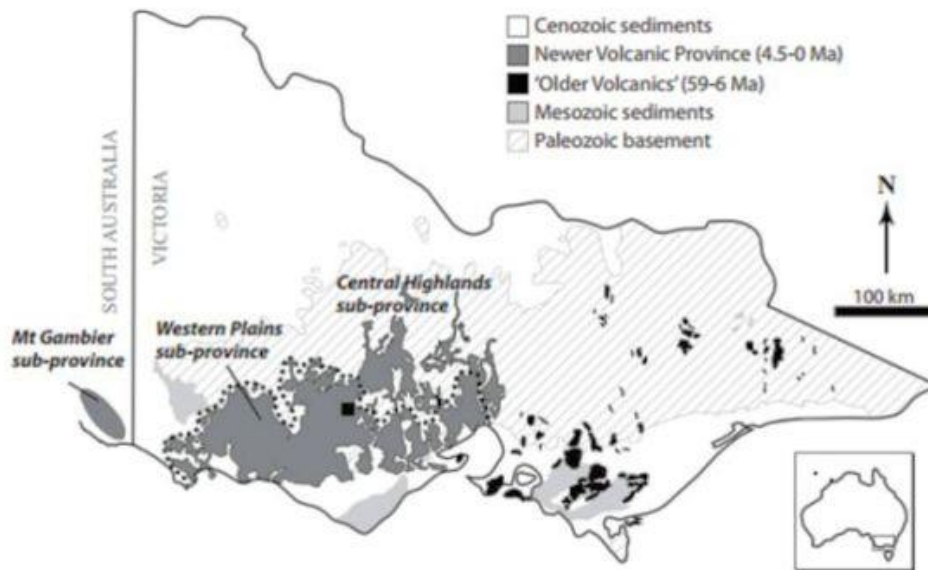
Figure 9 Map of Victoria with Volcanic overlay[75]

For metro Victoria, the key risk arising from a volcanic eruption in the Western Victoria Volcanic Plains includes the eruption of hazardous gases that could travel into the area.

On average, there are approximately 100 earthquakes in Australia per year that register above 3 magnitude.[76] As a nation, Australia experiences significantly less earthquakes than other parts of the world near tectonic boundaries, where large earthquakes occur more often. [77] However, the country experiences earthquakes due to a series of interlocking, interspersed fault lines that spread throughout the nation. In Victoria, several vault lines have been identified including the Strzelecki Ranges, The

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72 http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/landform_geomorphological_framework_6.1

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

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

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

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

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

Mornington Peninsula and the Otway Ranges. However, the frequency of earthquakes in the state indicates that there are multiple minor fault lines that have not been formally identified. [78] Included below is a table that lists earthquakes in Victoria with a magnitude over 4.5 since records began with damage reported:

Table 11. List of earthquakes above 4.5 magnitude in Victoria since records began [79] [80]

Location	Date	Magnitude	Damage Reported
Cape Liptrap	02 July 1885	5.7	Tied Victoria's largest earthquake – minor damage reported around epicentre
Warrnambool	14 July 1903	5.3	Minor damage over wide geographical area near epicentre
Alpine National Park	10 April 1904	5.0	No damage reported – epicentre in national park
Ocean Grove (offshore)	10 April 1922	5.7	Reports of minor item damage in Cranbourne, East Malvern, Pakenham and Portalington – aftershock 4.7 magnitude
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

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

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

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

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

recharged from streams or indirectly from other aquifers.[81] 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.[82] 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.[83]

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.[84] 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.[85] The minimum rainfall intensity required to extinguish a peat fire is roughly 4mm/h.[86] Southern Metro has the highest concentration of peat than any other metro region and some regional regions. Peat is found throughout Dandenong and north of Kooweerup. A full map of peat deposits can be found on EM-COP, below is a screenshot of the SMR with the peat hazard layer shown in yellow.

81 Southern Rural Water – Groundwater Atlas (2012) http://www.srw.com.au/wp-content/uploads/2016/03/GGA_SmallSize-1.pdf

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

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

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

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

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

Figure 10 EM-COP layer depicting peat deposits in Southern Metro[87]

6.5   Marine

Southern Metro region includes Western Port and Port Phillip Bays. It also includes the Bass Strait side of the Mornington Peninsula. While the region experiences constant vessel use year-round, this increases significantly in peak periods. This region averages approximately 600 Volunteer MSAR responses annually. The City of Melbourne released a climate change impacts report that predicts that by 2050 sea levels will rise by 24cms on 1990 levels, increasing risks of extreme sea level events and coastal erosion.[88]

Local risk factors include:

- Declared hazardous waters – Port Philip Bay Heads

- Very high summer patronage to beaches

87 EM-COP – Peat Overlay Layer

88 City of Melbourne (2020) https://www.melbourne.vic.gov.au/about-council/vision-goals/eco-city/Pages/adapting-to-climate-change.aspx

- Port Philip Bay patrolled 24/7 by Water Police

- Limited Water Police patrols on WP

- Significant diversity in water user groups

- Year-round water activities

- Reliance upon MSAR's for breakdowns

- Substantial issues with personal water craft usage

7. Built Environment

The built environment in SMR is diverse, spanning bayside residences, outer suburban areas and regional hubs in Frankston and Dandenong. It is also host to significant industrial precincts and is experiencing significant urban growth. A diverse population and the confounding factors relevant to meeting the needs of a rural-urban interface makes the effective management of the built environment in SMR complex. Arrangements must include all levels of government in addition to private sector interests.

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.[89]

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)

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

7.1.1 Telephone exchanges

Within SMR, telephone exchanges – which interconnect subscribers and are owned and operated by Telstra and Optus are located in:

- Bayside (Beaumaris, Sandringham, Brighton, Gardenvale)

- Cardinia (Tynong, Bunyip, Tonimbuk, Bayles, Beaconsfield Upper, Garfield, Nar Nar Goon North, Gembrook, Iona, Emerald, Lang Lang, Pakenham South, Pakenham, Pakenham Upper, Officer, Koo-Wee-Rup, Cardinia, Catani, Cockatoo, Nar Nar Goon, Yannathan)

- Casey (Tooradin, Berwick, Warneet, Narre Warren North, Narre Warren, Hallam, Lyndhurst, Cranbrook, Devon Meadows, Pearcedale, Clyde)

- Frankston (Seaford, Skye, Langwarrin, Frankston, Karingal, Carrum Downs)

- French Island (Tankerton)

- Glen Eira (Bentleigh, Elsternwick, Ormond)

- Greater Dandenong (Springvale, Keysborough, Dandenong North, Dandenong)

- Kingston (Heatherton, Highett, Chelsea, Cheltenham, Mordialloc)

- Mornington Peninsula (Balnarring, Rosebud, Rye, Safety, Shoreham, Baxter, Somerville, Sorrento, Merricks, Mount Martha, Hastings, Flinders, Main Ridge, Red Hill, Crib Point, Krowera, Mornington, Moorooduc, Tyabb, Dromana, Blairgowrie)

- Port Phillip (Balaclava, Port Melbourne, South Melbourne Elwood, St Kilda)

- Stonnington (Toorak, Malvern, Kooyong, Caufield, Windsor)

7.1.2 Television and radio stations

Many television and radio broadcasting stations – community and commercial – transmit from studios within SMR[90]. Several of these services could be of critical importance during an emergency, including the State's official emergency broadcasters.[91] Refer Table 12.

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90 https://en.wikipedia.org/wiki/List_of_radio_station_callsigns_in_Victoria

91 EMV (2016): https://www.emv.vic.gov.au/responsibilities/victorias-warning-system/emergency-broadcasters/official-emergency-broadcasters-in

Table 12. Communication services in SMR

		Communication Services (No.)	
	LGA	Television	Radio
	Bayside	0	0
	Cardinia	0	0
	Casey	0	2
	Glen Eira	0	1
	Frankston	0	0
	French Island	0	0
	Greater Dandenong	0	0
	Kingston	0	1
	Mornington Peninsula	18	2
	Port Phillip	0	0
	Stonnington	11	0
Total	**Metro**	11	1
	Interface	18	4
	SMR	**29**	**5**

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.[92]

Victoria's primary energy sources are electricity generated from brown coal in the La Trobe Valley, and natural gas sourced from the Gippsland Basin.[93]

SMR is not home to many alternative renewable energy supplies such as wind or solar farms.

Energy distribution within SMR is summarised by LGA in Table 13 below and discussed further by form in the following sections.

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[92] EMV (2018): https://files-em.em.vic.gov.au/public/EMV-web/2018_All_Sectors_Resilience_Report.pdf
[93] DELWP (2020): https://www.energy.vic.gov.au/

Table 13. Energy distribution (km) by LGA[94]

	Energy distribution (km)		
LGA	**Major Electricity Transmission Lines**	**Oil Pipelines**	**Gas Pipelines**
Bayside	7.7	8.6	4.2
Cardinia	285.4	29.5	148.3
Casey	228.9	14.1	26.5
Glen Eira	25.5	27.9	66.1
Frankston	0.0	0.0	0.0
French Island	25.3	3.3	25.1
Greater Dandenong	9.3	16.1	98.6
Kingston	7.2	13.5	23.5
Mornington Peninsula	10.7	44.1	90.0
Port Phillip	26.0	11.1	26.2
Stonnington	31.9	0.0	6.9
Total **Metro**	132.9	80.5	250.6
Interface	525	87.7	264.8
SMR	**657.9**	**168.2**	**515.4**

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).[95]

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

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

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[96]

7.2.1 Electricity

The key assets and infrastructure for the electricity sector include generators, high and low voltage transmission and distribution systems[97]. There are five electricity distributors in Victoria, who own and manage the power poles and wires delivering power across the State. Of these, Ausnet, Citipower and United Energy service different geographical areas within SMR with more than 657 km of major transmission lines.[98]

Most of Melbourne's electricity is generated by brown coal generators in the La Trobe Valley. While there are no major power facilities or generators located within NWMR, there are seven terminal stations and two zone substations[99].

Terminal stations are key centres for receiving high voltage electricity from transmission lines and converting it to lower voltages for distribution to zone substations.[100] SMR terminal stations are located in:

- Cranbourne

- Frankston

- John Lysaght Australia (switchyard) (Dandenong South)

- Narre Warren

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

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

98 DELWP (2020): https://www.energy.vic.gov.au/electricity/electricity-distributors

99 DELWP (2020): https://www.energy.vic.gov.au/electricity/about-the-electricity-sector

100 AusNet Services (2018): https://www.ausnetservices.com.au/-/media/Files/AusNet/About-Us/Determining-Revenues/Distribution-Network/Customer-Forum/Week-1/Networks-101-Customer-Forum.ashx?la=en

- Northern Reactive Compensation Station[101] (Cardinia[102])

- Tyabb

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.[103] SMR's zone substations are located in:

- Berwick North

- Clyde North

- Cranbourne

- Dandenong

- Hampton Park

- Lang-Lang

- Lysterfield

- Narre Warren

- Officer

- Pakenham

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101 (Page 37) https://www.aer.gov.au/system/files/SP%20AusNet%20-%20Electricity%20safety%20management%20scheme%20-%2028%20February%202013.pdf

102 (page 37) https://www.water.vic.gov.au/__data/assets/pdf_file/0020/54128/EES-Volume-4-Transfer-pipeline.pdf

103 AusNet Services (2018): https://www.ausnetservices.com.au/-/media/Files/AusNet/About-Us/Determining-Revenues/Distribution-Network/Customer-Forum/Week-1/Networks-101-Customer-Forum.ashx?la=en

A map of electrical infrastructure is provided in Figure 11.
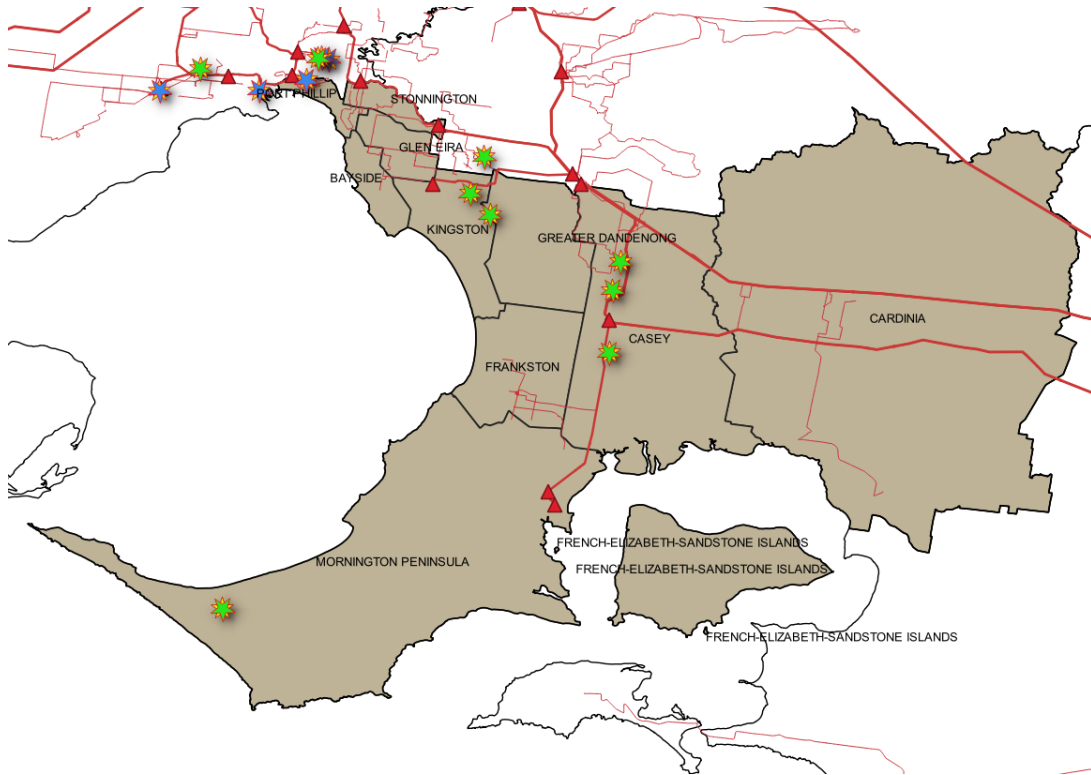
Green star – renewable power generation	Blue star – non-renewable power generation
Red triangle – Electrical substation	Green triangle – Electrical switchyard
Yellow triangle – Electrical transmission	Blue triangle – Electrical zone
Black dot – Electrical terminal	Thick red line – Power transmission
Thin red line – Power sub-transmission	

Figure 11. Transmission lines within SMR Region[104] [105] [106]

7.2.2 Gas

The key assets and infrastructure for the gas sector include production, receiving, processing and storage facilities, and transmission and distribution systems.[107]

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104 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

105 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

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

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

Victoria's natural gas supply is sourced from outside of SMR, 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).[108]

Approximately 515 km of gas pipelines traverse SMR (refer Table 13 and Figure 12 including:

- 9,900km of distribution mains and 575,000 customers operated by the Australian Gas Network that covers Northern, outer eastern, and southern areas of Melbourne, the Mornington Peninsula, rural communities in northern, eastern, and north-eastern Victoria and south-eastern rural townships in Gippsland [65]

- The ethane pipeline from Esso's Long Island Point plant is a major pipeline that feeds the chemical plant complex in Altona.

Gas supplies may also originate from the Otway Basins, interstate and offshore from the Bass Coast.
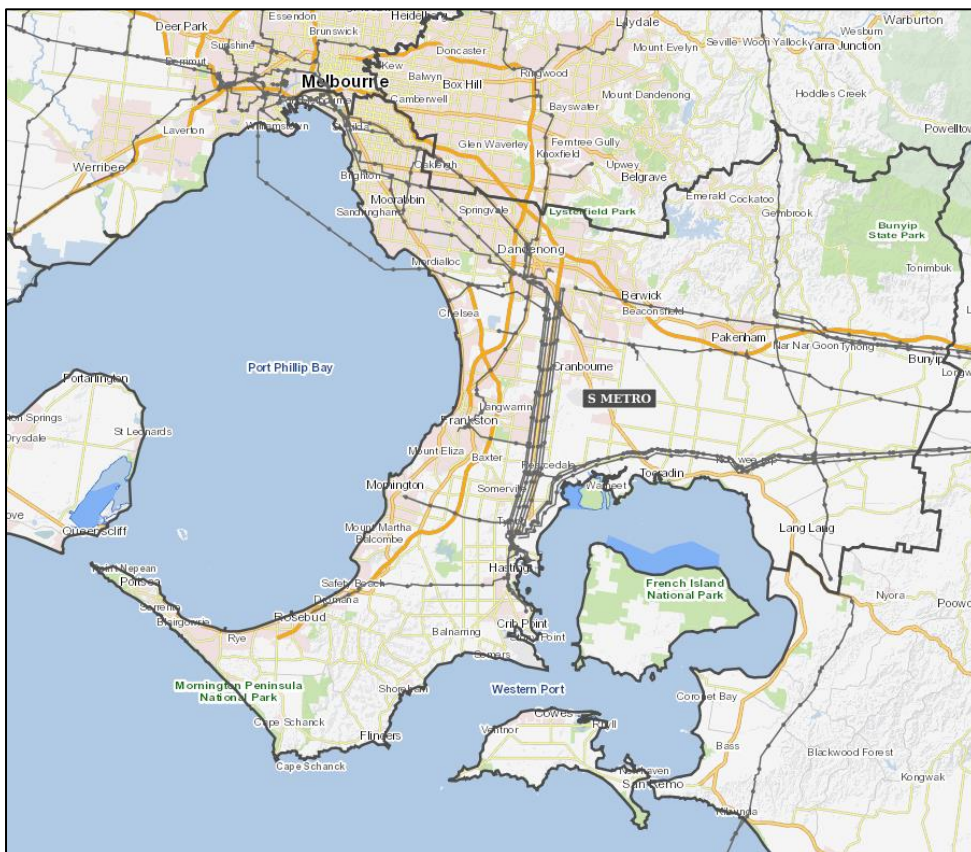
Gas/Oil Pipeline ●━━━●

Figure 12. Natural gas/oil pipelines within SMR Region[109]

7.2.3 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.[110]

The Australian Government has recently implemented a comprehensive fuel security package in recognition of, "ongoing financial pressures on the domestic refining sector, which have been exacerbated by the COVID-19 pandemic." More details are available from the Department of Industry, Science, Energy and Resources (DISER).[111]

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.[112]

Several large manufacturing businesses have their home bases in SMR including:

- Aldi Distribution Centre - Dandenong South

- Cleanaway Clayton Administrative Office and Workshop

Food and beverage manufacturing within SMR, and concomitant supply logistics, is also an essential sector within Victoria which provides fresh, refrigerated and packaged food and groceries across the State.

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 and Water Resources (DAWR) and other industry and government agencies. However, "States and territories have the lead responsibility for planning for and responding to emergency events

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

111 DISER (2020): https://www.energy.gov.au/government-priorities/energy-security/australias-future-fuel-security-package

112 DJPR (2020): https://djpr.vic.gov.au/about-us/overview/strategies-and-initiatives/advancing-victorian-manufacturing

within their jurisdictions.[113] Emergency situations that could give rise to supply chain disruptions, with downstream effects on consumers, include:

- Pandemic

- Biosecurity concern (e.g., foot and mouth disease)

- Drought

- Industrial action

- Natural disaster

- Severe weather event

- Terrorist attack

- Food or water contamination

- Power, water or communications outage

Figure 13 provides an overview of the food supply chain and its dependencies.

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113 DAWR (2020): https://www.agriculture.gov.au/ag-farm-food/food/food-chain-resilience
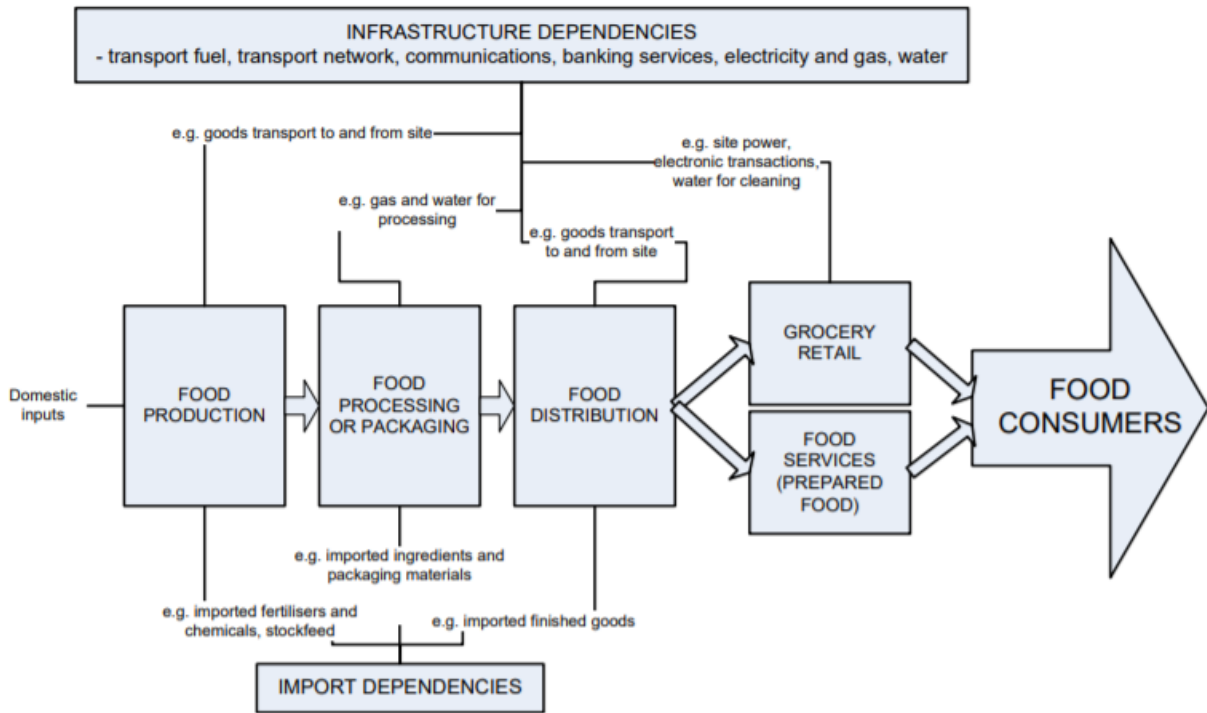
Figure 13. Overview of food supply chain and dependencies[114]

7.4 Transport

SMR plays an important role as a transport gateway for Melbourne's growing economy.[115] It is home to several major transport hubs – such as Moorabbin Airport and the Port of Hastings – and has a high level of demand for travel by private vehicle due to limited public transport services to outer suburbs and new growth areas. Significant disruptions to any of these routes could have a major impact on SMR residents, those who travel through SMR and who need to travel for work, services or recreation.

Transport infrastructure within SMR is summarised by LGA in

Table 14 and discussed further by mode in the following sections.

Table 14. Transport infrastructure (km) by LGA[116]

Transport infrastructure (km)	(%)

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114 DAFF (2012): https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/ag-food/food/national-food-plan/submissions-received/resilience-food-supply.pdf

115 https://www.suburbandevelopment.vic.gov.au/__data/assets/pdf_file/0026/59282/eBook-Northern.pdf

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

LGA	Major Roads	Major Rail	Distance to Melbourne CBD	Population close to Public Transport
Bayside	51.2	19.4	12	*96.6%*
Cardinia	277.4	116.9	58	***43.3%***
Casey	234.2	46.3	46	*62.4%*
Frankston	153.7	25.1	42	*72.8%*
French Island	0.0	0.0	-	-
Glen Eira	54.8	37.6	17	***100.0%***
Greater Dandenong	167.7	48.4	28	*94.0%*
Kingston	113.7	39.8	20	*97.9%*
Mornington Peninsula	413.0	28.8	54	*46.1%*
Port Phillip	33.0	5.1	6	*98.1%*
Stonnington	38.5	45.9	13	***100.0%***
Total **Metro**	612.6	221.4	-	*94.2%*
Interface	924.6	192.1	-	*50.6%*
SMR	**1,537.2**	**413.4**	**-**	***81.1%***

7.4.1 Roads

More than 1,537 km of major roads traverse SMR, including major highways, freeways, arterial roads, bridges and tunnels, such as:

- Bass Highway
- CityLink
- Dandenong Bypass
- Dandenong Road
- Eastlink
- Frankston Freeway
- Kings Way
- Monash Freeway
- Moorooduc Highway

- Mornington Peninsula Freeway
- Nepean Highway
- Princes Freeway
- Punt Road
- Queens Road
- South Gippsland Freeway
- Springvale Road
- Warrigal Road

Road Network in shown in Figure 14 and Figure 15. Darker red is arterial roads, lighter red is the municipal roads and tracks. Density of network in the LGAs closer to Melbourne CBD is clear. The interface LGAs generally have a lower density, but longer total length of local roads given their larger size. The satellite development areas also stand out, linked by road and rail corridors.
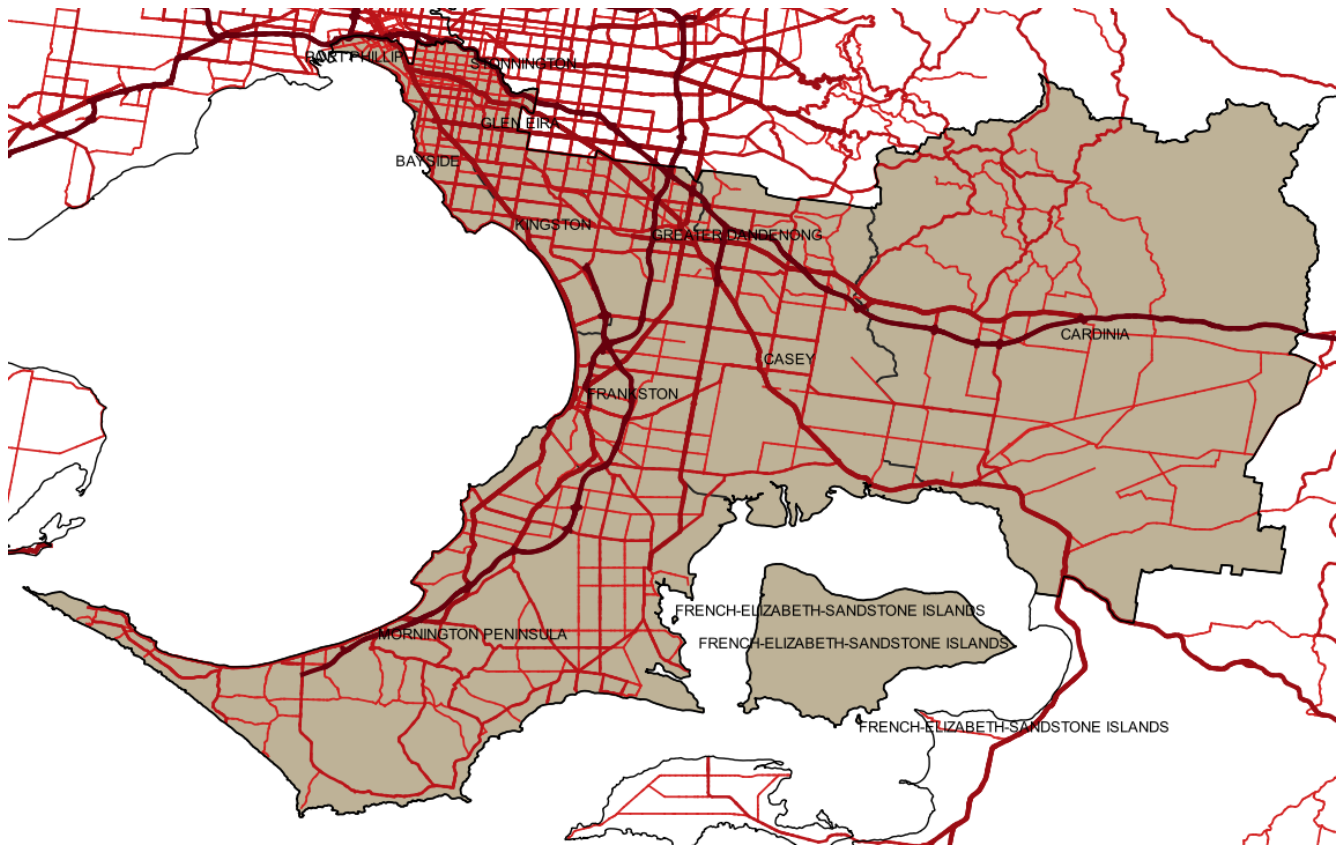
Figure 14. Major roads within SMR
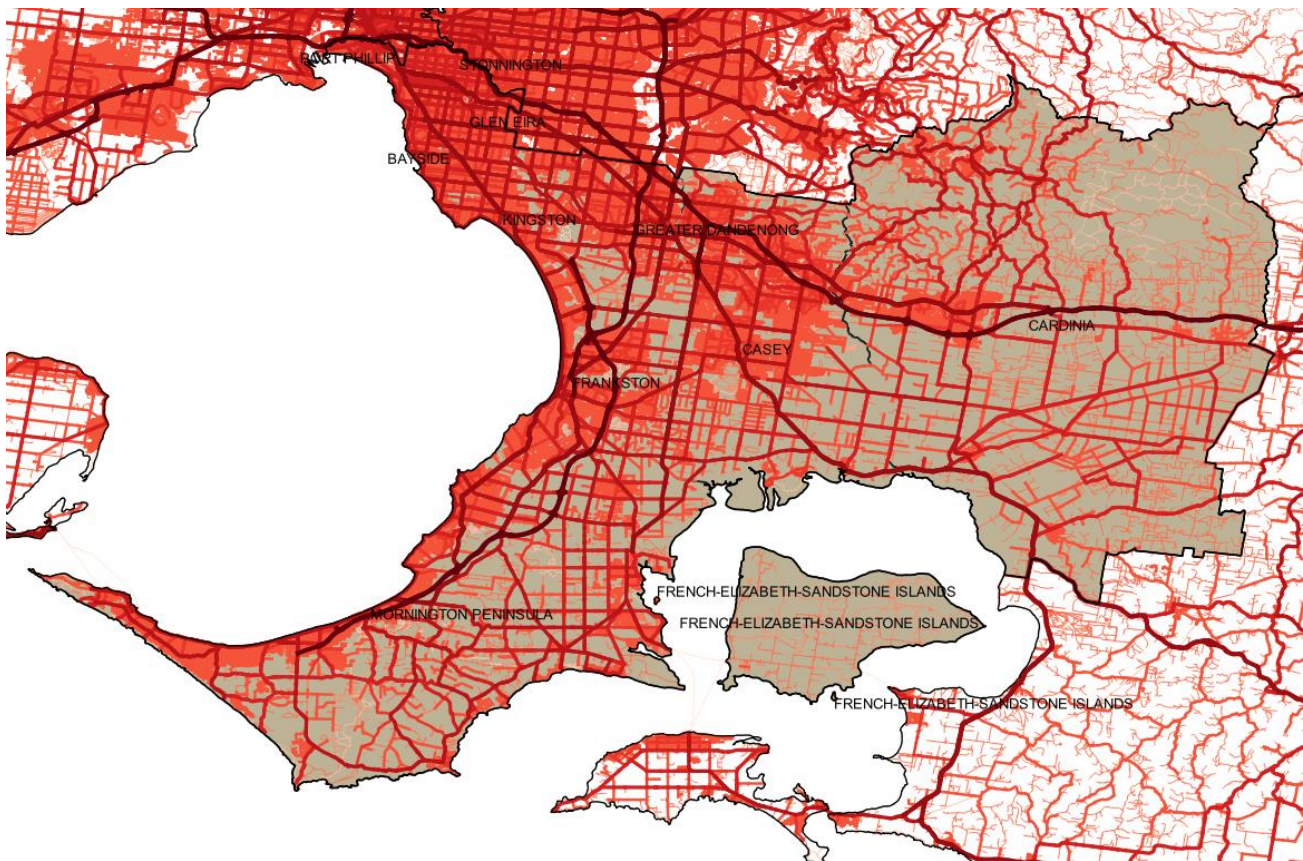
Figure 15. Density of road network within SMR

Cardinia LGA has a much lower density, but longer total length given its larger size has the lowest percentage of households with no vehicles, in line with its comparatively lower public transport service frequency.

Table 15 has calculated road lengths for each LGA based on Department of Transport standard categories. All road lengths in kilometres [117]. Note for evacuation planning, road capacity for a single lane can be estimated using a standard method supplied by Department of Transport. This can help to understand required lead time to evacuate areas with limited access.

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

Table 15. Road Lengths by LGA[118]

	Road Lengths (km)									
LGA	**Freeway**	**Highway**	**Arterial**	**Sub-Arterial**	**Collector**	**Local**	**2WD**	**4WD**	**Walking Track**	**Bike Path**
Bayside	0	12	43	17	44	296	10	-	14	21
Cardinia	41	76	113	293	92	948	1427	64	196	4
Casey	58	93	111	100	238	1497	231	28	49	125
Frankston	41	48	44	51	47	572	43	0	63	23
French Island	-	-	-	-	-	2	100	115	-	-
Glen Eira	-	20	40	32	30	348	3	-	8	2
Greater Dandenong	64	58	71	49	45	607	79	-	12	38
Kingston	10	18	92	8	58	599	20	-	27	58
Mornington Peninsula	59	64	245	215	113	1338	663	37	167	69
Port Phillip	1	12	18	39	17	222	3	-	22	29
Stonnington	18	10	7	50	22	262	8	-	8	12
Total Metro	158	232	469	608	443	3784	2421	243	412	198
Total Interface	135	179	314	246	264	2904	167	0	154	183
Total SMR	**293**	**411**	**783**	**854**	**707**	**6689**	**2587**	**243**	**566**	**381**

The number of bridges in SMR are shown in Table 16 by LGA and road class. Bridges are often a weakness in the overall road network, acting as a potential bottleneck funnelling traffic over an obstacle such as a river or other transport route. They can become impassable in floods or blocked by traffic and there is not always a suitable alternative route available.

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

Table 16. Number of bridges by LGA[119]

	Number of bridges by LGA									
LGA	**Freeway**	**Highway**	**Arterial**	**Sub-Arterial**	**Collector**	**Local**	**2WD**	**4WD**	**Walking Track**	**Bike Path**
Bayside	-	1	-	1	10	8		-	1	2
Cardinia	8	40	18	43	9	47	76	-	10	-
Casey	31	30	29	14	6	7	1	-	4	8
Frankston	31		32		6	4	1	-	28	16
French Island	-	-	-	-	-	-	-	-	-	-
Glen Eira			1	3	1	1		-	2	2
Greater Dandenong	45	33	26	9	6	6	1	-	2	14
Kingston	5	9	14		7	22		-	7	9
Mornington Peninsula	24	10	25	21	16	6	9	-	10	-
Port Phillip	18	2	8	18	4	15	-	-	9	1
Stonnington	21	-	19	29	15	11	-	-	13	16
Total **Metro**	63	80	72	78	31	60	86	-	24	8
Interface	120	45	100	60	49	67	2	-	62	60
SMR	183	125	172	138	80	127	88	-	86	68

The following roads projects are also underway or soon to start:

- Monash Freeway Upgrade – This project is expected to add extra lanes throughout the freeway from Warragul Road to Eastlink, Eastlink to Springvale Road and Clyde Road to Cardinia Road. Other upgrades include adding more efficient outbound/inbound ramps, extending interchanges and building shared walking/cycling path. The work began in 2016 and is staggered in tiers. Stage 1 was completed in June 2018 and Stage 2 is expected to be completed by 2022.This upgrade is intended to accommodate the increased traffic from Gippsland region and South Metro region into the CBD.[120]

- Mordialloc Freeway Project – This project is due for completion by 2021 and is expected to benefit growing communities and ease congestion in Melbourne's south east. A large component of this project is building bridges over Springvale, Governor, Lower Dandenong and Centre Dandenong Roads, along with new freeway entry and exit ramps.[121]

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

120 https://roadprojects.vic.gov.au/projects/northern-roads-upgrade

121 https://roadprojects.vic.gov.au/projects/northern-roads-upgrade

- South Road Upgrade – This work is intended to add to the development of Melbourne's south east transport network. It is intended to reduce congestion for the 40,000 people that use South Road to commute every day. This project is a part of the Victorian Governments $30 million to improve south road due the integral role it plays in linking the Nepean Highway to the Dingley Bypass.[122]

7.4.2 Rail

Major rail crosses SMR for 413 km shown in

Table 14, including lines and hubs run by the following Rail Authorities:

- Metro Trains (commuter rail):
  - Cranbourne Line
  - Frankston Line
  - Pakenham Line
  - Sandringham Line
- V/Line (commuter rail):
  - Yarrum
  - Cowes
  - Wonthaggi
  - Traralgon
  - Canberra (ACT)
  - Narooma and Batemans Bay (NSW)

SMR is also serviced by the Melbourne tram network (Routes 1, 3/3a, 5, 6, 12, 16, 48, 58, 64, 67, 70, 72, 75, 78, 86, 96, 109). Refer Figure 16 where train lines are depicted in green and tram lines are red.

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122 https://roadprojects.vic.gov.au/projects/northern-roads-upgrade
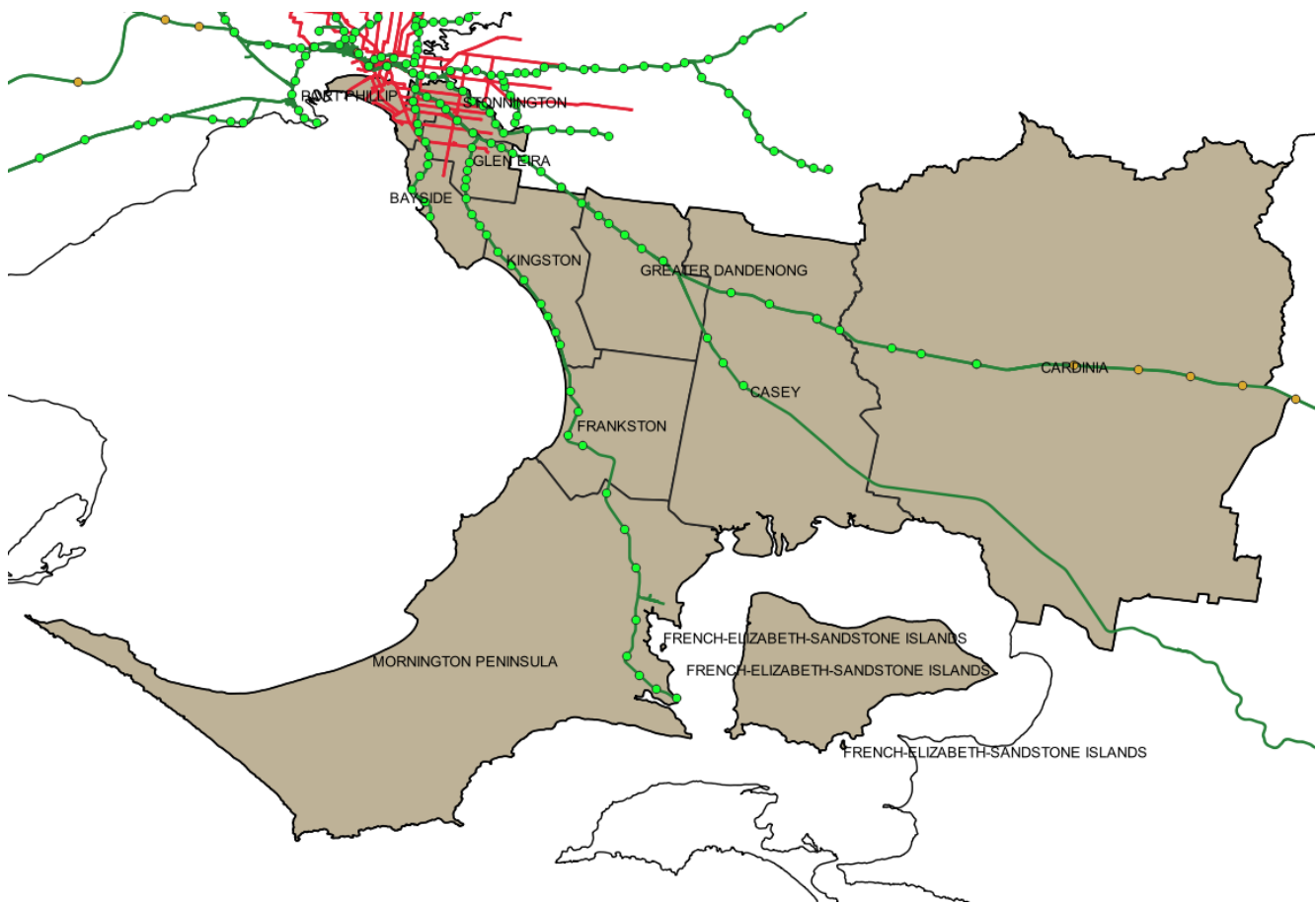
Figure 16. Map of major rail networks overlayed with SMR boundaries

Several construction projects are underway to further improve rail networks that are located in or feed into SMR:

- Suburban Rail Loop – a suburban rail loop with a 90 km route that will link major rail lines and has been designed to ease congestion and take pressure off Melbourne's entire transport network.[123]

- Upgrades to the Cranbourne and Pakenham Rail Lines.

7.4.3 Air

Within SMR, there is one airport – Moorabbin Airport:

- Moorabbin Airport is Australia's leading General Aviation airport and home to a dozen flying training schools for both fixed and rotary wing operations.

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123 Suburban Rail Loop (2020): https://suburbanrailloop.vic.gov.au/en

- Moorabbin airport sprawls across 294 hectares and hosts over 50 aviation organisations and approximately 350 aircraft and helicopters (including vintage biplanes, training craft and corporate jets).

- This airport hosts King Island Airlines, which links King Island to the mainland with daily flights. These flights primarily carry crayfish, cheese and tourists.

- Other aviation uses the airport for aircraft maintenance, air charter, freight, recreational flying and air work (photography and surveying). The Royal Flying Doctors and the Air Ambulance Service also use Moorabbin Airport for these services.

7.4.4 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.[124]

The Port of Hastings is the major port in the region and for Victoria. It is located in Western Port and provides a major gateway and supporting role for Victoria, Melbourne and south east Australia. The Port is responsible for a significant share of the State's bulk liquid trade amounting to 1.5 million tonnes of petroleum products, steel, oil and gas each year.[125]

Infrastructure Victoria estimate that The Port of Melbourne will reach capacity by 2055 by which time a second major container port will need to be established.[126] The Victorian Government has identified the Port of Hastings as a key area for development and expansion for future container traffic, with enough capacity of 9 million TEU (twenty-foot equivalent units) by 2060.[127]

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

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124 Ports Australia (2020): https://www.portsaustralia.com.au/resources/trade-statistics

125 https://static1.squarespace.com/static/592f5720f5e2317ce97cec2c/t/5dddcf6d0264c30de205e2c3/1574817677347/Annual+Report+2018+-+19+Final.pdf

126 Infrastructure Victoria (20178): https://www.infrastructurevictoria.com.au/project/securing-victorias-ports-capacity/

127 Infrastructure Victoria (2013): https://www.infrastructurevictoria.com.au/wp-content/uploads/2019/04/GHD_Port_of_Hastings_Container_Expansion_Project_-_Ecology_Description_-_Final_Report.pdf

- Security events.[128]

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

In their outlook for 2020, Melbourne Water noted that,

Melbourne's water supplies are currently secure for the coming year, however… challenges such as our increasing population and a warming, drying climate have contributed to Melbourne's storages decreasing by an annual average of 61 billion litres over the last five years.[129]

A shortage of water is an increasing issue and forecasts suggest a potential 50% reduction in streamflow by 2065.[130]

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. Different land uses in the region place varying levels of demand on water use, with some land uses posing potential threats to water quality and river health if note carefully managed.

Catchments in NWMR are at risk of threats to drinking water, including from:

- Bushfires – ash and sediment washed into reservoirs can contaminate water supplies for many months, while forests within catchment areas recover less water so reservoir supplies can become diminished.

- Contamination – from both human and animal sources.

- Erosion – which can cause sediment to enter the waterways that feed our reservoirs.[131]

Some examples of the impacts such events could have include:

- Diminished agricultural production leading to a decline in gross domestic product.

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128 EMV (2019): https://www.emv.vic.gov.au/publications/victorias-critical-infrastructure-all-sectors-resilience-report-2018

129 Melbourne Water (2020): https://www.melbournewater.com.au/about/strategies-and-reports/water-outlook

130 Emergency Management in Victoria 2030: Drivers and Trends, 2019, p.3.

131 Melbourne Water (2020): https://www.melbournewater.com.au/water/water-facts-and-history/why-melbournes-water-tastes-great-tap/water-catchments

- 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.[132]

- 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.[133]

In a range of emergencies – including blue-green algae incidents, dam safety issues and the disruption to water services, DELWP is charged with responsibility for responding to and mitigating the impact of such events.[134]

Since 2006 the water sector has been identified as an essential service according to an Act of Parliament,[135] which requires Victoria's water organisations to have risk management plans in place which include provisions for terrorist acts. Water resources are also particularly susceptible to all hazard events, including bushfires, drought, floods, earthquakes, cyclones, contamination and epidemics. Individual disruptions to infrastructure in one area can have an impact on the response and recovery efforts in other areas because water is both dependent and interdependent on infrastructure networks across Victoria. For example, water supplies rely on electric power to operate distribution pumps while electric power requires water for electricity generation. So too, the water sector relies on supply chains, including the transport sector, to provide chemicals for water treatment and disinfection and may share common service corridors.[136]

SMR also incorporates approximately 320 km of coastline around Port Phillip Bay and Western Port Bay (in the Cities and Shires of Bayside, Frankston, French Island*, Kingston, Mornington Peninsula and Port Phillip), Coastal hazards include storms, king tides, extreme weather, beach erosion and coastal inundations are a constant hazard for the communities in SMR.

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

- Parks Victoria

- Fisheries Victoria

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132 DELWP (2020): https://www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/blue-green-algae

133 DELWP (2020): https://www.water.vic.gov.au/groundwater/victorias-groundwater-resources

134 DELWP (2019): https://www.water.vic.gov.au/managing-dams-and-water-emergencies/emergency-management

135 The Terrorism (Community Protection) Act 2003.community protection

136 Global Terrorism Research Centre (2015):
https://www.researchgate.net/publication/275658307_Plan_Prepare_and_Safeguard_Water_Critical_Infrastructure_Protection_in_Australia

- Department of Environment, Land, Water and Planning (DELWP)

- Department of Transport

- Environmental Protection Agency (EPA)

- Water Police[137]

Victoria's water grid connects dams, reservoirs, irrigation districts and the Wonthaggi desalination plant via rivers, pipes and pumps. In 2018, a Water Grid Partnership was established to oversee the grid's operation and address Victoria's water security challenges such as climate change and population growth. The use of desalinated water will increase over time and form part of Melbourne's regular water supplies.[138] Refer Figure 17.
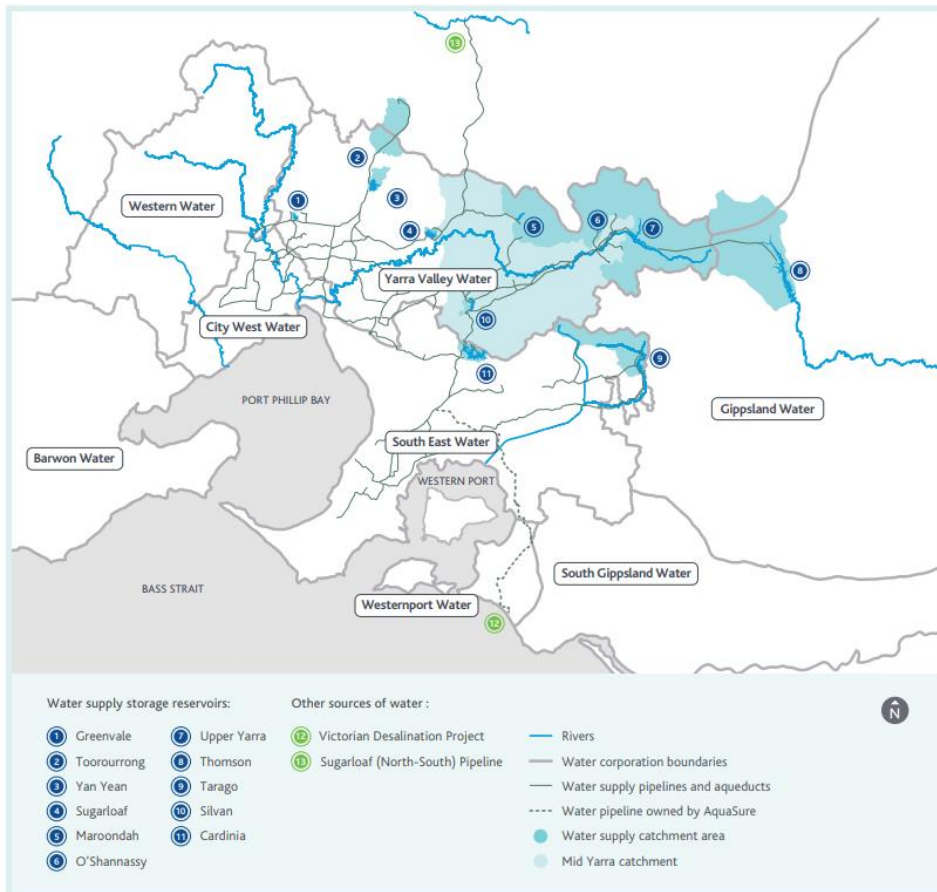
Figure 17. Melbourne's water supply system[139]

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137 Parks Victoria (2020): https://www.parks.vic.gov.au/water-management

138 DELWP (2019): https://www.water.vic.gov.au/water-grid-and-markets/the-grid

139 Vic Water (2019): https://www.water.vic.gov.au/water-grid-and-markets/the-grid

Small parts of SMR are within the Melbourne Water catchment zone, supplying water to Melbourne. Economic, recreational or other activities in these areas risks contamination to the water supply, impacting on water quantity and quality, as do events linked to severe weather such as floods, fires and landslides. The table below lists these catchments and areas.

Table 17. Water Supply Catchments for Melbourne Water[140]

Catchment	AREA_HA	Easting	Northing	Land use
Cardinia	2,806.8	361727	5797964	Melbourne Water Owned
Yerling Gorge	13,6773.0	369885	5820911	Open Catchment
Frankston Dam Site	94.3	336287	5772885	Land owned by DELWP; maintained by Parks Vic
Devil Bend	617.3	334570	5760245	Catchment maintained by Parks Vic
Bittern	367.8	334645	5758296	Catchment maintained by Parks Vic
Beaconsfield	150.6	360425	5790423	Reservoir is DELWP asset
Bunyip	4,029.4	388069	5802900	State Park

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.[141]

7.5.3 Wastewater

There are several wastewater treatment plants across the metro region, regulated by the Victorian Environment Protection Authority (EPA). The Eastern Treatment Plant (ETP) owned and operated by Melbourne Water and is located within the suburb of Bangholme. The ETP is a major sewage treatment plants which service Melbourne. Around 360 megalitres of sewage per day from the south eastern suburbs of Melbourne flow through the trunk sewerage network to the ETP. The treatment plant uses innovative processes to turn sewage into Class A recycled water.[142]

140

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

142 https://www.melbournewater.com.au/water-data-and-education/water-facts-and-history/where-your-sewage-goes/eastern-treatment-plant
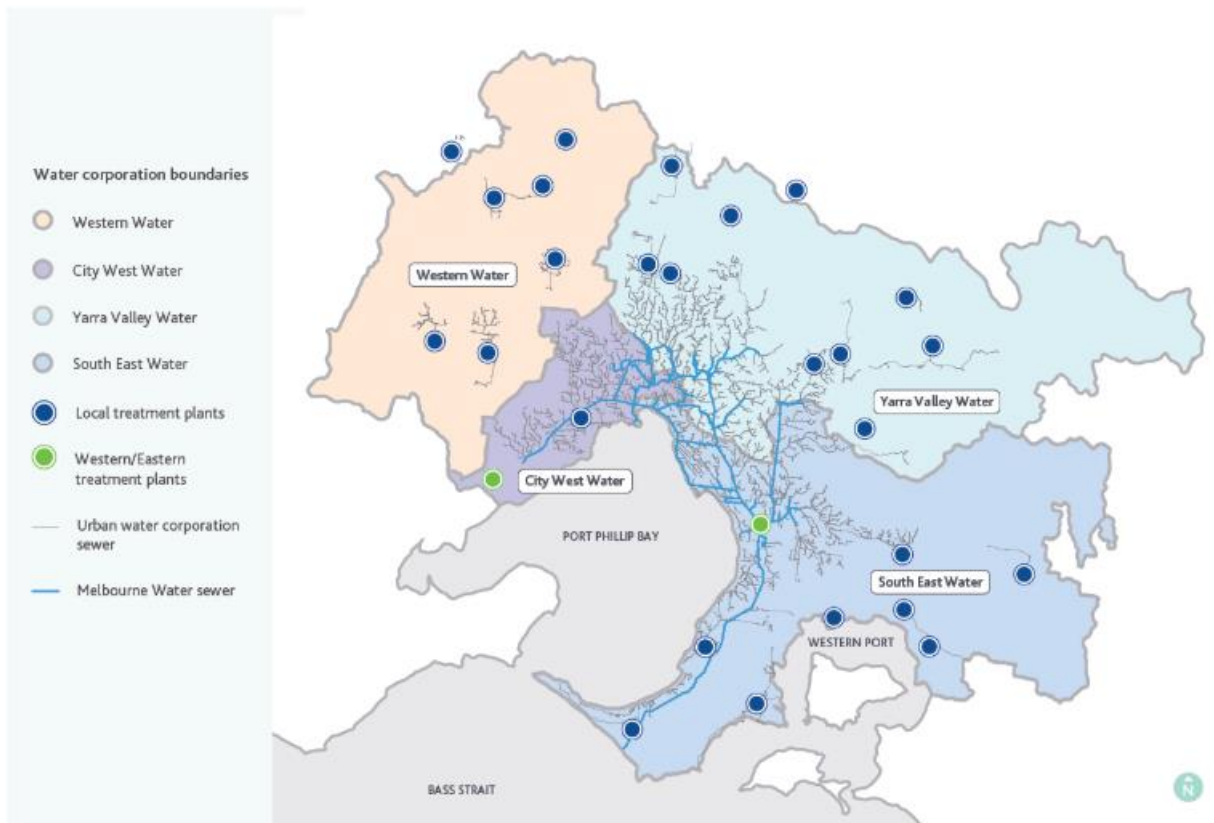
Figure 18. Melbourne's sewerage network[143]

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.[144]

EPA Victoria has identified several active environmental issues pertaining to landfill within SMR, including:

- SUEZ Taylors Road Landfill – owned by Suez, this landfill site has been identified due to the facility's acceptance of industrial (Category B) waste. This type of waste includes inert sludges, asbestos, solidified/polymerised waste and foundry sands.

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143 Melbourne Water (2020): https://www.melbournewater.com.au/water/water-facts-and-history/importance-sewerage
144 EPA Victoria (2020): https://ref.epa.vic.gov.au/your-environment/waste/landfills

- SUEZ Hallam Road Landfill – owned by Suez, this landfill site is one of Victoria's largest landfills and accepts waste from several Melbourne councils. In 2019, EPA investigated the site following reports from residents of strong odours emanating from the site.[145] The investigation concluded that landfill gas from the Hallam Road landfill is the source of the odour.[146]

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.[147]

7.6.2 Recycling

Transfer stations and recycling depots in SMR include:

- Bayside Waste and Recycling Centre (Bayside)
- Pakenham Transfer Station (Cardinia)
- Cardinia Waste and Recycle Centre (Cardinia)
- Sita/Outlook Waste Transfer and Recycle Centre (Casey)
- Cranbourne Waste Transfer and Recycling Depot (Casey)
- Frankston Regional Recycling and Recovery Centre (Frankston)
- Frankston Waste Transfer Centre (Frankston)
- Commercial Sands Rubbish Tip (Greater Dandenong)

- Kingston Waste Transfer Station (Kingston)
- TPI Clayton (Kingston)
- Clarinda Landfill Transfer Station (Kingston)
- Mornington Waste Disposal Centre (Mornington Peninsula)
- Tyabb Transfer Station (Mornington Peninsula)
- Rockleigh Waste Management and Landfill (Mornington Peninsula)
- Fingal (Rye) Waste Disposal and Recycling Centre (Mornington Peninsula)
- Port Phillip Transfer Station (Port Phillip)

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145 EPA Victoria (2020): https://www.epa.vic.gov.au/for-community/current-projects-issues/active-environmental-issues/western-metro/ravenhall-landfill

146 EPA Victoria (2019): https://www.epa.vic.gov.au/for-community/current-projects-issues/active-environmental-issues/southern-metro/hallam-road

147 EMV (2012): https://www.emv.vic.gov.au/how-we-help/reviews-and-lessons-management/operational-reviews/fire-management-at-landfill-sites

- Clayton Transfer Station (Kingston)

There are also 88 stockpile sites, waste in storage for recycling or reuse registered by EPA within SMR. The majority of these are located in Greater Dandenong and Kingston. Refer Table 18.

Table 18. Transfer Stations, Recycling Depots and EPA Stockpile sites in SMR by LGA[148]

	LGA	Transfer Stations and Recycling Depots	EPA Stockpile Sites
	Bayside	1	3
	Cardinia	2	7
	Casey	2	7
	Frankston	3	3
	French Island	-	0
	Glen Eira	0	0
	Greater Dandenong	1	**31**
	Kingston	4	**25**
	Mornington Peninsula	5	10
	Port Phillip	1	2
	Stonnington	0	0
Total	**Metro**	15	64
	Interface	4	24
	SMR	**19**	**88**

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).

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

Government services not already covered in this scan include prisons and community correctional services which can have their own unique issues in the face of an emergency. SMR is home to:

- Cranbourne Justice Service Centre
- Frankston Justice Service Centre

- Moorabbin Justice Service Centre
- Pakenham Justice Service Centre

Magistrates' Courts in SMR include:

- Moorabbin Magistrates' Court
- Dandenong Magistrates' Court

- Frankston Magistrates' Court

7.8 Emergency services

SMR is serviced by 29 police stations, 32 ambulance stations, 73 fire brigades, 12 SES units and 34 Life Saving Victoria (LSV) units or Coast Guard brigades.

Fire Stations – covered by:

- CFA District – 8

- CFA Region – South East

- Fire Rescue Victoria response area

CFA Total Fire Ban District - Central

Emergency services agencies in SMR are supported by two Regional Control Centres (RCCs) (a facility that enables the implementation of Command, Coordination and Control arrangements within a set regional boundary) in Mulgrave and Dandenong and an Incident Control Centre (ICC) in Kangaroo Ground (where an Incident Controller and Incident Management Teams can manage response activities in an emergency).[149]

A map of emergency services in EMR is provided in Figure 19

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[149] EMV (2019): https://files-em.em.vic.gov.au/public/Doctrine/ManHand/VIC-EOpsHandbook.pdf
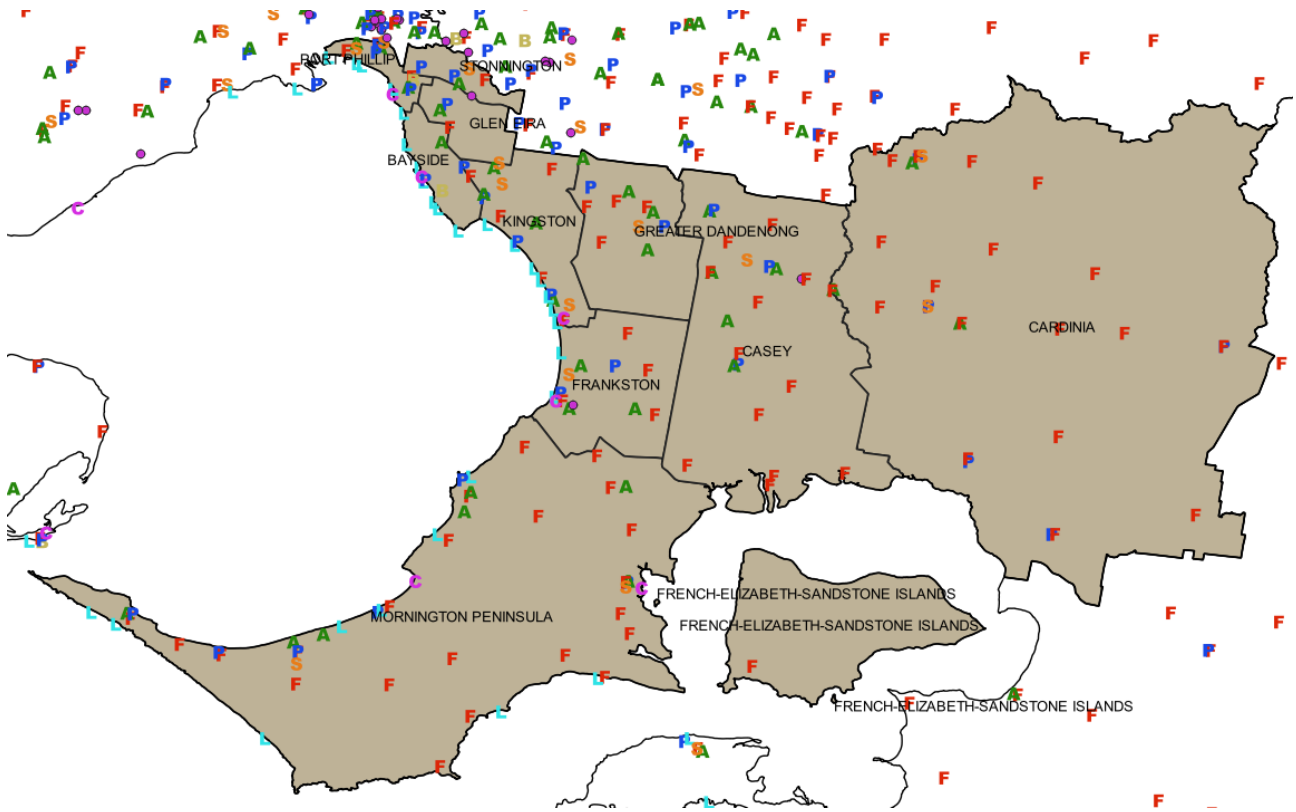
Red = Fire station (CFA and FRV)	Orange = SES
Green = Ambulance station	Light Blue = Life saving
Blue = Police station	Purple = Coast Guard

Figure 19. Emergency services in SMR

Table 19. Emergency services in SMR by LGA[150]

LGA	Ambulance			Fire		Police, SES and SLS			Emergency Coordination Facilities	
	Ambulance Stations[151]	Code 1 Response Q4 2019-20 (% within 15 Mins)[152]	Code 1 Response Q4 2019-20 Time (Average Mins)[153]	Fire Brigades, Stations or Local Commands	Fire Refuges and Neighbourhood Safer Places	Police Stations	SES Units	Surf Life Saving, Coast Guard and Marine Rescue Facilities	SCC and RCCs	ICCs
Bayside	1	86.6%	10:59	0	0	1	0	7	0	0
Cardinia	3	72.8%	12:35	18	3	5	2	0	0	0
Casey	5	84.3%	11:11	12	7	3	1	0	0	0
Frankston	3	91.0%	10:14	5	0	2	1	3	0	0
French Island	0			1	0	0	0	0	0	0
Glen Eira	1	91.6%	10:02	1	0	1	1	0	0	0
Greater Dandenong	4	90.4%	10:02	4	0	2	1	0	1	1
Kingston	4	89.8%	10:17	5	0	4	2	8	0	0
Mornington Peninsula	7	80.0%	11:33	24	13	6	2	10	0	0
Port Phillip	3	93.1%	9:24	1	0	3	1	6	0	0
Stonnington	1	89.8%	10:24	2	0	2	1	0	0	0
Total **Metro**	17	**90.3%**	10:11	18	0	15	7	24	1	1
Interface	15	**79.0%**	11:46	55	23	14	5	10	0	0
SMR	**32**	**86.9%**	**10:40**	**73**	**23**	**29**	**12**	**34**	**1**	**1**

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

151 Includes Air Ambulance Stations.

152 https://www.ambulance.vic.gov.au/about-us/our-performance/

153 https://www.ambulance.vic.gov.au/about-us/our-performance/

7.9 Other infrastructure assets and industries

7.9.1 Infrastructure and industries

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

- Major Hazard Facilities [154] (8)

    o APA GasNet Australia (Operations) Pty Ltd

    o BOC Limited

    o Elgas Ltd

    o Melbourne Water Corporation

    o Supagas Holdings Pty Ltd

    o Esso Australia Pty Ltd

    o United Terminals Pty Ltd

    o Lattice Energy Limited

7.9.2 Dependencies

The following infrastructure assets are key dependencies for this region:

- V/Line (commuter rail): Yarrum, Cowes, Wonthaggi, Traralgon, Canberra (ACT), Narooma and Batemans Bay (NSW)

- Prescribed industrial waste can only be accepted at one hazardous (Category B) landfill in Victoria. This is located on Taylors Road in Dandenong South

- Roadways that support freight or private vehicles: Bass Highway, CityLink, Dandenong Bypass, Dandenong Road, Eastlink, Frankston Freeway, Kings Way, Monash Freeway, Moorooduc Highway, Mornington Peninsula Freeway, Nepean Highway

- The ethane pipeline from Esso's Long Island Point plant is a major pipeline that feeds the chemical plant complex in Altona.

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154 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

Popular tourist attractions within SMR include:

- Royal Botanical Gardens
- Caufield Racecourse
- Como Park
- Fisherman's Bend
- Dandenong Fresh Fruit and Vegetable Market
- Churchill National Park
- Royal Melbourne Gold Club

- Philip Island Penguin Show
- French Island Tourist Excursions
- Mornington Peninsula
- Point Nepean National Park
- Sorrento Golf Club
- Cape Schanck Lighthouse
- Moonlit Sanctuary Wildlife Conservation Park

Major shopping centres and/or precincts include:

- Westfield Southland Shopping Centre (Cheltenham)
- DFO Moorabbin
- Bayside Shopping Centre (Frankston)

All of these locations attract large numbers of the population and tourists from all around the world and contribute significantly to the Victorian economy and reputation.

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.[155]

- 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.[156]

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[155] https://www.vba.vic.gov.au/cladding/audit

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

To date, more than 2,200 inspections have been undertaken and SMR has been identified to have 457 privately owned buildings with cladding: 423 in the metro region and 34 in interface LGAs shown in Figure 20
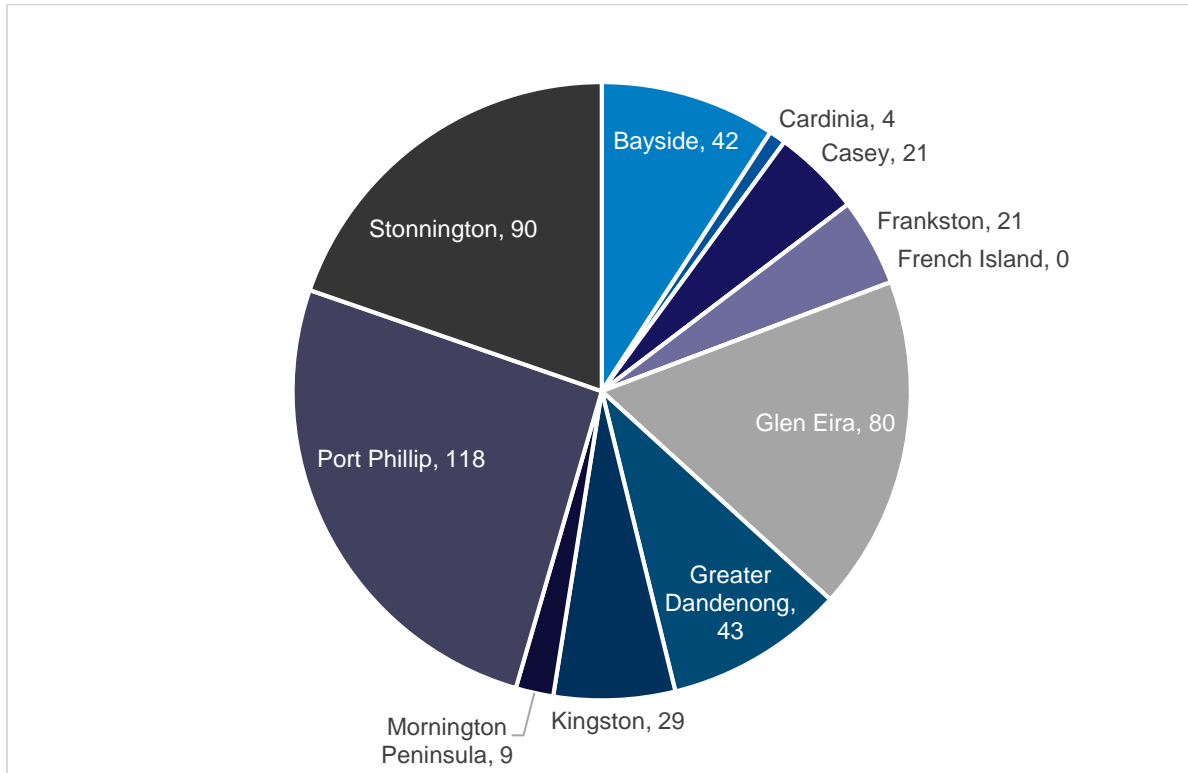
Figure 20: Number of privately owned buildings with cladding by LGA [157]

7.9.5 High Density Public Housing

SMR has a total of 14 public high rise towers. They are located at the following addresses:

180 Mills Street, Albert Park

150 Victoria Avenue, Albert Park

25 King Street, Prahran

27 King Street, Prahran

200 Dorcas Street, South Melbourne

332 Park Street, South Melbourne

259 Malvern Road, South Yarra

2 Simmons Street, South Yarra

1 Surrey Road, South Yarra

1a Surrey Road, South Yarra

5 Wicklow Lane, South Yarra

150 Inkerman Street, St Kilda

2 Raleigh Street, Windsor

49 Union Street, Windsor

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

8. Social Environment

Social factors that influence the culture and institutions of SMR 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

The following figures and tables show the current population statistics as at 2019 and the projected changes by 2036. Over one and a half million people live in SMR, making up approximately one quarter (24.3%) of the population of Victoria, but this proportion is expected to decrease slightly 2036 to 22.2%. In real terms, SMR is projected to increase by 33%, from just over 1.6 million people to nearly 2 million. While the total growth is evenly spread between metro and interface LGAs, this growth represents a higher percentage growth in the interface areas, which are expecting an increase of 42.1%. However, the rate of growth varies according to LGA: for example, Cardinia is forecast to grow by 58.4% (from approximately 100,000 to 180,000 people) by 2036. Conversely, the Cities of Bayside and Frankston are expected to grow around 15%.

Table 20. Southern Metro Region Population by LGA (2019) [158]

	LGA	Population[159]	Area (km^2)	Population Density (persons/km^2)
	Bayside	106,862	37	2,873
	Cardinia	112,159	1,283	87
	Casey	353872	409	864
	Frankston	142,643	130	1,101
	French Island	119	170	1
	Glen Eira	156,511	39	4,044
	Greater Dandenong	168,201	130	1,299
	Kingston	165,782	91	1,814
	Mornington Peninsula	167,636	724	231
	Port Phillip	115,601	21	5,585
	Stonnington	117,768	26	4,582
Total	**Metro**	973,368	474	2,053.5
	Interface	633,786	2,586	245.1
	SMR	**1,607,154**	**3,060**	**525.2**

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158 ABS (2020): https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02018-19?OpenDocument

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

VICTORIA State Government | Justice and Community Safety
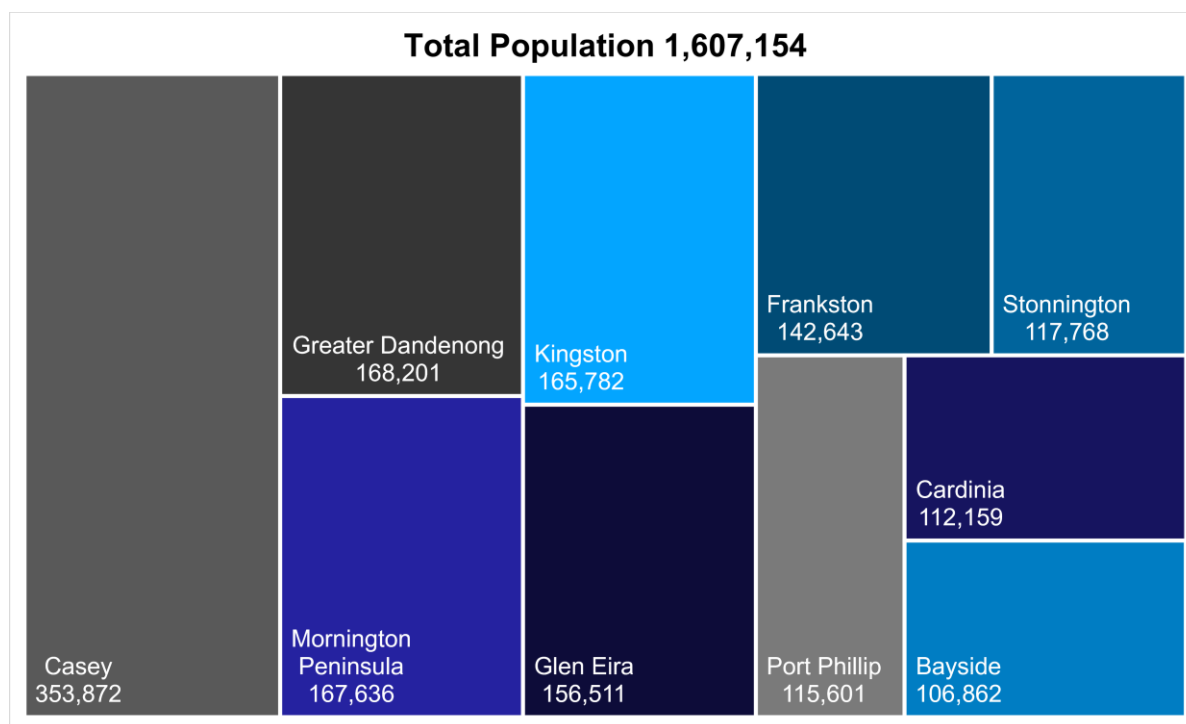
Figure 21. Southern Metro Region Population by LGA

Table 21. SMR Estimated Population and Projections by LGA

	LGA	Estimated Population and Projections			
		2019[160]	2036[161]	No. Increase	% Growth
	Bayside	106,862	122,708	15,846	*14.8%*
	Cardinia	112,159	177,686	65,527	*58.4%*
	Casey	353,872	522,251	168,379	*47.6%*
	Frankston	142,643	165,786	23,143	*16.2%*
	French Island	119	-	-	-
	Glen Eira	156,511	188,211	31,700	*20.3%*
	Greater Dandenong	168,201	218,560	50,359	*29.9%*
	Kingston	165,782	201,087	35,305	*21.3%*
	Mornington Peninsula	167,636	200,365	32,729	*19.5%*
	Port Phillip	115,601	159,447	43,846	*37.9%*
	Stonnington	117,768	146,890	29,122	*24.7%*
Total	**Metro**	973,368	1,712,379	766,986	*27.4%*
	Interface	633,786	1,570,023	**976,812**	***42.1%***
	SMR	**1,607,154**	**1,935,997**	**533,703**	**33.2%**
	VICTORIA	**6,596,039**	**8,722,766**	**2,126,727**	**32.2%**

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160 ABS (2019): https://www.rdv.vic.gov.au/information-portal/table-and-chart

161 VIF2019 projections: https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future/tab-pages/victoria-in-future-data-tables

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.[162]

Some of these indicators for SMR are summarised in Table 22 and Figure 22.

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162 Inspector General for Emergency Management (2019): Review of emergency management for high-risk Victorian communities.

Table 22. Vulnerable Communities Indicators by LGA (2016) [163]

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
Bayside	19.2	22.2	4.3	1.8	0.2	4.5	8.8
Cardinia	11.9	16.4	4.2	1.3	0.2	2.5	10.6
Casey	10.3	13.2	4.7	5.4	0.4	2.9	9.5
Frankston	15.4	23.6	5.4	1.4	0.4	5.3	12.5
French Island	-	-	-	-	-	-	-
Glen Eira	15.1	23.6	4.4	4.1	0.4	8.1	10.0
Greater Dandenong	14.4	17.6	6.4	16.8	1.3	7.8	16.0
Kingston	17.3	23.0	5.0	4.3	0.3	5.7	0.0
Mornington Peninsula	24.6	24.1	5.5	0.6	0.2	2.7	13.5
Port Phillip	11.5	34.0	3.2	2.5	1.1	14.1	9.0
Stonnington	15.2	30.3	3.3	3.2	0.4	13.8	8.4
Total **Metro**	15.4	24.9	4.6	4.9	0.6	8.5	9.2
Interface	11.7	13.4	3.6	1.8	0.2	2.0	8.4
SMR	*14.1*	*20.7*	*4.2*	*3.8*	*0.4*	*6.1*	*8.9*

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163 https://blog.id.com.au/2020/population/demographic-trends/interactive-chart-is-your-community-demographically-vulnerable/#chart
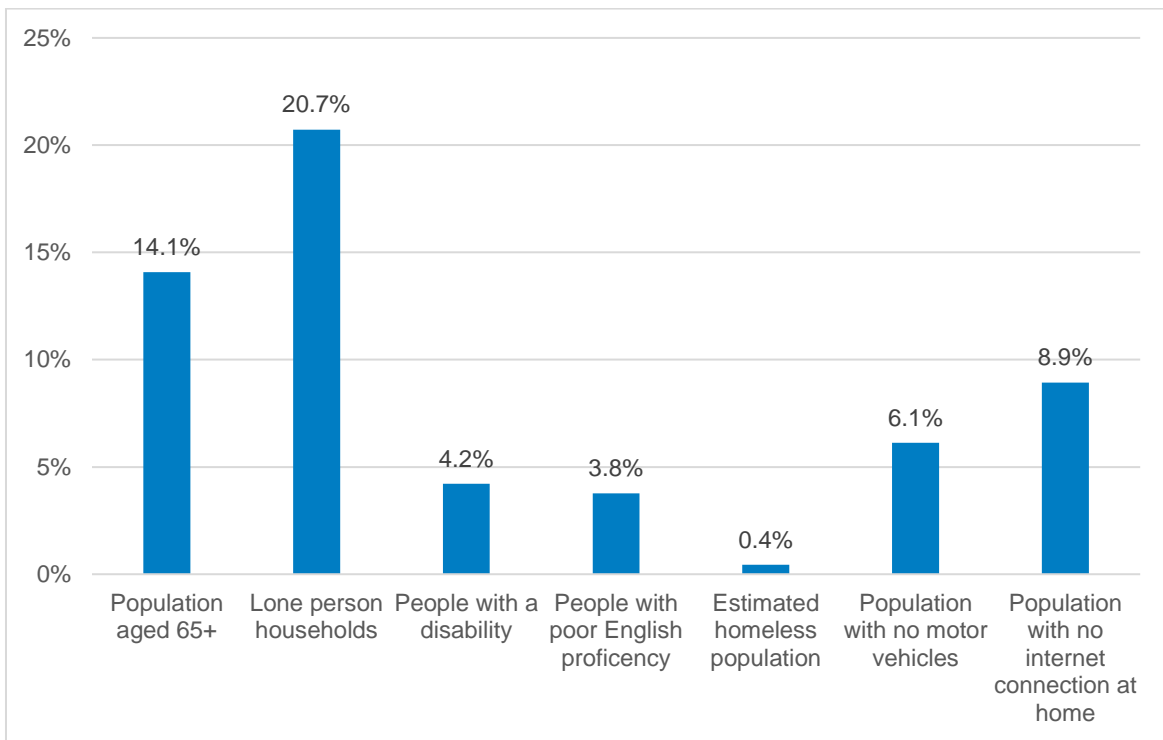
Figure 22: Vulnerable Communities Indicators for SMR (2016) [164]

8.2.1 The young, the elderly and those needing assistance

Within SMR, 24.4% of the population was aged 19 years or younger in 2017, while 14.8% was aged 65 years or older. However, these vulnerable groups were not evenly distributed across the region: Casey had the highest number of people aged 0-19 years (96,879), while Port Phillip had the lowest (16,279); Mornington Peninsula had the highest number of people aged 65+ years (39,460), while Cardinia had the lowest (11,939). None of these proportions were wildly different to those for Victoria as a whole. However, the number of people aged 0-19 years was slightly higher in SMR's interface LGAs compared to the State average. Refer Table 23.

Table 23. SMR population by age group (2017) [165]

LGA	Age Group (Years)

LGA	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.
Bayside	19,818	6,607	26,425	5,733	9,312	13,015	16,613	13,554	10,299	5,600	3,723	19,622	104,274
Cardinia	23,992	6,635	30,627	6,716	15,560	14,135	13,216	10,232	7,329	3,392	1,218	11,939	102,425
Casey	74,911	21,968	96,879	23,888	50,660	48,299	42,065	32,094	19,800	9,541	3,594	32,935	326,820
Frankston	26,750	8,038	34,788	9,097	20,235	19,116	19,342	16,691	12,230	6,417	2,823	21,470	140,739
French Island	-	-	-	-	-	-	-	-	-	-	-	-	119
Glen Eira	27,914	8,253	36,167	11,303	24,840	21,318	19,750	15,787	11,365	6,599	4,310	22,274	151,439
Greater Dandenong	29,745	9,545	39,290	13,555	29,939	22,118	18,906	16,589	12,692	7,317	3,108	23,117	163,514
Kingston	28,682	8,723	37,405	10,026	22,015	23,260	22,747	18,483	14,195	8,656	4,269	27,120	161,056
Mornington Peninsula	28,711	9,522	38,233	8,369	15,213	18,680	22,197	21,695	21,551	12,659	5,250	39,460	163,847
Port Phillip	13,084	3,195	16,279	7,427	28,884	19,050	14,591	11,425	7,835	3,607	1,536	12,978	110,634
Stonnington	14,086	5,042	19,128	10,896	27,967	15,161	12,977	10,832	8,823	5,395	2,558	16,776	113,737
Metro	160,079	49,403	209,482	68,037	163,192	133,038	124,926	103,361	77,439	43,591	22,327	143,357	945,393
%	16.9%	5.2%	22.2%	7.2%	17.3%	14.1%	13.2%	10.9%	8.2%	4.6%	2.4%	15.2%	100.0%
Interface	127,614	38,125	165,739	38,973	81,433	81,114	77,478	64,021	48,680	25,592	10,062	84,334	593,211
%	21.5%	6.4%	27.9%	6.6%	13.7%	13.7%	13.1%	10.8%	8.2%	4.3%	1.7%	14.2%	100.0%
SMR	287,693	87,528	375,221	107,010	244,625	214,152	202,404	167,382	126,119	69,183	32,389	227,691	1,538,604
%	18.7%	5.7%	24.4%	7.0%	15.9%	13.9%	13.2%	10.9%	8.2%	4.5%	2.1%	14.8%	100.0%
VICTORIA	1,166,502	374,125	1,540,627	466,102	991,712	849,923	809,781	705,704	532,826	294,754	130,219	957,799	6,321,648
%	18.5%	5.9%	24.4%	7.4%	15.7%	13.4%	12.8%	11.2%	8.4%	4.7%	2.1%	15.2%	100.0%

[165] ABS (2019): https://www.rdv.vic.gov.au/information-portal/table-and-chart

Table 24. SMR Projected population by age group (2036) [166]

		Age Group (Years)											Total No.
LGA	**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.**
Bayside	19,671	6,680	26,351	6,528	13,350	15,941	16,508	14,470	13,899	10,100	5,560	29,559	**122,708**
Cardinia	37,565	12,784	50,349	11,580	20,420	27,169	25,490	16,854	13,018	8,898	4,090	26,005	**177,868**
Casey	107,999	36,035	144,034	34,938	68,271	76,718	68,861	50,626	38,929	27,870	12,005	78,805	**522,251**
Frankston	27,547	9,444	36,992	10,247	20,108	21,827	21,969	18,836	16,989	12,682	6,136	35,808	**165,786**
French Island	-	-	-	-	-	-	-	-	-	-	-	-	**-**
Glen Eira	31,737	10,675	42,413	14,022	29,993	27,474	24,416	18,230	15,387	10,993	5,282	31,663	**188,211**
Greater Dandenong	40,078	12,732	52,810	15,810	34,080	33,794	29,468	20,202	14,598	11,487	6,312	32,397	**218,560**
Kingston	32,808	11,400	44,209	12,667	26,215	27,213	26,553	23,058	19,730	14,250	7,193	41,173	**201,087**
Mornington Peninsula	30,103	10,096	40,199	9,612	19,693	22,884	22,877	23,939	27,365	22,007	11,788	61,160	**200,365**
Port Phillip	18,196	5,970	24,166	11,191	36,556	24,802	19,371	17,292	13,468	8,654	3,948	26,070	**159,447**
Stonnington	17,642	5,525	23,167	11,053	31,901	26,579	20,522	12,150	9,823	7,282	4,413	21,518	**146,890**
Metro	198,112	65,843	263,955	84,603	198,546	184,573	165,174	133,707	117,361	87,355	45,073	337,143	**1,280,346**
%	*15.5%*	*5.1%*	*20.6%*	*6.6%*	*15.5%*	*14.4%*	*12.9%*	*10.4%*	*9.2%*	*6.8%*	*3.5%*	*26.3%*	*100.0%*
Interface	175,667	58,915	234,583	56,130	108,384	126,771	117,227	91,419	79,312	58,774	27,884	224,744	**900,484**
%	*19.5%*	*6.5%*	*26.1%*	*6.2%*	*12.0%*	*14.1%*	*13.0%*	*10.2%*	*8.8%*	*6.5%*	*3.1%*	*25.0%*	*100.0%*
SMR	363,347	121,342	484,689	137,649	300,587	304,400	276,033	215,657	183,206	134,223	66,728	518,379	**2,103,173**
%	*17.3%*	*5.8%*	*23.0%*	*6.5%*	*14.3%*	*14.5%*	*13.1%*	*10.3%*	*8.7%*	*6.4%*	*3.2%*	*24.6%*	*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%*

(Left side spanning label: **Total**)

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166 VIF2019 projections: https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future/tab-pages/victoria-in-future-data-tables

Projections regarding population growth of particular age cohorts in SMR shown in Table 24 suggest that:

- The 65+ year old cohort will outnumber all other age groups, growing from 14.8% of SMR's total population in 2016 to 24.6% in 2036. This represents an increase in SMR from about a quarter of a million residents (227,691) to over half a million (518,379) by 2036.

- The proportion of the SMR population falling into the 0-19 year age group will decrease (24.4% in 2017 to 23.0% in 2036). However, in real numbers this cohort is likely to increase by more than 100,000 people (from 375,221 to 486,689 people).

When it comes to assistance with core activities, approximately five per cent of the population within SMR have a need (5.0%). However, the number of people in need varies according to LGA, from 3.6% in Port Phillip (3,219 people) and Stonnington (3,459 people) in 2016 to 6.8% in Greater Dandenong (9,714 people). Refer Table 25 below.

Table 25. SMR Population by need for assistance with core activities (2016) [167]

	LGA	Does not have a need No.	Does not have a need %	Has Need No.	Has Need %	Total No.	Total %
	Bayside	87,317	95.4%	4,215	4.6%	91,532	100.0%
	Cardinia	84,335	95.5%	3,949	4.5%	88,284	100.0%
	Casey	268,232	95.0%	14,144	5.0%	282,376	100.0%
	Frankston	117,657	94.2%	7,277	5.8%	124,934	100.0%
	French Island	-	-	-	-	-	-
	Glen Eira	127,321	95.3%	6,206	4.6%	133,527	100.0%
	Greater Dandenong	132,517	93.2%	**9,714**	**6.8%**	142,231	100.0%
	Kingston	135,285	94.7%	7,613	5.3%	142,898	100.0%
	Mornington Peninsula	136,605	94.2%	8,469	5.8%	145,074	100.0%
	Port Phillip	86,885	96.3%	**3,219**	**3.6%**	90,104	100.0%
	Stonnington	92,210	96.4%	**3,459**	**3.6%**	95,669	100.0%
Total	**Metro**	992,775	94.5%	57,688	5.5%	1,050,463	100.0%
	Interface	717,449	94.6%	40,761	5.4%	758,210	100.0%
	SMR	1,268,364	95.0%	**68,265**	**5.0%**	1,336,629	100.0%

167 ABS Census 2016: https://www.rdv.vic.gov.au/information-portal/table-and-chart

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 SMR is culturally diverse with more than a third (34.8%) of the population born overseas. However, this varied according to LGA: for example, a greater proportion of the population of City of Greater Dandenong was born overseas (61.7%) compared with Mornington Peninsula Shire (19.1%). Refer Table 26.

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

- United Kingdom – which featured in the top three for all but one of the 10 LGAs

- India – which featured in 8 of the 11 LGAs

- New Zealand – which featured in 5 of the 10 LGAs

More than a quarter of the population of SMR speaks a language other than English at home. In some LGAs, the number of people who speak another language outnumber those who speak only English: for example, in Greater Dandenong, 68.4% of the population speak a language other than English at home. Similarly, other languages prevail over English in the City of Melbourne (54.3%). In contrast, Mornington Peninsula Shire has the greatest proportion of English only speakers (94.3%). Refer Table 27.

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

- Greek – which featured in the top three for 7 of the 10 LGAs

- Mandarin – which featured in 6 of the 10 LGAs

- Italian – which featured in 5 of the 10 LGAs

SMR is also home to approximately 15% of Victoria's Aboriginal and Torres Strait Islander peoples.[168] As a proportion of SMR, however, Aboriginal and Torres Strait Islanders represent less than 1.0% of the total SMR population (0.54%), ranging between 0.2% of the population in Glen Eira and Bayside to 1.0% of the population in the Frankston. No data is available for French Island due to the small population.

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168 https://www.abs.gov.au/census

Table 26. SMR Population by Aboriginal and Torres Strait Islander (ATSI) status and birthplace and LGA (2016) [169]

	Birthplace								Top 3 Countries of Birth (other than Australia)[170]		
	Australia				Elsewhere		Total				
	ATSI		All								
LGA	No.	% SMR	No.	%	No.	%	No.	%	1	2	3
Bayside	190	0.2%	66,946	72.9%	24,840	27.1%	**91,786**	**100.0%**	**United Kingdom**	China	**New Zealand**
Cardinia	780	0.8%	70,376	79.8%	17,837	20.2%	**88,213**	**100.0%**	**United Kingdom**	**India**	**New Zealand**
Casey	1616	0.5%	168,032	59.5%	114,430	40.5%	**282,462**	**100.0%**	**India**	Sri Lanka	**United Kingdom**
Frankston	1338	1.0%	95,934	76.9%	28,849	23.1%	**124,783**	**100.0%**	**United Kingdom**	**New Zealand**	**India**
French Island	-	-	-	-	-	-	**119**	**100.0%**			
Glen Eira	252	0.2%	82,026	61.3%	51,737	38.7%	**133,763**	**100.0%**	China	**India**	**United Kingdom**
Greater Dandenong	512	0.4%	54,476	38.3%	87,749	**61.7%**	**142,225**	**100.0%**	Vietnam	**India**	Cambodia
Kingston	579	0.4%	95,779	67.0%	47,232	33.0%	**143,011**	**100.0%**	**United Kingdom**	**India**	China
Mornington Peninsula	1304	0.8%	116,940	80.9%	27,621	19.1%	**144,561**	**100.0%**	**United Kingdom**	**New Zealand**	Italy
Port Phillip	392	0.4%	58,423	64.7%	31,878	35.3%	**90,301**	**100.0%**	**United Kingdom**	**New Zealand**	**India**
Stonnington	303	0.3%	63,154	65.9%	32,725	34.1%	**95,879**	**100.0%**	China	**United Kingdom**	**India**
Total Metro	**3566**	**0.43%**	**516,738**	**62.9%**	**305,010**	**37.1%**	**821,748**	**100.0%**			
Interface	**3700**	**0.72%**	**355,348**	**69.0%**	**159,888**	**31.0%**	**515,236**	**100.0%**			
SMR	**7266**	**0.54%**	**872,086**	**65.2%**	**464,898**	**34.8%**	**1,336,984**	**100.0%**			

169 ABS Census 2016: https://www.rdv.vic.gov.au/information-portal/table-and-chart

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

Table 27. SMR Population by language spoken at home (2016) [171]

LGA	Language Spoken at Home				Total		Top 3 Languages Spoken (other than English)[172]		
	English Only		Other Language						
	No.	%	No.	%	No.	%	1	2	3
Bayside	77,868	84.5%	14,236	15.5%	92,104	100.0%	Greek	Mandarin	Russian
Cardinia	78,327	88.1%	10,569	11.9%	88,896	100.0%	Punjabi	Sinhalese	Italian
Casey	177,273	62.3%	107,270	37.7%	284,543	100.0%	Persian/Dari	Sinhalese	Punjabi
Frankston	110,621	87.9%	15,242	12.1%	125,863	100.0%	Greek	Mandarin	Italian
French Island	-	-	-	-	-	-	-	-	-
Glen Eira	89,940	67.0%	44,368	33.0%	134,308	100.0%	Mandarin	Greek	Russian
Greater Dandenong	45,354	31.6%	98,020	68.4%	143,374	100.0%	Vietnamese	Khmer	Punjabi
Kingston	104,408	72.6%	39,350	27.4%	143,758	100.0%	Greek	Mandarin	Italian
Mornington Peninsula	137,797	94.3%	8,402	5.7%	146,199	100.0%	Italian	Greek	German
Port Phillip	69,959	77.1%	20,761	22.9%	90,720	100.0%	Greek	Mandarin	Italian
Stonnington	72,216	75.0%	24,067	25.0%	96,283	100.0%	Mandarin	Greek	Cantonese
Total — Metro	570,366	69.0%	256,044	31.0%	826,410	100.0%			
Total — Interface	393,397	75.7%	126,241	24.3%	519,638	100.0%			
Total — SMR	963,763	71.6%	382,285	28.4%	1,346,048	100.0%			

There are many Aboriginal languages. However, they do not have geographic boundaries. The most widespread in Victoria are the Kulin languages.[173] Refer Figure 23.
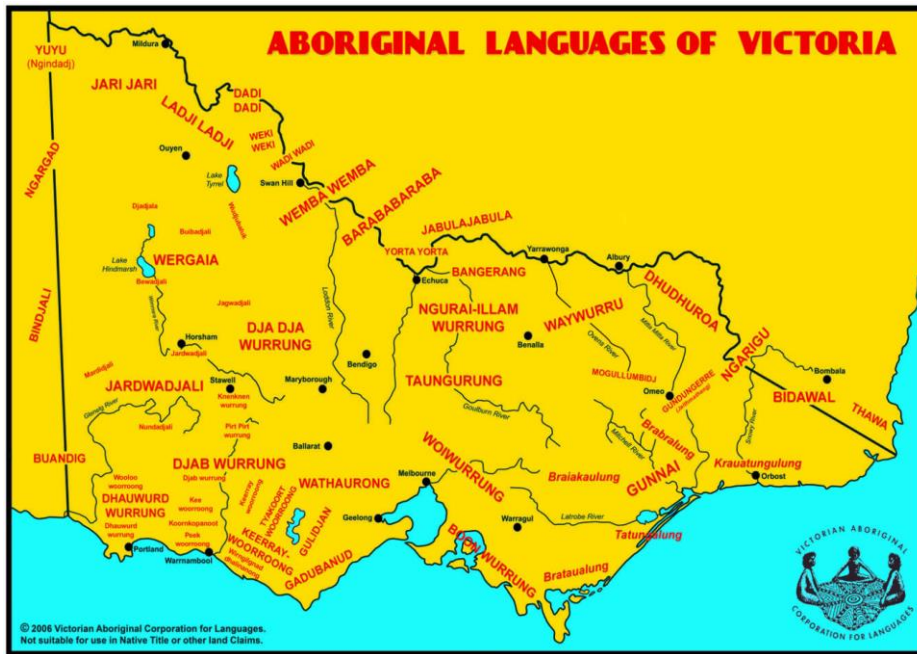
Figure 23: Map of Aboriginal languages of Victoria[174]

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), SMR overall (with a score of 1,032) is less disadvantaged than Victoria overall (which has a score of 1,010). The interface LGAs were more disadvantaged than metro LGAs (1,018 and 1,038 respectively). When considered individually Greater Dandenong was the most disadvantaged (896) (and is the second most disadvantaged LGA in Victoria) and Bayside was the least disadvantaged (1,097) (and is the third least advantaged in Victoria). Refer Table 28.

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

- There were 614,161 private dwellings with an average of 2.5 people and 1.6 motor vehicles per dwelling.

- The City of Casey had the most private dwellings (101,997) while the Shire of Cardinia had the least (35,074), not including French Island (101).

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

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

- The City of Port Phillip had fewer average people per dwelling (2.0) compared to all other LGAs; The Cities of Casey and Shire of Cardinia had the most (3.1 and 2.8 respectfully).

- The average weekly income was $1,436.79 but varied greatly between LGAs, between $1,276 in the Mornington Peninsula to $2,145 in The City of Bayside.

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.

Table 28. SMR Household Statistics (2016) [175]

	LGA	Private Dwellings (No.)	People per Dwelling (Avg. No.)	Motor Vehicles per Dwelling (Avg. No.)	Weekly Income ($)	SEIFA Index
	Bayside	41,032	2.6	1.8	$2,145	**1,097**
	Cardinia	35,074	2.8	2.1	$1,497	1,021
	Casey	101,998	3.1	2.1	$1,554	1,004
	Frankston	56,873	2.5	1.8	$1,331	1,001
	French Island	101	1.9	1.0	$477	-
	Glen Eira	59,745	2.5	1.6	$1,741	1,074
	Greater Dandenong	54,694	2.9	1.7	$1,168	**896**
	Kingston	63,794	2.5	1.7	$1,537	1,044
	Mornington Peninsula	88,996	2.4	1.9	$1,276	1,030
	Port Phillip	57,747	2.0	1.2	$1,842	1,069
	Stonnington	54,107	2.2	1.4	$1,944	1,087
Total	**Metro**	387,992	2.46	1.60	$1,673	**1,038**
	Interface	226,169	2.55	1.78	$1,201	**1,018**
	SMR	**614,161**	**2.50**	**1.69**	**$1,436.79**	**1,032**

175 ABS (2016): https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat

8.4   Education

Table 29 shows approximately 1 in 4 persons (24.3%) of people over 15 years of age in the SMR Region have a bachelor's degree or higher non-school qualification. Just over 4% of people aged between 15-19 years old were not in some form of education or employment at the time of the 2016 census.

Table 29: Education level within SMR (2016) [176]

Education Level	Total	%
People over 15 with bachelor's degree or higher non-school qualification (2016)	297,439	*24.3%*
15-19 years old not in school or employment (2016)	3,827	*4.4%*

The number of children attending primary and secondary schools in SMR is influenced by the age structure of the population and vice versa. In 2019 SMR was home to a total of 403 Government, Catholic and Independent schools with 235,633 total enrolments. This represents 17.9% of all schools (2,254) and 23.8% of all enrolments (988,436) within Victoria.[177]

More schools were located in Metro LGAs of SMR (240) compared to Interface LGAs (163). Metro LGAs (133,415) also had more enrolments than interface LGAs (102,218). Casey had the greatest number of schools (77) and the highest number of enrolments (57,368), while Port Phillip had the least (21 schools and 10,269 enrolments). Refer Table 30. Figure 24 shows the location of educational facilities in the Southern Metro Region:

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

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

Table 30. SMR Enrolments and Schools by LGA and type (2019) [178]

LGA	School Sector							
	Government		Catholic		Independent		Total	
	Enrolments	No. Schools	Enrolments	No. Schools	Enrolments	No. Schools	Enrolments	No. Schools
Bayside	9,040	15	3,455	9	5,047	3	**17,542**	**27**
Cardinia	11,490	25	3,861	7	4,247	5	**19,598**	**37**
Casey	41,458	56	7,903	14	8,007	7	**57,368**	**77**
Frankston	17,574	32	2,332	7	2,248	3	**22,154**	**42**
French Island	-	-	-	-	-	-	-	-
Glen Eira	12,088	20	2,919	8	6,645	11	**21,652**	**39**
Greater Dandenong	14,451	26	4,274	9	5,747	8	**24,472**	**43**
Kingston	14,943	30	5,607	11	2,635	3	**23,185**	**44**
Mornington Peninsula	16,995	36	4,398	8	3,859	5	**25,252**	**49**
Port Phillip	7,333	13	1,336	4	1,600	4	**10,269**	**21**
Stonnington	4,462	9	6,067	9	3,611	6	**14,140**	**24**
Total Metro	79,892	145	25,990	57	27,533	38	**133,415**	**240**
Interface	69,943	117	16,162	29	16,112	17	**102,218**	**163**
SMR	**149,835**	**262**	**42,152**	**86**	**43,645**	**55**	**235,633**	**403**

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

Light Green = Primary school	Pink = Special school
Mid-green = Primary/secondary school	Orange = Further education
Dark Green = Secondary school	Yellow = Tertiary institution
	Red = University
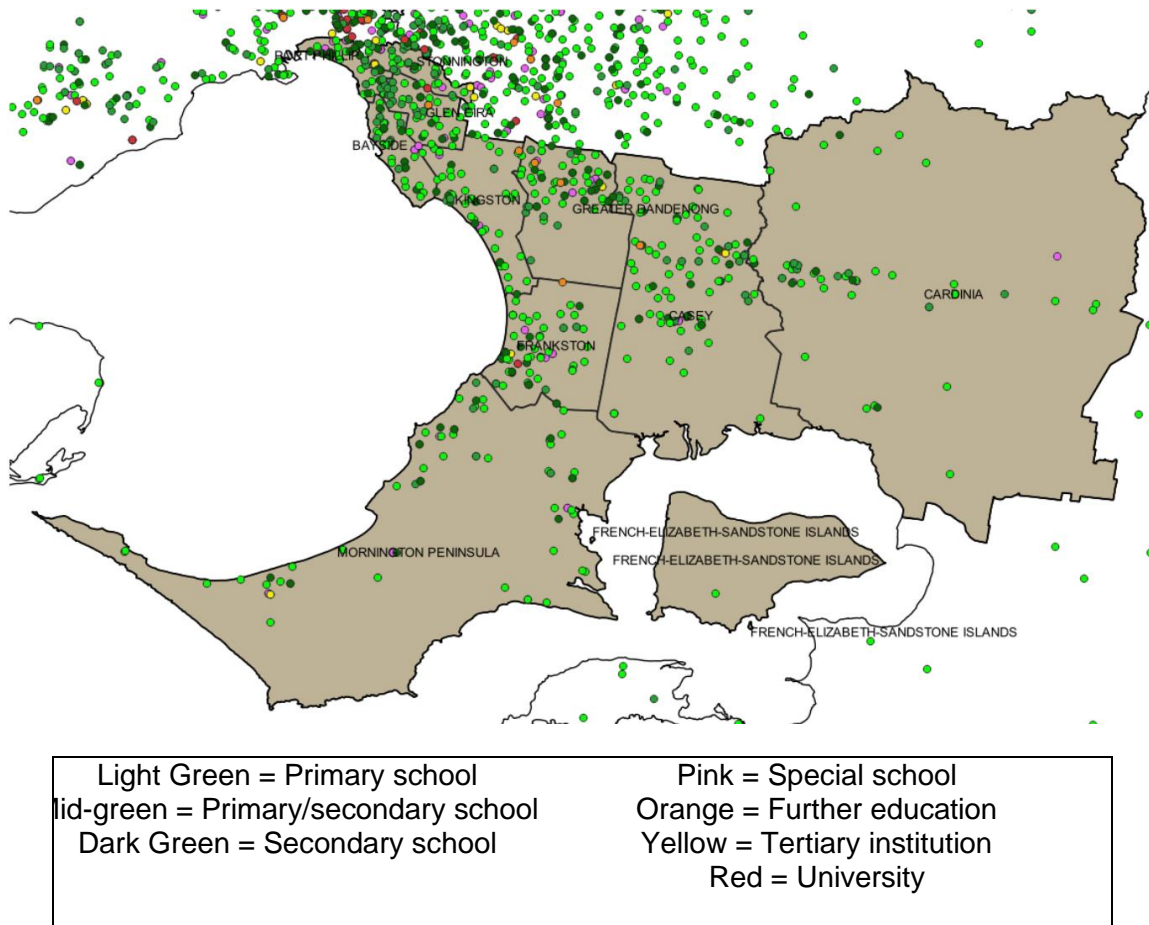
Figure 24. Map of educational facilities within SMR

Proximity to tertiary education can also have an influence over the age structure of the population and the degree to which educational opportunities are sought out, especially by young people in their late teens or early twenties.

Universities and Tertiary Institutions – Tertiary Institutions located within SMR include 4 universities and 4 TAFE institutes with multiple campuses across the region:

- Federation University Australia (Berwick)

- Melbourne University (Hawthorn)

- Monash University (Clayton, Caulfield, Peninsula)

- Swinburne University (Hawthorn)

- Chisholm Institute of TAFE (Multiple campuses - Mornington Peninsula)

- Holmesglen Institute (Chadstone and Moorabbin)

- National Institute for Circus Arts

- Swinburne TAFE (Hawthorn, Prahran)

Childcare centres – There are also approximately 1100 childcare facilities across the region (including childcare centres, pre-schools and kindergartens)

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.[179] 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 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.

SMR is home to 75 hospitals, with the vast majority located in metro LGAs (58 of 75), including emergency facilities at:

- Casey Public Hospital
- Dandenong Public Hospital
- Frankston Public Hospital
- Rosebud Public Hospital
- Sandringham Public Hospital

SMR has a total of 7 hospitals with an intensive care unit with a total of 65 ICU beds available:

- Cabrini Hospital – Malvern (16)
- Dandenong Public Hospital (14)
- Frankston Public Hospital (16)
- Homesglen Private Hospital (6)
- Peninsula Private Hospital (11)
- St John of God – Berwick (6)
- The Bays Private Hospital (6)

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179 DHHS (2020): https://www2.health.vic.gov.au/emergencies/shera

Figure 25 indicates most of the hospitals are in the urban area, while the community health services are located around the urban fringe.
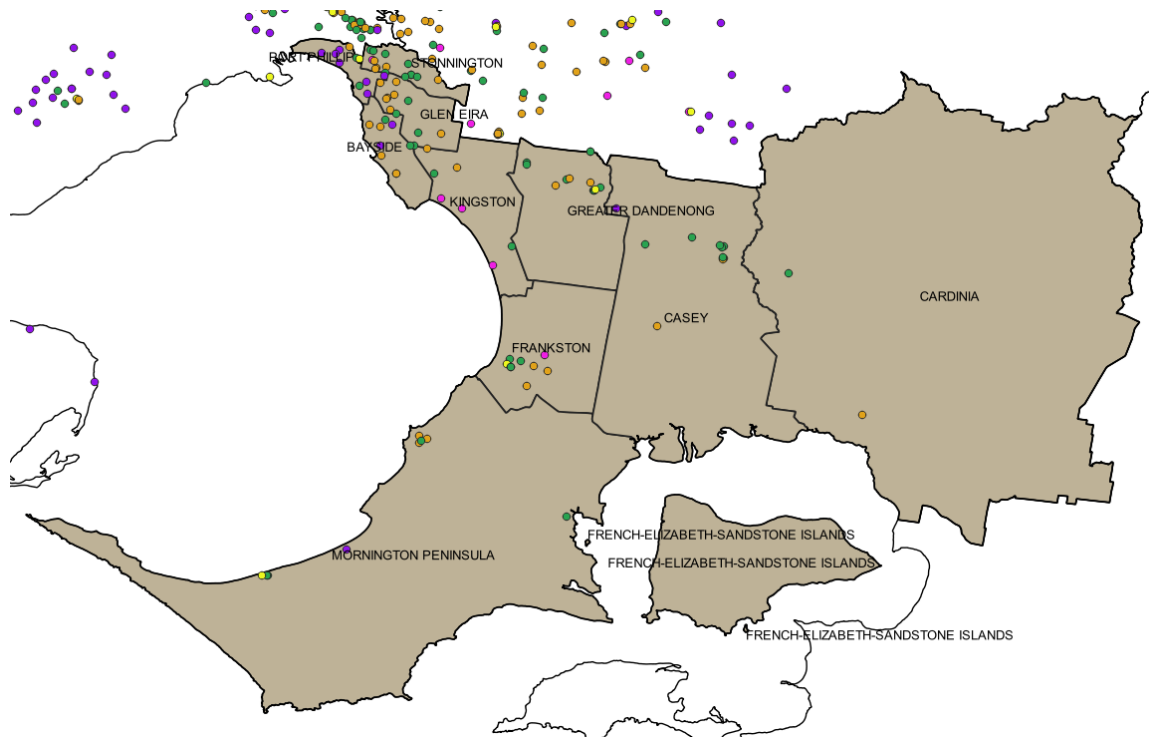
Pink = Community health centre   Orange = General hospital
Purple = Maternal/child health centre   Yellow = General hospital (emergency)
Green = Day procedure centre

Figure 25: Map of hospitals and other health care facilities in SMR

SMR is also home to 12 health care facilities (including maternal and child health centres, community health centres and community mental health centres) and 193 retirement villages shown in Table 31. Health care facilities are more common in metro areas (12; compared to 0 for Interface Councils); Retirement villages are evenly distributed across both metro (97 villages) and interface (96) areas with the majority in Cardinia (57).

Table 31. SMR Hospitals, Health Care Facilities, Retirement Villages, Aged Care[180]

	LGA	Health				
		Hospitals	ICU Beds	Health Care Facilities[181]	Retirement Villages	Aged Care
	Bayside	8		2	18	19
	Cardinia	**0**		0	**57**	**8**
	Casey	10	6	0	22	19
	Frankston	8	27	0	11	17
	French Island	**0**		0	**0**	**0**
	Glen Eira	**12**		0	21	24
	Greater Dandenong	10	14	0	14	**28**
	Kingston	5	6	3	20	27
	Mornington Peninsula	7	6	0	17	25
	Port Phillip	4		**7**	**0**	11
	Stonnington	11	16	0	13	15
Total	**Metro**	**58**		**12**	**97**	**141**
	Interface	**17**		**0**	**96**	**52**
	SMR	**75**		**12**	**193**	**193**

Table 32 indicates the number of people in SMR who accessed aged care support at some stage during 2018-19 reporting period. This number is part of the number of people in the community who may need some assistance during an evacuation or emergency.

Table 32. Number of people accessing aged care support (2018-19)[182]

Age Bracket (years)	Type of Aged Care			
	Home	Residential	Transition	Total
0–49	6	24	1	**31**
50–54	13	29	2	**44**
55–59	39	77	2	**118**
60–64	77	205	8	**290**
65–69	518	396	11	**925**
70–74	1,067	783	23	**1,873**

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180 EMV (2020): Potential Impact Reports by LGA.

181 Including community and maternal-child health centres.

182 https://www.gen-agedcaredata.gov.au/Resources/Access-data/2020/March/GEN-data-People-using-aged-care

75–79	1,385	1,175	43	**2,603**
80–84	1,901	1,983	45	**3,929**
85–89	1,796	2,823	46	**4,665**
90–94	1,024	2,819	32	**3,875**
95–99	273	1,237	7	**1,517**
100+	32	196	-	**228**
Total	**8,131**	**11,747**	**220**	**20,098**

Figure 26 shows the location of aged care facilities across the Southern Metro Region. Most are located in the urban municipalities.
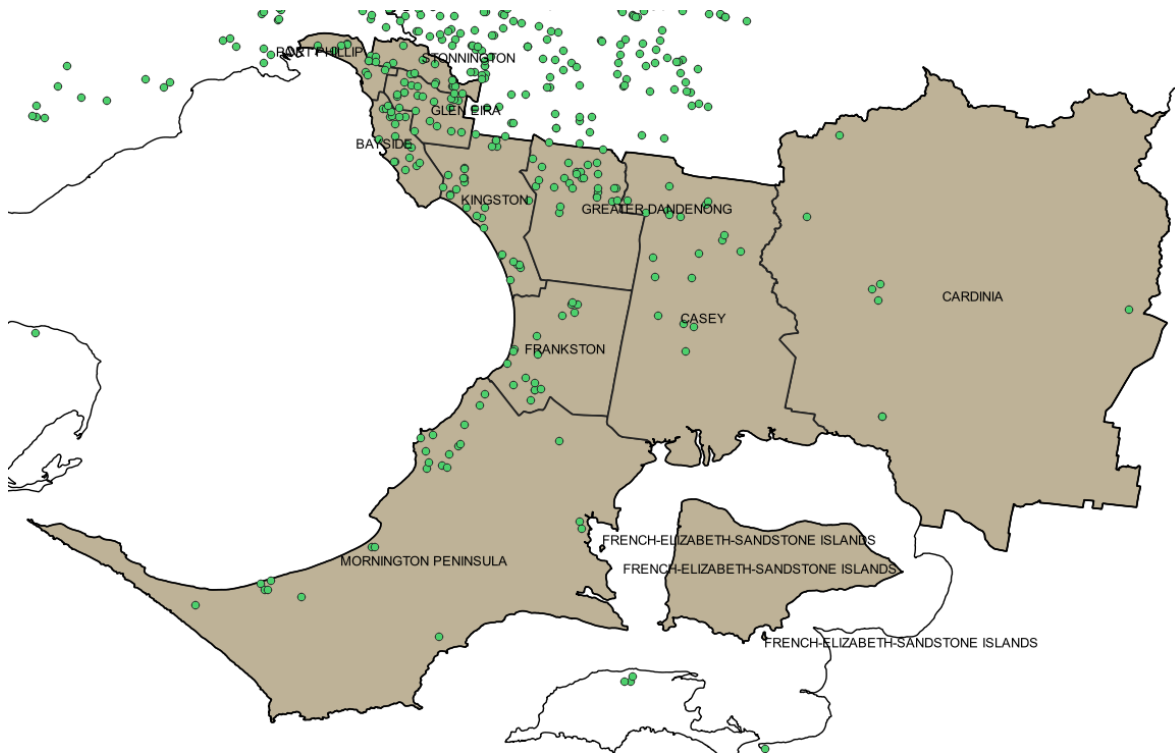
Figure 26. Map of Aged Care facilities in SMR

8.6   Cultural values and assets

Local Aboriginal Networks or Gathering Places, which provide connections and services for Aboriginal people such as:.[183]

- Casey Aboriginal Gathering Place in Doveton

- Nairm Marr Djambana, Frankston

- Willum Warrain, Mornington Peninsula

Other significant cultural assets in the Hume region include art galleries and museums, as outlined below:[184]

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183 Aboriginal Victoria (2020): https://www.aboriginalvictoria.vic.gov.au/melbourne-local-aboriginal-networks-and-gathering-places
184 Data Vic (2020): https://discover.data.vic.gov.au/dataset/foi-point-vicmap-features-of-interest

Table 33. SMR Art Galleries and Museums by LGA

LGA	Art Galleries and Museums
Cardinia	Light Horse And Field Artillery Museum
Casey	The Old Cheese Factory
Frankston	Ballam Park Homestead Mcclelland Sculpture Gallery
Glen Eira	Jewish Holocaust Museum
Greater Dandenong	Heritage Hill
Kingston	Australian National Aviation Museum Historical Society Museum
Mornington Peninsula	Baluk Arts Charles Auto Museum Dromana Historical Society Museum Manyung Gallery Mornington Historical Society Mornington Museum Mornington Peninsula Regional Gallery
Port Phillip	Gasworks Community Arts Centre Jewish Museum Of Australia Linden Centre For Contemporary Arts
Stonnington	Anna Pappas Gallery Chapel Off Chapel Arts Centre

Figure 27 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[185]. 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.[186]

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185 https://www.aboriginalvictoria.vic.gov.au/cultural-heritage-sensitivity

186 https://vhd.heritagecouncil.vic.gov.au/
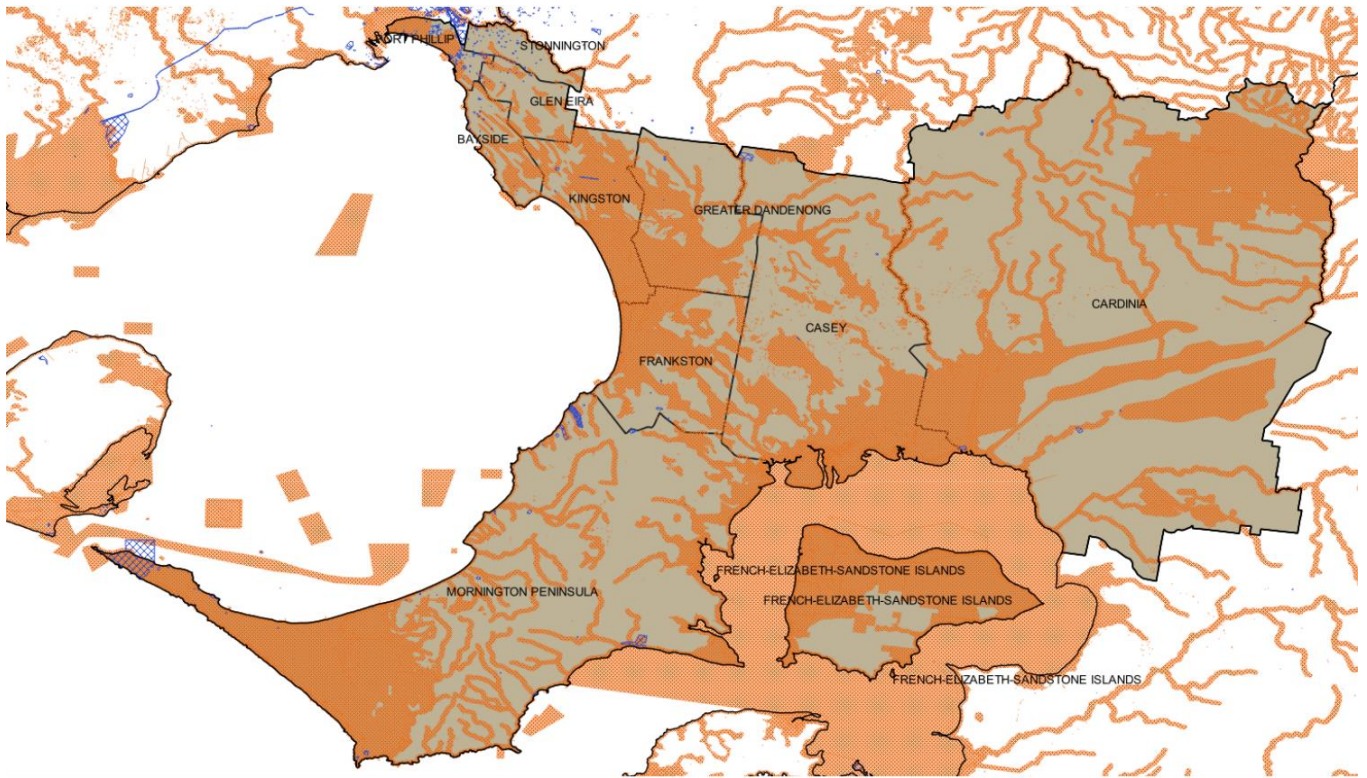
Figure 27. Areas of cultural and heritage significance[187] [188]

8.7 Volunteerism

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

In 2016 it was estimated that approximately 19% of the SMR population volunteered. However, this varied according to LGA: for example, more than a quarter of Bayside residents identified as volunteers (25.5%) compared with Greater Dandenong residents (11.9%).

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187 https://discover.data.vic.gov.au/dataset/areas-of-cultural-heritage-sensitivity
188 https://discover.data.vic.gov.au/dataset/victorian-heritage-register

Table 34. SMR Population by volunteer status (2016) [189]

		Volunteering					
		Not a Volunteer		Volunteer		Total	
	LGA	No.	%	No.	%	No.	%
	Bayside	54,864	74.5%	18,801	**25.5%**	**73,665**	**100.0%**
	Cardinia	54,056	80.4%	13,145	19.6%	**67,201**	**100.0%**
	Casey	184,193	85.1%	32,301	14.9%	**216,494**	**100.0%**
	Frankston	83,592	83.3%	16,808	16.7%	**100,400**	**100.0%**
	French Island	-	-	-	-	**-**	**-**
	Glen Eira	83,812	77.4%	24,530	22.6%	**108,342**	**100.0%**
	Greater Dandenong	101,403	88.1%	13,657	*11.9%*	**115,060**	**100.0%**
	Kingston	94,389	81.1%	21,933	18.9%	**116,322**	**100.0%**
	Mornington Peninsula	92,415	78.3%	25,660	21.7%	**118,075**	**100.0%**
	Port Phillip	61,459	77.6%	17,690	22.4%	**79,149**	**100.0%**
	Stonnington	63,884	76.7%	19,437	23.3%	**83,321**	**100.0%**
Total	**Metro**	543,403	80.4%	132,856	19.6%	**676,259**	**100.0%**
	Interface	330,664	82.3%	71,106	17.7%	**401,770**	**100.0%**
	SMR	**874,067**	*81.1%*	**203,962**	***18.9%***	**1,078,029**	**100.0%**

According to the Ministerial Council for Volunteers (2017), approximately 4% of volunteers work for an emergency services organisation[190] and EMV estimates over 100,000 people in Victoria volunteer across a wide range of emergency management agencies.[191]

As at 1 July 2020, CFA[192] Victoria noted its volunteer membership at 53,311 people, with an additional 1,486 junior members.[193]

In addition to well-known volunteer services such as the CFA and SES, other agencies operating within SMR[194] to assist with advocacy and sector development and the recruitment and management of volunteers include:

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189 ABS (2016): https://www.rdv.vic.gov.au/information-portal/table-and-chart

190 Ministerial Council for Volunteers (2017): https://iepcp.org.au/wp-content/uploads/2018/11/MCV-Volunteers-in-Victoria-report.pdf

191 EMV (2015): https://www.emv.vic.gov.au/volunteerstatement

192 This number may need to be reviewed in light of the restructure of CFA and MFB into Fire Rescue Victoria on 1 July 2020.

193 CFA (2020): https://www.cfa.vic.gov.au/about/cfa-at-a-glance

194 Volunteering Victoria (2020): https://www.volunteeringvictoria.org.au/for-volunteers/volunteer-support-in-your-region/

- Boroondara Volunteer Resource Centre (Camberwell)

- Community Information and Support Glen Eira (Glenhuntly)

- Doncare – Volunteering in Manningham (Doncaster)

- City of Whitehorse (Nunawading)

- City of Kingston (Mentone)

- Eastern Volunteers (Ringwood)

- City of Casey (Narre Warren)

- Impact Volunteering (Frankston)

- Volunteering Mornington Peninsula (Rosebud)

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 volunteering their time and staying connected. However, in their series of reports, Emergency Volunteering 2030,[195] 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.

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195 DIIS (2019): https://emergencyvolunteeringau.dropmark.com/594398?q=%23Emergency-Volunteering-2030-study%20%23report

9.   Economic Environment

An understanding of SMR'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

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. [196]

While the true extent of the impact on EMR is unclear, it is likely to reflect the economic trends for Victoria. and may even be harder hit in some areas where construction and international education have witnessed a boom from high immigration and population growth in recent years. According to leading economists, population growth for Victoria was around 140,000 people in 2018 but will likely drop to 40,000 people in 2021. This will reduce the demand for housing and reduce the number of construction jobs.[197]

9.1.1   Key economic indicators

Key economic indicators across SMR for the period 2017-2018 are summarised below:

- GRP reflects each LGA's contribution to the broader State economy and the value of the local economy.

   - Overall, SMR contributed over $85 billion to the Victorian economy, which was approximately 22% of the total for the State (more than $387 billion).

   - At the LGA level, the City of Port Phillip contributed the most at over $13 billion; Cardinia contributed the least at about $3 billion.

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196 DTF (2020): https://www.dtf.vic.gov.au/economic-and-financial-updates/coronavirus-economic-outlook

197 SGS (2020): https://www.theage.com.au/national/victoria/vic-economy-in-biggest-slump-since-depression-20200412-p54j6k.html

- GRP per worker provides an indication of workforce participation.

    o Overall, SMR had a slightly lower average rate of productivity at $123,933 per worker, compared with $127,912 per worker for Victoria.

    o Interface LGAs had a higher GRP per worker compared with Metro LGAs

    o At the LGA level, the City of Bayside's productivity rate was the highest at $157,716 per worker while The City of Frankston was the lowest at $101,165 per worker.

- The number of businesses is an indicator of active trade within the economy.

    o Overall, SMR hosted 137,007 businesses, representing 24.2% of all businesses in Victoria (566,056).

    o The number of businesses in Metro LGAs (107,518) was more than triple the number of businesses in Interface LGAs (29,489).

    o At the LGA level, the City of Port Phillip had the highest number of businesses (20,153) while Mornington Peninsula had the lowest (1,590).

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

    o Overall, SMR provided over 650 thousand jobs, which was 21.6% of the total number of jobs for the State (over 3.0 million jobs).

    o At the LGA level, the City of Greater Dandenong had the highest number of jobs (124,846), Mornington Peninsula had the lowest number of jobs (7,829).

- The unemployment rate measures the loss of productive resources to the economy.

    o Overall, SMR's unemployment rate (5.8%) was higher than the State average (4.8%).

    o Interface LGAs had a slightly higher rate of unemployment (6.5%) compared with Metro LGAs (5.2%).

    o The unemployment rate varied greatly across LGAs, from 2.8% in City of Stonnington to 10.0% in the City of Greater Dandenong.

Table 35. Key economic indicators for SMR by LGA (2017-2018) [198]

LGA	Economic Indicators				
	GRP ($ million)	Productivity: GRP per worker ($)	Businesses (No.)	Local jobs (No.)	Unemployment Rate
Bayside	$5,651	**$157,716**	13,231	35,832	*3.3%*
Cardinia	**$3,303**	$114,767	7,828	**28,782**	*6.5%*
Casey	$8,816	$105,979	20,071	83,190	*6.9%*
Frankston	$5,457	**$101,165**	9,990	53,946	*6.6%*
French Island	-	-	-	-	-
Glen Eira	$6,718	$144,980	15,674	64,339	*3.7%*
Greater Dandenong	$13,496	$108,102	14,442	124,846	***10.0%***
Kingston	$10,899	$116,789	16,256	93,323	*5.4%*
Mornington Peninsula	$7,618	$103,768	1,590	7,829	*6.0%*
Port Phillip	**$13,730**	$147,647	20,153	92,992	*4.4%*
Stonnington	$9,545	$138,419	17,772	**68,957**	***2.8%***
Total or Average — **Metro**	**$65,496**	**$130,688**	**107,518**	**534,235**	*5.2%*
Interface	**$19,737**	**$108,171**	**29,489**	**119,801**	*6.5%*
SMR	**$85,233**	**$123,933**	**137,007**	**654,036**	*5.8%*
Victoria	**$387,419**	**$127,912**	**566,056**	**3,028,790**	*4.8%*

9.1.2 Industry and employment

The main industries by number of jobs in SMR overall in 2016 were Health Care and Social Assistance jobs (68,361) and Retail jobs (65,784). However, the most common industries varied across the region as shown in Table 36:

- Healthcare and Social Assistance jobs were the predominant industries in Bayside (5,100 jobs), Frankston (8,573) and Glen Eira (7,263).

- Manufacturing was the predominant industry in Greater Dandenong (21,288 jobs) and Kingston (13,863).

- Professional, scientific and technical industries were the predominant industries in the City of Port Phillip (14,656).

- Retail industries were the most predominant industries in Cardinia (2,975 jobs), Casey (10,019), Mornington Peninsula (6,875) and Stonnington (9,702)

Table 36. Jobs by industry and LGA for SMR (2016) [199]

LGA	Accommodation and Food Services	Construction	Education and Training	Electricity, Gas, Water and Waste Services	Financial and Insurance Services	Health Care and Social Assistance	Manufacturing	Professional, Scientific and Technical	Public Administration and Safety	Retail	Transport, Postal and Warehousing	All Other[200]	Total Jobs
Bayside	2,371	2,158	3,480	52	1,231	**5,100**	1,350	3,105	850	3,111	536	4,806	**28,150**
Cardinia	1,872	2,909	2,658	223	322	2,256	1,851	1,036	629	**2,975**	1,022	4,273	**22,026**
Casey	4,786	6,381	7,647	312	970	8,646	3,938	2,459	2,227	**10,019**	2,554	11,007	**60,946**
Frankston	2,830	3,991	3,917	718	693	**8,573**	3,135	1,943	1,765	5,538	1,170	6,298	**40,571**
French Island	-	-	-	-	-	-	-	-	-	-	-	-	-
Glen Eira	2,669	2,509	5,808	47	860	**7,263**	978	3,156	1,430	3,626	737	6,519	**35,602**
Greater Dandenong	3,036	7,317	5,411	1,458	1,712	9,222	**21,288**	2,986	3,827	8,675	6,866	17,403	**89,201**
Kingston	4,036	6,078	4,348	694	1,096	5,742	**13,863**	3,854	2,247	9,719	3,309	13,695	**68,681**
Mornington Peninsula	4,768	5,244	4,398	337	666	6,866	3,248	2,566	3,075	**6,875**	897	8,374	**47,314**
Port Phillip	5,734	5,091	3,470	243	5,209	6,033	3,146	**14,656**	2,012	5,544	3,283	17,776	**72,197**
Stonnington	5,920	3,251	4,047	102	1,504	8,660	968	6,646	1,186	**9,702**	537	10,107	**52,630**
Total **Metro**	26,596	30,395	30,481	3,314	12,305	50,593	44,728	36,346	13,317	45,915	16,438	76,604	**387,032**
Interface	11,426	14,534	14,703	872	1,958	17,768	9,037	6,061	5,931	19,869	4,473	23,654	**130,286**
SMR	**38,022**	**44,929**	**45,184**	**4,186**	**14,263**	**68,361**	**53,765**	**42,407**	**19,248**	**65,784**	**20,911**	**100,258**	**517,318**

199 ABS (2016): https://www.rdv.vic.gov.au/information-portal/table-and-chart

200 All other jobs includes: administrative and support services; agriculture, forestry and fishing; arts and recreation services; information media and telecommunications; mining; other services; rental, hiring and real estate; and wholesale trade.

9.2   Banking and finance

Banking and finance is a critical infrastructure sector that facilitates financial transactions across service providers and customers, arranges insurance, leverages assets and aims to manage and create wealth. The sector reaches far beyond Victoria's borders and is regulated by the Commonwealth.[201]

Key assets and infrastructure within the banking and finance sector include:

- Primary and back-up data centres
- Call centres
- Corporate headquarters
- Operations, processing and trading centres[202]

Key dependencies for the sector include:

- Energy - electricity and gas
- Water
- Telecommunications

9.3   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. Southern Metro District sits within the Eastern Victoria, Southern Metropolitan and South-eastern Metro.

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.[203] Therefore, the list below includes all divisions that cross into SMR:

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

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

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

State Electorates

Albert Park	Carrum
Bentleigh	Clarinda,
Brighton	Cranbourne,
Burwood	Dandenong,
Caulfield	Frankston,
Hawthorn	Keysborough,
Kew	Mordialloc,
Malvern	Mulgrave,
Oakleigh	Narre Warren North
Prahran	Narre Warren South
Sandringham	Rowville.
Narracan (Part)	Bass (Part)

Federal Divisions

Flinders	Hotham
Dunkley	Bruce
Isaacs	Holt
Goldstein	La Trobe
Macnamara (part)	Monash (part)
Higgins	

10. Operational Learnings

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

- Encouraging the sector to share lessons, both positive actions to sustain and areas for improvement

- Encouraging learning from both assurance activities and contemporary good practice

- Focusing on systems of work, rather than the performance of individuals

- Recognising that identifying and implementing sustainable solutions takes time, resources and opportunity

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

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

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

Declarations

- It was observed that there was little discussion/communications with the regions regarding the State of Disaster declaration for the summer fires, which resulted in confusion around what arrangements were required to be put in place at the regional level to support this. However, the declaration did result in the appointment of a State Relief Coordinator to support relief activities at the regional level and the State Response Controller at the State level which was viewed positively.

- Observations indicate that during the lead-up to a Code Red Declaration on 21 November 2019, there were issues with responding agencies accessing timely intelligence, information and predictions to enhance their operations due to how quickly the data was being updated. Specifically, accessing EM-COP was highlighted as challenging at times.

IT

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

Evacuation

- Observations indicate that Controllers were hesitant to consider robust evacuation planning until the exact location of the towns requiring evacuation was known. Evacuation planning highlighted the need for targeted messaging to people within evacuation areas, and the importance of having local agencies (i.e. CFA) involved in the evacuation planning process and ensuring that relief centres are located in 'safe' areas.

- Observations indicate that it is difficult to plan for or assume where people will want to go post evacuation or assuming what their needs might be. It is also very important that local councils are involved in the planning and implementation of any evacuation or reception centres.

Planning

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

Information Management and Intelligence

- Observations indicate that relief information on VicEmergency was not always consistent with information distributed via community newsletters and other channels and that community communications need to be clear and targeted to the audience.

- Observations indicate that communications between the incident, regional and State tiers could be improved, in terms of building relationships, information sharing and reporting - and that all tiers need to be proactive and take responsibility for ensuring this is done in a clear and timely manner.

- Observations indicate that the lack of an intelligence unit within IMT's and Sector Commanders in the field impedes data collection at the incident level. There is value in establishing an intelligence within ICCs to centrally and consistently coordinate and manage damage assessment and other data which is collected from sources in various formats.

- It was observed that the SCC experienced difficulties in obtaining sufficient intelligence from across the incident and regional tiers. At times there was a divergence of views between the

State and incident tiers regarding what the priority intelligence requirements were, which was exacerbated by the fact that the State tier implemented new requirements - which were added to the existing procedures and products during times of peak operational demand on intelligence teams across all levels.

Personnel

- Fatigue management is a continuing issue. Personnel have concerns on shift length, rostering principles, rostering practices, entitlements and their general understanding of how to self-manage fatigue in relation to assigned shifts.

- Observations indicate staff are being activated into functional roles when they do not necessarily have the right accreditation or experience to perform the role effectively. In addition to being a potential safety issue of having unaccredited staff performing functional roles in an emergency, it also places pressure on others within the functional cell to cover the knowledge/experience gap and can cause frustration across the entire IMT.

11. Data sources and reference materials

Table 37: Metadata details

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

Item	Details
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 38: List of Acronyms and Abbreviations

Acronym	Description
ABC	Australian Broadcasting Corporation
ABS	Australian Bureau of Statistics
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
ARI	Average Reference Interval
BOM	Bureau of Meteorology
BPA	Bushfire Prone Area
CFA	Country Fire Authority
CMA	Catchment Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture
DAWR	Department of Agriculture and Water Resources
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)
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
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)
SMR	Southern Metro Region
SSIP	State Significant Industrial Precinct

13. Document information

13.1 Document details

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

13.2 Version control

Version	Date	Description	Author
0.1	14/05/2020	Initial template created	C. Jolly
0.2	15/07/2020	First draft	M. Brereton
0.3	07/08/2020	Second draft	W. Stephenson
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1.2	09/09/2020	Proof reading	T. Penfold
2.0	14/09/2020	Final release	C. Jolly

13.3 Document approval

This document requires the following approval:

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