1958: Air monitoring report 2020: Compliance with the National Environment Protection (Ambient Air Quality) Measure

Environment Protection Authority Victoria

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Executive summary

This report presents the results of air quality monitoring in Victoria for 2020 and assesses them against the requirements of the *Ambient Air Quality National Environment Protection Measure (AAQ NEPM)* (https://www.legislation.gov.au/Details/F2016C00215) (referred to as the Measure).

Based on the NEPM ambient air monitoring stations, Victoria's air quality was generally considered to be good in 2020, although there were periods of poor air quality. This was mainly due to major bushfires in January and February which resulted in significant smoke impacts and urban pollution across wide areas of the state. EPA also collects data from stations at sites with specific air pollution issues, such as the Brooklyn Industrial Precinct and in the Latrobe Valley (excluding Traralgon air monitoring station). These stations are additional to those required for reporting against the Measure, and therefore the data from these stations are not included in this report.

Environment Protection Authority Victoria (EPA) provides hourly data updates on air pollution levels and categories on its website. (https://www.epa.vic.gov.au/EPAAirWatch) EPA's historical air pollution data can be accessed via the Victorian Government DataVic website (https://discover.data.vic.gov.au/dataset/epa-air-watch-all-sites-air-quality-hourly-averages-yearly/historical).

What is the Measure?

The Measure establishes national ambient air quality standards. It aims to guide policies around the protection of human health by providing a consistent framework for monitoring and reporting common air pollutants: nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and particles (PM_{10}) and ($PM_{2.5}$). EPA is responsible for monitoring and reporting Victoria's ambient air quality in accordance with the requirements of the Measure.

Compliance with the Measure

EPA assesses air quality in Victoria against the standards and pollutant goals defined in the Measure. Compliance with the Measure requires that air quality standards are not exceeded more than the allowable number, as outlined in Schedule 2 of the Measure. Compliance with the Measure also requires that a minimum of 75 per cent of data are available for each quarter in the year. In addition to standard instrumentation for measuring compliance with the Measure, EPA also collects data from stations at sites with specific air pollution issues, such as the Brooklyn Industrial Precinct and in the Latrobe Valley (excluding Traralgon air monitoring station). This is known as 'campaign monitoring'. These data are not assessed against the Measure and therefore not included in this report. Results for these air monitoring stations are reported on

EPA's website (https://www.epa.vic.gov.au/EPAAirWatch) and historical air pollution data can be accessed via the Victorian Government DataVic website (https://discover.data.vic.gov.au/dataset/epa-air-watch-all-sites-air-quality-hourly-averages-yearly/historical).

1 - Monitoring summary

Victoria's air monitoring plan for the assessment of air quality against the Measure was first approved in February 2001 by national, state and territory ministers on the the National Environment Protection Council. Data presented in this report have been produced in accordance with the monitoring plan, with exceptions noted where required.

1.1 - Monitoring stations

The Measure requires EPA to monitor the pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), particles less than 10 micrometres in diameter (PM_{10}), and particles less than 2.5 micrometres in diameter ($PM_{2.5}$). EPA no longer monitors for lead, as ambient concentrations in Victoria have decreased significantly, due to the phase out of leaded petrol.

Eight regions are defined in Victoria's air monitoring plan. These are:

- Port Phillip and Latrobe Valley regions, which have Measure-compliant monitoring stations.
- Ballarat, Bendigo, Shepparton, Warrnambool and Mildura, where campaign monitoring was previously conducted.
- Wodonga, where data from monitoring at Albury New South Wales was used.

EPA's 2020 Measure-compliant monitoring stations are shown in Figure 1 and Figure 2. The monitoring stations, pollutants monitored, and site types are summarised in Table 1. Site types are defined in the Measure as 'generally representative upper bound for community exposure' and 'population-average sites'. EPA also has trend stations which provide data on the long-term trends in air pollution over many years. The types of communities covered by each monitoring station (known as the 'exposed population') is described in the 'location category' column in Table 1.

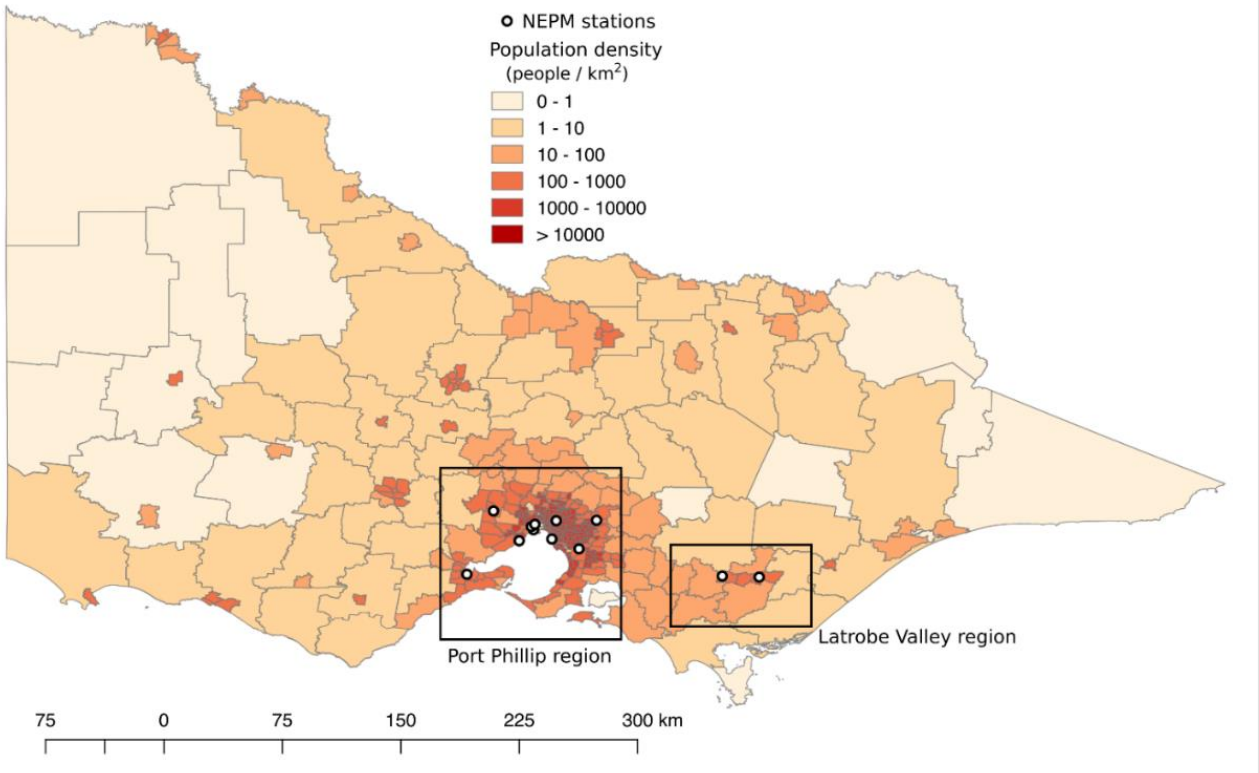


Figure 1: Defined regions and population density in Victoria

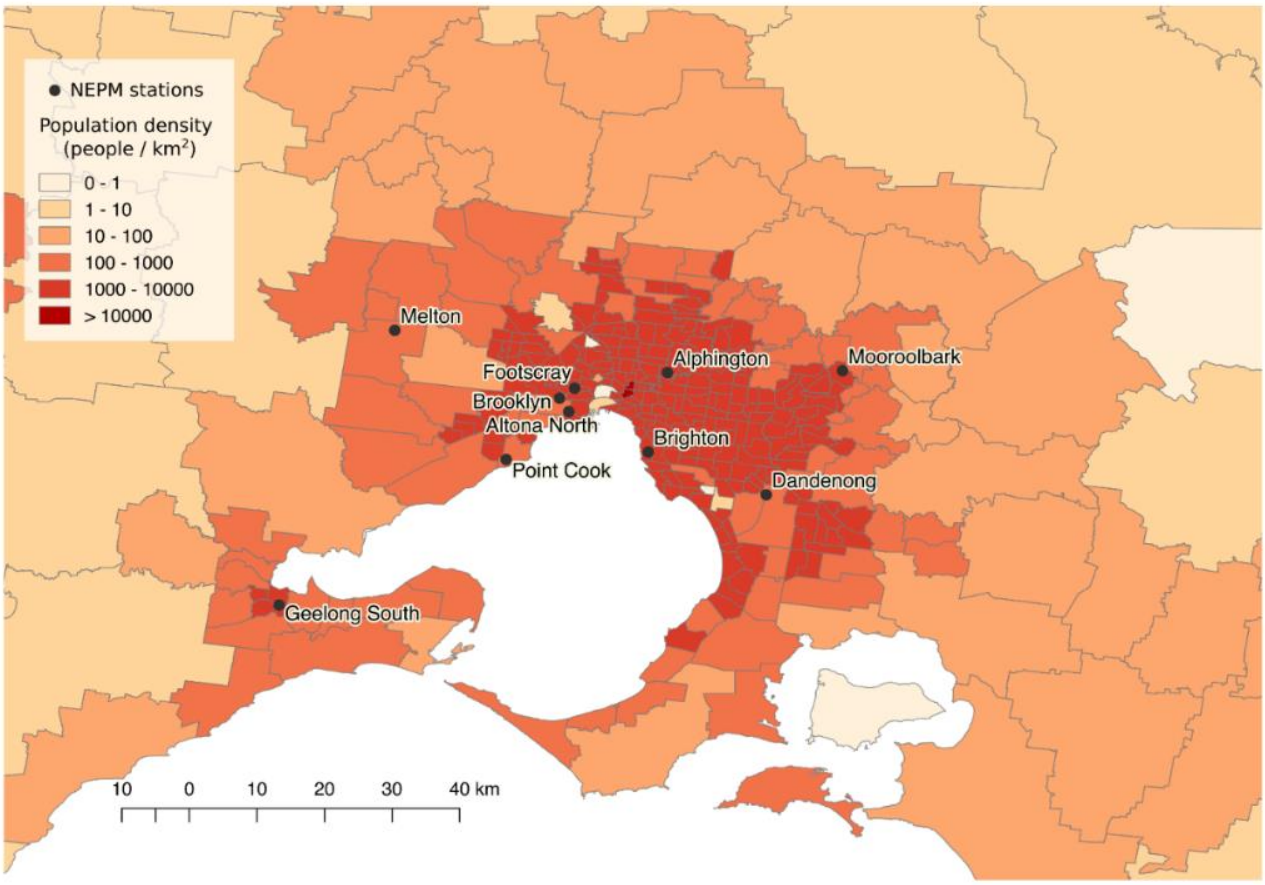


Figure 2: Defined regions and population density in Port Phillip region

Table 1: EPA NEPM monitoring stations and parameters

Monitoring Station	Region	Location Category	CO	NO_2	O_3	SO_2	PM_{10}	$PM_{2.5}$
Alphington	Melbourne East	Residential	G*	G*	Pop	Pop	G*	G*
Altona North	Melbourne West	Industrial / Residential				G*		
Dandenong	Melbourne East	Industrial			Pop*		Pop	
Footscray	Melbourne West	Residential		G*	G*		G*	G*
Geelong South	Geelong	Industrial / Residential	G*	G*	Pop*	G*	G*	G*
Melbourne CBD	Melbourne CBD	Commercial / Residential						G
Melton	Melbourne West	Residential			G			
Mooroolbark	Melbourne East	Residential			Pop		Pop	
Point Cook	Melbourne West	Residential		Pop*	G*			
Traralgon	Latrobe Valley	Residential		G*	G*	G*	G*	G*

Note:

* Trend station (use to determine long term trends in air quality

[1] G Generally representative upper bound

[a] Pop Population Average

1.1.1 - Implementation of the monitoring plan

EPA continually evaluates Victoria's air quality monitoring program to determine which sites and pollutants need to be monitored. Stations are located and set up according to the Australian Standards (Table 2). Generally, EPA's air monitoring stations have remained stable over the years, although changes to the network are made as needed. Recent changes

include:

- A $PM_{2.5}$ monitoring station was established in the Melbourne CBD in 2017.
- A $PM_{2.5}$ monitoring station was established in Bendigo in 2020. Data from this station are not included in this report as it is a campaign station. Data from this station are available on EPA's AirWatch website (https://www.epa.vic.gov.au/EPAAirWatch)
- A $PM_{2.5}$ monitoring station was established in Campbellfield in 2020. Data from this station are not included in this report as it is a campaign station. Data from this station are available on EPA's AirWatch website (https://www.epa.vic.gov.au/EPAAirWatch)
- In mid-2019, the Altona monitoring station was temporarily shut down pending relocation to another site, a new site was established at a nearby location in late 2020.

1.1.2 - Screening procedure

Victoria's air monitoring plan outlines how EPA may use screening procedures to demonstrate whether concentrations of pollutants are consistently below the standards in the Measure. If these screening procedures are satisfied, monitoring may not be required, or may be conducted at fewer locations. Screening procedures conducted in accordance with the Measure have been satisfied a number of for Victorian regions. EPA did not monitor air quality at Ballarat, Shepparton, Warrnambool, Wodonga and Mildura in 2020 as previous monitoring campaigns in these areas showed that pollutant levels were expected to be consistently below the relevant standards.

1.2 - Monitoring and reporting methods

Victorian monitoring is conducted in accordance with the Australian Standards as shown in Table 2 and Table 3. Data not meeting the requirements of these Standards and EPA's quality assurance procedures were identified as invalid and not included in this report. Tapered Element Oscillating Microbalance (TEOM) PM_{10} data included in this report have been adjusted according to the approved procedure outlined in Technical Paper No. 10 – Collection and Reporting of TEOM PM_{10} Data 5 (http://www.nepc.gov.au/system/files/resources/9947318f-af8c-0b24-d928-04e4d3a4b25c/files/aaqprctp10collectionandreporting200105final.pdf), using the temperature dependent formula with a constant value of K equal to 0.04. The resulting adjustments vary from no change at daily average temperatures at or above 15°C, to an increase of 40 per cent at a temperature of 5°C. Particle concentration units of $\mu g/m^3$ refer to volumes at 0°C and one atmosphere of pressure.

1.2.1 - NATA status

As of February 2016, EPA outsourced monitoring for PM_{10} and $PM_{2.5}$ using the Hivol and Partisol gravimetric methods to Golder Associates (NATA accreditation Number 1910). All other methods currently used by EPA for performance monitoring are covered by its National Association of Testing Authorities (NATA) accreditation (Number 15119) except for $PM_{2.5}$ using Beta Attenuation Monitors (BAMs). EPA was reaccredited by NATA in 2020. EPA is working to incorporate monitoring for $PM_{2.5}$ using BAMs as part of its NATA accreditation. The method is in use and all technical elements have been completed, and is due to be assessed at an upcoming NATA audit. Table 2 shows compliance with AS/NZS 3580.1.1:2016 for the siting and operation of each air monitoring station.

Table 2: EPA NEPM monitoring stations siting compliance with AS/NZS 3580.1.1-2016

Monitoring Station	Height above ground	Minimum distance to support structure	Clear sky angle of 120°	Unrestricted airflow of >270°	20m from trees	No nearby emission source	Minimum distance from road or traffic
Alphington	Y	Y	Y	Y	N	Y	N
Altona North	Y	Y	Y	Y	Y	Y	N
Dandenong	Y	Y	Y	Y	N	Y	N
Footscray	Y	Y	Y	Y	N	Y	N
Geelong South	Y	Y	Y	Y	N	Y	N
Melbourne CBD	Y	Y	Y	Y	N	Y	N

Monitoring Station	Height above ground	Minimum distance to support structure	Clear sky angle of 120°	Unrestricted airflow of >270°	20m from trees	No nearby emission source	Minimum distance from road or traffic
Melton	Y	Y	Y	Y	N	Y	N
Mooroolbark	Y	Y	Y	Y	N	Y	N
Point Cook	Y	Y	Y	Y	N	Y	N
Traralgon	Y	Y	Y	Y	N	Y	N

Table 3: EPA NEPM monitoring methods

Pollutant		Australian Standard	Measurement technique
Carbon monoxide	CO	Australian Standard 3580.7.1 Ambient air - Determination of carbon monoxide, direct instrumental method	Gas filter correlation/infrared
Nitrogen dioxide	NO_2	Australian Standard 3580.5.1 Ambient air — Determination of oxides of nitrogen — Direct reading instrument method	Gas phase chemiluminescence
Photochemical oxidant (ozone)	O_3	Australia Standard 3580.6.1 Ambient air — Determination of ozone — Direct reading instrument method	Non-dispersive ultraviolet
Sulfur dioxide	SO_2	Australian Standard 3580.4.1 Ambient air — Determination of sulfur dioxide — Direct reading instrument method	Pulsed fluorescence
Particles less than 10µm	PM_{10}	Australian Standard 3580.9.8 Determination of suspended particulate matter — PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser	Tapered element oscillating microbalance (TEOM)
Particles less than 2.5µm	$PM_{2.5}$	Australian Standard 3580.9.12 Determination of suspended particulate matter $PM_{2.5}$ beta attenuation monitors	Beta attenuation monitors (BAM)
Particles less than 2.5µm	$PM_{2.5}$	Australian Standard 3580.9.10 Determination of suspended particulate matter – $PM_{2.5}$ low volume sampler – Gravimetric method	Gravimetric reference method

2 - Assessment of compliance with standards and goal

Air quality is assessed against the standards defined in the Measure and the associated goals shown in Table 4. The goal of the Measure is to achieve the National Environment Protection Standards as assessed in accordance with the monitoring protocol to the extent specified in Schedule 2 of the Measure. The extent is expressed as a maximum allowable number of exceedances for each standard (shown in column four of Table 4).

The number of allowable exceedances associated with the standards has been set to account for unusual meteorological conditions. In the case of particles, allowable exceedances include exceptional events such as bushfires, hazard reduction burning (if authorised by state jurisdiction) or continental-scale windblown dust that cannot be controlled through normal air quality management strategies. Air quality monitoring data from each monitoring site are assessed against the Measure's standards and the associated goals for each pollutant.

Compliance with the Measure requires that air quality standards are not exceeded more than the allowable number (as outlined in Schedule 2 of the Measure). Compliance with the Measure also requires that a minimum of 75 per cent of data are available for each quarter in the year. Regions are deemed to meet the Measure's standards and goal if previous screening has shown that pollution levels are consistently below air quality standards and monitoring is therefore not required. In this way, lead is deemed to meet the Measure's standards and goals, because lead was shown to be consistently below the Measure's standards, due to the introduction of unleaded fuel in 1985. As a consequence, EPA stopped monitoring for lead in 2004.

The Measure's goals for carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, PM_{10}, $PM_{2.5}$ and lead must be below the standards within the extent specified, such as taking into consideration exceptional events as described in the Measure. EPA uses a green, amber & red traffic light system to indicate compliance.

- **Met**– standard and goal achieved.
- **Not Met (insufficient data)** – standard and goal not achieved due to insufficient data capture.
- **Not Met** – standard and goal not achieved.

Table 4: Air quality standards and goals in the Measure

Pollutant	Averaging period	Standard	Goal max allowable exceedances
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour	120 ppb	1 day a year
Nitrogen dioxide	1 year	30 ppb	None
Photochemical oxidant (ozone)	1 hour	100 ppb	1 day a year
Photochemical oxidant (ozone)	4 hours	80 ppb	1 day a year
Sulfur dioxide	1 hour	200 ppb	1 day a year
Sulfur dioxide	1 day	80 ppb	1 day a year
Sulfur dioxide	1 year	20 ppb	None
Particles less than 10µm	1 day	50 µg/m^3	None
Particles less than 10µm	1 year	25 µg/m^3	None
Particles less than 2.5µm	1 day	25 µg/m^3	None
Particles less than 2.5µm	1 year	8 µg/m^3	None
lead	1 year	0.50 µg/m^3	None

Note:
For $PM_{2.5}$, there is an additional goal to further reduce concentrations to below a daily concentration of 20 µg/m^3 and an annual concentration of 7 µg/m^3 by 2025.

2.1 - Particles ($PM_{2.5}$)

In Victoria, $PM_{2.5}$ is assessed against a daily standard of 25 µg/m^3, with a goal of zero exceedance days allowed per year, excluding exceptional events such as bushfires and authorised hazard reduction burning. $PM_{2.5}$ is also assessed against an annual standard of 8 µg/m^3 as shown in Table 5. Table 6 shows the highest recorded concentration for each monitoring station. In 2020 there were multiple exceedances recorded on $PM_{2.5}$ instruments across EPA's network. As a result, the standards and goal for $PM_{2.5}$ were not met. Most of the exceedances were due to major bushfire events in Quarter 1 (Q1; January and February 2020), with several exceedances also associated with hazard reduction burns and wood heater smoke in Quarter 2 and Quarter 3 (Q2 and Q3). There were also data losses at Alphington and Geelong monitoring stations for $PM_{2.5}$.

- At Alphington, there were 15 days where the standard was exceeded, however for the purpose of NEPM reporting only 7 days were reported. This was due to a failed flow audit in Q1 that meant that data was considered invalid, the data collected during this time included 7 exceedances caused by smoke from major bushfires that occurred in January 2020. A potential exceedance of the standard was also recorded on 4 October 2020, however this was identified during the data validation process as being due to pollen entering the sampling inlet, data collected for PM_{10} at Alphington was significantly lower than the $PM_{2.5}$ reading, as a result, this day has been excluded from the validated dataset.**
- At Geelong, the main detector in the instrument failed, and as a result there was less data collected during Q1.

Table 5: $PM_{2.5}$ compliance data for 2020

Monitoring Station	Data capture (%)	Exceedances	Annual Average	Performance against standard and goals

Monitoring Station	Data capture (%)					Exceedances	Annual Average	Performance against standard and goals
	Q1	Q2	Q3	Q4	Annual	24hr (days)	(µg/m^3)	
Alphington	28.66	97.59	88.23	96.24	77.91	7	7.84	Not Met
Footscray	95.32	98.61	98.63	97.89	97.64	8	8.47	Not Met
Geelong South	71.02	96.21	98.86	82.68	87.31	6	7.78	Not Met
Melbourne CBD	92.36	97.92	99.27	99.08	97.19	10	7.84	Not Met
Traralgon	91.2	98.47	97.57	79.43	91.7	5	8.99	Not Met

Table 6: 24hr $PM_{2.5}$ highest and second highest concentrations (µg/m^3) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		$PM_{2.5}$ (µg/m^3)	Date	$PM_{2.5}$ (µg/m^3)	Date
Alphington	280	35.66	2020-06-28	30.1	2020-07-26
Footscray	351	204.5	2020-01-14	111.02	2020-01-15
Geelong South	315	155.05	2020-01-15	132.7	2020-01-14
Melbourne CBD	355	196.31	2020-01-14	80.28	2020-01-15
Traralgon	326	236	2020-01-15	89.97	2020-01-03

2.2 - Particles (PM_{10})

In Victoria, PM_{10} is assessed against a daily standard of 50 µg/m^3, with a goal of zero exceedance days allowed per year, excluding exceptional events such as continental scale dust storms. PM_{10} is also assessed against an annual standard of 25 µg/m^3 as shown in Table 7. Table 8 shows the highest recorded concentration for each monitoring station.

In 2020 there were multiple exceedances recorded across the PM_{10} network, as a result, the standards and goal were not met. Most of the exceedances were due to major bushfire events in Quarter 1, with one exceedance at Footscray in Quarter 4 associated with strong winds and dust. There were also data losses for PM_{10} at Footscray in Quarter 1 and Geelong in Quarter 2 and Quarter 4 for PM_{10}.

- At Footscray, a sensor fault in Quarter 1 was detected during routine audits. This meant that some data were invalidated back to the prior audit.
- At Geelong, EPA replaced the instrument in Quarter 2 which resulted in some data being invalidated. A temperature sensor fault in Quarter 4 also resulted in some data being invalidated.

Table 7: PM_{10} compliance data for 2020

Monitoring Station	Data capture (%)					Exceedances	Annual Average	Performance against standard and goals
	Q1	Q2	Q3	Q4	Annual	24hr (days)	(µg/m^3)	
Alphington	98.38	91.44	88.51	95.83	93.55	7	19.38	Not Met
Dandenong	88.43	91.53	95.74	97.39	93.21	9	20.56	Not Met
Footscray	56.94	98.66	98.26	97.94	88.11	1	16.82	Not Met
Geelong South	94.44	38.18	76.19	73.71	70.45	6	NA	Not Met
Mooroolbark	79.12	88.71	97.34	97.94	90.89	4	15.66	Not Met
Traralgon	94.72	91.39	98.17	83.74	91.89	9	20.87	Not Met

Table 8: 24hr PM_{10} highest and second highest concentration (µg/m^3) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		PM_{10} (µg/m^3)	Date	PM_{10} (µg/m^3)	Date
Alphington	338	226.48	2020-01-14	98.02	2020-01-15
Dandenong	334	259.12	2020-01-14	134.21	2020-01-15
Footscray	320	50.95	2020-11-16	42.29	2020-02-07
Geelong South	254	199.41	2020-01-15	167.19	2020-01-13
Mooroolbark	326	71.37	2020-01-06	61.69	2020-01-31
Traralgon	332	236.31	2020-01-15	225.93	2020-01-14

2.3 - Carbon monoxide (CO)

In Victoria, carbon monoxide is assessed against an eight-hour standard of 9.0 ppm, with one exceedance day allowed per year as shown in Table 9. Table 10 shows the highest recorded concentration for each monitoring station.

In 2020 there were no exceedances of the carbon monoxide standard. As a result, the standards and goal for carbon monoxide were met.

Table 9: CO compliance data for 2020

Monitoring Station	Data capture (%)					Exceedances	Performance against standard and goals
	Q1	Q2	Q3	Q4	Annual	8hr (days)	
Alphington	92.64	87.32	82.23	94.87	87.98	0	Met
Footscray	93.84	89.77	93.82	94.04	91.71	0	Met
Geelong South	93.33	85.1	93.96	79.29	86.82	0	Met
Traralgon	90.83	83.11	94.32	79.16	85.96	0	Met

Table 10: 8hr CO highest and second highest concentration (ppm) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		CO (ppm)	Date	CO (ppm)	Date
Alphington	324	2.25	2020-01-06	1.46	2020-06-11
Footscray	339	2.84	2020-01-14	2.7	2020-01-06
Geelong South	322	3.04	2020-01-14	2.9	2020-01-13
Traralgon	319	4.94	2020-01-06	3.79	2020-01-15

2.4 - Nitrogen dioxide (NO_2)

In Victoria, nitrogen dioxide is assessed against a one-hour standard of 120 ppb, with one exceedance a day allowed per year and an annual standard of 30 ppb, with no exceedances allowed as shown in Table 11. Table 12 shows the highest recorded concentration for each monitoring station.

In 2020 there were no exceedances of the nitrogen dioxide standards. As a result, the standards and goal for nitrogen dioxide were met.

Table 11: NO_2 compliance data for 2020

Monitoring Station	Data capture (%)	Exceedances	Annual Average	Performance against standard and goals

Monitoring Station	Data capture (%)					Exceedances	Annual Average	Performance against standard and goals	
	Q1	Q2	Q3	Q4	Annual	1hr (days)	(ppb)	1hr	annual
Alphington	94.31	94.22	84.48	94.92	91.99	0	8.2	Met	Met
Footscray	93.84	94.22	94.92	94.09	94.28	0	9.84	Met	Met
Geelong South	93.33	94.63	94.41	79.43	90.45	0	5.68	Met	Met
Traralgon	90.83	93.57	94.64	79.8	89.75	0	6.01	Met	Met

Table 12: 1hr NO_2 highest and second highest concentrations (ppb) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		NO_2 (ppb)	Date	NO_2 (ppb)	Date
Alphington	348	51.5	2020-01-30	51.3	2020-11-21
Footscray	358	64.8	2020-01-30	56.9	2020-01-15
Geelong South	342	52.8	2020-01-15	45	2020-07-24
Traralgon	340	32	2020-01-31	29.2	2020-01-14

2.5 - Ozone (O_3)

In Victoria, ozone is assessed against a one-hour standard of 100 ppb and a four-hour standard of 80 ppb, with one exceedance day allowed per year as shown in Table 13. Tables 14 and 15 show the highest recorded concentrations for each monitoring station.

In 2020 there were multiple exceedances recorded on ozone instruments across EPA's network. As a result, with the exception of Alphington and Traralgon, the standards and goal for ozone were not met.

While there were no exceedances of the ozone standard recorded at Point Cook, the station did not meet the goal as there was less than 75% data capture in Quarter 1 and overall for the year. This was related to power supply issues at the site which required the site owner to replace a power transformer.

Table 13: O_3 compliance data for 2020

Monitoring Station	Data capture (%)					Exceedances		Performance against standard and goals	
	Q1	Q2	Q3	Q4	Annual	1hr	4hr	1hr	4hr
Alphington	94.49	94.31	83.52	94.92	91.82	1	1	Met	Met
Dandenong	94.54	94.72	94.09	95.01	94.57	1	2	Met	Not Met
Footscray	93.84	94.26	94.83	95.1	94.52	2	2	Not Met	Not Met
Geelong South	92.82	94.63	94.51	79.89	90.46	1	2	Met	Not Met
Melton	90.14	95.19	90.57	92.35	92.09	2	3	Not Met	Not Met
Point Cook	0	36.51	95.01	95.24	56.95	0	0	Not Met (insufficient data)	Not Met (insufficient data)
Traralgon	78.98	93.75	94.64	79.8	86.87	1	1	Met	Met

Table 14: 1hr O_3 highest and second highest concentrations (ppb) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		1hr O_3 (ppb)	Date	1hr O_3 (ppb)	Date

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		1hr O_3 (ppb)	Date	1hr O_3 (ppb)	Date
Alphington	347	129.2	2020-01-14	95.1	2020-01-09
Dandenong	359	110.9	2020-01-14	85.6	2020-01-03
Footscray	359	117.1	2020-01-03	112.7	2020-01-14
Geelong South	343	113.9	2020-01-15	93.7	2020-01-13
Melton	348	128.3	2020-01-03	115.6	2020-01-14
Point Cook	218	55.6	2020-11-22	55.1	2020-11-02
Traralgon	329	107.5	2020-01-14	83.8	2020-01-15

Table 15: 4hr O_3 highest and second highest concentration (ppb) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		4hr O_3 (ppb)	Date	4hr O_3 (ppb)	Date
Alphington	340	119.15	2020-01-14	78.33	2020-01-03
Dandenong	355	98	2020-01-14	80.7	2020-01-03
Footscray	353	108.38	2020-01-03	102.08	2020-01-14
Geelong South	342	95.5	2020-01-15	89.4	2020-01-13
Melton	344	119.35	2020-01-03	105.75	2020-01-14
Point Cook	217	50.55	2020-11-22	47.97	2020-11-21
Traralgon	324	101.55	2020-01-14	75.55	2020-01-15

2.6 - Sulfur dioxide (SO_2)

In Victoria, sulfur dioxide is assessed against a one-hour standard of 200 ppb, a daily standard of 80 ppb and an annual standard of 20 ppb, with one exceedance day allowed per year as shown in Table 16. Tables 17 and 18 show the highest recorded concentrations for each monitoring station.

In 2020 there no exceethere no exceedances recorded on sulfur dioxide instruments across EPA's network. As a result, the standards and goal were met at Alphington and Traralgon.
Compliance was not met at Altona North and Geelong South due to less than 75% data capture.

- For Altona North, this was due to EPA relocation the station to a new site due to the end of a long term lease agreement.
- For Geelong, there was a major fault with the instrument and a replacement instrument was not immediately available as the supplier was undertaking acceptance testing of the new instruments.

Table 16: SO_2 compliance data for 2020

Monitoring Station	Data capture (%)					Exceedances		Annual Average	Performance against standard and goals		
	Q1	Q2	Q3	Q4	Annual	1hr (days)	24hr (days)	(ppb)	1hr	24hr	annual
Alphington	75.79	88.99	84.48	80.9	82.64	0	0	1.05	Met	Met	Met

Monitoring Station	Data capture (%)					Exceedances		Annual Average	Performance against standard and goals		
	Q1	Q2	Q3	Q4	Annual	1hr (days)	24hr (days)	(ppb)	1hr	24hr	annual
Altona North	0	0	0	88.46	22.04	0	0	7.33	Not Met (insufficient data)	Not Met (insufficient data)	Not Met (insufficient data)
Geelong South	69.63	70.15	94.09	79.48	78.23	0	0	1.48	Not Met (insufficient data)	Not Met (insufficient data)	Not Met (insufficient data)
Traralgon	90.83	87	94.69	79.8	88.13	0	0	2.96	Met	Met	Met

Table 17: 1hr SO_2 highest and second highest concentrations (ppb) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		1hr SO_2 (ppb)	Date	1hr SO_2 (ppb)	Date
Alphington	310	5.3	2020-12-04	5.1	2020-05-03
Altona North	85	43.6	2020-10-17	40.6	2020-11-16
Geelong South	295	27.4	2020-06-28	19.4	2020-09-24
Traralgon	334	30.8	2020-02-05	28.8	2020-01-13

Table 18: 24hr SO_2 highest and second highest concentration (ppb) for 2020

Monitoring Station	Valid Days	Highest Day		Next Highest Day	
		24hr SO_2 (ppb)	Date	24hr SO_2 (ppb)	Date
Alphington	310	2.45	2020-12-04	2.37	2020-11-30
Altona North	85	9.61	2020-10-17	9.36	2020-11-16
Geelong South	295	2.64	2020-09-24	2.44	2020-05-19
Traralgon	334	5.56	2020-02-05	4.35	2020-07-20

3 - Analysis of air quality monitoring

The trends in air quality data across the year are analysed using a breakdown of daily concentration percentiles for the year for each parameter and station. This approach assesses how pollutant concentrations are distributed across the year. The use of percentiles is similar to expressing the data as the Nth highest value. For example, the 95th percentile of daily peak concentrations corresponds to the 18th highest daily peak concentration if there is 100% data availability. For pollutants and stations where exceedances have been recorded, calendar plots (Figures 3-7) have been included to show the temporal distribution for when the exceedances occurred.

3.1 - Particles ($PM_{2.5}$)

In 2020 the peak 24 hour $PM_{2.5}$ measurement at a NEPM station was 204.5 µg/m^3 at Footscray on 14 January 2020. A peak reading of 214 µg/m^3 was also measured at Alphington on the same day, however due to an issue with the flow controller, this measurement was invalid.

As shown in Figures 3 to 7, there were exceedances of the 24 hour standard recorded during the year, most of these occurred during Quarter 1 and were associated with major bushfires which were impacting the south east coast of Australia. Seven exceedances were recorded during May, June and July at Alphington and on two days during June and July at Melbourne CBD which were attributed to local wood heater impacts.

Table 19: 24hr $PM_{2.5}$ percentiles for 2020

Monitoring Station	Data availability	$PM_{2.5}$ percentile concentration ($\mu g/m^3$)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	76.5	35.66	27.89	25.94	19.05	13.52	9.01	6.37
Footscray	95.9	204.5	63.05	29.86	17.59	12.92	8.34	5.79
Geelong South	86.07	155.05	66.48	23.39	15.01	11.71	7.78	5.5
Melbourne CBD	96.99	196.31	69.19	26.92	18.54	12.81	7.67	5.28
Traralgon	89.07	236	31.42	23.29	18.49	14.49	9.94	6.74

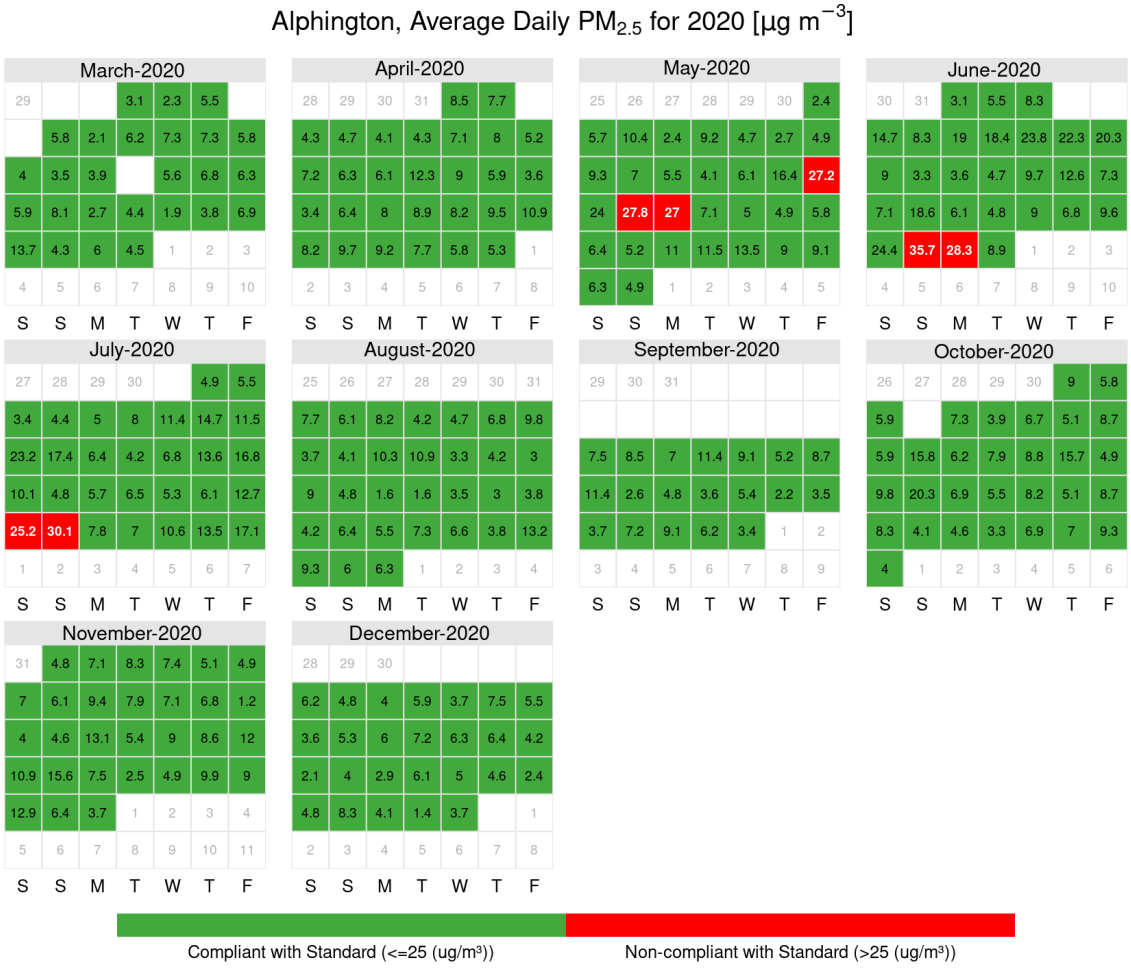


Figure 3: Alphington $PM_{2.5}$ calendar plots showing days where exceedances of the average daily $PM_{2.5}$ standard occurred in $\mu g/m^3$.

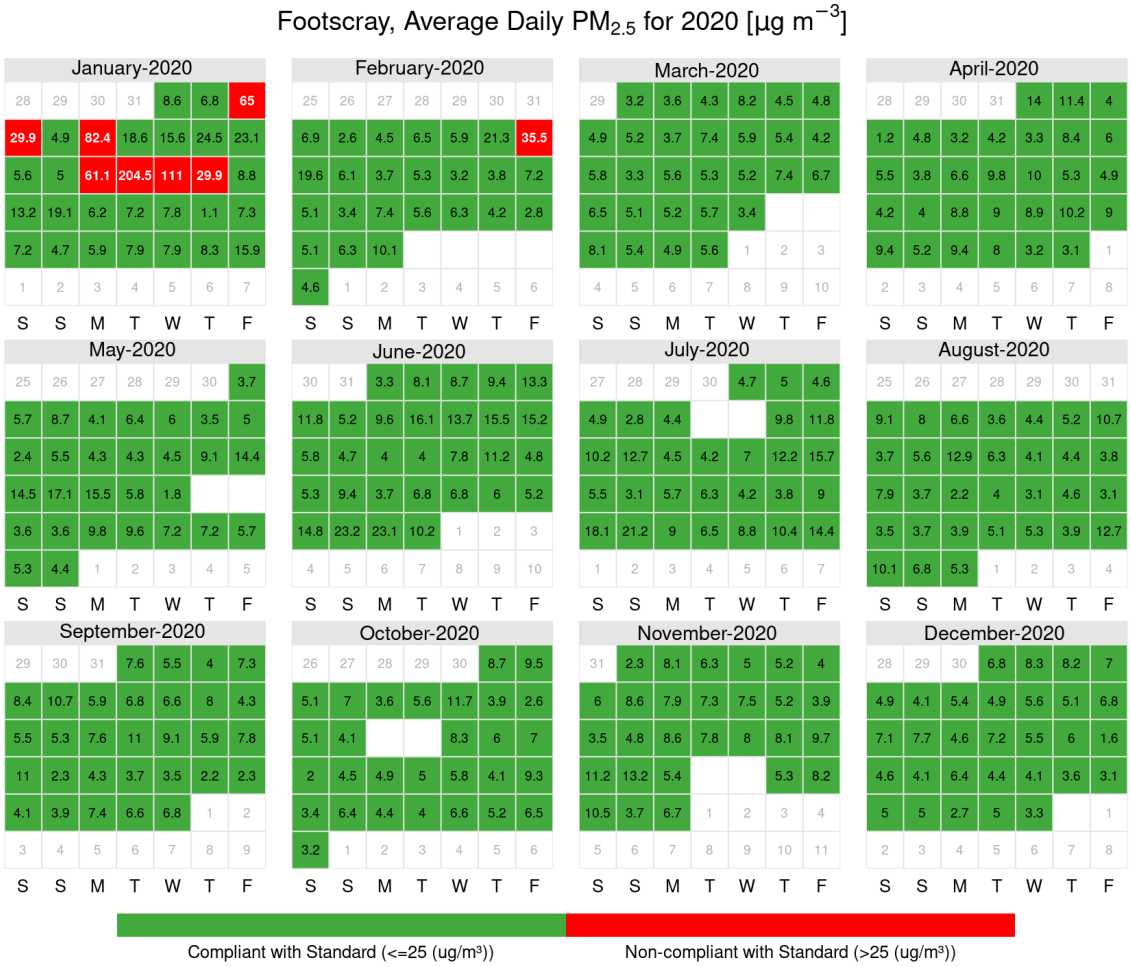


Figure 4: Footscray $PM_{2.5}$ calendar plots showing days where exceedances of the average daily $PM_{2.5}$ standard occurred in µg/m^3.

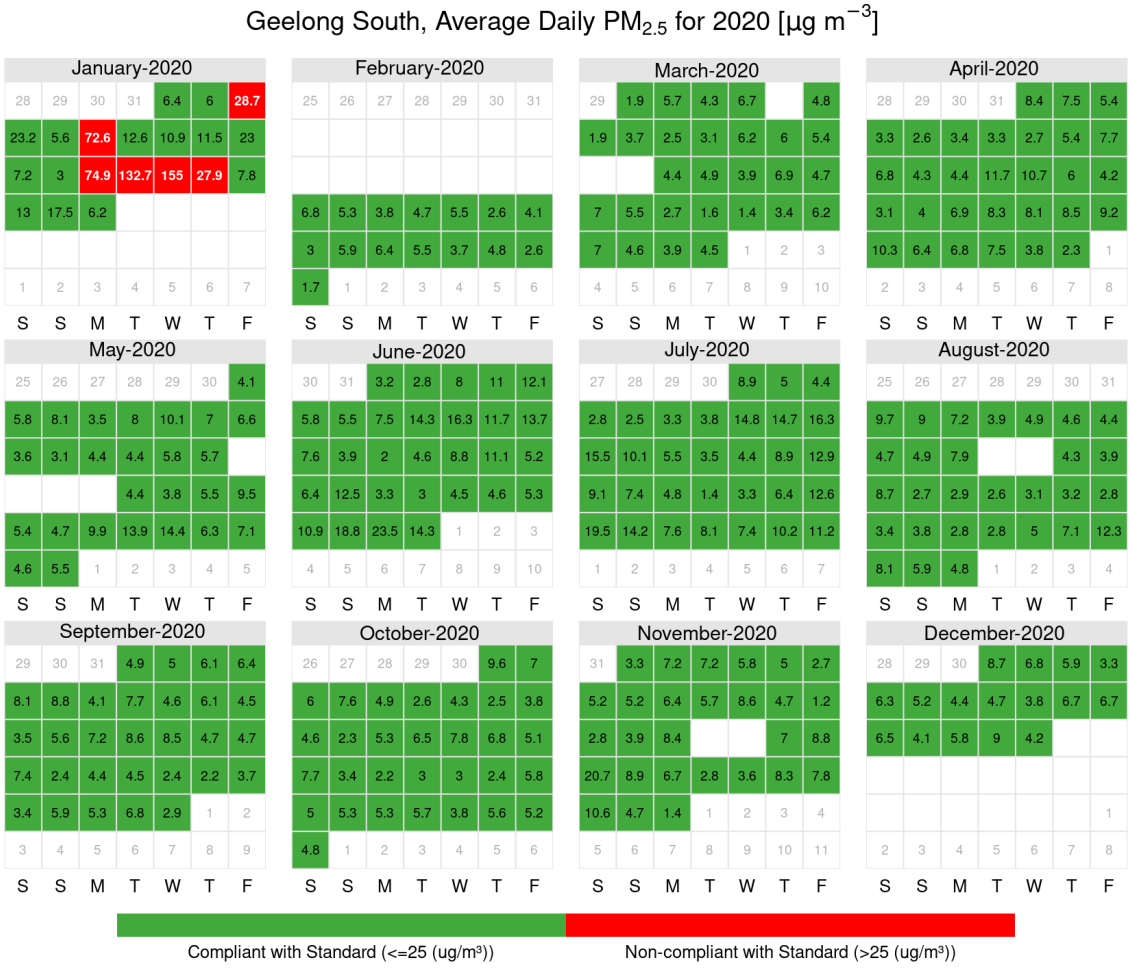


Figure 5: Geelong South $PM_{2.5}$ calendar plots showing days where exceedances of the average daily $PM_{2.5}$ standard occurred in $\mu g/m^3$.

Figure 6: Melbourne CBD $PM_{2.5}$ calendar plots showing days where exceedances of the average daily $PM_{2.5}$ standard occurred in $\mu g/m^3$.

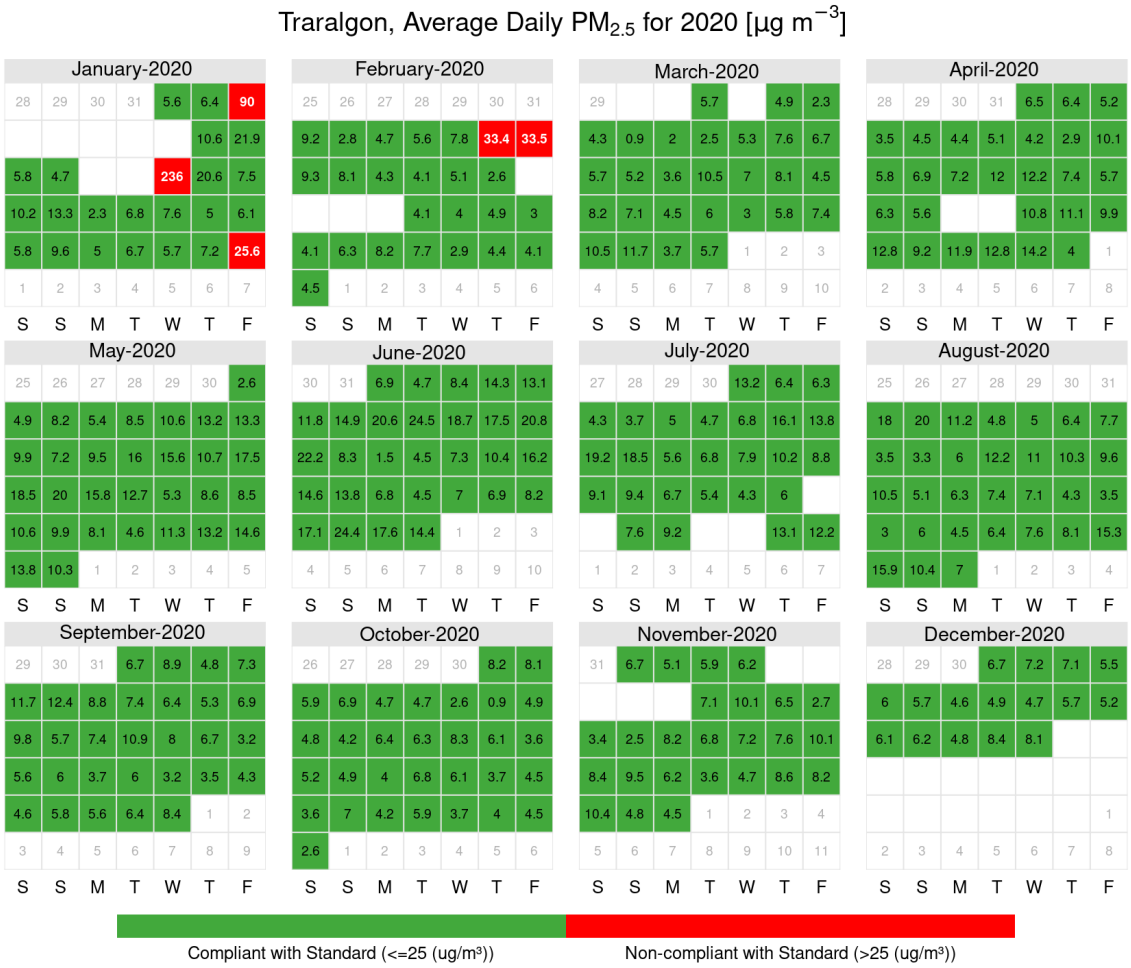


Figure 7: Traralgon $PM_{2.5}$ calendar plots showing days where exceedances of the average daily $PM_{2.5}$ standard occurred in µg/m^3.

3.2 - Particles (PM_{10})

In 2020 the peak 24 hour PM_{10} measurement at a NEPM station was 259.12 µg/m^3 at Dandenong on 14 January 2020, Similar concentrations were also recorded at other Melbourne stations, however due to a sensor fault at Footscray, an exceedance was not recorded on this day. As shown in Figures 8 to 13, there were exceedances of the 24 hour standard recorded during the year. All but one exceedance of the standard for PM_{10} in 2020 occurred during January and February and were associated with the major bushfires that impacted the south east coast of Australia. One exceedance of the standard at Footscray in November 2020 was attributed to local dust sources.

Bushfires and continental scale dust storms are classified as exceptional events as per the definition in the Measure. In 2020 no exceedances were attributed to continental-scale dust storms.

Table 20: 24hr PM_{10} percentiles for 2020

Monitoring Station	Data availability	PM_{10} percentile concentration (µg/m^3)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	92.35	226.48	68.99	48.01	37.08	28.96	21.98	16.22
Dandenong	91.26	259.12	87.27	62.22	37.08	29.81	23.21	17.57
Footscray	87.43	50.95	36.12	35.46	31.24	25.93	20.96	15.45
Geelong South	69.4	199.41	143.66	61.38	40.11	32.17	25.35	17.96
Mooroolbark	89.07	76.06	51	38.43	31.01	23.41	18.4	13.91
Traralgon	90.71	236.31	156.55	62.43	32.88	27.07	22.7	17.22

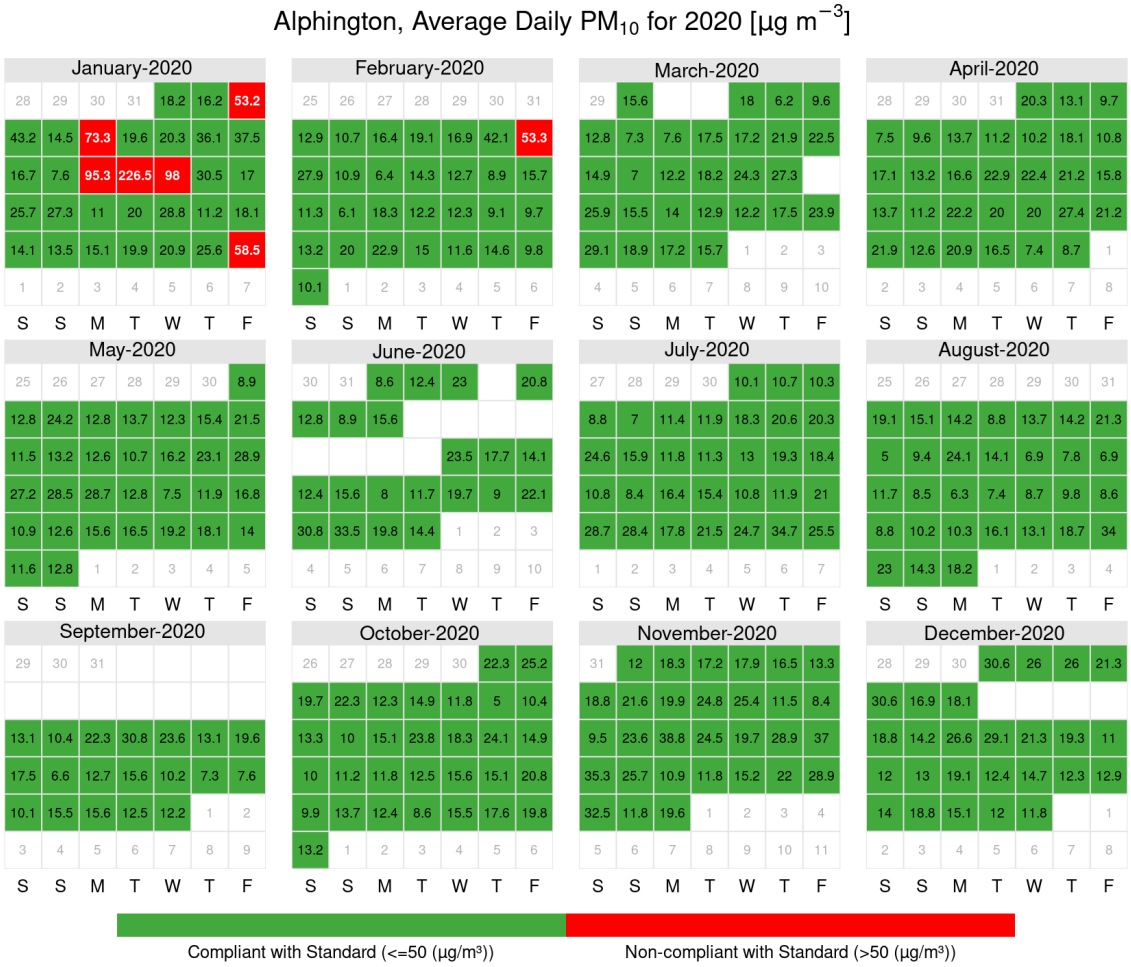


Figure 8: Alphington PM_{10} calendar plots showing days where exceedances of the average daily PM_{10} standard occurred in $\mu g/m^3$.

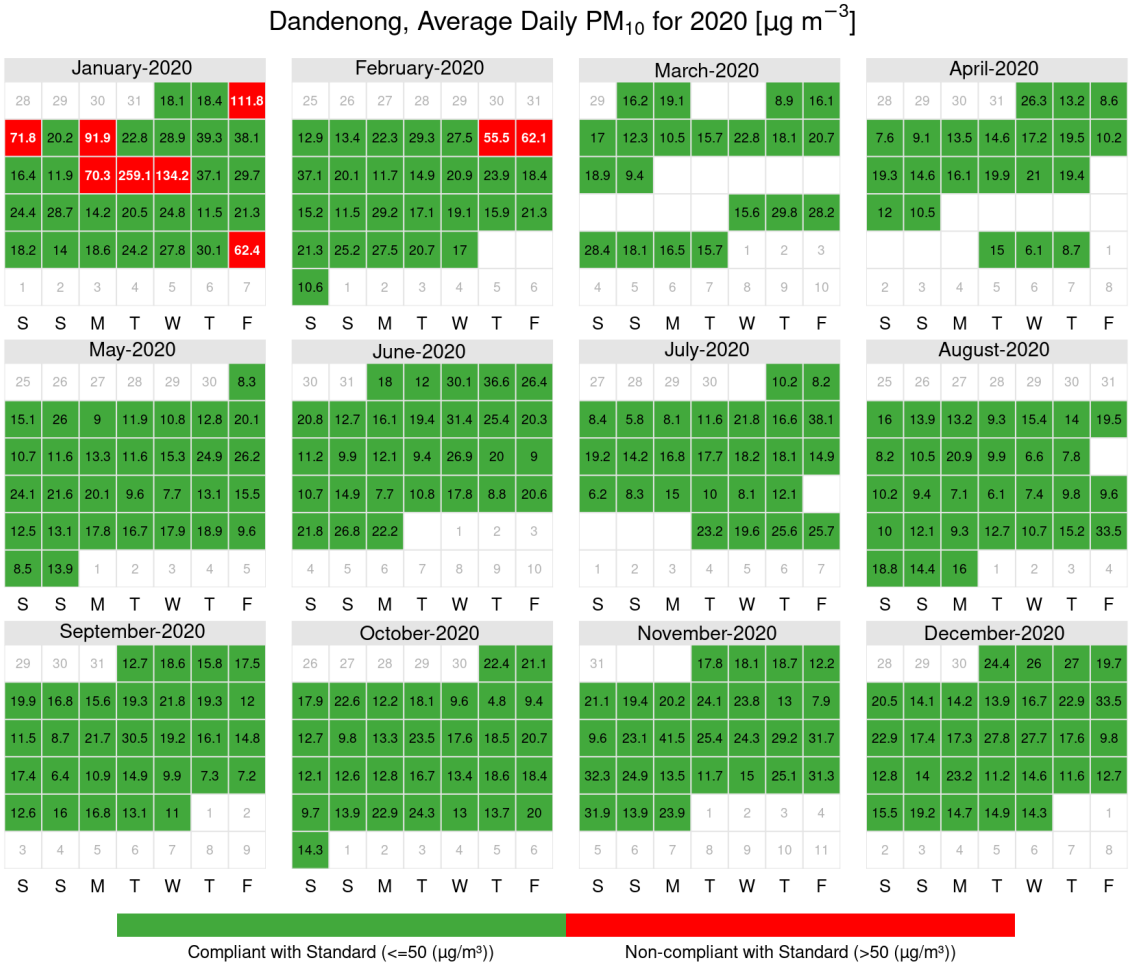


Figure 9: Dandenong PM_{10} calendar plots showing days where exceedances of the average daily PM_{10} standard occurred in µg/m^3.

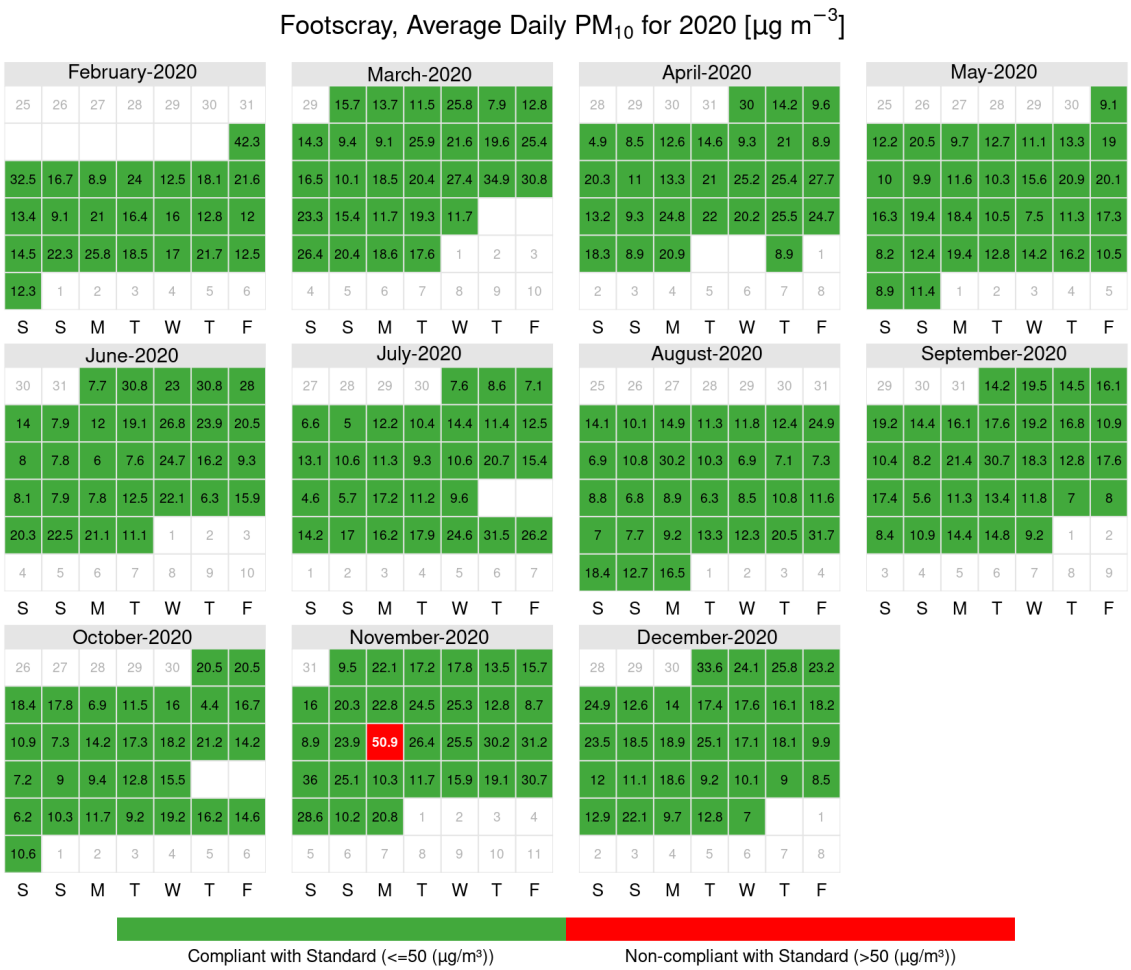


Figure 10: Footscray PM_{10} calendar plots showing days where exceedances of the average daily PM_{10} standard occurred in µg/m^3.

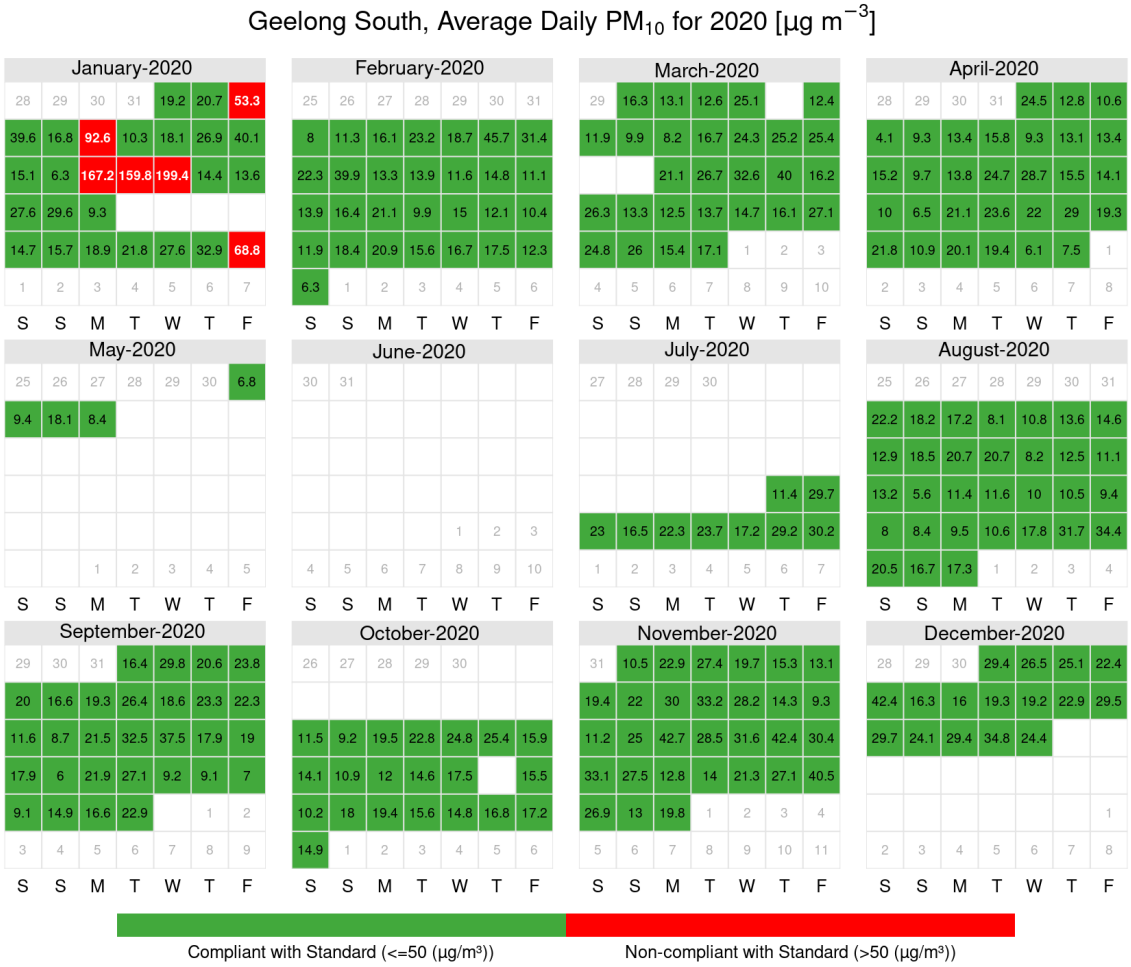


Figure 11: Geelong South PM_{10} calendar plots showing days where exceedances of the average daily PM_{10} standard occurred in $\mu g/m^3$.

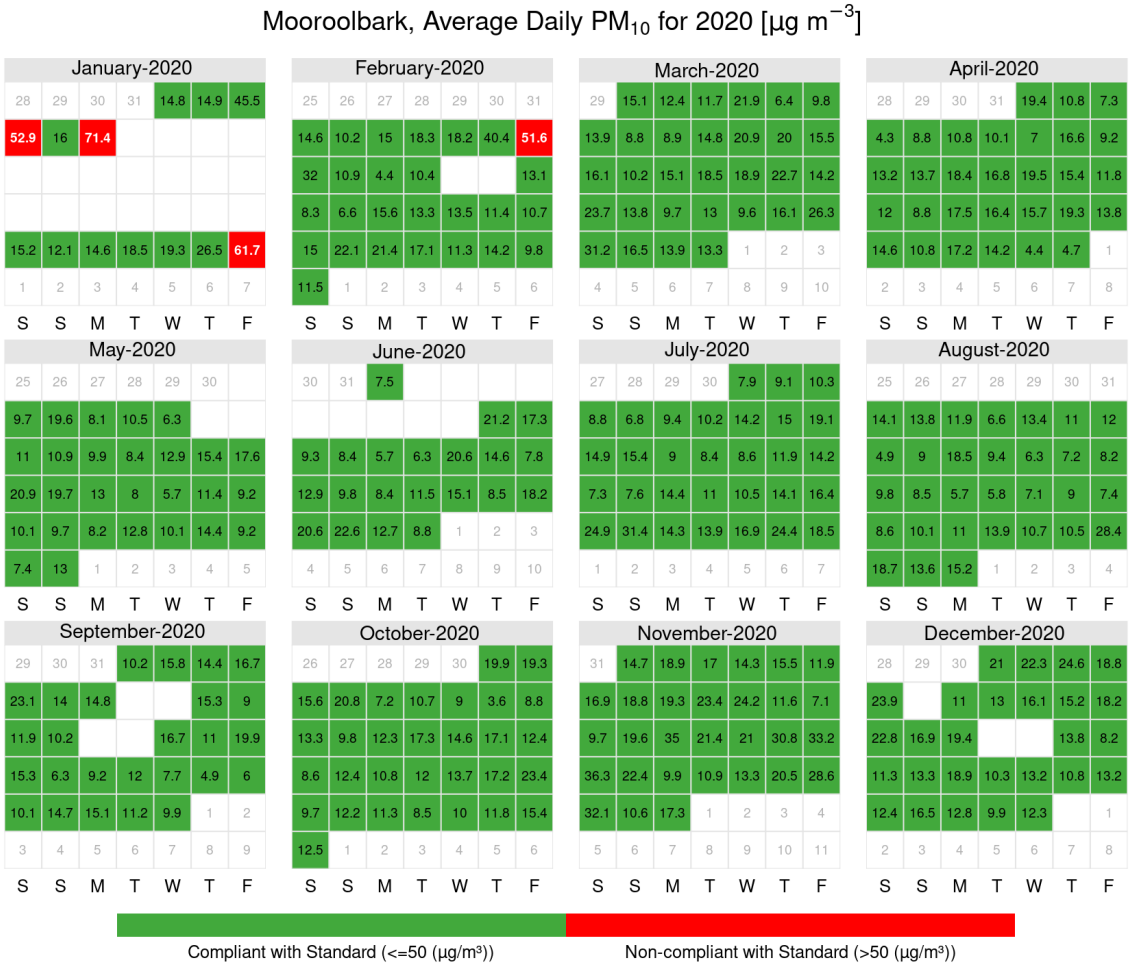


Figure 12: Mooroolbark PM_{10} calendar plots showing days where exceedances of the average daily PM_{10} standard occurred in µg/m^3.

Figure 13: Traralgon PM_{10} calendar plots showing days where exceedances of the average daily PM_{10} standard occurred in µg/m^3.

3.3 - Carbon monoxide (CO)

Percentiles of 2020 daily peak concentrations (over an eight-hour averaging period) are provided for carbon monoxide for each station in Table 21. Daily peak values are formed only when at least 75 per cent of the data for the day are valid. The percentiles for eight-hour carbon monoxide is based on rolling averages, including those that overlap from one day to the next.

Higher than usual maximum concentrations of carbon monoxide were recorded in 2020, this is likely to be due to significant bushfires that occurred in January. No exceedances of the standard were recorded in 2020.

Table 21: 8hr CO percentiles

Monitoring Station	Data availability	CO percentile concentration (ppm)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	88.52	2.25	1.35	1.21	0.99	0.74	0.41	0.22
Footscray	92.62	2.84	1.3	1.19	0.68	0.49	0.29	0.2
Geelong South	87.98	3.04	1.55	0.87	0.62	0.47	0.26	0.19
Traralgon	87.16	4.94	2.59	1.24	0.87	0.69	0.49	0.22

3.4 - Nitrogen dioxide (NO_2)

Percentiles of 2020 daily peak concentrations (over an one-hour averaging period) are provided for nitrogen dioxide for each station in Table 22. Daily peak values are formed only when at least 75 per cent of the data for the day are valid.

There were no exceedances of the nitrogen dioxide standard recorded in 2020.

Table 22: 1hr NO_2 percentiles

Monitoring Station	Data availability	NO_2 percentile concentration (ppb)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	95.08	51.5	34.76	32.54	31.46	29.1	23.52	17.1
Footscray	97.81	64.8	39.53	37.84	35.23	32.43	26.67	19.2
Geelong South	93.44	52.8	41.79	35.12	28.4	25.99	21.17	13.85
Traralgon	92.9	32	27.86	26.84	25.01	22.9	18.45	12.65

3.5 - Ozone (O_3)

Percentiles of 2020 daily peak concentrations (over an one-hour and four-hour averaging periods) are provided for ozone for each station and standard in Tables 23 and Table 24. Daily peak values are formed only when at least 75 per cent of the data for the day are valid. The percentiles for four-hour ozone is based on rolling averages, including those that overlap from one day to the next.

In 2020 there were several exceedances of the ozone standard recorded in January 2020. These were associated with the major bushfires which impacted south east Australia.

Table 23: 1hr O_3 percentiles

Monitoring Station	Data availability	1hr O_3 percentile concentration (ppb)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	94.81	129.2	74.13	65.4	47.24	37.76	30.75	25.9
Dandenong	98.09	110.9	74.79	55.29	43.11	36.74	30.5	26.4
Footscray	98.09	117.1	72.78	62.64	43.73	35.52	29.15	25.7
Geelong South	93.72	113.9	73.96	51.87	44.4	35	29.9	27.1
Melton	95.08	128.3	74.42	62.75	46.62	38.48	32.12	28.7
Point Cook	59.56	55.6	49.96	46.97	41.32	35.96	32.08	29.8
Traralgon	89.89	107.5	70.79	56.07	40.94	35.8	29.8	25.5

Table 24: 4hr O_3 percentiles

Monitoring Station	Data availability	4hr O_3 percentile concentration (ppb)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	92.9	119.15	71.57	59.18	43.09	36.14	29.41	24.89
Dandenong	96.99	98	69.13	50.81	39.82	34.27	29.86	25.2
Footscray	96.45	108.38	68.98	57.61	40.14	34	28.27	24.27
Geelong South	93.44	95.5	63.42	48.29	40.6	33.67	28.95	25.89
Melton	93.99	119.35	67.63	60.43	43.69	36.67	31.61	27.86
Point Cook	59.29	50.55	46.3	43.44	38.78	34.58	31.38	29.02

Monitoring Station	Data availability	4hr O_3 percentile concentration (ppb)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Traralgon	88.52	101.55	62.56	50.8	38.43	33.08	28.44	24.36

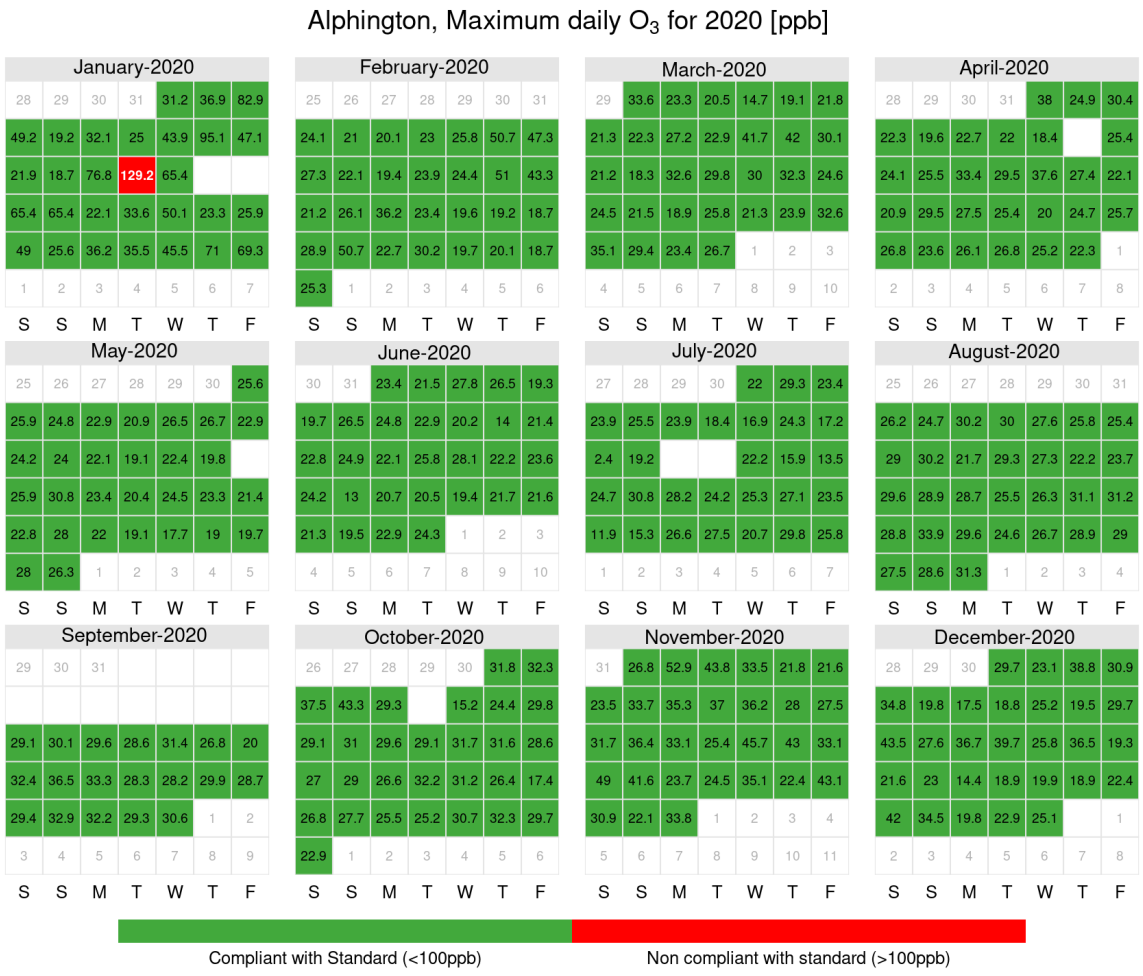


Figure 14: Alphington O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

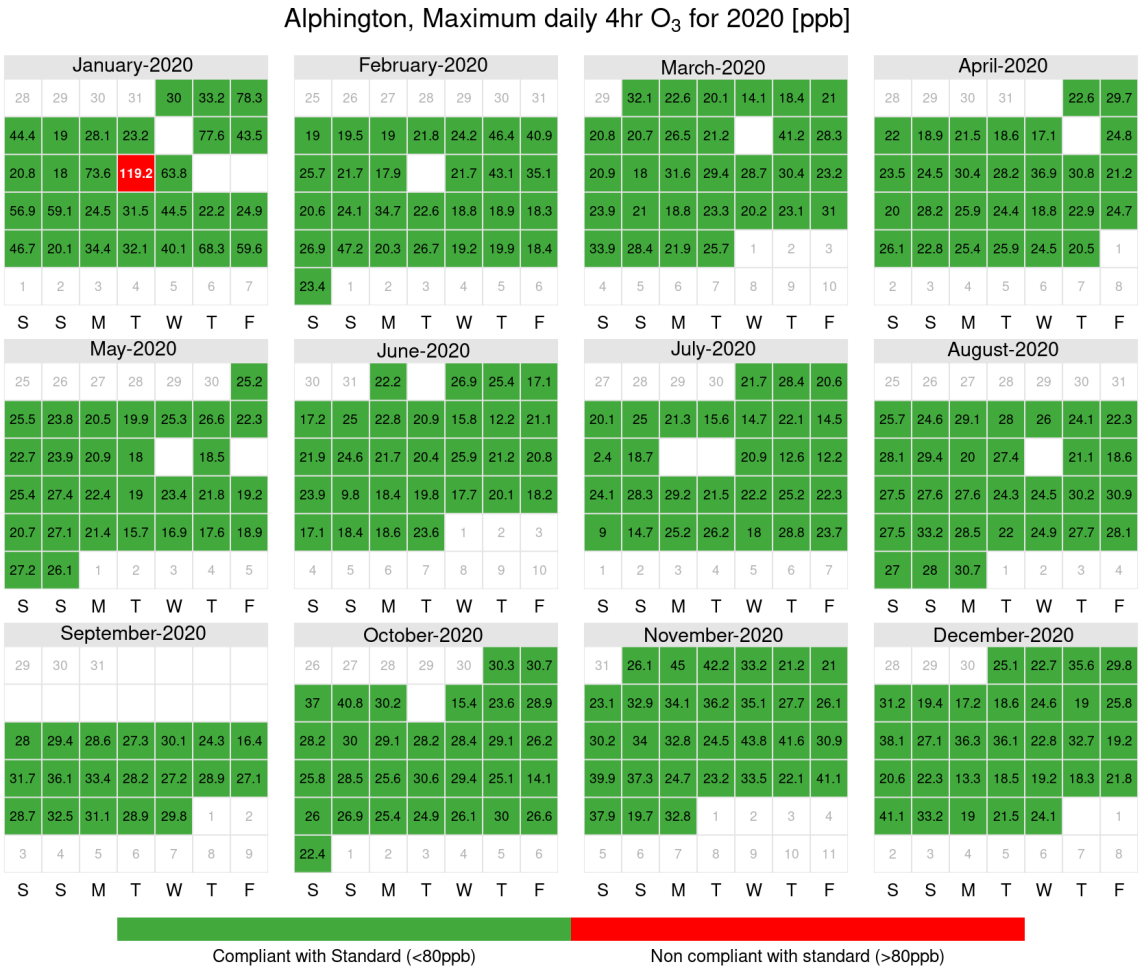


Figure 15: Alphington 4hr O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

Figure 16: Alphington O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

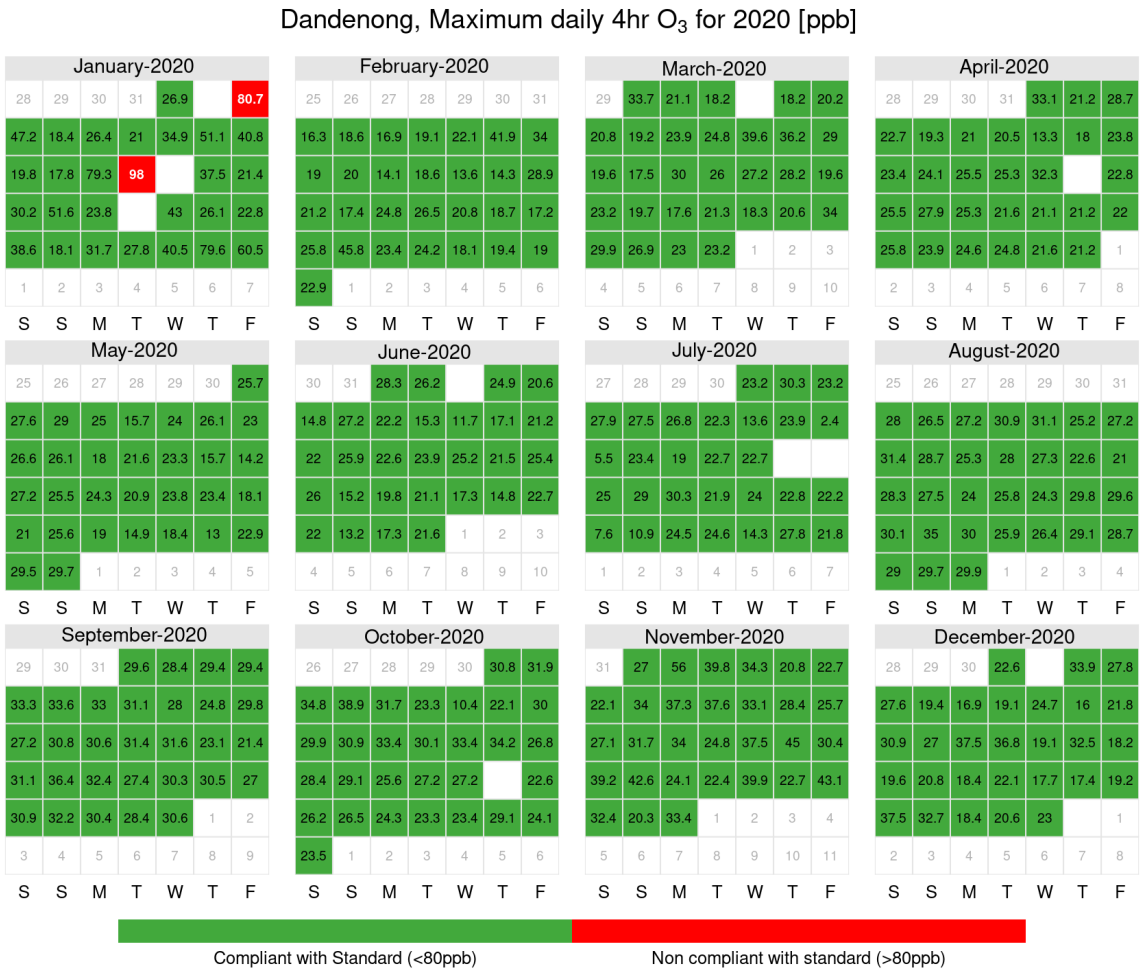


Figure 17: Dandenong 4hr O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

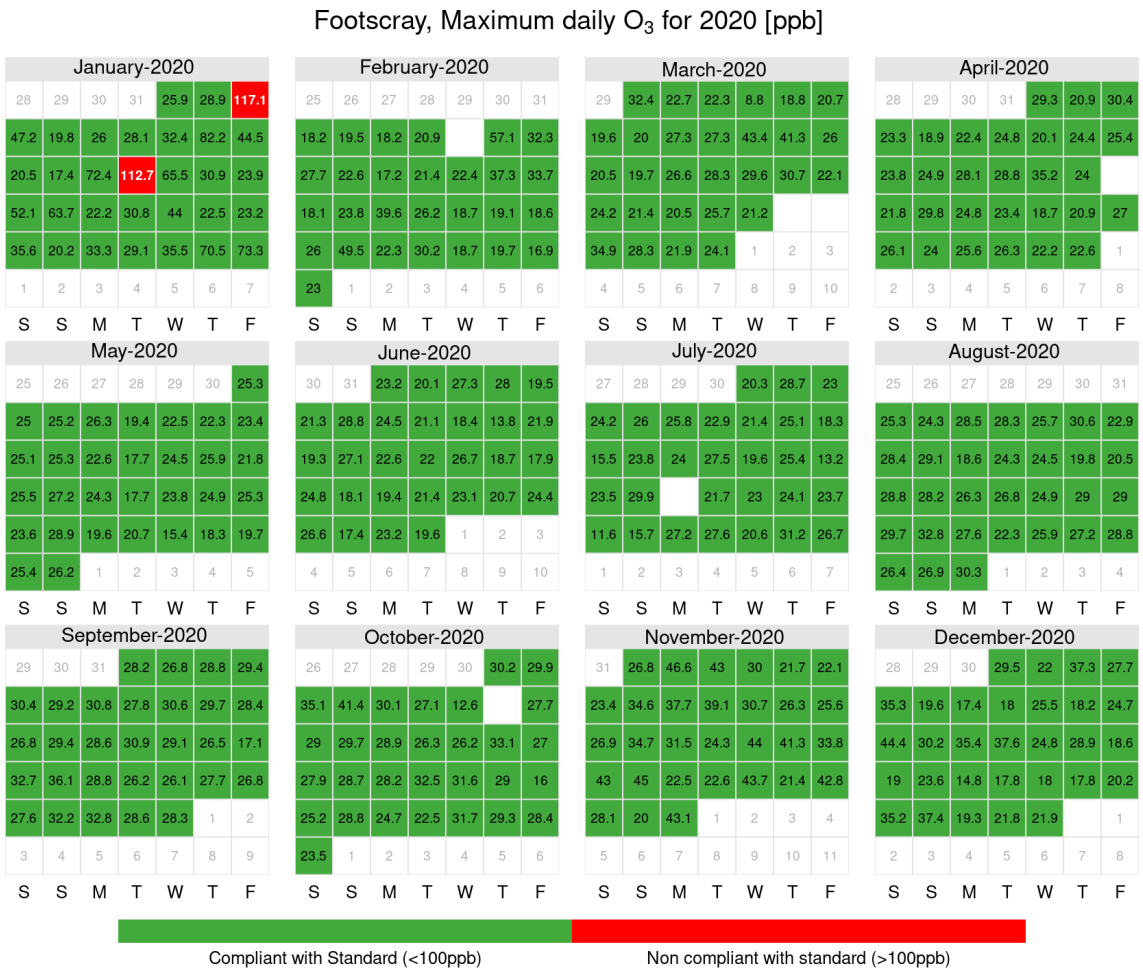


Figure 18: Footscray O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

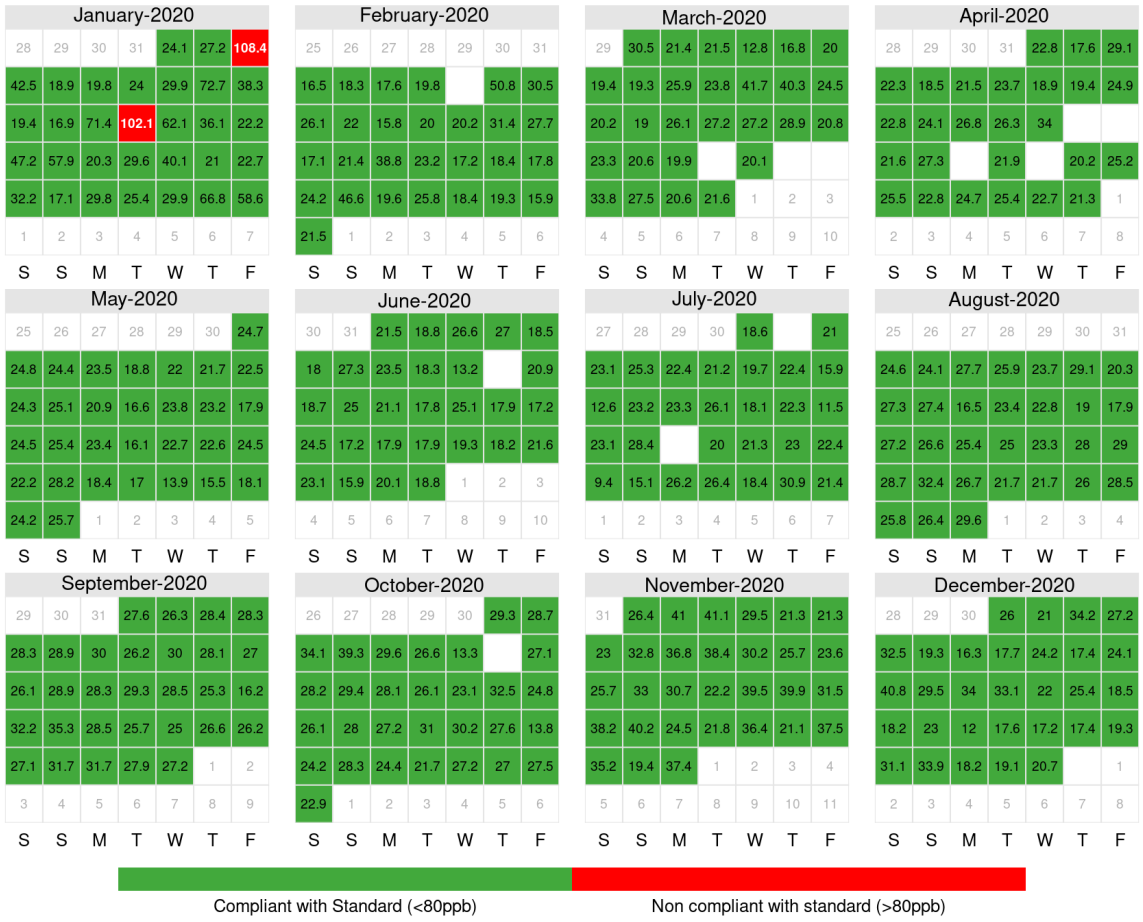


Figure 19: Footscray 4hr O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

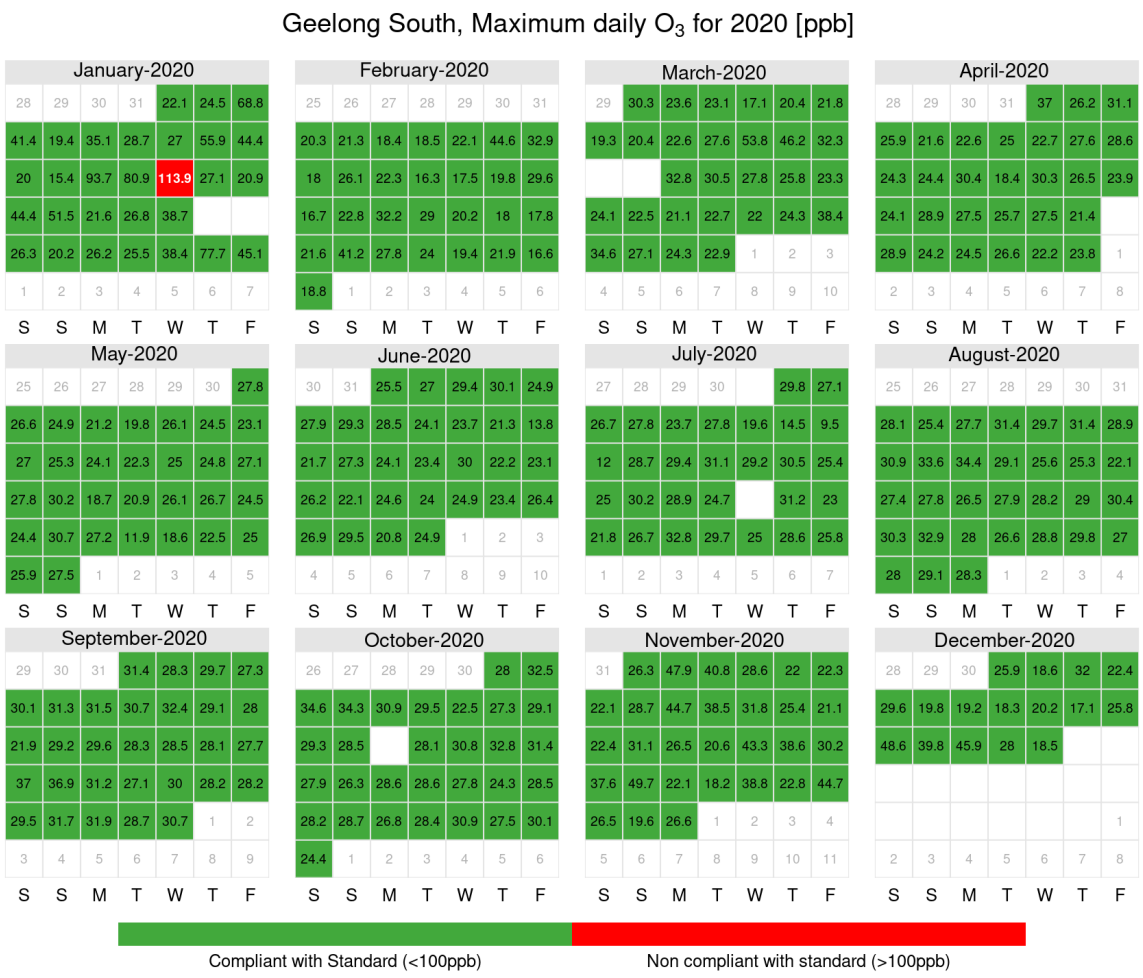


Figure 20: Geelong South O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

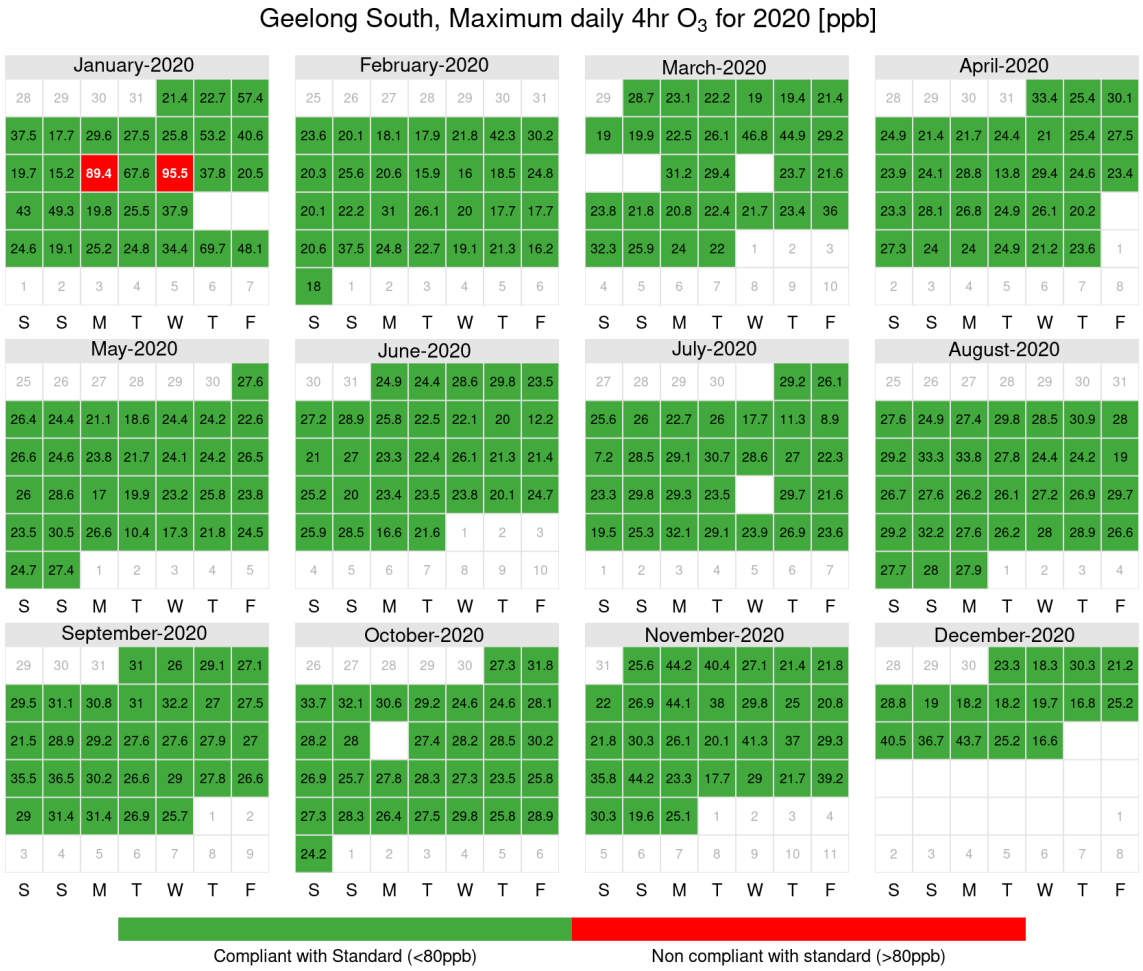


Figure 21: Geelong South 4hr O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

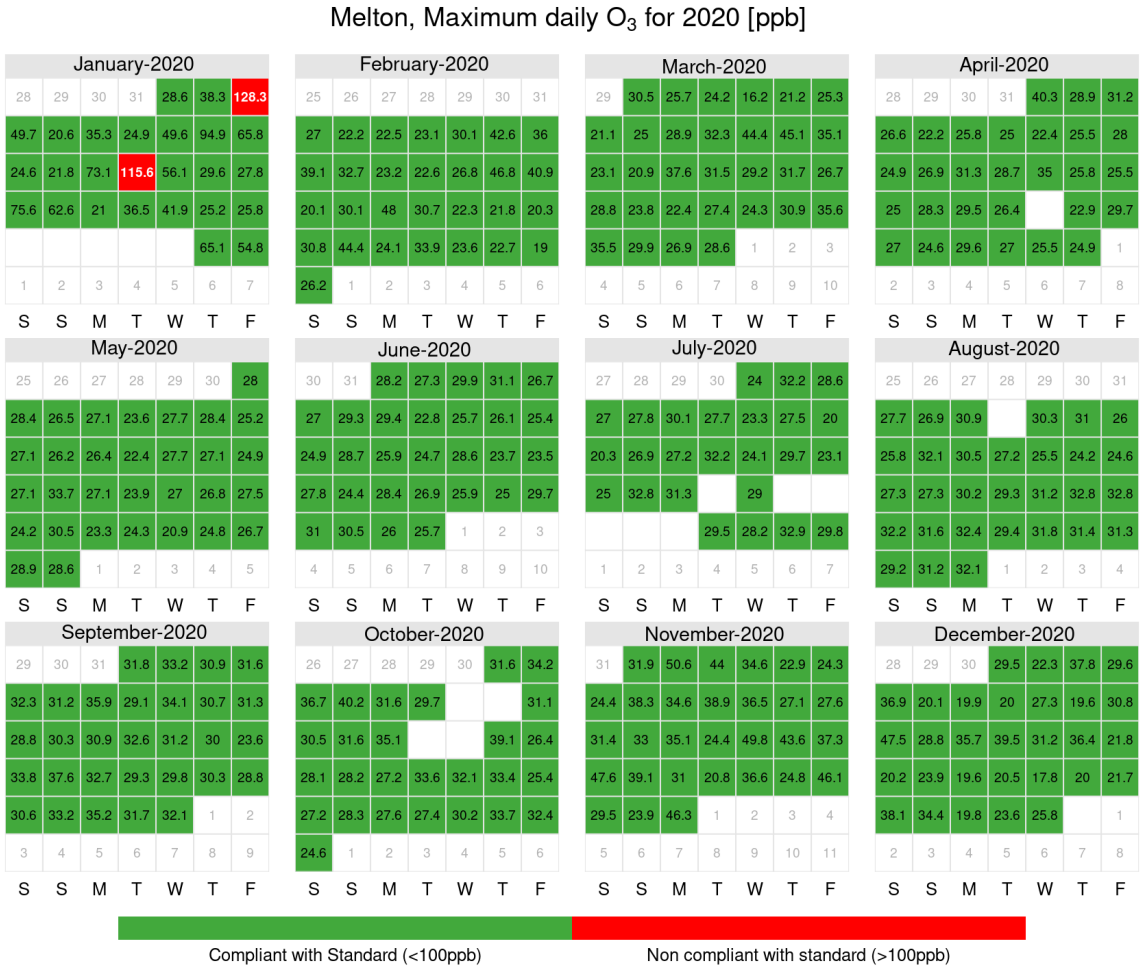


Figure 22: Melton O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

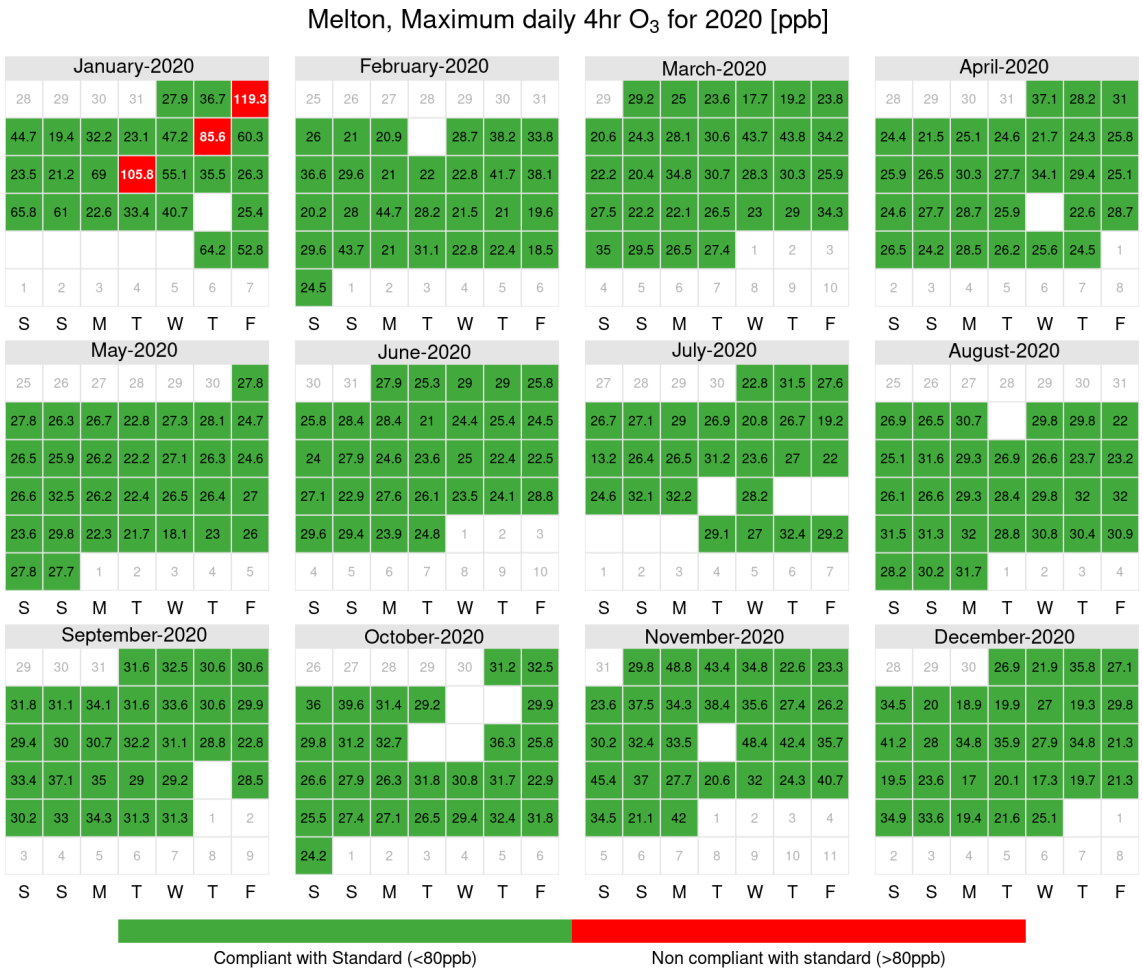


Figure 23: Melton 4hr O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

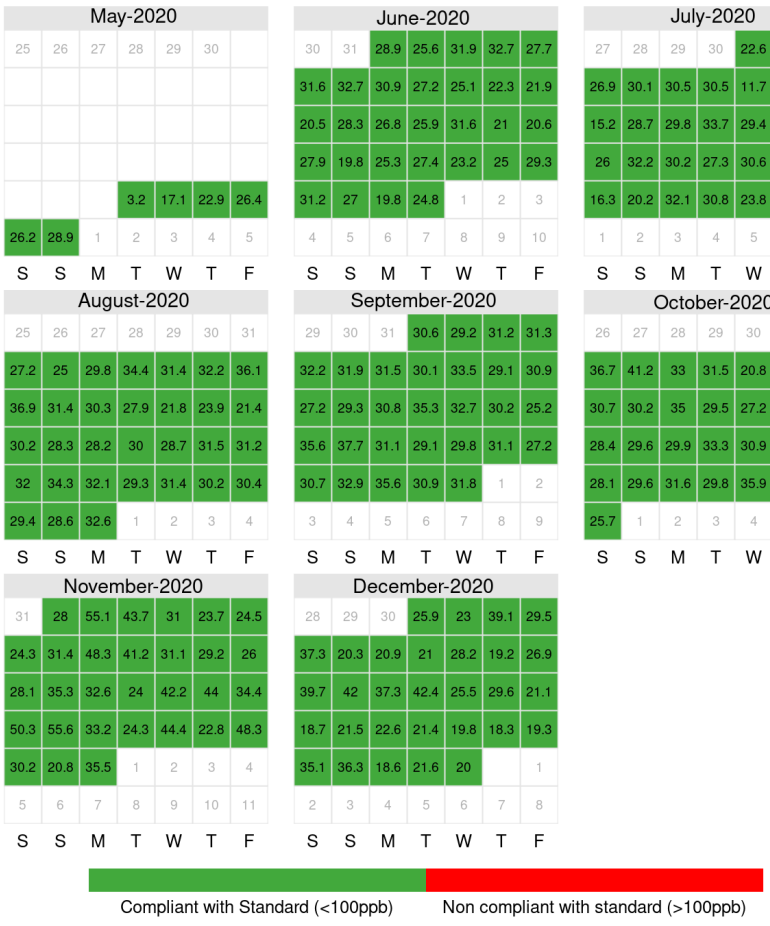


Figure 24: Point Cook O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

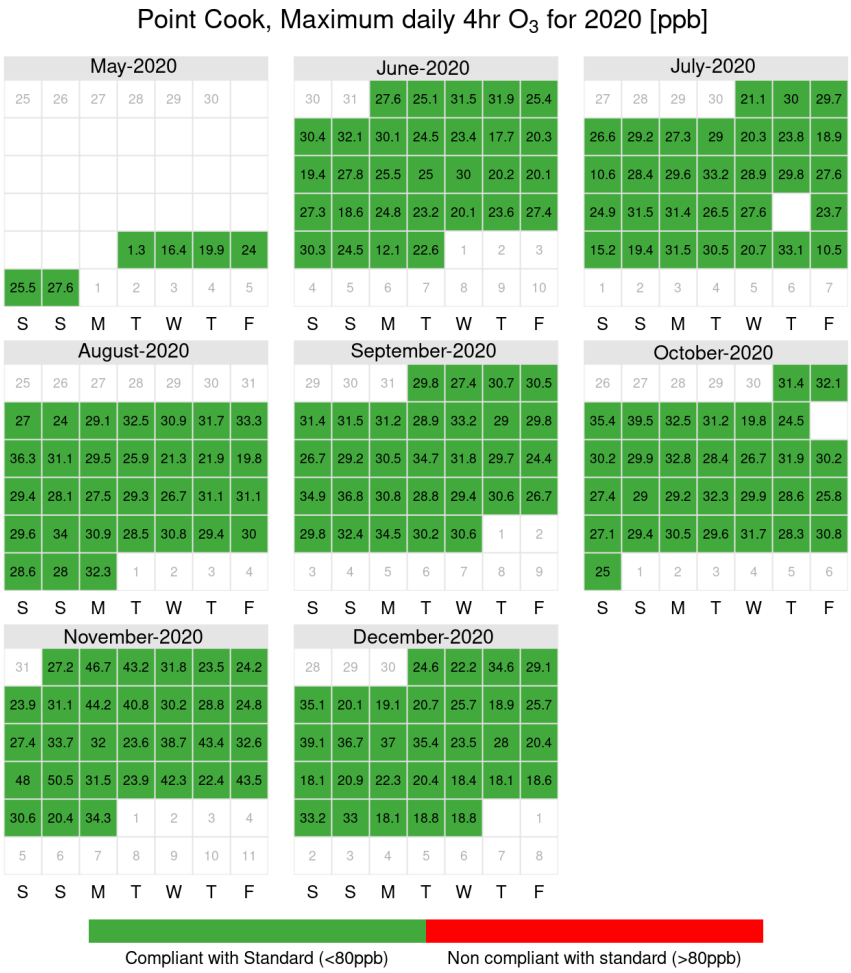


Figure 25: Point Cook 4hr O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

Figure 26: Traralgon O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

Figure 27: Traralgon 4hr O_3 calendar plots showing days where exceedances of the maximum daily standard occurred in ppb

3.6 - Sulfur dioxide (SO_2)

Percentiles of 2020 daily peak concentrations (over an one-hour and daily averaging periods) are provided for sulfur dioxide for each station and standard in Tables 25 and Table 26. Daily peak values are formed only when at least 75 per cent of the data for the day are valid.

There were no exceedances of the sulfur dioxide standard recorded in 2020.

Table 25: 1hr SO_2 percentiles

Monitoring Station	Data availability	1hr SO_2 percentile concentration (ppb)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	84.7	5.3	4.39	3.85	2.76	2.2	1.4	0.8
Altona North	23.22	43.6	41.08	32.98	26.8	19.58	8.7	3.9
Geelong South	80.6	27.4	14.22	8.52	4.45	3.26	1.5	0.6
Traralgon	91.26	30.8	19.21	14.64	9.47	6.84	3.6	1.75

Table 26: daily SO_2 percentiles

Monitoring Station	Data availability	24hr SO_2 percentile concentration (ppb)						
	(% days)	Max	99th	98th	95th	90th	75th	50th
Alphington	84.7	2.45	2.01	1.51	1.13	0.86	0.57	0.33
Altona North	23.22	9.61	9.4	8.02	6.48	4.56	2.43	1.25
Geelong South	80.6	2.64	1.7	1.34	1.06	0.84	0.5	0.28
Traralgon	91.26	5.56	3.23	2.33	2.03	1.47	0.94	0.56

4 - Trend and distribution analysis

4.1 - Particles ($PM_{2.5}$)

Overall trends in $PM_{2.5}$ are generally consistent however there is significant variation in the number of exceedances and higher percentiles depending on events during the year (Table 27 to 31). The number of exceedances and higher percentiles are greater for years were there are significant bushfires like those experienced in 2020. The higher number of exceedances and higher percentiles are not recorded for Alphington due to lack of data as a result of technical problems with the monitor.

Table 27: Alphington $PM_{2.5}$ percentiles

Year	Data availability	Number of Exceedances	$PM_{2.5}$ percentile concentration (µg/m^3)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	76.50	7	35.66	27.89	25.94	19.05	13.52	9.01	6.37
2019	67.67	2	30.65	23.71	18.90	16.23	13.34	9.27	6.58
2018	87.40	8	42.01	29.68	27.23	17.46	13.36	8.79	6.52
2017	92.33	8	35.94	27.75	26.60	20.34	15.76	10.17	7.45
2016	84.15	2	33.62	23.05	22.29	14.53	11.93	8.64	6.24

Table 28: Footscray $PM_{2.5}$ percentiles

Year	Data availability	Number of Exceedances	$PM_{2.5}$ percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	95.90	8	204.50	63.05	29.86	17.59	12.92	8.34	5.79
2019	98.08	4	31.30	23.83	20.43	15.06	12.01	8.66	6.65
2018	88.22	5	31.20	28.32	20.95	15.34	12.52	8.76	6.67
2017	96.44	4	34.77	24.51	20.72	15.53	13.06	9.25	6.75
2016	93.17	2	25.87	19.65	14.60	12.88	11.11	8.41	6.18

Table 29: Geelong South $PM_{2.5}$ percentiles

Year	Data availability	Number of Exceedances	$PM_{2.5}$ percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	86.07	6	155.05	66.48	23.39	15.01	11.71	7.78	5.50
2019	95.62	1	32.68	19.28	16.97	12.85	10.48	7.51	5.53
2018	86.58	1	31.03	21.87	18.43	13.66	10.16	7.70	5.57
2017	83.01	2	26.80	22.27	18.23	13.52	10.89	8.50	6.42
2016	36.34	0	13.53	11.98	10.66	9.69	8.41	6.72	5.24

Table 30: Melbourne CBD $PM_{2.5}$ percentiles

Year	Data availability	Number of Exceedances	$PM_{2.5}$ percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	96.99	10	196.31	69.19	26.92	18.54	12.81	7.67	5.28
2019	93.70	2	27.95	21.59	19.07	14.20	12.35	8.22	5.81
2018	94.79	7	42.14	32.43	23.97	17.07	12.79	9.07	6.81
2017	62.19	3	28.66	26.54	23.74	17.92	13.34	9.62	7.13

Table 31: Traralgon $PM_{2.5}$ percentiles

Year	Data availability	Number of Exceedances	$PM_{2.5}$ percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	89.07	5	236.00	31.42	23.29	18.49	14.49	9.94	6.74
2019	95.07	8	37.40	31.42	26.15	19.23	14.87	10.73	7.48
2018	87.12	2	30.08	23.21	22.26	17.75	13.39	9.66	6.86
2017	86.85	5	32.26	27.98	21.98	18.34	14.85	9.84	7.19
2016	94.81	1	25.69	22.89	20.64	15.63	12.47	9.31	6.91

4.2 - Population exposure ($PM_{2.5}$)

In order to estimate concentrations where there are no EPA air monitoring stations, modelled concentrations of $PM_{2.5}$ are used. This has been carried out using the CSIRO Air Quality Forecasting (AQFx) system. The modelling results as shown in Figure 28 and Figure 29 show that the highest levels and impacts from the bushfires which occurred in eastern Victoria.

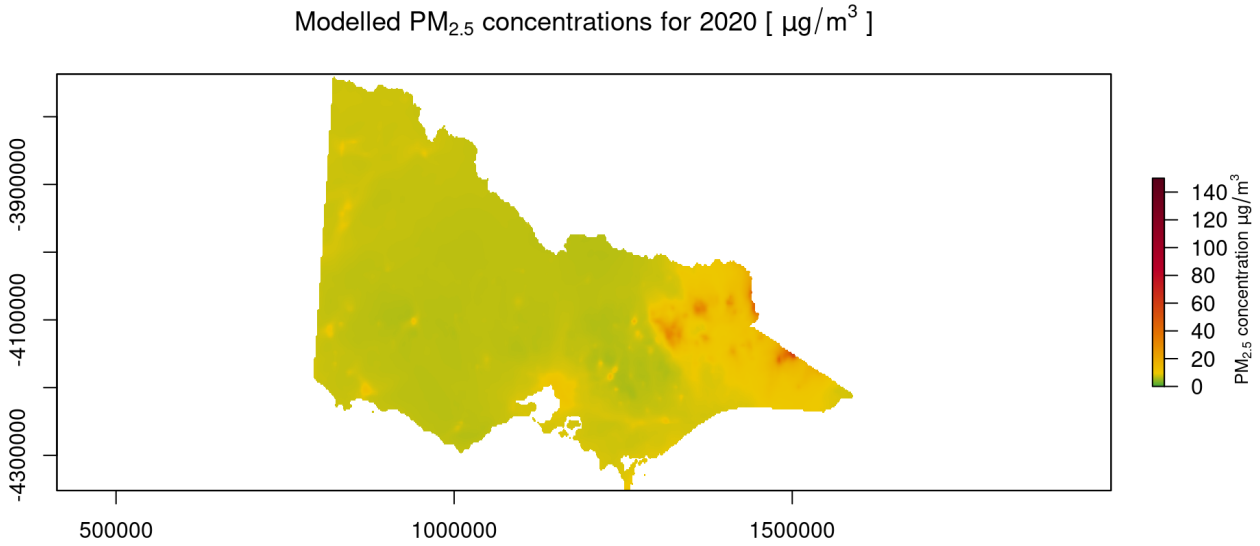


Figure 28: Modelled $PM_{2.5}$ annual average concentration ($\mu g/m^3$) for 2020

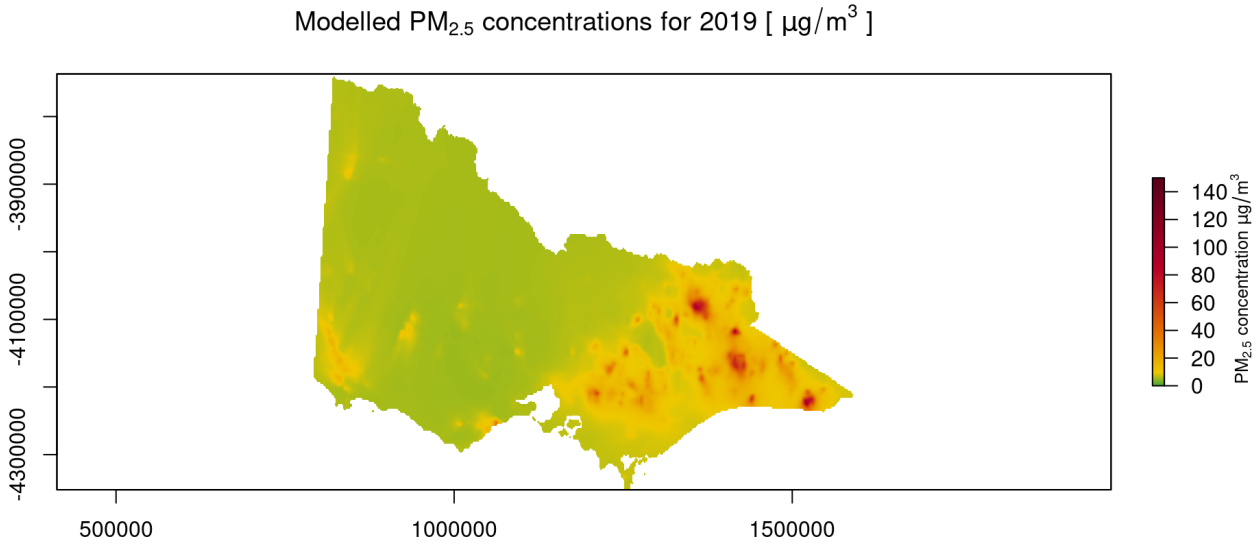


Figure 29: Modelled $PM_{2.5}$ annual average concentration ($\mu g/m^3$) for 2019

The modelling results in combination with corresponding population data were used to determine the population weighted concentration. A population weighted concentration gives greater weight to modelled concentrations that occur near or in population centres. The model was first used by the Bureau of Meteorology in May 2018. The first year with a full year of modelling was 2019.

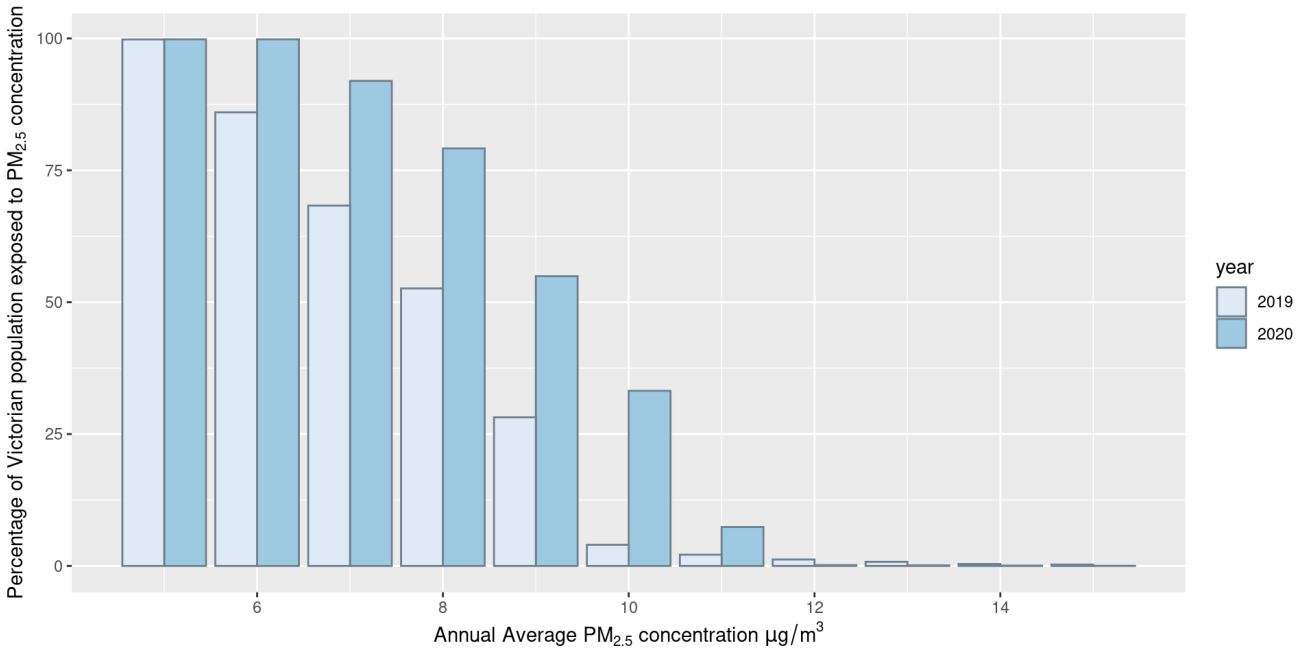
The modelled mean $PM_{2.5}$ shows that bushfires and land burns can have significant impact on annual $PM_{2.5}$ concentrations. These data were weighted against population data collected during the 2016 census to calculate a population weighted annual concentration of 7.1 $\mu g/m^3$ for Victoria in 2020.

As shown in Table 32, the model also estimated that approximately 79.2 per cent of the Victorian population may have experienced an annual mean concentration of 8 $\mu g/m^3$ or greater in 2020 compared to 52.6 per cent in 2019. In 2020 54.9 may have experienced a concentration of 9 $\mu g/m^3$ or greater compared to 28.2 per cent in 2019.

Table 32: Percentage of population exposed to $PM_{2.5}$ concentrations ($\mu g/m^3$)

Year	Percentage of population exposed to $PM_{2.5}$ concentrations ($\mu g/m^3$)

Year	Percentage of population exposed to $PM_{2.5}$ concentrations ($\mu g/m^3$)															
	5	6	7	8	9	10	11	12	13	14	15	20	25	30	35	40
2020	99.829	99.829	91.942	79.151	54.932	33.198	7.382	0.158	0.121	0.071	0.028	0.006	0.003	0.001	0.001	0.000
2019	99.807	85.991	68.310	52.614	28.180	4.004	2.129	1.227	0.784	0.365	0.263	0.112	0.048	0.024	0.014	0.005



4.3 - Particles (PM_{10})

Overall trends in PM_{10} as shown in Tables 33 to 38 are generally consistent from year to year, however there can be significant variation in the number of exceedances and higher percentiles depending on events during the year. The number of exceedances and higher percentiles are greater for years where there are significant bushfires like those experienced in 2020.

Table 33: Alphington PM_{10} percentiles

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	92.35	7	226.48	68.99	48.01	37.08	28.96	21.98	16.22
2019	95.34	5	69.81	55.26	45.29	37.27	31.98	23.08	16.80
2018	90.96	3	73.99	47.44	46.25	38.33	31.07	22.56	17.34
2017	95.89	0	41.08	32.51	31.22	27.27	24.09	20.00	15.83
2016	94.54	0	37.94	34.23	31.35	27.49	24.21	18.58	14.05

Table 34: Dandenong PM_{10} percentiles

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	91.26	9	259.12	87.27	62.22	37.08	29.81	23.21	17.57
2019	94.52	9	144.03	78.72	56.55	40.81	35.45	26.27	18.24
2018	95.89	3	89.74	47.63	40.59	33.51	28.95	24.08	17.37
2017	23.29	0	37.53	35.29	34.13	29.92	28.00	22.60	16.69

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2016	72.13	0	41.78	38.86	34.65	31.81	27.27	20.69	14.47

Table 35: Footscray PM_{10} percentiles

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	87.43	1	50.95	36.12	35.46	31.24	25.93	20.96	15.45
2019	79.73	7	66.92	52.89	51.18	39.85	33.19	24.30	17.38
2018	95.89	1	58.77	46.15	42.31	35.06	29.54	23.44	17.19
2017	91.23	0	49.83	39.53	36.59	30.99	28.09	23.04	17.40
2016	94.26	0	42.66	37.88	35.11	30.05	25.97	20.24	14.18

Table 36: Geelong South PM_{10} percentiles

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	69.40	6	199.41	143.66	61.38	40.11	32.17	25.35	17.96
2019	88.49	11	101.51	70.42	63.85	45.75	36.86	24.16	17.20
2018	93.70	6	97.08	70.13	46.71	41.49	33.85	25.03	17.52
2017	81.10	3	73.73	44.33	39.57	32.41	29.61	22.82	16.43
2016	93.17	5	68.35	57.22	47.29	37.36	30.42	21.94	15.89

Table 37: Mooroolbark PM_{10} percentiles

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	89.07	4	76.06	51.00	38.43	31.01	23.41	18.40	13.91
2019	97.53	4	75.10	49.98	42.61	35.02	30.46	21.57	15.14
2018	95.62	1	111.25	34.65	33.69	29.16	25.31	20.22	15.24
2017	96.16	2	55.45	36.35	31.25	24.49	21.60	18.54	14.39
2016	95.36	0	44.68	32.48	29.70	26.33	22.49	17.43	12.53

Table 38: Traralgon PM_{10} percentiles

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	90.71	9	236.31	156.55	62.43	32.88	27.07	22.70	17.22
2019	95.07	5	77.99	52.84	46.31	35.91	29.42	22.88	16.70
2018	95.62	0	50.08	34.09	28.49	25.91	22.87	18.85	14.82

Year	Data availability	Number of Exceedances	PM_{10} percentile concentration ($\mu g/m^3$)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2017	91.78	0	42.83	32.17	28.44	24.57	21.75	17.98	14.70
2016	97.54	0	49.19	36.07	30.26	25.45	21.88	17.45	14.02

4.4 - Carbon monoxide (CO)

Overall trends in carbon monoxide as shown in Tables 39 to 42 are generally consistent from year to year, however there can be significant variation in the number of exceedances and higher percentiles depending on events during the year. The number of exceedances and higher percentiles are greater for years where there are significant bushfires like those experienced in 2020.

Table 39: Alphington 8hr CO percentiles

Year	Data availability	Number of Exceedances	CO percentile concentration (ppm)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	88.52	0	2.25	1.35	1.21	0.99	0.74	0.41	0.22
2019	86.03	0	1.17	0.84	0.73	0.61	0.47	0.35	0.23
2018	92.88	0	1.71	1.27	1.11	0.87	0.70	0.41	0.27
2017	93.15	0	1.49	1.37	1.24	1.12	0.88	0.43	0.31
2016	88.80	0	2.01	1.32	1.18	0.94	0.78	0.49	0.33

Table 40: Footscray 8hr CO percentiles

Year	Data availability	Number of Exceedances	CO percentile concentration (ppm)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	92.62	0	2.84	1.30	1.19	0.68	0.49	0.29	0.20
2019	85.21	0	1.11	0.67	0.60	0.47	0.36	0.26	0.18
2018	86.30	0	0.97	0.71	0.64	0.59	0.47	0.29	0.18
2017	91.23	0	1.11	0.91	0.81	0.60	0.47	0.30	0.19
2016	90.44	0	1.35	0.72	0.66	0.55	0.46	0.28	0.18

Table 41: Geelong South 8hr CO percentiles

Year	Data availability	Number of Exceedances	CO percentile concentration (ppm)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	87.98	0	3.04	1.55	0.87	0.62	0.47	0.26	0.19
2019	92.88	0	1.46	0.85	0.71	0.49	0.31	0.22	0.15
2018	81.92	0	1.07	0.81	0.73	0.58	0.44	0.26	0.18
2017	92.33	0	1.01	0.92	0.79	0.48	0.40	0.27	0.19
2016	86.34	0	1.72	0.84	0.80	0.59	0.38	0.25	0.17

Table 42: Traralgon 8hr CO percentiles

Year	Data availability	Number of Exceedances	CO percentile concentration (ppm)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	87.16	0	4.94	2.59	1.24	0.87	0.69	0.49	0.22
2019	90.14	0	1.19	0.96	0.87	0.62	0.54	0.35	0.21
2018	96.16	0	1.23	0.76	0.72	0.65	0.51	0.31	0.19
2017	88.77	0	1.14	0.91	0.84	0.77	0.61	0.37	0.24
2016	95.08	0	1.06	0.76	0.73	0.61	0.52	0.39	0.21

4.5 - Nitrogen dioxide (NO_2)

Overall trends in nitrogen dioxide concentrations as shown in Tables 43 to 46 are generally consistent from year to year.

Table 43: Alphington NO_2 percentiles

Year	Data availability	Number of Exceedances	NO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	95.08	0	51.5	34.76	32.54	31.46	29.10	23.52	17.10
2019	94.25	0	42.4	37.30	34.67	31.88	29.71	24.80	19.05
2018	96.71	0	50.0	39.48	36.00	33.40	31.00	26.00	20.00
2017	92.60	0	57.0	38.26	36.00	33.00	31.00	27.00	20.00
2016	91.53	0	43.0	37.66	36.00	31.00	28.60	23.00	18.00

Table 44: Footscray NO_2 percentiles

Year	Data availability	Number of Exceedances	NO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	97.81	0	64.8	39.53	37.84	35.23	32.43	26.67	19.20
2019	97.81	0	49.1	43.52	41.64	36.70	32.54	27.90	21.70
2018	98.63	0	46.0	40.64	38.00	35.05	32.00	27.00	21.00
2017	92.88	0	50.0	47.24	42.48	39.00	35.20	29.00	23.00
2016	95.08	0	52.0	41.24	37.81	35.00	32.33	25.63	20.05

Table 45: Geelong South NO_2 percentiles

Year	Data availability	Number of Exceedances	NO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	93.44	0	52.8	41.79	35.12	28.40	25.99	21.17	13.85
2019	95.62	0	38.2	34.51	31.34	29.04	25.30	21.20	13.90
2018	88.22	0	51.0	37.58	34.00	29.95	26.00	19.00	14.00
2017	94.79	0	42.0	37.75	34.00	30.00	27.00	21.00	15.00
2016	95.63	0	44.1	36.60	30.95	28.17	25.03	20.60	14.00

Table 46: Traralgon NO_2 percentiles

Year	Data availability	Number of Exceedances	NO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	92.90	0	32.0	27.86	26.84	25.01	22.90	18.45	12.65
2019	87.67	0	34.7	33.58	31.57	28.71	24.61	19.83	14.05
2018	96.99	0	53.0	31.00	30.00	27.00	25.00	20.00	12.00
2017	90.68	0	34.0	31.00	30.00	27.00	24.00	20.00	13.00
2016	86.61	0	36.0	32.84	30.00	27.00	24.00	20.00	14.00

4.6 - Ozone (O_3)

Overall trends in ozone concentrations as shown in Tables 47 to 60 are generally consistent from year to year, however there can be significant variation in the number of exceedances and higher percentiles, depending on pollution events during the year. The number of exceedances and higher percentiles are greater for years where there are significant bushfires like those experienced in 2020. This is due to the emissions of chemicals in smoke which can lead to the formation of ozone. The hotter conditions typically associated with major bushfires are also more conducive to ozone formation.

Table 47: Alphington O_3 percentiles

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	94.81	1	129.2	74.13	65.40	47.24	37.76	30.75	25.90
2019	97.53	1	109.4	69.27	58.15	52.47	43.40	31.72	26.85
2018	97.81	0	80.9	59.00	54.88	49.00	43.00	32.10	28.00
2017	85.75	0	73.0	60.88	57.00	50.00	40.00	30.00	25.00
2016	96.45	0	66.0	58.48	53.96	47.40	37.00	28.00	22.00

Table 48: Dandenong O_3 percentiles

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	98.09	1	110.9	74.79	55.29	43.11	36.74	30.50	26.4
2019	95.62	1	109.7	68.92	59.60	50.76	43.70	30.90	26.7
2018	97.26	0	93.6	59.92	51.92	45.30	41.00	31.65	27.0
2017	46.85	0	69.0	66.60	61.60	58.00	53.00	41.50	31.0
2016	41.80	0	60.0	58.14	56.96	53.40	46.00	36.00	26.3

Table 49: Footscray O_3 percentiles

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99^{th}	98^{th}	95^{th}	90^{th}	75^{th}	50^{th}
2020	98.09	2	117.1	72.78	62.64	43.73	35.52	29.15	25.70

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2019	91.23	0	87.8	67.70	60.72	50.28	42.48	30.90	26.00
2018	49.86	0	88.8	70.14	62.52	52.19	47.90	38.00	30.00
2017	98.08	0	79.0	63.00	56.72	51.00	43.30	31.00	27.00
2016	64.48	0	65.3	55.26	52.40	44.23	40.05	30.30	23.55

Table 50: Geelong South O_3 percentiles

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	93.72	1	113.9	73.96	51.87	44.40	35.0	29.90	27.1
2019	96.16	0	75.8	64.15	59.30	49.10	38.3	30.40	26.9
2018	86.58	0	69.0	61.25	51.40	45.50	39.0	31.23	28.0
2017	97.26	0	67.0	58.00	56.92	48.00	42.0	32.00	29.0
2016	98.09	0	56.0	52.13	47.84	42.82	35.2	28.30	25.4

Table 51: Melton O_3 percentiles

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	95.08	2	128.3	74.42	62.75	46.62	38.48	32.12	28.7
2019	96.99	0	76.3	69.62	64.28	51.51	47.47	34.38	29.6
2018	98.63	0	85.0	63.23	55.82	48.16	41.80	34.00	30.0
2017	44.38	0	73.0	70.39	68.00	63.95	55.00	46.00	33.0
2016	48.36	0	70.0	62.20	58.48	52.00	46.00	38.00	28.0

Table 52: Point Cook O_3 percentiles

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	59.56	0	55.6	49.96	46.97	41.32	35.96	32.08	29.8
2019	75.62	0	67.3	65.17	63.05	53.12	44.10	32.20	28.7
2018	98.08	0	81.7	66.00	57.00	48.00	41.00	33.00	30.0
2017	46.58	0	80.0	66.41	62.24	57.55	52.00	41.00	29.0
2016	54.64	0	66.0	61.04	59.00	49.10	43.10	33.00	26.0

Table 53: Traralgon O_3 percentiles

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th

Year	Data availability	Number of Exceedances	1hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	89.89	1	107.5	70.79	56.07	40.94	35.80	29.80	25.50
2019	95.34	0	88.9	66.16	60.25	51.96	43.03	30.90	26.55
2018	50.96	0	67.0	54.45	52.86	47.67	42.00	33.88	27.20
2017	97.81	0	64.0	52.44	48.88	43.00	38.00	30.00	26.00
2016	90.16	0	63.0	50.97	43.42	38.00	33.00	28.00	25.00

Table 54: Alphington 4hr O_3 percentiles

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	92.90	1	119.15	71.57	59.18	43.09	36.14	29.41	24.89
2019	94.25	1	96.80	60.08	54.30	49.11	41.45	30.17	25.37
2018	95.62	0	75.75	54.04	50.59	45.23	38.80	30.78	26.50
2017	83.84	0	67.00	55.50	53.95	47.81	39.12	28.00	24.00
2016	94.54	0	58.25	51.94	50.30	43.75	35.12	26.75	21.67

Table 55: Dandenong 4hr O_3 percentiles

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	96.99	2	98.00	69.13	50.81	39.82	34.27	29.86	25.20
2019	94.52	1	102.33	59.68	56.94	48.83	42.11	29.90	25.33
2018	96.44	1	82.92	56.23	49.50	43.19	38.59	30.33	26.00
2017	46.03	0	64.00	59.00	57.25	53.75	50.90	38.54	29.38
2016	41.26	0	56.50	55.25	53.67	49.06	43.00	33.25	24.65

Table 56: Footscray 4hr O_3 percentiles

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	96.45	2	108.38	68.98	57.61	40.14	34.00	28.27	24.27
2019	84.66	0	77.50	60.53	55.75	47.88	40.24	29.22	24.65
2018	49.86	1	82.17	66.69	58.85	49.47	43.98	35.75	28.25
2017	96.44	0	67.00	58.35	50.75	45.86	39.93	29.75	25.75
2016	63.11	0	52.92	50.85	48.28	41.94	38.17	28.41	22.50

Table 57: Geelong South 4hr O_3 percentiles

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	93.44	2	95.50	63.42	48.29	40.60	33.67	28.95	25.89
2019	94.79	0	69.53	57.73	54.04	45.26	36.81	29.57	25.98
2018	84.38	0	67.25	50.44	47.75	41.63	35.83	30.69	27.12
2017	95.07	0	61.00	56.31	52.00	46.02	39.75	31.00	28.00
2016	97.54	0	51.02	47.22	44.16	38.16	32.32	27.25	24.27

Table 58: Melton 4hr O_3 percentiles

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	93.99	3	119.35	67.63	60.43	43.69	36.67	31.61	27.86
2019	96.16	0	66.25	59.66	57.27	49.50	43.63	32.73	28.72
2018	97.81	0	72.00	56.91	51.85	47.00	40.05	32.50	29.00
2017	44.38	0	66.50	64.17	61.70	59.06	51.65	43.62	31.75
2016	48.09	0	58.25	56.81	52.75	49.38	43.25	35.54	26.62

Table 59: Point Cook 4hr O_3 percentiles

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	59.29	0	50.55	46.30	43.44	38.78	34.58	31.38	29.02
2019	74.79	0	63.20	58.62	57.03	49.79	41.02	30.67	27.82
2018	97.26	0	71.10	61.61	53.78	44.08	38.40	32.00	28.50
2017	46.30	0	70.50	61.67	56.25	55.05	48.55	37.50	28.25
2016	54.37	0	57.00	56.76	55.06	46.00	40.35	32.12	25.50

Table 60: Traralgon 4hr O_3 percentiles

Year	Data availability	Number of Exceedances	4hr O_3 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	88.52	1	101.55	62.56	50.80	38.43	33.08	28.44	24.36
2019	94.79	0	75.50	61.29	55.68	48.59	38.88	28.96	24.76
2018	50.96	0	61.25	51.98	50.27	41.73	39.12	31.56	25.62
2017	97.81	0	55.50	48.57	44.97	40.35	35.25	28.67	24.75
2016	89.89	0	58.70	47.18	40.80	35.40	30.80	27.00	23.50

4.7 - Sulfur dioxide (SO_2)

Overall trends in sulfur dioxide as shown in Tables 61 to 68 are generally consistent from year to year, with most NEPM stations recording values close to the instruments' limit of detection. Stations such as Altona North, Geelong South and Traralgon are situated near major industrial sources, and show that there is ongoing variation in sulfur dioxide concentrations between years.

Table 61: Alphington SO_2 percentiles

Year	Data availability	Number of Exceedances	1hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	84.70	0	5.3	4.39	3.85	2.76	2.20	1.4	0.8
2019	90.14	0	10.2	6.17	5.38	3.96	3.22	2.1	1.2
2018	96.99	0	13.0	7.19	6.94	5.00	3.00	2.0	1.0
2017	95.62	0	11.0	6.00	5.04	5.00	4.00	2.0	1.0
2016	91.80	0	9.0	7.65	7.00	5.00	4.00	2.0	1.0

Table 62: Altona SO_2 percentiles

Year	Data availability	Number of Exceedances	1hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	23.22	0	43.6	41.08	32.98	26.80	19.58	8.70	3.9
2019	47.95	0	35.1	30.14	28.30	25.23	20.84	10.65	4.3
2018	84.93	0	53.0	36.82	34.00	28.55	19.00	11.00	4.0
2017	94.79	0	49.0	37.75	34.00	25.00	18.50	10.00	4.0
2016	92.62	0	44.0	38.00	32.00	24.00	19.00	7.50	3.0

Table 63: Geelong South SO_2 percentiles

Year	Data availability	Number of Exceedances	1hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	80.60	0	27.4	14.22	8.52	4.45	3.26	1.5	0.6
2019	94.25	0	47.1	26.54	17.80	9.85	5.54	2.2	0.7
2018	89.86	0	29.0	12.46	9.14	7.00	5.00	2.0	1.0
2017	94.52	0	17.0	10.56	8.00	5.00	3.00	2.0	1.0
2016	79.23	0	10.1	7.11	6.44	5.30	4.12	2.3	1.0

Table 64: Traralgon SO_2 percentiles

Year	Data availability	Number of Exceedances	1hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	91.26	0	30.8	19.21	14.64	9.47	6.84	3.6	1.75
2019	93.15	0	49.9	30.47	26.32	15.24	8.71	5.2	2.80
2018	89.59	0	79.0	38.74	21.86	14.00	10.00	4.0	2.00
2017	94.79	0	63.0	35.60	22.20	11.75	9.00	6.0	3.00

Year	Data availability	Number of Exceedances	1hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2016	88.25	0	57.0	22.78	17.12	13.72	10.00	6.0	3.00

Table 65: Alphington daily SO_2 percentiles

Year	Data availability	Number of Exceedances	24hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	84.70	0	2.45	2.01	1.51	1.13	0.86	0.57	0.33
2019	90.14	0	2.10	1.79	1.46	1.21	0.99	0.64	0.37
2018	96.99	0	3.74	1.90	1.52	1.23	1.00	0.57	0.30
2017	95.62	0	2.57	1.79	1.52	1.22	1.00	0.57	0.30
2016	91.80	0	2.26	1.72	1.63	1.14	0.93	0.57	0.26

Table 66: Altona daily SO_2 percentiles

Year	Data availability	Number of Exceedances	24hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	23.22	0	9.61	9.40	8.02	6.48	4.56	2.43	1.25
2019	47.95	0	7.76	7.09	6.31	4.55	3.01	1.88	1.10
2018	84.93	0	14.91	9.39	8.76	5.42	3.17	1.86	1.02
2017	94.79	0	13.65	8.24	7.10	4.51	3.41	1.91	1.00
2016	92.62	0	13.04	7.94	6.21	4.00	3.05	1.54	0.74

Table 67: Geelong South daily SO_2 percentiles

Year	Data availability	Number of Exceedances	24hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	80.60	0	2.64	1.70	1.34	1.06	0.84	0.50	0.28
2019	94.25	0	5.09	3.00	2.36	1.58	1.02	0.57	0.21
2018	89.86	0	3.48	2.27	2.04	1.55	1.11	0.69	0.27
2017	94.52	0	2.30	1.81	1.57	1.17	0.91	0.61	0.17
2016	79.23	0	1.99	1.93	1.64	1.41	0.87	0.59	0.26

Table 68: Traralgon daily SO_2 percentiles

Year	Data availability	Number of Exceedances	24hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2020	91.26	0	5.56	3.23	2.33	2.03	1.47	0.94	0.56
2019	93.15	0	8.44	4.25	3.19	2.59	1.85	1.20	0.64
2018	89.59	0	9.57	4.66	3.02	2.12	1.61	0.98	0.48

Year	Data availability	Number of Exceedances	24hr SO_2 percentile concentration (ppb)						
	(% days)	(days)	Max	99th	98th	95th	90th	75th	50th
2017	94.79	0	15.09	6.05	3.63	2.47	2.04	1.35	0.65
2016	88.25	0	6.35	4.72	4.03	2.90	2.26	1.39	0.87

EPA acknowledges Aboriginal people as the first peoples and Traditional custodians of the land and water on which we live, work and depend. We pay respect to Aboriginal Elders, past and present. As Victoria's environmental regulator, we pay respect to how Country has been protected and cared for by Aboriginal people over many tens of thousands of years. We acknowledge the unique spiritual and cultural significance of land, water and all that is in the environment to Traditional Owners, and recognise their continuing connection to, and aspirations for Country.

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