ACT AIR QUALITY REPORT 2022

Environment Protection Authority | June 2023

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# LIST OF DEFINITIONS AND ABBREVIATIONS

| **Term** | **Definition** |
| --- | --- |
| AAQ NEPM | National Environment Protection (Ambient Air Quality) Measure |
| ACT | Australian Capital Territory |
| CO | Carbon Monoxide |
| BAM | Beta Attenuation Monitor |
| Exceptional event | Exceptional event means a fire or dust occurrence that adversely affects air quality at a particular location and causes an exceedance of one (1) day average standards in excess of normal historical fluctuations and background levels and is directly related to: bushfire; jurisdiction authorised hazard reduction burning; or continental scale windblown dust |
| NATA | National Association of Testing Authorities |
| ND | Not Demonstrated |
| NO2 | Nitrogen Dioxide |
| O3 | Ozone |
| PMS | Performance Monitoring Station |
| PM2.5 | Particles with an equivalent aerodynamic diameter less than or equal to 2.5 micrometres |
| PM10 | Particles with an equivalent aerodynamic diameter less than or equal to 10 micrometres |
| ppm | Parts per million by volume – parts of pollutant per million parts of air |
| Q | Quarter (e.g. Q1 means the first quarter of the year) |
| SO2 | Sulfur Dioxide |
| µg/m3 | micrograms per cubic metre |
|  |  |
|  |  |

# OVERVIEW

The ACT Air Quality Report 2022 (‘the Report’) presents the results of ambient air quality monitoring in the ACT for 2022 and assesses the results in accordance with the requirements of the National Environment Protection (Ambient Air Quality) Measure[[1]](#footnote-1) (AAQ NEPM) made by the National Environment Protection Council on 26 June 1998.

Air quality in this Report is assessed against the revised AAQ NEPM standards shown in Table 3. In accordance with its agreed policy position, the ACT assesses its compliance for the annual average for particulate matter less than 10 microns (PM10) against a lower standard of an annual average of 20 μg/m3 rather than the 25 μg/m3 standard. This means that it is reporting against a more stringent target than in the published national standard.

The ACT monitors four of the six NEPM pollutants:

* carbon monoxide (CO)
* nitrogen dioxide (NO2)
* photochemical oxidants as ozone (O3)
* particulate matter (as PM10, particles less than or equal to 10 microns in diameter and PM2.5, particles less than or equal to 2.5 microns in diameter).

The ACT does not monitor sulfur dioxide (SO2) as it is primarily an industrial pollutant and the ACT does not have much heavy industry. In 2002, lead monitoring ceased with the phase out of leaded petrol.

A summary of the 2022 Report is:

* The ACT experienced the best air quality on record in 2022, with no exceedances of any of the AAQ NEPM standards at any of the ACT’s monitoring stations;
* The daily PM2.5 standard was not exceeded for the first time since 2004 due to the wet weather in 2022; and
* Annual average levels for particulate matters (PM10 and PM2.5) were at the lowest levels experienced in the past 10 years.

# MONITORING SUMMARY

## Performance Monitoring Stations

The ACT Government has been undertaking ambient air quality monitoring in Canberra since the early 1990’s. The Health Directorate is responsible for the Government’s ambient air quality monitoring network. The Environment Protection Authority within the Chief Minister, Treasury and Economic Development Directorate is responsible for annual reporting under the AAQ NEPM.

The ACT monitoring network consists of three monitoring stations located at:

* Monash – approximately 300 metres west of Cockcroft Avenue in open urban space area;
* Civic – at the northern end of the carpark on the western side of the Olympic swimming pool adjacent to Allara Street; and
* Florey – at the end of Neumann Place, on public land.

The compliance and non-compliance criteria for the monitoring stations against the siting standard AS/NZS 3580.1.1:2016 are listed in Table 1 below.

Table 1: Summary of stations’ siting compliance with AS 3580.1.1:2016

| **Station** | **Height above ground** | **Minimum distance to support structure** | **Clear sky angle of 120°** | **Unrestricted airflow of 270°/360°** | **20m from trees** | **No boilers or incinerators nearby** | **Minimum distance from road or traffic** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Monash | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 |
| Civic | 🗹 | 🗷 | 🗷 | 🗷 | 🗷 | 🗹 | 🗹 |
| Florey | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 | 🗹 |

Monash and Florey stations are the ACT’s two performance monitoring stations as per the requirements under Section 14 of the AAQ NEPM and they fully comply with relevant standards.

In addition, the ACT Government carries out key pollutants monitoring at Civic station to better inform the community concerning ambient air quality and support formation of government policy.

The Monash and Florey stations contain instrumentation that continuously monitors carbon monoxide, nitrogen dioxide, ozone and particles as PM10 and PM2.5. Following the establishment of the Florey station on 28 February 2014, the Civic station only monitors selected, key pollutants, including ozone and particles as PM10 and PM2.5.

## Monitoring Methods

The ACT monitoring is conducted in accordance with the relevant Australian Standards as shown in Table 2. Data not meeting the requirements of these Standards are identified as invalid and not included in this Report.

Table 2: Methods used for monitoring AAQ NEPM pollutants

| **Pollutant** | **Standard** | **Title** | **Method Used** |
| --- | --- | --- | --- |
| Carbon monoxide | AS 3580.7.1-2011 | Methods for sampling and analysis of ambient air - Determination of carbon monoxide - Direct-reading instrumental method | Gas filter correlation/  Infrared |
| Nitrogen dioxide | AS 3580.5.1-2011 | Methods for sampling and analysis of ambient air - Determination of oxides of nitrogen - Direct-reading instrumental method | Gas phase  chemiluminescence |
| Photochemical  oxidant (ozone) | AS 3580.6.1-2016 | Methods for sampling and analysis of ambient air - Determination of ozone - Direct-reading instrumental method | Non-dispersive ultraviolet |
| PM10 | AS/NZS 3580.9.11-2016 | Method for sampling and analysis of ambient air Method – Determination of suspended particles matter – PM10 beta attenuation monitors | Beta Attenuation Monitor |
| PM2.5 | AS/NZS 3580.9.12:2013 | Methods for sampling and analysis of ambient air - Method 9.12: Determination of suspended particulate matter - PM2.5 beta attenuation monitors | Beta Attenuation Monitor |

## NATA Accreditation Status

The ACT Government monitoring network is accredited by NATA for the measurement of all AAQ NEPM pollutants except sulfur dioxide and lead as required under Clause 12 of the AAQ NEPM.

# ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOAL

For the purpose of this Report, air quality is assessed against the AAQ NEPM standards as specified in Schedule 2 of the AAQ NEPM and ACT policy position. The standards against which air quality is assessed are concentrations in parts per million (ppm) or micrograms per cubic metre (µg/m3) (refer to Table 3, column 3).

The goal of the AAQ NEPM is to achieve the NEPM standards specified in Schedule 2 of the AAQ NEPM.

Table 3: AAQ NEPM standards in 2022

| **Pollutant** | **Averaging Period** | **NEPM Standard** |
| --- | --- | --- |
| Carbon monoxide | 8 hours | **9.0 ppm** |
| Nitrogen dioxide | 1 hour  1 year | **0.08 ppm**  **0.015 ppm** |
| Photochemical oxidants (as ozone) | 8 hours | **0.065 ppm** |
| Sulfur dioxide | 1 hour  1 day | **0.10 ppm**  **0.02 ppm** |
| Lead | 1 year | **0.50 μg/m3** |
| Particles as PM10 | 1 day  1 year | **50 μg/m3**  **25 μg/m3** |
| Particles as PM2.5 | 1 day  1 year | **25 μg/m3**  **8 μg/m3** |

In accordance with its agreed policy position, the ACT assesses its compliance for the annual average for PM10 against a lower standard of 20 μg/m3 rather than the AAQ NEPM standard of 25 μg/m3. There is an additional goal to further reduce PM2.5 concentrations to below a daily concentration of 20 μg/m3 and an annual concentration of 7 μg/m3 by 2025.

Table 4 to Table 8 summarise compliance with the standards of the AAQ NEPM and ACT policy position. For each pollutant, the data availability (quarterly and annual), the number of days when standards were exceeded, the annual average (where an annual standard exists) and an assessment of compliance, are given for each monitoring station. Although Civic station is not a NEPM performance monitoring station, measured data from this station is included in this Report to better understand ambient air quality in the ACT, especially in the city area.

Air quality is assessed as complying with the AAQ NEPM (i.e. ‘*MET’*) if the maximum recorded concentration is no more than the standard specified in Table 3 and data availability was at least 75 percent in each quarter of the year.

Air quality is assessed as not complying with the AAQ NEPM (i.e. ‘*NOT MET’*) if the maximum recorded concentration is more than the standard specified in Table 3.

Air quality is assessed as ‘*NOT DEMONSTRATED’* (i.e. *‘ND’*) if there has been insufficient data collected to demonstrate that the standards and goal have been met or not met.

For the purpose of reporting compliance against PM10 and PM2.5 daily average standards, monitoring data that has been determined as being directly associated with an exceptional event has been excluded in accordance with the AAQ NEPM.

These categories (i.e. MET, NOT MET and ND) are used in Tables 4 to 8 on the following pages.

## Carbon monoxide

During 2022, no exceedances of the carbon monoxide standard were recorded and compliance was demonstrated at Florey. Due to instrument failure, there was insufficient data collected in the second quarter at Monash. As a result, compliance was not demonstrated at Monash.

Table 4: 2022 compliance summary for CO

AAQ NEPM standard - 9.0 ppm (8-hour average)

| **Monitoring station** | **Data availability rates**  **(% of hours)** | | | | | **Number of exceedances**  **(days)** | **NEPM goal compliance** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Q1** | **Q2** | **Q3** | **Q4** | **Annual** |
| Monash  Florey | 89.8  89.8 | 55.4  95.8 | 94.7  95.5 | 94.7  90.3 | 83.7  92.9 | 0  0 | ND  MET |

Figure 1: Daily maximum for CO 8-hour average – Monash

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Figure 2: Daily maximum for CO 8-hour average – Florey

## Nitrogen dioxide

During 2022, no exceedances of the nitrogen dioxide standards were recorded and compliance was demonstrated at Monash and Florey.

The annual average levels remained low and met the standard at Monash and Florey.

Table 5: 2022 compliance summary for NO2

AAQ NEPM standard – 0.08 ppm (1-hour average), 0.015 ppm (1-year average)

| **Monitoring station** | **Data availability rates**  **(% of hours)** | | | | | **1 Hour** | | **1 Year** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q1** | **Q2** | **Q3** | **Q4** | **Annual** | **Number of exceedances** | **NEPM goal compliance** | **Annual average**  **(ppm)** | **NEPM goal compliance** |
| Monash  Florey | 95.8  93.4 | 88.0  93.4 | 95.6  95.5 | 95.7  90.3 | 93.8  92.9 | 0  0 | MET  MET | 0.003 0.004 | MET  MET |

Figure 3: Daily maximum for NO2 1-hour average – Monash

Figure 4: Daily maximum for NO2 1-hour average – Florey

## Ozone

During 2022, no exceedances of the 8-hour standard for ozone were recorded and compliance was demonstrated at all monitoring stations.

Table 6: 2022 compliance summary for O3

AAQ NEPM standard – 0.065 ppm (8-hour average)

| **Monitoring station** | **Data availability rates**  **(% of hours)** | | | | | **Number of exceedances** | **NEPM goal compliance** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Q1** | **Q2** | **Q3** | **Q4** | **Annual** |
| Monash  Civic  Florey | 95.8  95.8  94.4 | 84.0  94.8  95.7 | 95.7  94.7  95.8 | 95.7  95.7  95.7 | 92.8  95.3  95.4 | 0  0  0 | MET  MET  MET |

Figure 5: Daily maximum for O3 8-hour average – Monash

Figure 6: Daily maximum for O3 8-hour average – Civic

Figure 7: Daily maximum for O3 8-hour average – Florey

## PM10

During 2022, no exceedances of the daily PM10 standard were recorded and compliance was demonstrated at all monitoring stations.

The annual average PM10 levels at all stations met the ACT policy position of 20 μg/m3.

Table 7: 2022 compliance summary for PM10

AAQ NEPM standard 50 μg/m3 1-day average, 20 μg/m3 (1-year average)\*

| **Monitoring station** | **Data availability rates**  **(% of days)** | | | | | **1 Day** | | **1 Year** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q1** | **Q2** | **Q3** | **Q4** | **Annual** | **Number of exceedances** | **NEPM goal compliance** | **Annual average**  **(μg/m3)** | **ACT goal compliance** |
| Monash  Civic  Florey | 100  98.9  97.8 | 91.2  97.8  100 | 100  100  97.8 | 95.7  96.7  98.9 | 96.7  98.4  98.6 | 0  0  0 | MET  MET  MET | 7.5  6.6  7.5 | MET  MET  MET |

\* ACT policy position 20 µg/m3 not AAQ NEPM standard of 25 µg/m3 .

Figure 8: Daily maximum for PM10 – Monash

Figure 9: Daily maximum for PM10 – Civic

Figure 10: Daily maximum for PM10 – Florey

## PM2.5

During 2022, no exceedances of the daily PM2.5 standard were recorded and compliance was demonstrated at all monitoring stations.

Annual average PM2.5 data at all stations met the 8 μg/m3 AAQ NEPM standard.

Table 8: 2022 compliance summary for PM2.5

AAQ NEPM standard – 25 μg/m3 (1-day), 8 μg/m3 (1-year)

| **Monitoring station** | **Data availability rates**  **(% of days)** | | | | | **1 Day** | | **1 Year** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q1** | **Q2** | **Q3** | **Q4** | **Annual** | **Number of exceedances\*** | **NEPM goal compliance** | **Annual average**  **(μg/m3)** | **NEPM goal compliance** |
| Monash  Civic  Florey | 98.9  95.6  90.0 | 83.5  93.4  100 | 98.9  100  100 | 89.1  96.7  96.7 | 92.6  96.4  96.7 | 0  0  0 | MET  MET  MET | 5.3  4.1  5.0 | MET  MET  MET |

\* the number excludes exceptional events.

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Figure 11: Daily maximum for PM2.5 – Monash

Figure 12: Daily maximum for PM2.5 – Civic

Figure 13: Daily maximum for PM2.5 – Florey

# ANALYSIS OF AIR QUALITY MONITORING

Annual summary statistics contained in Table 9 to Table 13 below assess air quality against the standards and the extent of compliance with the goal. In each case a result of ‘below the standard’ indicates that compliance is achieved. Instances where the standard has been exceeded are highlighted in bold.

## Carbon monoxide

Carbon monoxide levels are well below the AAQ NEPM standard at all monitoring stations. The highest recorded value in the ACT during 2022 was 1.4 ppm at Monash, which is 16% of the standard.

Table 9: 2022 summary statistics for daily peak 8-hour CO

AAQ NEPM standard - 9.0 ppm (8-hour average)

| **Monitoring station** | **Number of valid days** | **Highest**  **(ppm)** | **Highest**  **(date/time)** |
| --- | --- | --- | --- |
| Monash  Florey | 316  352 | 1.3  1.4 | 19 Jun 04:00  31 Jul 04:00 |

## Nitrogen dioxide

Similar to carbon monoxide, nitrogen dioxide levels are well below the AAQ NEPM standard. The highest recorded 1-hour value during 2022 was 0.030 ppm at Monash, which is only 37.5% of the standard. The highest recorded annual average in 2022 was 0.004 ppm at Florey (refer to Table 5). This is 27% of the annual standard 0.015 ppm.

Table 10: 2022 summary statistics for daily peak 1-hour NO2

AAQ NEPM standard 0.08 ppm (1-hour average)

| **Monitoring station** | **Number of valid days** | **Highest**  **(ppm)** | **Highest**  **(date/time)** |
| --- | --- | --- | --- |
| Monash  Florey | 357  354 | 0.030  0.026 | 14 Sep 20:00  14 Sep 20:00 |

## Ozone

Ozone levels in 2022 were below the 8-hour standard. The highest recorded value in the ACT during 2022 was 0.042 ppm at Florey and Florey, which is 65% of the standard.

Table 11: 2022 summary statistics for daily peak 8-hour O3

AAQ NEPM standard 0.065 ppm (8-hour average)

| **Monitoring station** | **Number of valid days** | **Highest**  **(ppm)** | **Highest**  **(date/time)** |
| --- | --- | --- | --- |
| Monash  Civic  Florey | 353  361  363 | 0.042  0.037  0.042 | 26 Dec 16:00  26 Dec 16:00  26 Dec 16:00 |

## PM10

PM10 levels were significantly reduced in 2022. The highest daily PM10 level was recorded at Florey on 31 July 2022, with the concentration of 25.0 μg/m3. The highest recorded annual average in 2022 was only 7.5 μg/m3 at Monash and Florey (refer to Table 7), which is 37.5% of the ACT policy standard of 20 μg/m3.

Table 12: 2022 summary statistics for daily PM10

AAQ NEPM daily standard 50 μg/m3

| **Monitoring station** | **Number of valid days** | **Highest**  **(μg/m3)** | **Highest**  **(date)** |
| --- | --- | --- | --- |
| Monash  Civic  Florey | 353  359  360 | 25.0  17.6  25.3 | 31 July  17 Feb  31 July |

## PM2.5

PM2.5 levels were below the standard for the first time since 2004. The highest daily PM2.5 level was 23.2 μg/m3 which was recorded at Florey on 31 July 2022. The highest recorded annual average in 2022 was 5.3 μg/m3 at Monash (refer to Table 8), which is 66% of the standard.

Table 13: 2022 summary statistics for daily PM2.5

AAQ NEPM daily standard 25 μg/m3

| **Monitoring station** | **Number of valid days** | **Highest**  **(μg/m3)** | **Highest**  **(date)** |
| --- | --- | --- | --- |
| Monash  Civic  Florey | 338  352  353 | 22.8  10.1  23.2 | 31 Jul  29 Aug  31 Jul |

# ASSESSMENT OF PROGRESS TOWARDS ACHIEVING THE GOAL

Historical monitoring results indicate that the only AAQ NEPM pollutant of concern in the ACT air shed is particulate matter, which increases significantly during winter because of emissions from domestic wood heaters. During periods of drier weather exceedances of the particulate matter standards have also been attributed to smoke from hazard reduction burns, bushfires and dust storms.

In 2022, the AAQ NEPM standards for all pollutants were not exceeded during the whole year.

While PM2.5 levels increase during the cooler months of the year which can be seen in Figure 11 to Figure 13, the daily PM2.5 standard was not exceeded for the first time since 2004. This is understood to be due to the wet weather and associated lack of any significant bushfire events, combined with the implementation of Government programs to minimise emissions from wood heaters and transition to renewable energy.

Notwithstanding there were no exceedances of the PM2.5 standard the ACT Government acknowledges that wood heater emissions have an adverse effect on air quality during winter, and will continue to implement an integrated program to address this including:

* Provides public information on air quality levels in the ACT through the online Air Quality Index[[2]](#footnote-2) and AirRater App;
* Advice is provided about how to burn better by using wood heaters correctly to improve air quality, save money and keep homes warm during winter [[3]](#footnote-3);
* The regulation of firewood merchants to ensure only seasoned wood is sold[[4]](#footnote-4);
* The regulation of wood heaters sold in the ACT to ensure they meet the current Australian Standards for emissions and efficiency;
* The prohibition of wood heaters in new developments where planning studies show that they would have an adverse impact on air quality. The ACT Government has taken this approach for the development of the Molonglo Valley (except Wright)[[5]](#footnote-5), and previously with the suburbs of Dunlop and East O'Malley;
* Compliance and enforcement activities for wood heater emissions with a focus on correct wood heater operation, including both proactive and reactive inspections[[6]](#footnote-6);
* Administering the Wood Heater Replacement Program to replace old inefficient wood heaters with high efficiency alternatives[[7]](#footnote-7);
* Administering the Sustainable Households Loan Scheme which provided loans of between $2,000 to 15,000 to buy energy-efficient products[[8]](#footnote-8); and
* Implementing the first action plan 2021-23 under “*Bushfire Smoke and Air Quality Strategy 2021-25”* which will guide the ACT Government’s approach to prevent, prepare for, respond to, and recover from significant bushfire smoke events and management of the smoke from wood heaters[[9]](#footnote-9).

# APPENDIX A: STATISTICAL SUMMARY AND TRENDS

The following section provides a basic statistical summary, using percentiles, for Monash, Civic and Florey stations and for each standard in the past ten years. While the 8-hour O3 standard was only established in 2021, the long-term data for this new standard is back-calculated and present below. Daily maximum values are also presented in the following tables.

## Carbon monoxide

Table 15: Statistical summary for daily maximum 8-hour CO Monash 2013 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (ppm) | 95th  percentile  (ppm) | 75th  percentile  (ppm) | 50th  percentile  (ppm) |
| --- | --- | --- | --- | --- | --- | --- |
| 2013 | 95.9 | 0 | 2.1 | 1.5 | 0.6 | 0.3 |
| 2014 | 94.0 | 0 | 1.8 | 1.4 | 0.7 | 0.4 |
| 2015 | 94.8 | 0 | 1.9 | 1.4 | 0.6 | 0.3 |
| 2016 | 95.8 | 0 | 1.7 | 1.0 | 0.4 | 0.2 |
| 2017 | 95.4 | 0 | 1.6 | 1.2 | 0.6 | 0.2 |
| 2018 | 92.3 | 0 | 1.5 | 1.2 | 0.5 | 0.2 |
| 2019 | 72.1 | 1 | 12.4 | 1.1 | 0.4 | 0.1 |
| 2020 | 94.9 | 2 | 22.0 | 1.5 | 0.6 | 0.2 |
| 2021 | 88.2 | 0 | 1.3 | 1.0 | 0.4 | 0.1 |
| 2022 | 83.7 | 0 | 1.3 | 0.7 | 0.3 | 0.2 |

Figure 14: Statistical summary for daily maximum 8-hour CO Monash 2013 – 2022

Table 16: Statistical summary for daily maximum 8-hour CO Florey 2014 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (ppm) | 95th  percentile  (ppm) | 75th  percentile  (ppm) | 50th  percentile  (ppm) |
| --- | --- | --- | --- | --- | --- | --- |
| 2014 | 79.2 | 0 | 2.2 | 1.4 | 0.7 | 0.3 |
| 2015 | 94.9 | 0 | 2.0 | 1.5 | 0.6 | 0.3 |
| 2016 | 95.5 | 0 | 1.9 | 1.2 | 0.5 | 0.3 |
| 2017 | 94.7 | 0 | 1.8 | 1.4 | 0.5 | 0.2 |
| 2018 | 94.7 | 0 | 1.5 | 1.1 | 0.5 | 0.3 |
| 2019 | 95.3 | 0 | 8.6 | 1.2 | 0.6 | 0.3 |
| 2020 | 94.7 | 2 | 14.6 | 1.3 | 0.6 | 0.3 |
| 2021 | 95.2 | 0 | 1.2 | 0.9 | 0.4 | 0.2 |
| 2022 | 92.9 | 0 | 1.4 | 0.8 | 0.3 | 0.2 |

Figure 15: Statistical summary for daily maximum 8-hour CO Florey 2014 – 2022

## Nitrogen dioxide

Table 17: Statistical summary for daily maximum 1-hour NO2 Monash 2013 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (ppm) | Annual average  (ppm) | 95th  percentile  (ppm) | 75th  percentile  (ppm) | 50th  percentile  (ppm) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2013 | 97.5 | 0 | 0.037 | 0.005 | 0.027 | 0.021 | 0.014 |
| 2014 | 94.1 | 0 | 0.036 | 0.005 | 0.027 | 0.020 | 0.015 |
| 2015 | 94.8 | 0 | 0.032 | 0.004 | 0.026 | 0.020 | 0.014 |
| 2016 | 95.6 | 0 | 0.036 | 0.004 | 0.027 | 0.019 | 0.012 |
| 2017 | 95.6 | 0 | 0.031 | 0.004 | 0.027 | 0.021 | 0.013 |
| 2018 | 95.5 | 0 | 0.039 | 0.004 | 0.028 | 0.020 | 0.014 |
| 2019 | 94.9 | 0 | 0.084 | 0.005 | 0.027 | 0.021 | 0.014 |
| 2020 | 95.7 | 0 | 0.116 | 0.004 | 0.027 | 0.019 | 0.011 |
| 2021 | 95.7 | 0 | 0.036 | 0.003 | 0.024 | 0.016 | 0.010 |
| 2022 | 93.8 | 0 | 0.030 | 0.003 | 0.023 | 0.015 | 0.007 |

Figure 16: Statistical summary for daily maximum 1-hour NO2 Monash 2013 – 2022

Figure 17: Annual average 1-hour NO2 Monash 2013 – 2022

Table 18: Statistical summary for daily maximum 1-hour NO2 Florey 2014 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (ppm) | Annual average  (ppm) | 95th  percentile  (ppm) | 75th  percentile  (ppm) | 50th  percentile  (ppm) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2014 | 78.3 | 0 | 0.045 | 0.006 | 0.027 | 0.020 | 0.015 |
| 2015 | 91.5 | 0 | 0.033 | 0.005 | 0.027 | 0.020 | 0.014 |
| 2016 | 94.7 | 0 | 0.034 | 0.004 | 0.027 | 0.019 | 0.013 |
| 2017 | 93.7 | 0 | 0.033 | 0.005 | 0.025 | 0.020 | 0.015 |
| 2018 | 93.3 | 0 | 0.039 | 0.005 | 0.028 | 0.022 | 0.015 |
| 2019 | 92.4 | 0 | 0.062 | 0.005 | 0.027 | 0.020 | 0.014 |
| 2020 | 94.1 | 2 | 0.171 | 0.004 | 0.024 | 0.017 | 0.011 |
| 2021 | 91.6 | 0 | 0.034 | 0.004 | 0.020 | 0.013 | 0.009 |
| 2022 | 93.7 | 0 | 0.026 | 0.004 | 0.021 | 0.014 | 0.009 |

Figure 18: Statistical summary for daily maximum 1-hour NO2 Florey 2014 – 2022

Figure 19: Annual average 1-hour NO2 Florey 2014 – 2022

## Ozone

Table 19: Statistical summary for daily maximum 8-hour O3 Monash 2013 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (ppm) | 95th  percentile  (ppm) | 75th  percentile  (ppm) | 50th  percentile  (ppm) |
| --- | --- | --- | --- | --- | --- | --- |
| 2013 | 97.8 | 0 | 0.054 | 0.032 | 0.025 | 0.018 |
| 2014 | 94.8 | 0 | 0.057 | 0.035 | 0.025 | 0.019 |
| 2015 | 92.8 | 0 | 0.047 | 0.032 | 0.022 | 0.014 |
| 2016 | 95.2 | 0 | 0.049 | 0.031 | 0.022 | 0.017 |
| 2017 | 95.5 | 0 | 0.052 | 0.036 | 0.027 | 0.020 |
| 2018 | 95.8 | 0 | 0.053 | 0.036 | 0.028 | 0.022 |
| 2019 | 95.8 | 10 | 0.107 | 0.042 | 0.029 | 0.022 |
| 2020 | 95.8 | 6 | 0.093 | 0.036 | 0.026 | 0.020 |
| 2021 | 95.7 | 0 | 0.042 | 0.030 | 0.023 | 0.017 |
| 2022 | 92.8 | 0 | 0.042 | 0.035 | 0.030 | 0.026 |

Figure 20: Statistical summary for daily maximum 8-hour O3 Monash 2012 – 2022

Table 20: Statistical summary for daily maximum 8-hour O3 Civic 2012 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (ppm) | 95th  percentile  (ppm) | 75th  percentile  (ppm) | 50th  percentile  (ppm) |
| --- | --- | --- | --- | --- | --- | --- |
| 2013 | 92.1 | 0 | 0.050 | 0.026 | 0.019 | 0.013 |
| 2014 | 94.0 | 0 | 0.044 | 0.028 | 0.017 | 0.012 |
| 2015 | 89.0 | 0 | 0.040 | 0.025 | 0.018 | 0.013 |
| 2016 | 95.8 | 0 | 0.042 | 0.027 | 0.020 | 0.015 |
| 2017 | 95.8 | 0 | 0.046 | 0.032 | 0.023 | 0.017 |
| 2018 | 95.2 | 0 | 0.050 | 0.032 | 0.024 | 0.018 |
| 2019 | 95.8 | 4 | 0.088 | 0.039 | 0.026 | 0.020 |
| 2020 | 95.8 | 3 | 0.076 | 0.032 | 0.023 | 0.018 |
| 2021 | 95.5 | 0 | 0.041 | 0.028 | 0.022 | 0.017 |
| 2022 | 95.3 | 0 | 0.037 | 0.030 | 0.025 | 0.022 |

Figure 21: Statistical summary for daily maximum 8-hour O3 Civic 2013 – 2022

Table 21: Statistical summary for daily maximum 8-hour O3 Florey 2014 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (ppm) | 95th  percentile  (ppm) | 75th  percentile  (ppm) | 50th  percentile  (ppm) |
| --- | --- | --- | --- | --- | --- | --- |
| 2014 | 79.4 | 0 | 0.037 | 0.024 | 0.017 | 0.010 |
| 2015 | 94.2 | 0 | 0.034 | 0.023 | 0.016 | 0.010 |
| 2016 | 95.8 | 0 | 0.046 | 0.029 | 0.022 | 0.016 |
| 2017 | 95.5 | 0 | 0.052 | 0.036 | 0.026 | 0.020 |
| 2018 | 95.2 | 0 | 0.054 | 0.036 | 0.027 | 0.021 |
| 2019 | 95.3 | 10 | 0.099 | 0.042 | 0.027 | 0.021 |
| 2020 | 92.0 | 6 | 0.089 | 0.037 | 0.026 | 0.020 |
| 2021 | 95.8 | 0 | 0.047 | 0.030 | 0.023 | 0.018 |
| 2022 | 95.4 | 0 | 0.042 | 0.033 | 0.028 | 0.024 |

Figure 22: Statistical summary for daily maximum 1-hour O3 Florey 2014 – 2022

## PM10

Table 22: Statistical summary for daily maximum daily PM10 Monash 2012 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (μg/m3) | Annual average  (μg/m3) | 95th  percentile  (μg/m3) | 75th  percentile  (μg/m3) | 50th  percentile  (μg/m3) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2013 | 95.6 | 0 | 43.5 | 9.8 | 20.2 | 13.1 | 8.9 |
| 2014 | 97.8 | 0 | 39.3 | 10 | 19.1 | 12.9 | 9.6 |
| 2015 | 98.4 | 0 | 49.4 | 9.9 | 19.5 | 13.1 | 9.5 |
| 2016 | 99.5 | 0 | 31.9 | 9.7 | 21.5 | 12.7 | 9.0 |
| 2017 | 98.9 | 0 | 28.3 | 9.8 | 20.5 | 12.3 | 9.0 |
| 2018 | 99.2 | 4 | 139.2 | 11.8 | 23.0 | 14.8 | 10.4 |
| 2019 | 98.4 | 22 | 385.7 | 19.1 | 61.1 | 17.8 | 11.4 |
| 2020 | 99.2 | 21 | 1046.1 | 22.4 | 54.3 | 17.8 | 10.4 |
| 2021 | 99.5 | 0 | 37.3 | 10.3 | 22.9 | 13.7 | 9.1 |
| 2022 | 96.7 | 0 | 25..0 | 7.5 | 15.4 | 9.8 | 6.9 |

Figure 23: Statistical summary for daily PM10 Monash 2013 – 2022

Figure 24: Annual average daily PM10 Monash 2013 – 2022

Table 23: Statistical summary for daily maximum daily PM10 Civic 2013 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (μg/m3) | Annual average  (μg/m3) | 95th  percentile  (μg/m3) | 75th  percentile  (μg/m3) | 50th  percentile  (μg/m3) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2013 | 92.9 | 1 | 57.8 | 9.7 | 19.9 | 12.0 | 8.6 |
| 2014 | 95.1 | 0 | 31.4 | 9.8 | 17.7 | 12.6 | 9.3 |
| 2015 | 97.5 | 1 | 64.3 | 11.1 | 20.9 | 14.1 | 10.4 |
| 2016 | 100 | 0 | 36.6 | 10.7 | 20.6 | 14.3 | 9.7 |
| 2017 | 83.6 | 1 | 53.0 | 9.68 | 10.8 | 7.1 | 5.2 |
| 2018 | 97.8 | 1 | 179.8 | 13.5 | 24.1 | 16.1 | 11.3 |
| 2019 | 97.3 | 29 | 390.2 | 22.9 | 82.5 | 19.5 | 12.7 |
| 2020 | 98.4 | 24 | 994.9 | 21.7 | 56.7 | 15.2 | 10.0 |
| 2021 | 93.7 | 0 | 28.6 | 8.7 | 15.6 | 11.5 | 8.1 |
| 2022 | 98.4 | 0 | 17.6 | 6.6 | 11.1 | 8.5 | 6.1 |

Figure 25: Statistical summary for daily PM10 Civic 2013 – 2022

Figure 26: Annual average daily PM10 Civic 2013 – 2022

Table 24: Statistical summary for daily maximum daily PM10 Florey 2014 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (μg/m3) | Annual average  (μg/m3) | 95th  percentile  (μg/m3) | 75th  percentile  (μg/m3) | 50th  percentile  (μg/m3) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2014 | 83.3 | 0 | 30.2 | 10.4 | 21.5 | 13.0 | 9.4 |
| 2015 | 95.6 | 0 | 70.8 | 10.7 | 21.8 | 13.7 | 9.4 |
| 2016 | 98.9 | 0 | 28.8 | 10.1 | 20.6 | 13.1 | 9.2 |
| 2017 | 98.4 | 0 | 28.1 | 9.84 | 21.8 | 12.8 | 8.5 |
| 2018 | 89.9 | 3 | 158.6 | 12.0 | 23.8 | 15.3 | 10.1 |
| 2019 | 98.1 | 28 | 379.7 | 23.8 | 96.8 | 20.6 | 13.4 |
| 2020 | 99.5 | 21 | 1075.5 | 22.8 | 57.5 | 17.9 | 10.9 |
| 2021 | 99.5 | 0 | 37.9 | 9.6 | 19.6 | 12.7 | 8.5 |
| 2022 | 98.6 | 0 | 25.3 | 7.5 | 15.0 | 9.5 | 6.9 |

Figure 27: Statistical summary for daily PM10 Florey 2014 – 2022

Figure 28: Annual average daily PM10 Florey 2014 – 2022

## PM2.5

Table 25: Statistical summary for daily maximum daily PM2.5 Monash 2013 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (μg/m3) | Annual average  (μg/m3) | 95th  percentile  (μg/m3) | 75th  percentile  (μg/m3) | 50th  percentile  (μg/m3) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2013 | 98.6 | 6 | 38.4 | 6.9 | 19.2 | 8.1 | 5.2 |
| 2014 | 87.7 | 4 | 31.5 | 6.8 | 18.7 | 8.6 | 5.6 |
| 2015 | 96.4 | 6 | 33.8 | 7.4 | 19.0 | 8.2 | 5.6 |
| 2016 | 98.1 | 8 | 32.7 | 7.4 | 20.7 | 8.2 | 5.4 |
| 2017 | 98.6 | 12 | 35.2 | 7.7 | 22.5 | 9.3 | 5.3 |
| 2018 | 99.2 | 2 | 32.0 | 6.8 | 19.2 | 8.6 | 5.3 |
| 2019 | 98.9 | 28 | 307.9 | 14.1 | 42.7 | 12.5 | 7.2 |
| 2020 | 98.6 | 37 | 1146.5 | 17.9 | 38.4 | 11.3 | 5.7 |
| 2021 | 98.6 | 5 | 27.9 | 6.8 | 19.2 | 8.1 | 4.9 |
| 2022 | 92.6 | 0 | 22.8 | 5.3 | 12.7 | 6.6 | 4.6 |

Figure 29: Statistical summary for daily PM2.5 Monash 2013 – 2022

Figure 30: Annual average daily PM2.5 Monash 2013 – 2022

Table 26: Statistical summary for daily maximum daily PM2.5 Civic 2016 – 2022

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (μg/m3) | Annual average  (μg/m3) | 95th  percentile  (μg/m3) | 75th  percentile  (μg/m3) | 50th  percentile  (μg/m3) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2016 | 98.6 | 0 | 22.1 | 5.5 | 11.0 | 7.1 | 4.8 |
| 2017 | 94.2 | 1 | 53.8 | 5.9 | 10.8 | 7.1 | 5.2 |
| 2018 | 98.6 | 1 | 36.1 | 6.5 | 12.1 | 8.1 | 6.1 |
| 2019 | 96.4 | 29 | 390.2 | 22.9 | 82.5 | 19.5 | 12.7 |
| 2020 | 99.2 | 18 | 872.6 | 12.9 | 24.8 | 7.6 | 5.1 |
| 2021 | 96.7 | 0 | 21.8 | 5.0 | 9.5 | 6.6 | 4.6 |
| 2022 | 96.4 | 0 | 10.1 | 4.1 | 7.5 | 5.3 | 3.8 |

Figure 31: Statistical summary for daily PM2.5 Civic 2016 – 2022

Figure 32: Annual average daily PM2.5 Civic 2016 – 2022

Table 27: Statistical summary for daily maximum daily PM2.5 Florey 2014 – 2021

| Year | Data  Availability  (%) | No. of  Exceedances  (days) | Max  conc.  (μg/m3) | Annual average  (μg/m3) | 95th  percentile  (μg/m3) | 75th  percentile  (μg/m3) | 50th  percentile  (μg/m3) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2014 | 74.2 | 0 | 22.8 | 5.8 | 15.0 | 7.1 | 4.9 |
| 2015 | 96.2 | 0 | 24.3 | 6.5 | 17.1 | 7.4 | 4.8 |
| 2016 | 98.6 | 1 | 27.2 | 7.3 | 17.4 | 8.6 | 5.8 |
| 2017 | 94.2 | 0 | 23.8 | 7.2 | 17.9 | 8.7 | 5.6 |
| 2018 | 97.3 | 2 | 26.4 | 7.4 | 17.0 | 8.7 | 5.9 |
| 2019 | 98.4 | 29 | 319.6 | 14.8 | 46.9 | 12.3 | 7.2 |
| 2020 | 97.3 | 25 | 983.4 | 16.9 | 28.8 | 12.2 | 5.9 |
| 2021 | 98.4 | 3 | 28.2 | 6.2 | 16.0 | 7.6 | 4.9 |
| 2022 | 96.7 | 0 | 23.2 | 5.0 | 12.3 | 6.3 | 4.4 |

Figure 33: Statistical summary for daily PM2.5 Florey 2014 – 2022

Figure 34: Annual average daily PM2.5 Florey 2014 – 2022

1. <http://www.nepc.gov.au/nepms/ambient-air-quality> [↑](#footnote-ref-1)
2. <https://www.health.act.gov.au/about-our-health-system/population-health/environmental-monitoring/monitoring-and-regulating-air> [↑](#footnote-ref-2)
3. <https://www.environment.act.gov.au/environment/wood-fire-heating> [↑](#footnote-ref-3)
4. <https://www.accesscanberra.act.gov.au/s/article/air-pollution-tab-business-and-industry> [↑](#footnote-ref-4)
5. <https://files.accesscanberra.act.gov.au/legacy/3224/Molonglo%20Valley%20air%20quality%20assessment.pdf> [↑](#footnote-ref-5)
6. <https://files.accesscanberra.act.gov.au/legacy/3371/Your-guide-to-using-a-wood-heater.pdf> [↑](#footnote-ref-6)
7. <https://www.climatechoices.act.gov.au/policy-programs/wood-heater-replacement-program> [↑](#footnote-ref-7)
8. https://www.climatechoices.act.gov.au/policy-programs/sustainable-household-scheme [↑](#footnote-ref-8)
9. <https://www.act.gov.au/bushfire-smoke-and-air-quality-strategy> [↑](#footnote-ref-9)