NSW air quality report 2023

National Environment Protection (Ambient Air Quality) Measure

Department of Climate Change, Energy, the Environment and Water

NSW GOVERNMENT

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

The department acknowledges the contributions of Sean Watt and Dr Praveen Puppala in the preparation of this document. It was reviewed by David Salter, Dr Upma Dutt and Margaret Haak, all within the Climate and Atmospheric Science Branch. Information in Section D was provided by the Air Policy Team in the Biodiversity Conservation and Science Group.

This document should be cited as: DCCEEW (2025) *NSW air quality report 2023,* Department of Climate Change, Energy, the Environment and Water, Parramatta, NSW

Artist and designer Nikita Ridgeway from Aboriginal design agency Boss Lady Creative Designs created the People and Community symbol.

Cover photo: Landscapes of Tomaree National Park 2019. Adam Hollingworth/DCCEEW

Published by:
Environment and Heritage
Department of Climate Change,
Energy, the Environment and Water
Locked Bag 5022, Parramatta NSW 2124
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment and Heritage enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email info@environment.nsw.gov.au
Website www.environment.nsw.gov.au

ISBN 978-1-923357-53-2
EH 2025/0028 February 2025

Find out more at:

environment.nsw.gov.au

Contents

List of tables

List of figures

Acronyms, abbreviations and glossary

The following is a list of acronyms, abbreviations and terms used in this report.

Term	Meaning
AAQ NEPM	*National Environment Protection (Ambient Air Quality) Measure*
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AEST	Australian eastern standard time
Amdt	Amendment
AS/NZ(S)	Australian standard / New Zealand standard
BAM	beta attenuation monitor
BOM	Australian Bureau of Meteorology
C	compliant (with AAQ NEPM standards and goals)
CAM	Clean Air Metric
CBD	central business district
CO	carbon monoxide
COVID-19	Coronavirus disease caused by the SARS-CoV-2 virus
DCCEEW	Department of Climate Change, Energy, the Environment and Water, NSW
DPE	Department of Planning and Environment, NSW – former name for DCCEEW
EPA	Environment Protection Authority
EU	European Union
Exceed.	short for 'exceedance' – used in table headers throughout the report
FDMS	filter dynamics measurement system
FRM	Federal Reference Method, USEPA
GMR	Greater Metropolitan Region – covers Sydney, the Illawarra, Lower Hunter, Central Coast and Lake Macquarie air quality regions
ISO 17025	standard of competency for testing and calibration laboratories
KOALA	Knowing Our Ambient Local Air-quality sensor
km	kilometre
m	metre
MODIS	Moderate Resolution Imaging Spectroradiometer: imaging instruments on board NASA's Terra and Aqua satellites
NASA	National Aeronautics and Space Administration
NATA	National Association of Testing Authorities

Term	Meaning
N-C	not compliant (with AAQ NEPM standards and goals)
ND	not demonstrated – this means the 75% availability of data criterion for at least one yearly quarter was not achieved at this monitoring station, therefore compliance with the AAQ NEPM standard was not demonstrated
NEED	non-exceptional event days
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NSW	New South Wales
OEH	Office of Environment and Heritage
O_3	ozone
PM2.5	particulate matter with an aerodynamic diameter of 2.5 micrometres or less
PM10	particulate matter with an aerodynamic diameter of 10 micrometres or less
POEO Act	*Protection of the Environment Operations Act 1997*
ppm	parts per million – parts of a chemical compound per million parts of air by volume
pphm	parts per hundred million – parts of a chemical compound per hundred million parts of air by volume
SO_2	sulfur dioxide
TEOM	tapered element oscillating microbalance
USEPA	United States Environmental Protection Agency
$\mu g/m^3$	microgram of pollutant (1 millionth of a gram) per cubic metre of air, referenced to temperature of 0°C (273.15°K) and absolute pressure of 101.325 kilopascals (kPa)
VOCs	volatile organic compounds – chemical species that have high enough vapour pressure to exist at least partially as a gas at standard atmospheric temperature and pressure

1. Summary

The *National Environment Protection (Ambient Air Quality) Measure* amended 2021 (AAQ NEPM or NEPM) is the Commonwealth legislation that sets out the national standards and goals for air quality in Australia. This measure is implemented in New South Wales (NSW) under the *Protection of the Environment Operations Act 1997* (POEO Act), the Protection of the Environment Operations (Clean Air) Regulation 2022 and the Protection of the Environment Operations (General) Regulation 2021. This annual compliance report is required under clause 18 of the AAQ NEPM. It presents NSW air quality monitoring data for 2023, assessed against the standards and requirements of the AAQ NEPM.

The AAQ NEPM (May 2021 amendment) sets requirements for the monitoring and reporting of air pollutants with reference to:

- air quality standards, as concentrations of pollutants against which air quality can be assessed
- describing circumstances that led to the exceedance of standards and the extent to which these exceedance events are exceptional or not for particles as PM10, as PM2.5 and photochemical oxidants (ozone, O_3)
- population exposures to PM2.5, nitrogen dioxide (NO_2) and ozone.

The NSW AAQ NEPM Compliance Monitoring Network (the network) is a part of the NSW Government's broader ambient air quality monitoring network described in Section A. The NSW Government operates the network in accordance with the NSW Air Quality Monitoring Plan 2021–2025 (DPIE 2020a), the AAQ NEPM ambient air quality legislation and associated technical papers (National Environment Protection Council, various years, see the 'Reference' section for more information), and the Department of Climate Change, Energy, the Environment and Water's (DCCEEW) accreditation by the National Association of Testing Authorities (NATA).

In 2023, the AAQ NEPM network comprised 43 air quality monitoring stations across NSW.

Note that ambient lead monitoring in NSW ceased in 2004 as ambient concentrations fell consistently below the AAQ NEPM standard due to the introduction of unleaded motor fuel.

1.1 Approach to AAQ NEPM compliance assessment

Air quality monitoring stations are compliant with AAQ NEPM standards if the following conditions are met:

- at least 75% of each quarter's data is valid during a calendar year for:
  - 1-hour data for gaseous parameters and
  - 1-day data for particles as PM10 and PM2.5, and

- the NEPM standards are not exceeded for 1-hour average standards for nitrogen dioxide and sulfur dioxide (SO_2), 8-hour rolling average for carbon monoxide (CO), 1-day average for sulfur dioxide and 1-year nitrogen dioxide
- the NEPM standards for 8-hour rolling average for ozone or the 1-day averages for PM10 and PM2.5 are exceeded only due to events deemed to be exceptional in nature as defined in the AAQ NEPM legislation.

1.2 Network changes

Permanent monitoring of ozone and nitrogen dioxide began at the following monitoring stations in 2023:

- ozone: Wagga Wagga North, Albury, Tamworth, Bathurst and Orange
- nitrogen dioxide: Wagga Wagga North, Albury, Tamworth.

1.3 Compliance assessment (2023)

The 2023 compliance status for all criteria pollutants at all stations in the network is summarised in Table 1.

1.3.1 Carbon monoxide

Eighteen of 20 stations monitoring carbon monoxide in 2023 complied with the quarterly 75% valid data availability criterion.

No exceedances were observed, resulting in those 18 stations complying with the 8-hour rolling average standard of 9.0 ppm.

Two stations did not meet the quarterly 75% data availability criterion. The compliance of those stations was assessed as ‘not demonstrated’.

1.3.2 Nitrogen dioxide

Thirty-six of 38 stations monitoring nitrogen dioxide in 2023 complied with the quarterly 75% valid data availability criterion.

As no exceedances of the 1-hour average standard (0.080 ppm) was observed, 36 stations complied with this standard.

Bradfield Highway recorded an exceedance (0.019 ppm) of the 1-year average standard (0.015 ppm), resulting in 35 stations complying with the 1-year standard.

Two stations did not meet the quarterly 75% valid data availability criterion. The compliance of those stations was assessed as ‘not demonstrated’.

1.3.3 Sulfur dioxide

All 27 stations monitoring sulfur dioxide in 2023 complied with the quarterly 75% valid data availability criterion.

Muswellbrook exceeded both the 1-hour average standard (0.100 ppm) and the 1-day average standard (0.020 ppm), resulting in 26 stations complying with both standards.

1.3.4 Ozone

Thirty-five of the 38 stations monitoring ozone in 2023 complied with the quarterly 75% valid data availability criterion.

Eleven stations recorded exceedances of the 8-hour rolling average standard (0.065 ppm), resulting in 25 stations complying with the standard. All exceedances were due to photochemical reactions exacerbated by heatwave conditions.

Three stations did not meet the quarterly 75% valid data availability criterion. However, Camden also recorded a valid exceedance of the 8-hour standard, resulting in a status assessed as 'not met'. The status of the remaining 2 stations was assessed as 'not demonstrated'.

1.3.5 Particles as PM10 and PM2.5

There were 39 days during 2023 where either one or both 1-day particle standards (PM10 and PM2.5) were exceeded in NSW.

Particles as PM10

Forty-one of 43 stations monitoring PM10 in 2023 complied with the quarterly 75% valid data availability criterion.

There were 26 days above the 1-day PM10 standard (50.0 µg/m^3) in 2023, compared to 1 day in 2022 and 18 in 2021. Over these 26 days, exceedances occurred at 19 stations across the AAQ NEPM network in 2023.

Exceptional events caused 10 of 26 exceedance days. Six days were attributed to hazard reduction burning in southern Sydney in September 2023. Three days were attributed to bushfire smoke from the Duck Creek Pilliga Forest bushfire in December 2023. The remaining day was attributed to the combined effect of local dust and bushfire smoke from the Alpha Road bushfire in March 2023.

The remaining 16 exceedance days were non-exceptional event days attributed to local dust, observed at 7 stations. Kembla Grange recorded 8 non-exceptional event days, Bargo recorded 4, Muswellbrook and Wagga Wagga North recorded 2 days each, while Bathurst, Wollongong and Bringelly recorded 1 day each. As these 7 stations were assessed as non-compliant, 34 stations complied with the PM10 1-day standard in 2023.

There were no exceedances of the PM10 1-year average standard (25.0 µg/m^3), resulting in 41 stations complying with the PM10 1-year average standard.

Two stations did not meet the quarterly 75% valid data availability criterion and their compliance was assessed as 'not demonstrated' for both the 1-day and 1-year PM10 standards.

Particles as PM2.5

Thirty-eight of 42 stations monitoring PM2.5 in 2023 complied with the quarterly 75% valid data availability criterion.

There were 24 days above the 1-day PM2.5 standard (25.0 µg/m^3) in 2023, compared to 16 days in 2022 and 23 in 2021. These exceedance days occurred at 27 stations across the AAQ NEPM network in 2023.

Exceptional events caused 14 of 24 exceedance days. Seven days were attributed to smoke from hazard reduction burning in southern Sydney in September 2023. Six days were attributed to bushfire smoke from the Duck Creek Pilliga Forest bushfire in December 2023. The remaining day was attributed to the combined effect of local and bushfire smoke from the Alpha Road bushfire in March 2023.

The remaining 10 days were non-exceptional event days attributed to wood smoke from domestic wood heaters, observed at 4 stations. Armidale recorded 8 non-exceptional event days, while Gunnedah, Rouse Hill and Port Macquarie all recorded 1 day each. These 4 stations did not comply, and as a result, 34 stations complied with the 1-day PM2.5 standard.

Two stations exceeded the PM2.5 1-year average standard (8.0 µg/m^3), resulting in 36 stations complying with the PM2.5 1-year standard.

Four stations did not meet the quarterly 75% valid data availability criterion and their compliance was assessed as 'not demonstrated' for both the 1-day and the 1-year PM2.5 standards.

1.4 Population exposure analysis

The AAQ NEPM mandates 1-year reporting on population exposure for the 3 criteria pollutants: particles as PM2.5, nitrogen dioxide and ozone. There is currently no agreed national method among participating jurisdictions on evaluation and reporting of exposure. Population exposure analysis was introduced in 2018 for PM2.5 and in 2021 for nitrogen dioxide and ozone.

The Clean Air Metric (CAM) accounts for population exposure when assessing average air quality. The CAM index is calculated by dividing the 2023 population-weighted concentrations for PM2.5, nitrogen dioxide and ozone by the respective AAQ NEPM standards. Section E of this report outlines the department's approach to evaluating population exposure to particles as PM2.5, nitrogen dioxide and ozone.

Results show that regions characterised by elevated PM2.5 and nitrogen dioxide exposure in 2023 were generally aligned with populated areas that are concentrated along transport corridors in the Greater Sydney Region. The ozone exposure results had the largest spatial extent of the 3 pollutants that were analysed. Results show PM2.5 population-weighted concentrations in 2023 were returning to values similar to those calculated for the years prior to the 2019–20 bushfire period and La Nina events between 2020 and 2022.

CAM-PM2.5 index values for the Greater Sydney Region and the NSW Greater Metropolitan Region (GMR) were 82 and 80 respectively, 53 and 50 for CAM-NO_2 and 81 and 84 for CAM-O_3. The overall CAM index is determined by the pollutant that has the maximum CAM value for the Greater Sydney Region and the NSW GMR. For 2023, the

overall CAM index for the Greater Sydney Region was driven by CAM-PM2.5, with a value of 82, while the overall CAM index for the NSW GMR was driven by the CAM-O_3, with a value of 84.

1.5 Compliance summary table (2023)

Table 1 Summary of compliance with AAQ NEPM goals for particles and gases (2023)

Region/station[1]		CO 8-hour	NO_2 1-hour	NO_2 1-year	SO_2 1-hour	SO_2 1-day	O_3 8-hour	PM10 1-day	PM10 1-year	PM2.5 1-day	PM2.5 1-year
East Sydney											
1	Alexandria	ND	C	C	C	C	ND	C	C	C	C
2	Bradfield Highway	C	C	N-C	C	C	C	C	C	C	N-C
3	Cook and Phillip	C	C	C	C	C	C	ND	ND	ND	ND
4	Earlwood	–	C	C	–	–	N-C	C	C	C	C
5	Macquarie Park	C	C	C	C	C	C	C	C	C	C
6	Randwick	–	C	C	C	C	C	C	C	C	C
7	Rozelle	C	C	C	C	C	C	C	C	C	C
Central West Sydney											
8	Lidcombe	C	C	C	C	C	N-C	C	C	C	C
9	Parramatta North	C	C	C	C	C	N-C	C	C	ND	ND
10	Prospect	C	C	C	C	C	N-C	C	C	C	C
11	Rouse Hill	C	C	C	C	C	C	C	C	N-C	C
South West Sydney											
12	Bargo	–	C	C	C	C	N-C	N-C	C	C	C
13	Bringelly	–	C	C	C	C	N-C	N-C	C	C	C
14	Camden	ND	ND	ND	–	–	N-C	C	C	ND	ND
15	Campbelltown West	C	C	C	C	C	C	C	C	C	C
16	Liverpool	C	C	C	C	C	N-C	C	C	C	C
17	Oakdale	–	C	C	–	–	N-C	C	C	C	C

Region/station[1]		CO 8-hour	NO_2 1-hour	NO_2 1-year	SO_2 1-hour	SO_2 1-day	O_3 8-hour	PM10 1-day	PM10 1-year	PM2.5 1-day	PM2.5 1-year
North West Sydney											
18	Penrith	C	C	C	C	C	C	C	C	C	C
19	Richmond	–	C	C	C	C	C	C	C	C	C
20	St Marys	–	C	C	–	–	N-C	C	C	C	C
Illawarra											
21	Albion Park South	–	C	C	C	C	N-C	C	C	C	C
22	Kembla Grange	–	C	C	–	–	C	N-C	C	C	C
23	Wollongong	C	C	C	C	C	C	N-C	C	C	C
Central Coast											
24	Wyong	C	C	C	C	C	C	C	C	C	C
Lake Macquarie											
25	Morisset	C	C	C	C	C	C	C	C	C	C
Lower Hunter											
26	Beresfield	–	C	C	C	C	C	C	C	C	C
27	Newcastle	C	C	C	C	C	C	C	C	C	C
28	Wallsend	–	C	C	C	C	C	C	C	C	C
Upper Hunter											
29	Aberdeen	–	–	–	–	–	–	C	C	–	–
30	Merriwa	C	C	C	C	C	C	C	C	C	C
31	Muswellbrook	–	C	C	N-C	N-C	–	N-C	C	C	C
32	Singleton	–	C	C	C	C	–	C	C	C	C
Central Tablelands											
33	Bathurst	–	–	–	–	–	C	N-C	C	C	C
34	Orange	–	–	–	–	–	C	ND	ND	ND	ND

Region/station[1]		CO 8-hour	NO_2 1-hour	NO_2 1-year	SO_2 1-hour	SO_2 1-day	O_3 8-hour	PM10 1-day	PM10 1-year	PM2.5 1-day	PM2.5 1-year
North West Slopes											
35	Gunnedah	–	C	C	–	–	C	C	C	N-C	C
36	Narrabri	–	–	–	–	–	–	C	C	C	C
37	Tamworth	–	C	C	–	–	C	C	C	C	C
Northern Tablelands											
38	Armidale	–	–	–	–	–	–	C	C	N-C	N-C
Mid North Coast											
39	Coffs Harbour	C	C	C	–	–	C	C	C	C	C
40	Port Macquarie	C	C	C	C	C	C	C	C	N-C	C
South West Slopes											
41	Albury	–	C	C	–	–	C	C	C	C	C
42	Wagga Wagga North	–	ND	ND	–	–	ND	N-C	C	C	C
Southern Tablelands											
43	Goulburn	–	C	C	–	–	C	C	C	C	C
	Summary										
	Standard	CO 8-hour	NO_2 1-hour	NO_2 1-year	SO_2 1-hour	SO_2 1-day	O_3 8-hour	PM10 1-day	PM10 1-year	PM2.5 1-day	PM2.5 1-year
	Total stations	20	38	38	27	27	38	43	43	42	42
	Total compliant	18	36	35	26	26	25	34	41	34	36
	Total non-compliant	0	0	1	1	1	11	7	0	4	2
	Total not demonstrated	2	2	2	0	0	2	2	2	4	4

Notes:

CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; O_3 = ozone; PM10 = particulate matter with an aerodynamic diameter of 10 micrometres or less; PM2.5 = particulate matter with an aerodynamic diameter of 2.5 micrometres or less; C = compliant; N-C = not compliant; ND = not demonstrated; '–' indicates the parameter is not monitored at this station.

2. Section A: monitoring summary

2.1 Overview of air quality monitoring in New South Wales

As of 31 December 2023, the NSW Government operated a network of 95 long-term air quality monitoring stations comprising:

- 56 stations that are ISO 17025 accredited by NATA and are located in metropolitan and regional centres throughout NSW:
  - 28 stations in the NSW GMR:
    - 7 stations in the East Sydney region
    - 4 stations in the Central West Sydney region
    - 6 stations in the South West Sydney region
    - 3 stations in the North West Sydney region
    - 3 stations in the Lower Hunter region
    - 3 stations in the Illawarra region
    - 1 station in the Central Coast region
    - 1 station in the Lake Macquarie region.
  - 9 stations in NSW regional centres:
    - 2 stations in the Central Tablelands region
    - 2 stations in the Mid North Coast region
    - 2 stations in the South West Slopes region
    - 1 station in the Northern Tablelands region
    - 1 station in the North West Slopes region
    - 1 station in the Southern Tablelands region.
  - 19 industry-funded, government-operated stations:
    - 14 stations in the Upper Hunter Air Quality Monitoring Network monitor air quality affected by coal mining and coal-fired power generation
    - 3 stations in the Newcastle Local Air Quality Monitoring Network monitor air quality affected by industrial activity around the Port of Newcastle
    - 2 stations in the North West Slopes Air Quality Monitoring Network monitor air quality affected by coal mining.
- 39 indicative monitoring stations in the Rural Air Quality Monitoring Network that monitor the impact of dust and smoke in rural and remote areas of NSW. Six stations are located in Victoria (4) and South Australia (2), primarily to monitor major sources of dust near those stations that are known to impact air quality in NSW.

2.2 The NSW AAQ NEPM Compliance Monitoring Network

The AAQ NEPM requires the NSW Government to report annually on compliance against the Schedule 2 standards for air quality measured at performance monitoring stations to assess the exposure of the public to air pollution.

2.2.1 Monitoring stations and maps

Of the 56 monitoring stations accredited by NATA listed above, 43 of those stations are assessed for compliance against the AAQ NEPM standards for the 2023 calendar year. These are mapped in Figure 1 and Figure 2. A full list of stations, criteria pollutants monitored at each station and their classifications are listed in Table 2.

These stations include:

- 28 stations in the NSW GMR (Figure 1):
  - 20 stations in Greater Sydney:
    - 7 stations in the East Sydney region
    - 4 stations in the Central West Sydney region
    - 6 stations in the South West Sydney region
    - 3 stations in the North West Sydney region.
  - 3 stations in the Lower Hunter region
  - 3 stations in the Illawarra region
  - 1 station in the Central Coast region
  - 1 station in the Lake Macquarie region.
- 15 stations in regional centres, including industry-funded stations (Figure 2):
  - 4 stations in the industry-funded Upper Hunter region
  - 3 stations in the North West Slopes, including 2 industry-funded stations
  - 2 stations in the Central Tablelands region
  - 2 stations in the Mid North Coast region
  - 2 stations in the South West Slopes region
  - 1 station in the Northern Tablelands
  - 1 station in the Southern Tablelands.

Stations monitor air quality within their air quality regions, which are shown on the NSW Air Quality website. While each station represents air quality that is typical of the urban area and NEPM region they are located in, stations, particularly in regional NSW do not always reflect the air quality in the broader region due to localised events. Given the larger population, concentration of monitoring stations and pollutant patterns, Greater Sydney is divided into 4 subregions. These are shown on the NSW Air Quality website. For the purposes of NEPM compliance, all stations in Sydney, irrespective of their subregion, are considered part of Greater Sydney.

The purpose of the NSW AAQ NEPM Compliance Monitoring Network is to measure air quality experienced by the NSW public and to capture air quality events that will impact

population centres. As such, the location of monitoring stations in each region is selected to optimise both population coverage and representation of the occurrences of higher pollutant concentrations. Identification and selection of appropriate locations for long-term performance monitoring is hindered by additional factors including security, accessibility and long-term availability.

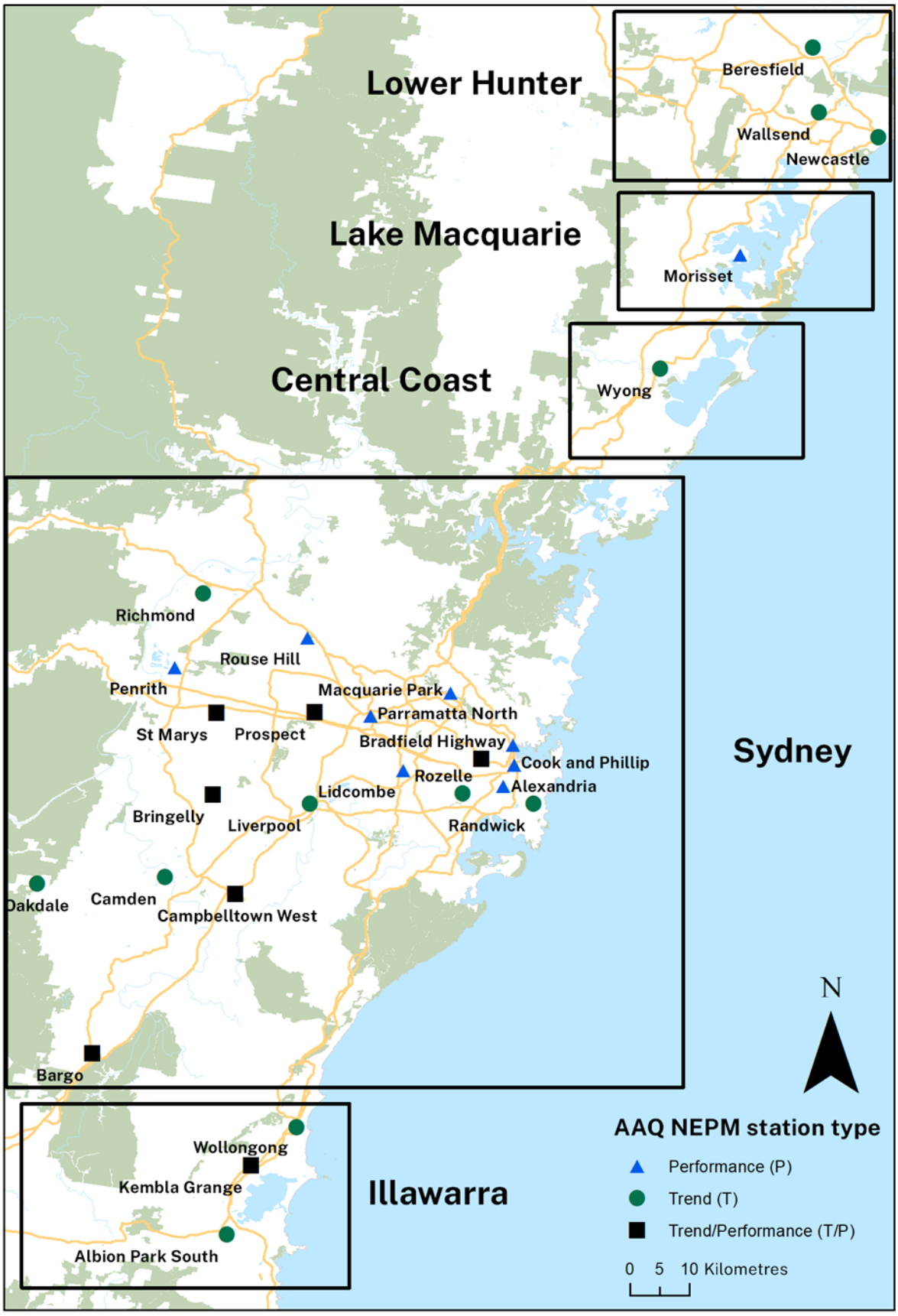


Figure 1 **NSW AAQ NEPM Compliance Monitoring Network in the NSW Greater Metropolitan Region, including Greater Sydney (Sydney), Illawarra, Central Coast, Lake Macquarie and Lower Hunter regions**

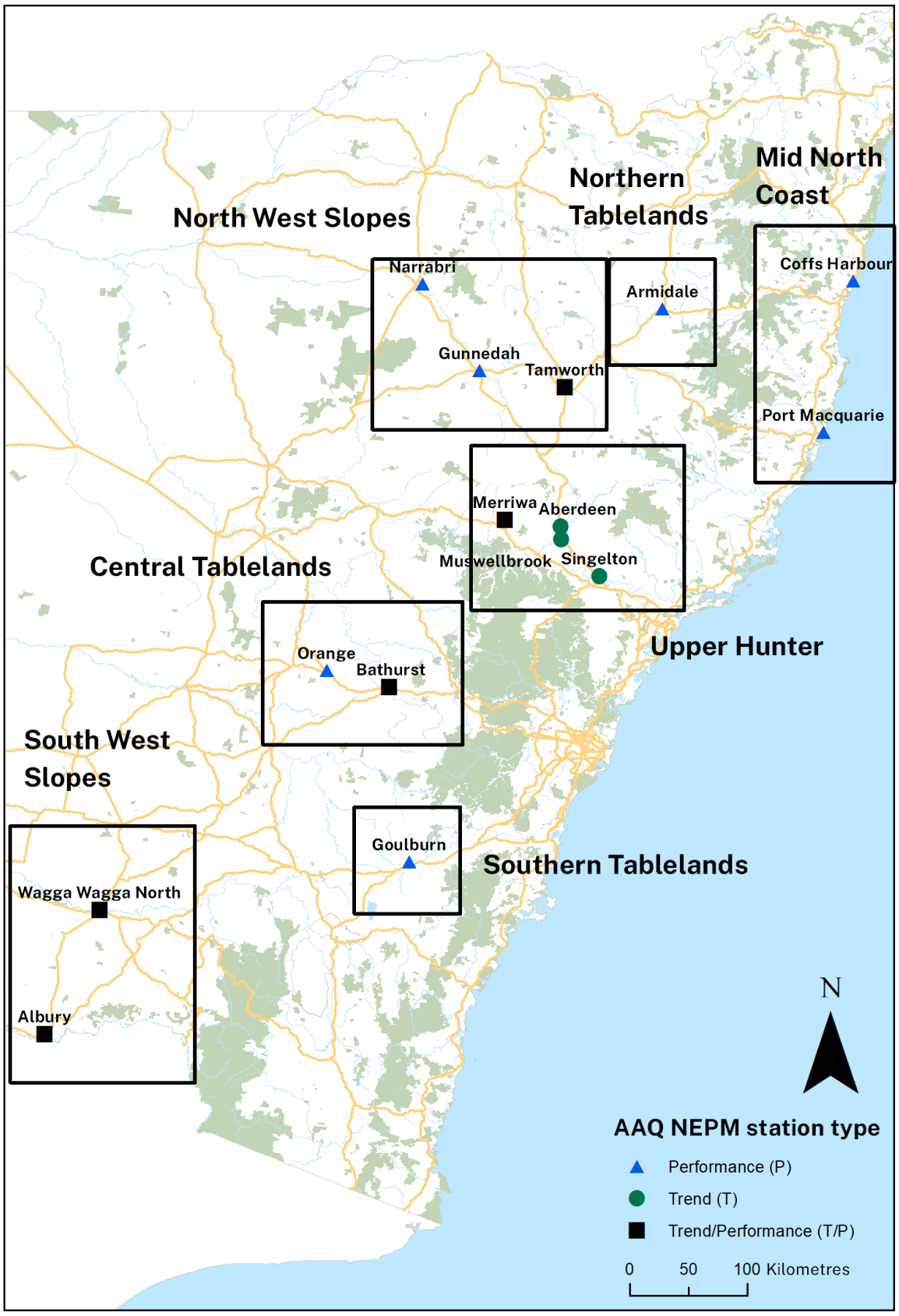


Figure 2 **NSW AAQ NEPM Compliance Monitoring Network in NSW regional centres, including the Upper Hunter, Mid North Coast, Northern Tablelands, North West Slopes, Central Tablelands, Southern Tablelands and South West Slopes regions**

2.2.2 Changes to the network and campaign monitoring in 2023

Permanent monitoring of ozone and nitrogen dioxide began at the following monitoring stations in 2023:

- ozone: Wagga Wagga North, Albury, Tamworth, Bathurst and Orange
- nitrogen dioxide: Wagga Wagga North, Albury, Tamworth.

2.2.3 Station classifications

The NSW Government assesses the air quality the public is exposed to in a given region by monitoring AAQ NEPM pollutants across a network of 43 stations. Station classifications are based on pollutant classifications, which are determined by the length of time a pollutant has been monitored at a station and for what purpose the monitoring is being undertaken. The network is a mixture of trend (T), performance (P), campaign (C) and mixed (T/P) air quality monitoring stations, which is summarised in Table 2.

- **Trend (T):** classification denotes a pollutant that has been operating at a station – or suitable, equivalent nearby location – continuously for a decade or more and captures most pollution events that occur across that station's region.
- **Performance (P):** classification signals one or more of the following:
  - a pollutant or station that has been monitoring continuously for less than a decade
  - where a criteria pollutant is not monitored at a trend station in the region
  - a station's location that is designed to monitor pollutants at the upper bounds of the concentrations likely to be experienced in a region.
- **Campaign (C):** is a temporary classification used when monitoring at a station, or of a particular pollutant has been undertaken for short periods of time, such as:
  - assessing the possibility of an exceedance of a criteria pollutant at a particular station
  - monitoring for specific pollution sources
  - monitoring at temporary locations.

Table 2 Stations reported as part of the NSW AAQ NEPM Compliance Monitoring Network for 2023

Region/station		Start year	Overall[1]	PM10	PM2.5	O_3	NO_2	CO	SO_2
East Sydney									
1	Alexandria[2]	2021	P	P	P	P	P	P	P
2	Bradfield Highway[3]	2018	P	P	P	P	P	P	P
3	Cook and Philip[4]	2019	P	P	P	P	P	P	P
4	Earlwood	1978	T	T	T	T	T	–	–
5	Macquarie Park[5]	2017	P	P	P	P	P	P	P

Region/station		Start year	Overall[1]	PM10	PM2.5	O_3	NO_2	CO	SO_2
6	Randwick	1994	T	T	T	T	T	–	T
7	Rozelle	1976	T/P	T	P	T	T	T	T
Central West Sydney									
8	Lidcombe[6]	2020	P	P	P	P	P	P	P
9	Parramatta North[7]	2017	P	P	P	P	P	P	P
10	Prospect	2007	T/P	T	P	T	T	T	T
11	Rouse Hill[8]	2019	P	P	P	P	P	P	P
North West Sydney									
12	Penrith[9]	2020	P	P	P	P	P	P	P
13	Richmond	1992	T	T	T	T	T	–	T
14	St Marys	1992	T/P	T	P	T	T	–	–
South West Sydney									
15	Bargo	1996	T/P	T	P	T	T	–	T
16	Bringelly	1992	T/P	T	P	T	T	–	T
17	Camden	2012	T	T	T	T	T	T	–
18	Campbelltown West[10]	2012	T/P	T	P	T	T	T	T
19	Liverpool	1990	T	T	T	T	T	T	T
20	Oakdale	1996	T	T	T	T	T	–	–
Illawarra									
21	Albion Park South	2005	T	T	T	T	T	–	T
22	Kembla Grange	1994	T/P	T	P	T	T	–	–
23	Wollongong	1993	T	T	T	T	T	T	T
Central Coast									
24	Wyong	2012	T	T	T	T	T	–	–
Lake Macquarie									
25	Morisset[11]	2020	P	P	P	P	P	–	–
Lower Hunter[12]									
26	Beresfield	1993	T	T	T	T	T	–	T
27	Newcastle	1992	T	T	T	T	T	T	T
28	Wallsend	1992	T	T	T	T	T	–	T
Upper Hunter									
29	Aberdeen	2011	T	T	–	–	–	–	–
30	Merriwa	2012	T/P	T	P	P	P	P	P
31	Muswellbrook	2010	T	T	T	–	T	–	T
32	Singleton	2010	T	T	T	–	T	–	T
Central Tablelands									
33	Bathurst	2000	T/P	T	P	P	–	–	–
34	Orange[13]	2018	P	P	P	P	–	–	–

Region/station		Start year	Overall[1]	PM10	PM2.5	O_3	NO_2	CO	SO_2
North West Slopes									
35	Gunnedah	2017	P	P	P	P	P	–	–
36	Narrabri	2017	P	P	P	–	–	–	–
37	Tamworth	2000	T/P	T	P	P	–	–	–
Northern Tablelands									
38	Armidale	2018	P	P	P	–	–	–	–
Mid North Coast									
39	Coffs Harbour[14]	2019	P	P	P	P	P	P	–
40	Port Macquarie[15]	2019	P	P	P	P	P	P	P
South West Slopes									
41	Albury	2000	T/P	T	P	P	P	–	–
42	Wagga Wagga North[16]	2011	T/P	T	T	P	P	–	–
Southern Tablelands									
43	Goulburn[17]	2019	P	P	P	P	P	–	–

Notes:

1. 'Overall' describes the classification status for each station derived from the classifications of each parameter monitored at a station. Stations may be a performance (P), trend (T), campaign (C) or a mix (T/P) if some pollutants have been monitored for more than 10 years, while others for less, '–' indicates the parameter is not monitored at this station.
2. Alexandria station was commissioned in October 2021, however, was included in the AAQ NEPM Compliance Monitoring Network from 2022.
3. Bradfield Highway station was commissioned in October 2018 as a roadside monitoring station and was included in the AAQ NEPM Compliance Network from 2022.
4. Cook and Philip station was commissioned in September 2019.
5. Macquarie Park station replaced the Lindfield station (1994–2019) in August 2017.
6. Lidcombe station replaced the Chullora station (2003–2022) in April 2020.
7. Parramatta North station was established on the old Westmead station (1980–2004) site and re-commissioned in December 2017.
8. Rouse Hill station replaced the Vineyard station (1994–2016) in May 2019.
9. Penrith station was commissioned in November 2020.
10. Campbelltown West station replaced Macarthur station (2004–2012) in September 2012.
11. Morisset station was commissioned in November 2020.
12. Upper Hunter stations included in the AAQ NEPM Compliance Monitoring Network represent general population locations in the Upper Hunter Air Quality Monitoring Network. These stations, along with the rest of the network, began operation in 2010–2012.
13. Orange station was commissioned in January 2019.
14. Coffs Harbour station was commissioned in November 2019 initially as a bushfire emergency response monitoring station. It has since been retained as a monitoring station by DCCEEW and was included in the AAQ NEPM Compliance Network from 2022.
15. Port Macquarie station was commissioned in July 2019 initially as a bushfire emergency response monitoring station. It has since been retained as a monitoring station by DCCEEW and was included in the AAQ NEPM Compliance Network from 2022.
16. Wagga Wagga North station replaced the Wagga Wagga station (2000–2011) in July 2011.
17. Goulburn station was commissioned in November 2019.

2.2.4 Non-conforming stations

Most stations in the AAQ NEPM Compliance Monitoring Network met the AAQ NEPM siting and exposure criteria stipulated as AS/NZS 3580.1.1:2016 in clause 13 of the AAQ NEPM. Those that do not comply with clause 13 are listed in Table 3.

Table 3 Stations that did not comply with all siting criteria (2023)

Station	Siting criteria not met	Comments	Period
Alexandria	Distance to road > 50 m	Site < 15 m from road	2021 – now
Armidale	Distance to road > 50 m	Site < 15 m from road	2018 – now
Bradfield Highway	Distance to road > 50 m Clear sky angle >120° Unrestricted airflow > 270°	Site adjacent to Bradfield Highway/Cahill Expressway	2018 – now
Coffs Harbour	Distance to road > 50 m Distance to tree > 10 m	Site < 15 m from road and < 5 m from tree	2019 – now
Cook and Phillip	Distance to road > 50 m	Site 40 m from road	2019 – now
Earlwood	Distance to road > 50 m	Sited in a carpark and 35 m from road	2011 – now
Goulburn	Distance to road > 50 m Distance to tree < 10 m	Site < 15 m from road Site < 10 m from trees	2019 – now
Gunnedah	Distance to road > 50 m	Site < 10 m from a suburban road and < 50 m from a highway	2017 – now
Lidcombe	Distance to nearby tree > 10 m	Trees < 10 m east of the site	2020 – now
Morisset	Distance to road > 50 m	Site < 15 m from road	2020 – now
Muswellbrook	Distance to road > 50 m	Site < 15 m from road	2011 – now
Penrith	Distance to road > 50 m	Site < 20 m from road	2020 – now
Port Macquarie	Distance to road and tree < 20 m	Site < 20 m from road and trees	2019 – now
Rozelle	Clear sky angle > 120° Unrestricted airflow > 270°	Established trees in a heritage area	2011 – now

2.2.5 NATA accreditation

The NSW air quality monitoring network is accredited by NATA for the sampling and/or measurement of all AAQ NEPM parameters, as required under clause 12 of the AAQ NEPM. Accreditation number: 14209.

For the purposes of this report, the last assessment of the Air Quality Monitoring laboratory and associated monitoring stations by NATA was completed in May 2022.

At the time of publishing this report (2025), the most recent NATA surveillance assessment was completed in February 2024.

2.2.6 Monitoring methods

The NSW AAQ NEPM Compliance Monitoring Network uses instruments in accordance with relevant Australian standards, which are specified in Schedule 3 of the AAQ NEPM and are shown in Table 4.

Table 4 **Australian standards, methods and instrumentation currently used in the NSW AAQ NEPM Compliance Monitoring Network**

Pollutant	Standard	Title	Instrumentation method
Carbon monoxide	AS 3580.7.1:2011/ Amdt 1-2012	Determination of Carbon Monoxide – Direct Reading Instrumental Method	Gas filter correlation/infrared
Nitrogen dioxide	AS 3580.5.1-2011	Determination of oxides of nitrogen – Chemiluminescence Method	Gas-phase chemiluminescence
Photochemical oxidants (as ozone)	AS 3580.6.1-2016	Determination of Ozone – Direct-Reading Instrumental Method	Non-dispersive ultraviolet
Sulfur dioxide	AS 3580.4.1-2008 REC:2018	Determination of Sulfur Dioxide – Direct Reading Instrumental Method	Pulsed fluorescence
Particles as PM10	AS 3580.9.8-2008 REC:2018	Determination of Suspended Particulate Matter – PM10 continuous direct mass method using a tapered element oscillating microbalance monitor	Tapered element oscillating microbalance (TEOM)
Particles as PM10	AS/NZS 3580.9.16:2016	Determination of Suspended Particulate Matter – PM10 continuous direct mass method using a tapered element oscillating microbalance monitor	TEOM-FDMS
Particles as PM2.5	AS 3580.9.10:2017	Determination of Suspended Particulate Matter – PM2.5 low volume sampler – Gravimetric Method	USEPA Federal Reference Method (FRM) sampler
Particles as PM2.5	AS/NZS 3580.9.12:2013	Determination of Suspended Particulate Matter – PM2.5 beta attenuation monitors	Beta attenuation monitor (BAM)
Particles as PM2.5	AS/NZS 3580.9.13:2013	Determination of Suspended Particulate Matter – PM2.5 continuous direct mass method using a tapered element oscillating microbalance monitor	TEOM-FDMS

Notes:
AS = Australian standard.
NZS = New Zealand standard.
USEPA = United States Environmental Protection Agency.
TEOM-FDMS = tapered element oscillating microbalance filter dynamics measurement system. Simultaneously measure PM10 and PM2.5. Instrument in use at Alexandria, Armidale, Bradfield Highway, Coffs Harbour, Cook and Phillip, Goulburn, Gunnedah, Narrabri, Orange and Port Macquarie.

3. Section B: assessment of compliance with standards and goals

The compliance status of the 43 stations that make up the AAQ NEPM Compliance Monitoring Network for the 2023 calendar year is presented in this section.

All pollutants at each of these stations are assessed against the national standards as outlined in Schedule 2 of the National Environment Protection (Ambient Air Quality) Measure from May 2021, which are given in Table 5. This section also discusses the treatment of exceptional air quality events and the calculation and reporting methods necessary for NEPM compliance.

Table 6 identifies the stations and pollutants that did not comply with the 75% data availability criterion, while Table 7 to 12 present the following summary statistics for each pollutant monitored in 2023 in the network:

- quarterly and annual data availability rates
- 1-year mean concentration for nitrogen dioxide and particles as PM10 and PM2.5
- number of exceedance days and the number of non-exceptional event days for ozone and particles as PM10 and PM2.5
- assessment of compliance: compliant (met), not compliant (not met) or not demonstrated (ND) against all standards for the 6 of 7 criteria pollutants monitored in NSW during 2023 as given in Table 5. Lead is no longer monitored in NSW.

3.1 Compliance assessment requirements

3.1.1 Air NEPM standards

Air quality data for 2023 is assessed against the standards specified in Schedule 2 of the AAQ NEPM, amended 18 May 2021. The goal of the AAQ NEPM is to achieve the standards presented in Table 5, with no maximum allowable exceedances for any pollutant. There are exceptions for exceptional events that apply to the 8-hour rolling averaging period for ozone and 1-day averages for particles as PM10 and PM2.5.

Table 5 Air quality standards in Schedule 2 of the AAQ NEPM (May 2021)

Pollutant	Averaging period	Maximum concentration standard
Carbon monoxide	8-hour rolling average	9.0 ppm
Nitrogen dioxide	1-hour average 1-year average	0.080 ppm 0.015 ppm
Photochemical oxidants – as ozone	8-hour rolling average	0.065 ppm
Sulfur dioxide	1-hour average 1-day average	0.100 ppm 0.020 ppm
Particles as PM10	1-day average 1-year average	50 µg/m^3 25 µg/m^3
Particles as PM2.5	1-day average 1-year average	25 µg/m^3 8 µg/m^3
Lead	1-year	0.50 µg/m^3

3.1.2 Air NEPM goal

Clause 6 of the AAQ NEPM defines the goal of the AAQ NEPM as achieving the standards given in Schedule 2. For the purposes of this report, the AAQ NEPM goal is to achieve the standards given in Table 5.

3.1.3 Exceptional event days for particles and ozone

Clause 2(3) of the AAQ NEPM defines an exceptional event as a fire or dust occurrence that adversely affects air quality at a particular location such that it causes an exceedance of one or more of 1-day averages for particles as PM10 and PM2.5 and 8-hour rolling averages for ozone. This has been a NEPM reporting requirement for particles as PM10 and PM2.5 since 2016 and ozone since 2021. These events are directly related to bushfire, jurisdiction-authorised hazard reduction burning or continental-scale windblown dust.

For the purposes of this report, exceedances attributed to the following pollution sources are classified as non-exceptional events:

- 1-day PM10: local and regional sources of dust and wood smoke
- 1-day PM2.5: wood smoke
- 8-hour ozone: wood smoke and photochemistry.

Exceptional event days are not counted towards the AAQ NEPM goal of no maximum allowable exceedances for the 1-day averages of PM10 and PM2.5 and the 8-hour rolling average for ozone – see tables 10 to 12 and tables 28 to 30 (clause 18(3C)). However, exceptional event days are included for assessing compliance against the PM10 and PM2.5 1-year standards – see tables 11 and 12 and tables 29 and 30 (clause 19(3D)). In addition, clause 19(3A) requires exceptional events to be identified and described – see tables 18, 20 and 23.

3.1.4 Calculation and reporting methods

The calculation and reporting methods used in this report comply with the AAQ NEPM requirements as described in the *National Environment Protection (Ambient Air Quality) Measure technical paper no. 8*, annual reports (AAQ NEPM technical paper no. 8) (NEPC Peer Review Committee 2002).

One-day averages

One-day averages are calculated from hourly averages, as described in *National Environment Protection (Ambient Air Quality) Measure technical paper no. 5, data collection and handling* (AAQ NEPM technical paper no. 5) (NEPC Peer Review Committee 2001).

Correction factors for particles

For particulate matter as PM10, an internal correction factor for the United States Environmental Protection Agency (USEPA) equivalency has been applied to PM10 data collected using the tapered element oscillating microbalance (TEOM) method. However, there has been no subsequent treatment, or temperature adjustment. PM2.5 measurements were taken using the beta attenuation monitor (BAM), or TEOM-FDMS (filter dynamics measurement system) instrument.

In this report, PM2.5 data collected pre-2012 by using TEOMs do not include the internal correction factor for USEPA equivalency, or any subsequent treatment or adjustment for temperature.

PM2.5 measurements using the USEPA Federal Reference Method (FRM) are reported for the Lidcombe (93.4% of 2023) monitoring station.

Data availability rates

Before data can be assessed for compliance against AAQ NEPM standards, a data availability floor of at least 75% of valid data must be met for each of the following periods:

- every quarter, as well as over the full year
- data averaging periods that correspond to relevant NEPM standards such that at least 75% of the data available is valid for every valid 1-hour, 8-hour rolling, 1-day and 1-year average to be made.

For example, if annual data availability for a pollutant is 92.6%, however for one of the year's quarters, only 72.2% of data is valid, this pollutant does not meet the 75% data availability requirement and cannot be assessed for compliance. With respect to data averaging periods, the carbon monoxide and ozone AAQ NEPM standards are based on an 8-hour rolling average. To calculate a valid 8-hour rolling average, at least 6 of the last 8 hourly averages must be valid, which is 75%. In this report, data availability rates are calculated using:

- 1-hour data for gaseous criteria pollutants, and
- 1-day data for particles as PM10 and PM2.5.

Presenting data availability rates

In this report, data availability rates are presented as:

- percentages of quarterly and annual valid data (Section B, tables 7 to 13 and Appendix A, table 25 to 30) and
- numbers of valid days (Section C, Table 14 to Table 17, table 19, 21 and 22).

The number of valid days is the sum of all days where at least 18 out of 24 hours (75%) of data is valid.

Calibration hour

For gaseous pollutants, the calibration hour – which occurs between 2 am and 3 am Australian eastern standard time (AEST) – is included in the calculation of the data availability rates. The department undertakes 1-day automated instrument calibration checks during the early morning for the following NEPM criteria pollutants:

- carbon monoxide
- nitrogen dioxide
- sulfur dioxide
- ozone.

Hourly data obtained during the calibration period is considered invalid for reporting purposes. As a result, the maximum number of valid hours in each day for the gaseous pollutants is 23 hours. Annually, this results in 96% as the maximum data availability rate for 1-hour gaseous data.

Data availability for pollutants reported against more than one sub-annual standard

Since the May 2021 amendment to the AAQ NEPM, only sulfur dioxide is assessed against 2 sub-annual standards: a 1-hour standard and a 1-day standard. As the calibration hour is accounted for in the data availability calculations, only the 1-hour data availability rate is impacted, with an annual maximum data availability rate of 96%. However, if 96% of 1-hour data is valid for all days of the year, then the data availability rate for the 1-day standard is said to be 100%.

3.1.5 Categories used to assess compliance

Air quality compliance with the AAQ NEPM requirements in tables 7 to 12 is shown using 3 categorisation statuses as follows:

- **Met (compliant, C):** the station **is NEPM-compliant** if there are no exceedances of the standards specified in Schedule 2 of the AAQ NEPM classified as non-exceptional events, and it meets 75% annual data availability as given in AAQ NEPM technical paper no. 8.
- **Not met (not compliant, N-C):** the station **is not NEPM-compliant** if at least one exceedance of the standards specified in Schedule 2 of the AAQ NEPM is classified as a non-exceptional event is measured and identified.

- **Not demonstrated (ND):** the station **has not met** the data availability rate requirement of at least 75% of data available for at least one quarter of a calendar year, unless an exceedance assessed as a non-exceptional event is recorded at the station, and the station is assigned as not compliant (N-C) instead.

3.2 Data availability requirements (2023)

Of the 43 monitoring stations in the compliance network, pollutants at 6 stations did not meet the requirement for at least 75% data availability in each quarter (Table 6).

Table 6 Stations that did not meet the data availability criteria (2023)

Station	Criteria of at least 75% data availability requirement not met	Comments
Alexandria	CO (Q1, Q4) due to negative data and instrument issues, O_3 (Q4) due to instrument issues	CO data was below the lower bounds for negative data for the majority of Q1 and some of Q4. Communications issues with the instrument also impeded online time for CO in Q4. Ozone data in Q4 was invalidated and the instrument was offline due to a fault between 01/12/2023 and 22/12/2023.
Camden	CO, O_3 and NO_2 (Q2, Q3) due to issues with the sample manifold, PM2.5 (Q3) due to an instrument fault	Between the period of 09/06/2023 and 07/09/2023 there was an issue with the fan in the manifold, causing erroneous readings for all gaseous parameters (CO, O_3 and NO_2). PM2.5 data was invalided from 12/07/2023 to 03/08/2023 due to an instrument error.
Cook and Phillip	PM10, PM2.5 (Q1) due to a flow issue	Station maintenance on 05/04/2023 discovered a flow issue with the instrument. Data was invalidated from 13/03/2023.
Orange	PM10, PM2.5 (Q1) due to instrument flow leak	Station maintenance on 04/04/2023 discovered a flow leak in the instrument. Data was invalidated from 09/03/2023.
Parramatta North	PM2.5 (Q4) due to instrument issue	Instrument was taken offline after having been found to have no flow on 13/12/2023. No data available for the remainder of December 2023.
Wagga Wagga North	NO_2 (Q4), O_3 (Q4) due to instrument faults	Data for NO_2 and O_3 was unavailable for less than 75% of Q4 due to multiple instrument faults.

3.3 Compliance summaries (2023)

Compliance with the AAQ NEPM standards is summarised in tables 7 to 12 for each of the criteria pollutants.

Bolded entries in the following tables are assigned a performance status of 'not met'. These stations have been assessed as being not compliant with NEPM standards due to exceedances of the standard, or because in the case of particles as PM10 and PM2.5 and ozone, those exceedances were not exceptional events. In tables 7 to 12, bolded entries are also assigned a dagger symbol (†) to signify that station has not met NEPM standards.

Where the font is *italicised*, station performance is assessed as 'ND' (not demonstrated), indicating the stations that failed to comply with the 75% quarterly data availability requirement. Stations with data availability for any pollutant below 75% for any quarter, do not have enough valid data to adequately assess its compliance against the NEPM standard and are assigned a hash symbol (#).

Exceptions occur when a station records a valid exceedance, or when a non-exceptional event is observed for ozone and particles as PM10 and PM2.5. In these cases, compliance is assessed as 'not met'. In these cases, entries are assigned both a dagger (†) and hash (#) symbol.

For ozone and particles as PM10 and PM2.5 (tables 10 to 12), the number of non-exceptional event days (if any) are written in brackets next to the total number of exceedances. For these tables, non-exceptional event days are expressed in the column heading as 'NEED'.

For tables 10 to 12, where both numbers are in bold, for example, '**1(1)**', this indicates that the station recorded one exceedance represented as '1', which was due to a non-exceptional even written as '(1)'. Any exceedances due to non-exceptional events are not compliant with the AAQ NEPM, and the performance status of stations that record non-exceptional events is given as 'not met'.

3.3.1 Carbon monoxide

Table 7 2023 compliance summary for carbon monoxide

Region/station	Data availability rate (% of hours)					Number of exceedance days	Performance against standard and goal
	Q1	Q2	Q3	Q4	Year		
East Sydney							
Alexandria#	*20.0*	*91.8*	*94.3*	*67.9*	*68.7*	*0*	*ND*
Bradfield Highway	95.0	86.8	94.5	93.3	92.4	0	Met
Cook and Phillip	94.4	95.7	87.1	93.6	92.7	0	Met
Macquarie Park	94.7	95.5	93.8	92.0	94.0	0	Met
Rozelle	79.0	93.8	94.2	95.1	90.6	0	Met

Region/station	Data availability rate (% of hours)					Number of exceedance days	Performance against standard and goal
	Q1	Q2	Q3	Q4	Year		
Central West Sydney							
Lidcombe	81.8	93.5	93.4	88.5	89.3	0	Met
Parramatta North	93.8	95.5	92.1	96.9	94.2	0	Met
Prospect	88.2	95.5	80.3	86.9	87.7	0	Met
Rouse Hill	95.5	93.9	95	93.6	94.5	0	Met
South West Sydney							
Camden[#]	*95.5*	*64.1*	*23.7*	*93.3*	*69.0*	*0*	*ND*
Campbelltown West	93.4	85.5	93.8	95.4	92.0	0	Met
Liverpool	92.5	94.8	93.3	85.9	91.6	0	Met
North West Sydney							
Penrith	90.6	93.0	93.0	89.9	91.6	0	Met
Illawarra							
Wollongong	94.5	94.0	94.2	93.3	94.0	0	Met
Central Coast							
Wyong	90.8	91.3	89.0	89.4	90.1	0	Met
Lake Macquarie							
Morisset	92.7	95.3	95.4	93.0	94.1	0	Met
Lower Hunter							
Newcastle	93.9	91.8	92.3	94.5	93.1	0	Met
Upper Hunter							
Merriwa	94.7	90.8	94.0	93.7	93.3	0	Met
Mid North Coast							
Coffs Harbour	83.5	82.5	93.7	93.5	88.3	0	Met
Port Macquarie	92.9	95.1	88.7	96.9	93.4	0	Met

Of the 20 stations that monitored carbon monoxide in 2023, 18 stations complied with the quarterly 75% valid data availability criterion.

As no exceedances were observed, all 18 stations complied with the 8-hour rolling average standard for carbon monoxide (9.0 ppm).

Two stations did not meet the 75% valid quarterly data availability criterion. Compliance for these stations is assessed as ‘not demonstrated’. These stations were Alexandria (Q1 and Q4) and Camden (Q2 and Q3).

No carbon monoxide exceedances have been recorded since the 2 days were observed at Port Macquarie in 2019 during the 2019-20 bushfire period.

3.3.2 Nitrogen dioxide

Table 8 2023 compliance summary for nitrogen dioxide

Region/station	Data availability rate (% of hours)					Number of exceed-ance days	1-year mean (ppm)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-hour	1-year
East Sydney									
Alexandria	92.7	94.9	94.2	80.1	90.4	0	0.011	Met	Met
Bradfield Highway[†]	93.9	82.5	91.4	89.1	89.2	0	**0.019**	Met	**Not met**
Cook and Phillip	93.1	95.6	89.3	94.0	93.0	0	0.012	Met	Met
Earlwood	95.2	91.8	87.5	85.1	89.9	0	0.009	Met	Met
Macquarie Park	93.4	90.6	93.0	93.0	92.5	0	0.004	Met	Met
Randwick	94.4	91.3	92.4	90.0	92.0	0	0.007	Met	Met
Rozelle	77.9	92.8	90.0	93.8	88.7	0	0.008	Met	Met
Central West Sydney									
Lidcombe	93.3	90.4	92.4	93.4	92.4	0	0.011	Met	Met
Parramatta North	95.6	95.5	88.3	94.3	93.4	0	0.008	Met	Met
Prospect	87.5	94.6	91.9	95.2	92.3	0	0.008	Met	Met
Rouse Hill	95.5	91.4	95.1	91.8	93.4	0	0.005	Met	Met
South West Sydney									
Bargo	82.9	94.1	91.6	95.1	91.0	0	0.005	Met	Met
Bringelly	81.2	93.4	88.3	91.3	88.6	0	0.003	Met	Met
Camden[#]	*95.5*	*68.1*	*23.6*	*93.2*	*70.0*	*0*	*0.004*	*ND*	*ND*
Campbelltown West	94.0	86.9	93.7	93.4	92.0	0	0.009	Met	Met
Liverpool	92.5	94.6	93.3	95.0	93.8	0	0.009	Met	Met
Oakdale	94.3	92.6	92.8	92.2	93.0	0	0.001	Met	Met
North West Sydney									
Penrith	93.2	95.1	95.0	93.1	94.1	0	0.007	Met	Met
Richmond	87.8	89.2	94.0	92.6	90.9	0	0.003	Met	Met
St Marys	91.5	93.0	95.2	91.3	92.8	0	0.006	Met	Met
Illawarra									
Albion Park South	94.8	92.6	95.3	93.6	94.1	0	0.004	Met	Met
Kembla Grange	88.0	92.4	92.7	93.3	91.6	0	0.005	Met	Met
Wollongong	93.9	93.9	94.0	91.8	93.4	0	0.007	Met	Met
Central Coast									
Wyong	88.1	88.3	90.8	88.9	89.0	0	0.002	Met	Met

Region/station	Data availability rate (% of hours)					Number of exceed-ance days	1-year mean (ppm)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-hour	1-year
Lake Macquarie									
Morisset	92.0	95.4	95.4	92.6	93.8	0	0.002	Met	Met
Lower Hunter									
Beresfield	92.1	94.0	94.4	92.7	93.3	0	0.008	Met	Met
Newcastle	90.9	91.1	87.0	79.3	87.1	0	0.005	Met	Met
Wallsend	95.6	88.0	94.1	95.2	93.2	0	0.006	Met	Met
Upper Hunter									
Merriwa	94.5	90.7	94.3	93.8	93.6	0	0.008	Met	Met
Muswellbrook	95.5	94.4	91.5	93.1	91.6	0	0.006	Met	Met
Singleton	88.2	93.9	95.1	89.2	93.3	0	0.003	Met	Met
North West Slopes									
Gunnedah	91.3	94.4	92.6	94.6	93.2	0	0.003	Met	Met
Tamworth	95.7	93.8	93.8	94.9	94.6	0	0.004	Met	Met
Mid North Coast									
Coffs Harbour	83.5	92.4	93.7	93.4	90.8	0	0.003	Met	Met
Port Macquarie	97.9	97.8	94.6	97.9	97.0	0	0.002	Met	Met
South West Slopes									
Albury	95.5	90.8	94.5	90.7	92.9	0	0.005	Met	Met
Wagga Wagga North[#]	*94.9*	*87.9*	*76.0*	*71.2*	*82.4*	*0*	*0.003*	*ND*	*ND*
Southern Tablelands									
Goulburn	95.5	95.4	95.0	92.5	94.6	0	0.003	Met	Met

Of the 38 stations that monitored nitrogen dioxide in 2023, 36 stations complied with the quarterly 75% valid data availability criterion.

No exceedances of the 1-hour average standard (0.08 ppm) were observed during 2023, resulting in all 36 stations complying with the 1-hour average standard. However, Bradfield Highway exceeded the 1-year average standard of 0.015 ppm with a 1-year average of 0.019 ppm, resulting in 35 of 36 stations complying with the 1-year average nitrogen dioxide standard.

Two stations, including Wagga Wagga North (Q3 and Q4) and Camden (Q2 and Q3) did not meet the 75% quarterly data availability criterion. Compliance was therefore assessed as ‘not demonstrated’ for these stations.

3.3.3 Sulfur dioxide

Table 9 2023 compliance summary for sulfur dioxide

Region/station	Data availability rate (% of hours)					Number of exceedance days		Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year	1-hour	1-day	1-hour	1-day
East Sydney									
Alexandria	93.8	95.0	95.1	78.9	90.7	0	0	Met	Met
Bradfield Hwy	95.6	86.8	94.5	78.0	88.7	0	0	Met	Met
Cook and Phillip	94.4	95.7	89.3	91.7	92.8	0	0	Met	Met
Macquarie Park	94.7	91.9	92.2	94.1	93.2	0	0	Met	Met
Randwick	90.0	88.4	92.0	91.9	90.6	0	0	Met	Met
Rozelle	79.0	90.7	83.6	95.2	87.1	0	0	Met	Met
Central West Sydney									
Lidcombe	93.2	93.5	94.4	93.7	93.7	0	0	Met	Met
Parramatta North	95.5	95.5	92.1	91.8	93.7	0	0	Met	Met
Prospect	87.7	95.5	92.1	95.3	92.7	0	0	Met	Met
Rouse Hill	95.6	94.0	95.1	87.3	93.0	0	0	Met	Met
South West Sydney									
Bargo	85.6	95.5	93.5	95.2	92.5	0	0	Met	Met
Bringelly	91.3	95.6	91.4	90.9	92.3	0	0	Met	Met
Campbelltown West	93.9	89.1	93.8	95.4	93.1	0	0	Met	Met
Liverpool	90.0	95.6	93.4	94.9	93.5	0	0	Met	Met
North West Sydney									
Penrith	78.6	95.3	95.0	94.8	91.0	0	0	Met	Met
Richmond	86.3	91.2	90.6	92.7	90.2	0	0	Met	Met
Albion Park South	93.1	93.7	95.5	93.7	94.0	0	0	Met	Met
Illawarra									
Wollongong	94.2	93.3	94.2	93.8	93.9	0	0	Met	Met
Central Coast									
Wyong	95.7	92.2	90.7	90.3	92.2	0	0	Met	Met
Lake Macquarie									
Morisset	81.8	95.4	95.4	93.0	91.4	0	0	Met	Met
Lower Hunter									
Beresfield	93.0	95.2	94.4	95.0	94.4	0	0	Met	Met
Newcastle	94.7	88.3	92.1	88.5	90.9	0	0	Met	Met
Wallsend	95.5	89.0	94.2	94.9	93.4	0	0	Met	Met
Upper Hunter									
Merriwa	92.4	90.1	93.3	93.8	92.4	0	0	Met	Met

Region/station	Data availability rate (% of hours)					Number of exceedance days		Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year	1-hour	1-day	1-hour	1-day
Muswellbrook†	92.8	95.4	91.5	95.3	93.8	**2**	**1**	**Not met**	**Not met**
Singleton	89.7	95.5	94.5	92.0	92.9	0	0	Met	Met
Mid North Coast									
Port Macquarie	98.1	97.3	83.9	93.6	93.2	0	0	Met	Met

All 27 stations that monitored sulfur dioxide in 2023 complied with the quarterly 75% valid data availability criterion.

Twenty-six of the 27 stations complied with the both the 1-hour average standard (0.100 ppm) and the 1-day average standard (0.020 ppm). Muswellbrook exceeded the 1-hour standard twice, and the 1-day standard once during 2023. This is the first year since 2021 that Muswellbrook has recorded an exceedance of the hourly sulfur dioxide standard and the first time since 2019 Muswellbrook has exceeded the 1-day standard.

3.3.4 Ozone

Table 10 2023 compliance summary for ozone

Region/station	Data availability rate (% of hours)					Number of exceedance days (NEED)	Performance against rolling 8-hour standard and goal
	Q1	Q2	Q3	Q4	Year		
East Sydney							
Alexandria#	*83.6*	*86.4*	*84.1*	*67.2*	*80.3*	*0*	*ND*
Bradfield Highway	94.5	86.7	94.3	94.5	92.5	0	Met
Cook and Phillip	85.4	90.4	87.6	94.5	89.5	0	Met
Earlwood†	95.2	91.3	91.8	94.6	93.2	**1 (1)**	**Not Met**
Macquarie Park	94.6	95.3	93.6	95.0	94.6	0	Met
Randwick	95.4	93.6	92.3	91.9	93.3	0	Met
Rozelle	76.5	93.8	92.3	95.1	89.5	0	Met
Central West Sydney							
Lidcombe†	95.0	83.7	93.3	94.5	91.6	**1 (1)**	**Not Met**
Parramatta North†	95.5	95.3	93.1	95.2	94.8	**1 (1)**	**Not Met**
Prospect†	89.3	95.2	93.0	95.2	93.2	**1 (1)**	**Not Met**
Rouse Hill	94.2	91.8	95.0	94.7	93.9	0	Met
South West Sydney							
Bargo†	92.6	95.4	93.6	95.2	94.2	**1 (1)**	**Not Met**
Bringelly†	91.6	91.4	92.6	95.5	92.8	**1 (1)**	**Not Met**
Camden#†	*94.4*	*69.0*	*23.6*	*93.5*	*70.0*	***1 (1)***	***Not Met***

Region/station	Data availability rate (% of hours)					Number of exceedance days (NEED)	Performance against rolling 8-hour standard and goal
	Q1	Q2	Q3	Q4	Year		
Campbelltown West	95.2	91.1	93.8	95.3	93.9	0	Met
Liverpool†	90.6	95.6	94.7	95.0	94.0	**1 (1)**	**Not Met**
Oakdale†	94.2	92.5	87.2	93.6	91.9	**1 (1)**	**Not Met**
North West Sydney							
Penrith	93.5	95.3	95.0	94.7	94.6	0	Met
Richmond	86.8	92.3	90.5	94.7	91.1	0	Met
St Marys†	95.2	94.1	89.1	91.7	92.5	**1 (1)**	**Not met**
Illawarra							
Albion Park South†	90.5	94.8	94.6	93.8	93.4	**1 (1)**	**Not met**
Kembla Grange	95.3	94.0	92.3	89.1	92.6	0	Met
Wollongong	93.3	93.9	95.2	93.8	94.1	0	Met
Central Coast							
Wyong	95.6	94.9	92.1	94.5	94.3	0	Met
Lake Macquarie							
Morisset	93.8	95.5	95.4	94.2	94.7	0	Met
Lower Hunter							
Beresfield	93.2	90.7	94.4	94.9	93.3	0	Met
Newcastle	95.0	90.9	86.3	94.2	91.6	0	Met
Wallsend	93.9	87.6	94.0	94.2	92.5	0	Met
Upper Hunter							
Merriwa	86.6	90.9	94.2	93.6	91.3	0	Met
Central Tablelands							
Bathurst	93.1	95.1	94.6	95.1	94.5	0	Met
Orange	91.7	91.5	88.7	85.6	89.4	0	Met
North West Slopes							
Gunnedah	93.1	91.7	93.8	95.2	93.5	0	Met
Tamworth	95.7	93.9	93.9	95.0	94.6	0	Met
Mid North Coast							
Coffs Harbour	83.3	92.9	93.7	93.6	90.9	0	Met
Port Macquarie	89.2	96.2	93.7	97.8	94.3	0	Met
South West Slopes							
Albury	80.8	81.9	84.0	90.2	84.2	0	Met
Wagga Wagga North#	*95.5*	*75.4*	*84.3*	*63.4*	*79.6*	*0*	*ND*
Southern Tablelands							
Goulburn	95.5	95.4	95.1	94.5	95.1	0	Met

Of the 38 stations that monitored ozone in 2023, 35 stations complied with the quarterly 75% data availability criterion.

Twenty-five stations complied with the 8-hour rolling average ozone standard of 0.065 ppm. Eleven stations recorded one exceedance each during 2023. Ten of these stations are located in Sydney, with Albion Park South in the Illawarra being the only station to record an ozone exceeded outside Sydney in 2023.

Three stations did not meet the 75% quarterly valid data availability criterion, which included Wagga Wagga North and Alexandria – both in Q4. The compliance of these 2 stations was assessed as 'not demonstrated'. Camden (Q2 and Q3) also did not meet the data availability criterion, however its status was assessed as 'not met' as it recorded a valid exceedance of the 8-hour rolling average standard.

The exceedances observed at Albion Park South, St Marys and Earlwood were the first ozone exceedances at these stations since 2020.

3.3.5 Particles as PM10

Table 11 2023 compliance summary for particles as PM10

Region/station	Data availability rate (% of days)					Number of exceed-ance days (NEED)	1-year mean (µg/m³)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-day	1-year
East Sydney									
Alexandria	94.4	91.2	90.2	84.8	90.1	3 (0)	14.6	Met	Met
Bradfield Highway	97.8	94.5	98.9	100	97.8	4 (0)	17.8	Met	Met
Cook and Phillip[#]	*74.4*	94.5	93.5	100	*90.7*	2 (0)	*14.2*	*ND*	*ND*
Earlwood	96.7	97.8	94.6	97.8	96.7	1 (0)	15.9	Met	Met
Macquarie Park	93.3	95.6	94.6	90.2	93.4	0	14.5	Met	Met
Randwick	100	100	92.4	95.7	97.0	2 (0)	16.6	Met	Met
Rozelle	82.2	100	96.7	100	94.8	0	15.7	Met	Met
Central West Sydney									
Lidcombe	100	100	98.9	97.8	99.2	1 (0)	16.6	Met	Met
Parramatta North	100	97.8	92.4	100	97.5	0	16.8	Met	Met
Prospect	100	100	98.9	97.8	99.2	0	16.8	Met	Met
Rouse Hill	100	100	100	97.8	99.5	0	15.4	Met	Met
South West Sydney									
Bargo[†]	98.9	95.6	97.8	100	98.1	**5 (4)**	15.0	**Not met**	Met
Bringelly[†]	93.3	100	98.9	96.7	97.3	**1 (1)**	16.2	**Not met**	Met

Region/station	Data availability rate (% of days)					Number of exceed-ance days (NEED)	1-year mean (µg/m³)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-day	1-year
Camden	100	87.9	98.9	97.8	96.2	2 (0)	13.7	Met	Met
Campbelltown West	100	93.4	98.9	100	98.1	2 (0)	14.4	Met	Met
Liverpool	100	100	100	95.7	98.9	2 (0)	19.3	Met	Met
Oakdale	97.8	94.5	90.2	96.7	94.8	1 (0)	12.4	Met	Met
North West Sydney									
Penrith	100	96.7	97.8	97.8	98.1	0	16.6	Met	Met
Richmond	94.4	94.5	96.7	83.7	92.3	0	14.0	Met	Met
St Marys	98.9	95.6	95.7	96.7	96.7	0	16.1	Met	Met
Illawarra									
Albion Park South	92.2	97.8	100	100	97.5	0	13.4	Met	Met
Kembla Grange†	100	96.7	88.0	89.1	93.4	**8 (2)**	20.9	**Not met**	Met
Wollongong†	94.4	94.5	100	94.6	95.9	**1 (1)**	16.5	**Not met**	Met
Central Coast									
Wyong	100	100	91.3	100	97.8	0	13.9	Met	Met
Lake Macquarie									
Morisset	94.4	91.2	98.9	97.8	95.6	0	11.2	Met	Met
Lower Hunter									
Beresfield	100	100	95.7	97.8	98.4	0	17.8	Met	Met
Newcastle	100	96.7	98.9	97.8	98.4	0	20.1	Met	Met
Wallsend	100	92.3	93.5	100	96.4	0	16.1	Met	Met
Upper Hunter									
Aberdeen	100	97.8	100	100	99.5	0	15.3	Met	Met
Merriwa	100	94.5	95.7	98.9	97.3	0	14.2	Met	Met
Muswellbrook†	98.9	97.8	98.9	100	98.9	**2 (2)**	21.9	**Not met**	Met
Singleton	97.8	100	100	94.6	98.1	0	19.1	Met	Met
Central Tablelands									
Bathurst†	93.3	100	97.8	96.7	97.0	**2 (1)**	12.5	**Not met**	Met
Orange#	*74.4*	*95.6*	*96.7*	*90.2*	*89.3*	*0*	*11.8*	*ND*	*ND*
North West Slopes									
Gunnedah	87.8	100	97.8	100	96.4	2 (0)	12.9	Met	Met
Narrabri	100	96.7	100	75.0	92.9	1 (0)	9.4	Met	Met
Tamworth	100	97.8	100	95.7	98.4	0	15.1	Met	Met

Region/station	Data availability rate (% of days)					Number of exceed-ance days (NEED)	1-year mean (µg/m³)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-day	1-year
Northern Tablelands									
Armidale	100	97.8	100	94.6	98.1	0	11.9	Met	Met
Mid North Coast									
Coffs Harbour	93.3	96.7	95.7	100	96.4	0	10.5	Met	Met
Port Macquarie	88.9	100	94.6	95.7	94.8	0	11.9	Met	Met
South West Slopes									
Albury	90.0	86.8	97.8	96.7	92.9	0	13.5	Met	Met
Wagga Wagga North†	100	89.0	96.7	98.9	96.2	**2 (2)**	17.4	**Not met**	Met
Southern Tablelands									
Goulburn	100	97.8	100	100	99.5	0	10.4	Met	Met

Of the 43 stations that monitored PM10 in 2023, 41 stations complied with the quarterly 75% valid data availability criterion. Exceedances of the 1-day average standard (50.0 µg/m³) were observed at 19 stations, while exceedances due to non-exceptional events were recorded at 7 stations. As a result, 34 stations complied with the 1-day average PM10 standard.

As no exceedances of the 1-year average standard (25.0 µg/m³) were observed, 41 stations complied with the 1-year standard.

Cook and Phillip and Orange (both Q1) did not meet the quarterly 75% valid data availability criterion and their compliance was assessed as ‘not demonstrated’.

2023 is the fourth consecutive year that no 1-year exceedance for PM10 within the AAQ NEPM compliance network has been recorded.

3.3.6 Particles as PM2.5

Table 12 2023 compliance summary for particles as PM2.5

Region/station	Data availability rate (% of days)					Number of exceed-ance days (NEED)	1-year mean (µg/m³)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-day	1-year
East Sydney									
Alexandria	94.4	91.2	90.2	84.8	90.1	5 (0)	7.3	Met	Met
Bradfield Highway†	97.8	94.5	98.9	100	97.8	5 (0)	**8.3**	Met	**Not met**
Cook and Phillip#	*74.4*	*94.5*	*93.5*	*100*	*90.7*	*4 (0)*	*6.9*	*ND*	*ND*
Earlwood	97.8	97.8	94.6	97.8	97.0	4 (0)	7.1	Met	Met
Macquarie Park	98.9	100	96.7	97.8	98.4	3 (0)	6.0	Met	Met
Randwick	100	100	92.4	95.7	97.0	3 (0)	6.2	Met	Met
Rozelle	82.2	100	95.7	100	94.5	3 (0)	6.3	Met	Met
Central West Sydney									
Lidcombe	100	97.8	98.9	96.7	98.4	4 (0)	6.6	Met	Met
Parramatta North#	*100*	*97.8*	*97.8*	*71.7*	*91.8*	*0*	*6.6*	*ND*	*ND*
Prospect	100	100	95.7	93.5	97.3	2 (0)	7.4	Met	Met
Rouse Hill†	100	98.9	96.7	93.5	97.3	**5 (1)**	6.7	**Not met**	Met
South West Sydney									
Bargo	92.2	93.4	97.8	100	95.9	1 (0)	5.7	Met	Met
Bringelly	98.9	98.9	97.8	91.3	96.7	3 (0)	7.0	Met	Met
Camden#	*100*	*85.7*	*72.8*	*97.8*	*89.0*	*2 (0)*	*5.8*	*ND*	*ND*
Campbelltown West	94.4	93.4	98.9	97.8	96.2	4 (0)	6.1	Met	Met
Liverpool	100	100	100	97.8	99.5	4 (0)	7.7	Met	Met
Oakdale	97.8	94.5	90.2	96.7	94.8	2 (0)	5.0	Met	Met
North West Sydney									
Penrith	98.9	100	100	97.8	99.2	1 (0)	7.5	Met	Met
Richmond	97.8	92.3	90.2	95.7	94.0	3 (0)	6.6	Met	Met
St Marys	97.8	97.8	95.7	96.7	97.0	2 (0)	5.8	Met	Met
Illawarra									
Albion Park South	97.8	94.5	100	100	98.1	0	4.9	Met	Met
Kembla Grange	100	100	93.5	83.7	94.2	0	5.8	Met	Met
Wollongong	93.3	96.7	98.9	95.7	96.2	2 (0)	5.6	Met	Met

Region/station	Data availability rate (% of days)					Number of exceed-ance days (NEED)	1-year mean (µg/m³)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-day	1-year
Central Coast									
Wyong	94.4	90.1	91.3	97.8	93.4	0	4.9	Met	Met
Lake Macquarie									
Morisset	95.6	91.2	98.9	97.8	95.9	0	5.0	Met	Met
Lower Hunter									
Beresfield	100	100	95.7	97.8	98.4	0	6.7	Met	Met
Newcastle	100	95.6	96.7	97.8	97.5	0	6.7	Met	Met
Wallsend	97.8	89.0	96.7	100	95.9	0	6.1	Met	Met
Upper Hunter									
Merriwa	100	94.5	95.7	97.8	97.0	1 (0)	4.7	Met	Met
Muswellbrook	98.9	97.8	98.9	100	98.9	1 (0)	7.5	Met	Met
Singleton	97.8	100	96.7	96.7	97.8	0	6.7	Met	Met
Central Tablelands									
Bathurst	96.7	100	97.8	96.7	97.8	1 (0)	5.7	Met	Met
Orange[#]	*74.4*	*95.6*	*96.7*	*90.2*	*89.3*	*0*	*7.0*	*ND*	*ND*
North West Slopes									
Gunnedah[†]	87.8	100	98.9	100	96.7	**5 (1)**	7.6	**Not met**	Met
Narrabri	100	96.7	100	75.0	92.9	4 (0)	4.8	Met	Met
Tamworth	97.8	96.7	97.8	95.7	97.0	0	6.6	Met	Met
Northern Tablelands									
Armidale[†]	100	97.8	100	94.6	98.1	**8 (8)**	**8.6**	**Not met**	**Not met**
Mid North Coast									
Coffs Harbour	93.3	96.7	95.7	100	96.4	0	4.3	Met	Met
Port Macquarie[†]	88.9	100	94.6	95.7	94.8	**1 (1)**	5.1	**Not met**	Met
South West Slopes									
Albury	100	93.4	87.0	87.0	91.8	0	6.5	Met	Met
Wagga Wagga North	98.9	91.2	97.8	98.9	96.7	0	6.6	Met	Met
Southern Tablelands									
Goulburn	100	97.8	100	100	99.5	0	5.9	Met	Met

Of the 42 stations that monitored PM2.5 in 2023, 38 stations complied with the quarterly 75% valid data availability criterion.

Exceedances of the 1-day average standard (25.0 µg/m^3) were observed at 27 stations during 2023. Exceedances at 4 stations were due to non-exceptional events. As a result, 34 stations complied with the 1-day PM2.5 standard and goal. Thirty-six stations complied with the PM2.5 1-year standard of 8.0 µg/m^3, with 2 stations recording exceedances of that standard (Armidale and Bradfield Highway).

Three stations did not meet the quarterly 75% valid data availability criterion, which included Orange (Q1), Camden (Q3) and Parramatta North (Q4). Compliance at these stations was subsequently assessed as 'not demonstrated'.

For both Bradfield Highway and Armidale, where 1-year average exceedances were observed in 2023, these were the first 1-year average exceedances since 2020. The 1-day PM2.5 exceedance at Port Macquarie was also that station's first since 2020.

Monitoring and reporting using USEPA Federal Reference Method for PM2.5

The compliance summary determined using the USEPA Federal Reference Method (FRM) for 2023 is in Table 13.

A background to PM2.5 monitoring and the reporting of USEPA FRM data in NSW is provided in the *New South Wales annual compliance report 2018* (DPIE 2020b).

With Chullora having been decommissioned in 2022, this was the first year that only Lidcombe was used to assess PM2.5 compliance against the USEPA FRM. Lidcombe met the 1-year average standard for PM2.5 (8.0 µg/m^3) with a 1-year average of 6.3 µg/m^3. The station also met the 75% quarterly data availability requirement.

Table 13 2023 PM2.5 compliance summary, USEPA Federal Reference Method

Region/ Station	Data availability rate[1] (% of days)					Number of exceedance days (NEED)	1-year mean (µg/m^3)	Performance against standards and goals	
	Q1	Q2	Q3	Q4	Year			1-day	1-year
East Sydney									
Lidcombe	93.3	86.7	100	93.5	93.4	1 (0)	6.3	Met	Met

Notes:

Data availability rates are based on a 1-day-in-3 sampling regime.

4. Section C: analysis of air quality

This section summaries the highest concentrations recorded for each parameter at every station in the AAQ NEPM network during 2023.

Italicised entries (also assigned a hash, #) highlight stations that failed to comply with the 75% quarterly data availability criterion, while **bold** entries (also assigned a dagger, †) indicate an exceedance of a NEPM standard, whether or not the exceedance was due to an exceptional or non-exceptional event.

Table 14 to 21 show data availability as a count of days during 2023 with valid data, the highest value (daily maxima) and the date (and time stamps for sub-daily standards) this concentration occurred.

The formats used for the dates and time stamps are:

- **Date, hour (dd Mmm, hh)** for averaging periods less than 1-day shows the date and hour in 1-day time. For example, 3 am on 8 July 2022 is given below as: 08 Jul, 03.
- **Date (dd Mmm)** for 1-day standards shows the date only. For example, 11 October 2022 is given as: 11 Oct.

All times in this section are given as AEST.

Technical paper no. 8, annual reports (NEPC Peer Review Committee 2002) requires standards with averaging periods of less than 24 hours to report the daily maxima irrespective of the number of valid hours in a day. For example, the daily 1-hour sulfur dioxide during the year may have occurred at a station that reported less than 75% valid data during that year.

4.1 Carbon monoxide

Table 14 Summary for CO: daily maximum rolling 8-hour average concentrations (2023)

Region/station	Number of valid days	Daily maximum rolling 8-hour average (ppm)	
		Highest	Date, hour (dd Mmm, hh)
East Sydney			
Alexandria#	*241*	*0.8*	*24 May, 02*
Bradfield Highway	352	0.9	19 Dec, 17
Cook and Phillip	348	0.8	13 Sep, 15
Macquarie Park	355	0.5	13 Aug, 09
Rozelle	344	0.7	14 Sep, 09
Central West Sydney			
Lidcombe	340	1.3	11 Sep, 03
Parramatta North	356	1.0	21 Jun, 02
Prospect	331	1.0	25 May, 02
Rouse Hill	360	0.7	12 Jun, 08

Region/station	Number of valid days	Daily maximum rolling 8-hour average (ppm)	
		Highest	Date, hour (dd Mmm, hh)
South West Sydney			
Camden#	*261*	*1.4*	*13 Sep, 03*
Campbelltown West	349	1.4	13 Sep, 00
Liverpool	349	1.3	18 Jun, 03
North West Sydney			
Penrith	344	0.5	30 Jul, 03
Illawarra			
Wollongong	356	1.2	12 Apr, 16
Central Coast			
Wyong	335	0.1	30 Aug, 21
Lake Macquarie			
Morisset	357	0.3	18 Sep, 19
Lower Hunter			
Newcastle	354	0.9	15 Jul, 03
Upper Hunter			
Merriwa	353	0.5	19 Dec, 15
Mid North Coast			
Coffs Harbour	334	0.5	15 Oct, 06
Port Macquarie	337	0.6	12 Aug, 00

No exceedances of the 8-hour rolling average standard for carbon monoxide were observed during 2023. The highest 8-hour concentration was 1.4 ppm, jointly recorded at both Camden and Campbelltown West on 13 September. The lowest maximum concentration during 2023 was 0.1 ppm at Wyong on 30 August at 21:00.

Five Sydney stations recorded their highest carbon monoxide concentration of the year during a large hazard reduction burn in Sydney's south during September 2023.

4.2 Nitrogen dioxide

Table 15 Summary for NO_2: daily maximum 1-hour average concentrations (2023)

Region/station	Number of valid days	Daily maximum 1-hour average (ppm)	
		Highest	Date, hour (dd Mmm, hh)
East Sydney			
Alexandria	340	0.046	17 Sep, 22
Bradfield Highway	335	0.068	15 Mar, 16
Cook and Phillip	350	0.057	16 Sep, 20
Earlwood	337	0.041	19 Sep, 09
Macquarie Park	349	0.026	30 Aug, 00
Randwick	349	0.040	16 Mar, 20

Region/station	Number of valid days	Daily maximum 1-hour average (ppm)	
		Highest	Date, hour (dd Mmm, hh)
Rozelle	336	0.042	17 Sep, 21
Central West Sydney			
Lidcombe	352	0.053	19 Sep, 01
Parramatta North	354	0.046	18 Sep, 22
Prospect	349	0.049	15 Sep, 23
Rouse Hill	355	0.036	13 Sep, 23
South West Sydney			
Bargo	341	0.048	24 Oct, 22
Bringelly	327	0.025	15 Sep, 22
Camden[#]	*265*	*0.041*	*12 Sep, 20*
Campbelltown West	350	0.060	18 Sep, 22
Liverpool	358	0.063	18 Sep, 20
Oakdale	348	0.025	12 Sep, 22
North West Sydney			
Penrith	356	0.034	13 Sep, 20
Richmond	337	0.021	25 Aug, 20
St Marys	350	0.036	19 Sep, 21
Illawarra			
Albion Park South	358	0.037	15 Sep, 17
Kembla Grange	340	0.052	18 Sep, 19
Wollongong	353	0.055	18 Sep, 21
Central Coast			
Wyong	327	0.027	20 Sep, 22
Lake Macquarie			
Morisset	356	0.029	04 Oct, 23
Lower Hunter			
Beresfield	353	0.038	20 Sep, 23
Newcastle	327	0.034	14 Jul, 19
Wallsend	352	0.031	13 Jul, 19
Upper Hunter			
Merriwa	353	0.027	03 Jul, 18
Muswellbrook	357	0.041	14 Sep, 21
Singleton	345	0.034	19 Sep, 22
North West Slopes			
Gunnedah	354	0.026	17 Dec, 20
Tamworth	359	0.034	25 May, 19
Mid North Coast			
Coffs Harbour	343	0.029	01 Aug, 19
Port Macquarie	356	0.024	07 Jul, 08

Region/station	Number of valid days	Daily maximum 1-hour average (ppm)	
		Highest	Date, hour (dd Mmm, hh)
South West Slopes			
Albury	350	0.032	16 Mar, 00
Wagga Wagga North[#]	*298*	*0.039*	*18 Sep, 19*
Southern Tablelands			
Goulburn	360	0.034	21 Jun, 18

There were no recorded exceedances of the 1-hour average nitrogen dioxide standard (0.080 ppm) during 2023. The highest 1-hour average for nitrogen dioxide recorded in 2023 was 0.068 ppm, at Bradfield Highway at 16:00 on 15 March 2023. This is the second year in a row that Bradfield Highway has recorded the highest 1-hour concentration for nitrogen dioxide across the network. The lowest maximum 1-hour concentration was 0.021 ppm, observed at Richmond at 20:00, on 25 August 2023.

Fifteen Sydney stations recorded their highest 1-hour average for nitrogen dioxide during a large hazard reduction burn in Sydney's south during September 2023.

4.3 Sulfur dioxide

Table 16 **Summary for SO_2: daily maximum 1-hour average and maximum 1-day average concentrations (2023)**

Region/station	Number of valid days	Daily maximum 1-hour average (ppm)		Annual maximum 1-day average (ppm)	
		Highest	Date hour (dd Mmm, hh)	Highest	Date (dd Mmm)
East Sydney					
Alexandria	341	0.021	16 Feb, 09	0.003	16 Feb
Bradfield Highway	338	0.018	16 Feb, 09	0.007	12 Sep
Cook and Phillip	348	0.016	28 Aug, 11	0.004	12 Sep
Macquarie Park	352	0.023	30 Sep, 23	0.004	30 Sep
Randwick	341	0.024	18 Jan, 09	0.004	15 Sep
Rozelle	330	0.024	16 Apr, 01	0.003	07 Sep
Central West Sydney					
Lidcombe	357	0.027	07 Sep, 21	0.005	07 Sep
Parramatta North	354	0.036	07 Jun, 12	0.004	07 Jun
Prospect	350	0.024	05 Mar, 23	0.004	19 Nov
Rouse Hill	354	0.026	19 Nov, 08	0.006	19 Nov
South West Sydney					
Bargo	351	0.022	15 Jan, 23	0.003	22 Jun
Bringelly	350	0.009	02 Jun, 16	0.003	19 Nov
Campbelltown West	353	0.017	19 Nov, 08	0.003	07 Jun
Liverpool	356	0.024	07 Jun, 13	0.004	07 Jun

Region/station	Number of valid days	Daily maximum 1-hour average (ppm)		Annual maximum 1-day average (ppm)	
		Highest	Date hour (dd Mmm, hh)	Highest	Date (dd Mmm)
North West Sydney					
Penrith	344	0.011	19 Mar, 10	0.003	05 Jan
Richmond	340	0.015	25 Feb, 22	0.005	17 Feb
Illawarra					
Albion Park South	357	0.020	29 Oct, 15	0.006	11 Nov
Wollongong	356	0.025	20 Sep, 22	0.006	04 Jan
Central Coast					
Wyong	350	0.044	19 Dec, 18	0.005	24 Oct
Lake Macquarie					
Morisset	345	0.086	26 May, 07	0.011	04 Oct
Lower Hunter					
Beresfield	357	0.028	15 Dec, 04	0.006	20 Dec
Newcastle	345	0.044	30 Oct, 07	0.006	08 Jun
Wallsend	353	0.038	30 Aug, 20	0.006	31 Jan
Upper Hunter					
Merriwa	349	0.047	26 Aug, 11	0.013	10 Jan
Muswellbrook†	357	**0.124**	02 Jan, 09	**0.025**	02 Jan
Singleton	351	0.055	09 Jan, 13	0.011	18 Mar
Mid North Coast					
Port Macquarie	341	0.026	24 Sep, 15	0.004	27 Dec

Two exceedances of the 1-hour average sulfur dioxide standard (0.100 ppm) were observed at Muswellbrook, with the highest being 0.124 ppm observed at 09:00 2 January 2023. Muswellbrook also exceeded the 1-day sulfur dioxide average standard of 0.020 ppm on 2 January 2023, with a 1-day averaged concentration of 0.025 ppm.

The lowest maximum 1-hour concentration was 0.009 ppm recorded at Bringelly at 16:00 2 June 2023, while the lowest maximum 1-day average was 0.003 ppm, recorded at Alexandria on 16 February, Bargo on 22 June, Bringelly on 19 November, Campbelltown West on 7 June and Penrith on 5 January.

Seven of the 27 stations recorded their highest 1-day average on the same day as their highest 1-hour average.

4.4 Ozone

Table 17 **Summary for ozone: daily maximum 8-hour rolling average concentrations (2023)**

Region/station	Number of valid days	Daily maximum rolling 8-hour average (ppm)	
		Highest	Date, hour (dd Mmm, hh)
East Sydney			
Alexandria[#]	*297*	*0.048*	*19 Mar, 18*
Bradfield Highway	352	0.029	01 Oct, 17
Cook and Phillip	339	0.040	16 Dec, 19
Earlwood[†]	350	**0.072**	19 Mar, 19
Macquarie Park	358	0.063	19 Mar, 19
Randwick	353	0.057	09 Dec, 17
Rozelle	340	0.059	19 Mar, 18
Central West Sydney			
Lidcombe[†]	346	**0.077**	19 Mar, 19
Parramatta North[†]	358	**0.074**	19 Mar, 19
Prospect[†]	350	**0.071**	19 Mar, 19
Rouse Hill	355	0.055	05 Dec, 20
South West Sydney			
Bargo[†]	357	**0.066**	08 Dec, 19
Bringelly[†]	353	**0.075**	19 Mar, 20
Camden[#†]	*265*	***0.074***	*19 Mar, 20*
Campbelltown West	356	0.065	19 Mar, 18
Liverpool[†]	359	**0.083**	19 Mar, 19
Oakdale[†]	344	**0.066**	08 Dec, 19
North West Sydney			
Penrith	358	0.062	19 Mar, 21
Richmond	344	0.056	09 Dec, 19
St Marys[†]	351	**0.069**	19 Mar, 20
Illawarra			
Albion Park South[†]	354	**0.069**	09 Dec, 17
Kembla Grange	348	0.056	11 Mar, 20
Wollongong	356	0.056	09 Dec, 17
Central Coast			
Wyong	357	0.056	09 Dec, 16
Lake Macquarie			
Morisset	359	0.058	16 Dec, 21
Lower Hunter			
Beresfield	354	0.062	09 Dec, 17
Newcastle	349	0.058	16 Dec, 19

Region/station	Number of valid days	Daily maximum rolling 8-hour average (ppm)	
		Highest	Date, hour (dd Mmm, hh)
Wallsend	349	0.062	09 Dec, 16
Upper Hunter			
Merriwa	345	0.063	11 Dec, 19
Central Tablelands			
Bathurst	360	0.056	10 Mar, 19
Orange	341	0.054	08 Dec, 19
North West Slopes			
Gunnedah	352	0.062	08 Dec, 19
Tamworth	359	0.061	09 Dec, 20
Mid North Coast			
Coffs Harbour	344	0.050	31 Oct, 19
Port Macquarie	347	0.041	27 Nov, 19
South West Slopes			
Albury	318	0.057	11 Nov, 18
Wagga Wagga North[#]	*301*	*0.058*	*11 Dec, 18*
Southern Tablelands			
Goulburn	361	0.053	11 Nov, 18

Eleven stations exceeded the 8-hour rolling ozone standard of 0.065 ppm during 2023 on one occasion each for a total of 11 exceedances during 2023. These occurred over 3 days, including over consecutive days of 8–9 December 2023. Exceedances on 19 March 2023 were the most widespread, with 8 stations across the 4 Sydney regions exceeding the 8-hour rolling ozone standard of 0.065 ppm.

Maximum ozone concentrations during 2023 ranged from 0.083 ppm at Liverpool at 19:00 on 19 March 2023 to 0.029 ppm at Bradfield Highway at 17:00 on 1 October 2023. Eighteen stations recorded their highest ozone concentrations for 2023 in December, while 15 recorded their annual maximum in March 2023.

4.4.1 Days above 8-hour rolling average ozone standard

All 11 exceedances have been attributed to photochemical processes exacerbated by heatwave conditions and are therefore not exceptional events. Ten exceedances occurred in Sydney, with Albion Park South in the Illawarra being the only station to record an ozone exceedance outside Sydney.

On 19 March 2023, where 8 stations exceeded the ozone standard, 13 stations in Sydney recorded their highest 8-hour rolling ozone concentration for 2023. The maximum concentration on this day was 0.083 ppm recorded at Liverpool at 19:00. On this day, Lidcombe also recorded its highest ever ozone concentration (0.077 ppm at 19:00).

Exceedances of the 8-hour rolling average ozone standard were observed at Bargo and Oakdale on 8 December and Albion Park South on 9 December.

Table 18 **Days exceeding the 8-hour rolling AAQ NEPM ozone standard (0.065 ppm) (2023)**

Date (dd Mmm)	Region	Stations exceeding rolling 8-hour ozone standard (ppm)	Event classification
19 Mar	Central West Sydney	Lidcombe (0.077), Parramatta North (0.074), Prospect (0.071)	Not exceptional – photochemistry
19 Mar	East Sydney	Earlwood (0.072)	Not exceptional – photochemistry
19 Mar	North West Sydney	St Marys (0.069)	Not exceptional – photochemistry
19 Mar	South West Sydney	Bringelly (0.075), Camden (0.074), Liverpool (0.084)	Not exceptional – photochemistry
08 Dec	South West Sydney	Oakdale (0.066), Bargo (0.066)	Not exceptional – photochemistry
09 Dec	Illawarra	Albion Park South (0.069)	Not exceptional – photochemistry

4.5 Particles as PM10

Table 19 **Summary for PM10: maximum daily (1-day) average concentrations (2023)**

Region/station	Number of valid days	Maximum 1-day average (µg/m³)	
		Highest	Date (dd Mmm)
East Sydney			
Alexandria†	329	**91.9**	12 Sep
Bradfield Highway†	357	**70.5**	12 Sep
Cook and Phillip#†	*331*	***67.4***	*12 Sep*
Earlwood†	353	**96.3**	12 Sep
Macquarie Park	341	44.7	19 Dec
Randwick†	354	**89.0**	12 Sep
Rozelle	346	40.9	14 Sep
Central West Sydney			
Lidcombe†	362	**51.4**	10 Sep
Parramatta North	356	48.8	19 Dec
Prospect	362	44.4	19 Dec
Rouse Hill	363	48.6	19 Dec
South West Sydney			
Bargo†	358	**78.9**	30 Sep
Bringelly†	355	**53.2**	18 Nov
Camden†	351	**89.9**	12 Sep
Campbelltown West†	358	**78.1**	12 Sep
Liverpool†	361	**76.4**	13 Sep

Region/station	Number of valid days	Maximum 1-day average (µg/m³)	
		Highest	Date (dd Mmm)
Oakdale†	346	**64.5**	14 Sep
North West Sydney			
Penrith	358	42.6	25 Oct
Richmond	337	40.3	13 Nov
St Marys	353	42.5	25 Oct
Illawarra			
Albion Park South	356	36.7	25 Oct
Kembla Grange†	341	**74.1**	24 Oct
Wollongong†	350	**50.8**	03 Oct
Central Coast			
Wyong	357	37.8	12 Nov
Lake Macquarie			
Morisset	349	33.8	16 Sep
Lower Hunter			
Beresfield	359	41.0	19 Sep
Newcastle	359	49.0	19 Sep
Wallsend	352	39.0	02 Oct
Upper Hunter			
Aberdeen	363	43.3	19 Dec
Merriwa	355	49.4	02 Oct
Muswellbrook†	361	**59.4**	22 Oct
Singleton	358	48.0	08 Mar
Central Tablelands			
Bathurst†	354	**59.7**	10 Mar
Orange#	*326*	*34.1*	*13 Jul*
North West Slopes			
Gunnedah†	352	**61.3**	17 Dec
Narrabri†	339	**53.0**	10 Dec
Tamworth	359	40.4	17 Dec
Northern Tablelands			
Armidale	358	37.7	21 Jun
Mid North Coast			
Coffs Harbour	352	34.5	31 Oct
Port Macquarie	346	36.2	02 Oct
South West Slopes			
Albury	339	32.4	03 Mar
Wagga Wagga North†	351	**62.5**	12 Jan
Southern Tablelands			
Goulburn	363	23.8	24 May

Maximum PM10 concentrations ranged from 96.3 µg/m^3 at Earlwood on 12 September 2023, to 23.8 µg/m^3 at Goulburn on 24 May 2023.

In 2023, 21 stations recorded their highest 1-day PM10 average since the 2019–20 bushfire period, of which 7 occurred on 12 September 2023. Of those, 11 recorded their first exceedance since 2019–20, while 9 stations are yet to record a PM10 exceedance since the bushfire period. Lidcombe recorded its first PM10 exceedance on 10 September 2023 since the station's commissioning in 2020.

Eleven Sydney stations recorded their highest 1-day PM10 average between 10–14 September 2023 due to a hazard reduction burn in Sydney's south, 10 of which were exceedances.

Seven stations recorded their highest 1-day PM10 average between 17 and 19 December 2023 due to smoke from the Duck Creek Pilliga Forest bushfire.

4.5.1 Days above 1-day PM10 standard

There were 26 days above the PM10 1-day standard in 2023. This is compared to 1 day in 2022 and 18 days in 2021. In 2023, these 26 exceedance days occurred at 19 stations. Exceedance observations ranged from 91.9 µg/m^3 at Alexandria on 12 September 2023 to 50.1 µg/m^3 at Kembla Grange on 30 October 2023.

Sixteen of the 26 exceedance days were due to non-exceptional local dust events observed at 7 stations, with Kembla Grange and Bargo recording 6 and 4 days respectively. The maximum concentration of 74.1 µg/m^3 occurred at Kembla Grange on 24 October 2023.

Hazard reduction burning in Sydney accounted for 6 exceedance days between 10–15 September 2023, with 15 stations (14 in Sydney and Kembla Grange in the Illawarra) exceeding the PM10 1-day standard during this period. Both Bradfield Highway and Alexandria recorded the most exceedances (3 each) and recorded the highest 1-day PM10 average during this period, of 91.9 µg/m^3, on 12 September 2023.

Between 10 and 19 December 2023, smoke from the Duck Creek Pilliga Forest bushfire resulted in 3 exceedance days, with 2 exceedance days recorded at Gunnedah, and 1 each at Narrabri and Bradfield Highway. The highest recorded was 61.3 µg/m^3 observed at Gunnedah on 17 December 2023.

A fourth exceedance day is attributed to a mixture of local dust and bushfire smoke. Bathurst recorded a 1-day PM10 exceedance of 59.7 µg/m^3 on 10 March 2023. While Bathurst City Council was undertaking heavy earthwork regeneration of the Macquarie River around 200 m from the station, smoke from the Alpha Road bushfire was also observed on 10 March, resulting in the exceptional event classification for PM10 for that day.

Table 20 Days exceeding the 1-day AAQ NEPM PM10 standard (50.0 µg/m³) (2023)

Date (dd Mmm)	Region	Stations exceeding 1-day average PM10 standard concentration (µg/m³)	Event classification
12 Jan	South West Slopes	Wagga Wagga North (62.5)	Not exceptional – local dust
10 Mar	Central Tablelands	Bathurst (59.7)	Exceptional – mix of bushfire and local dust
13 Mar	Central Tablelands	Bathurst (52.1)	Not exceptional – local dust
10 Sep	Central West Sydney	Lidcombe (51.4)	Exceptional – hazard reduction burn
11 Sep	East Sydney	Alexandria (52.1), Bradfield Highway (62.4)	Exceptional – hazard reduction burn
12 Sep	East Sydney	Alexandria (91.1), Bradfield Highway (70.5), Cook and Phillip (67.4), Earlwood (96.3), Randwick (89)	Exceptional – hazard reduction burn
12 Sep	South West Sydney	Bargo (54), Camden (89.9), Campbelltown West (78.1)	Exceptional – hazard reduction burn
13 Sep	South West Sydney	Camden (70.5), Liverpool (76.4)	Exceptional – hazard reduction burn
14 Sep	East Sydney	Alexandria (55.7), Bradfield Highway (61.2), Cook and Phillip (56), Randwick (50.5)	Exceptional – hazard reduction burn
14 Sep	South West Sydney	Campbelltown West (58), Oakdale (61.2)	Exceptional – hazard reduction burn
14 Sep	Illawarra	Kembla Grange (52.6)	Exceptional – hazard reduction burn
15 Sep	Illawarra	Kembla Grange (60.8)	Exceptional – hazard reduction burn
15 Sep	South West Sydney	Liverpool (52.6)	Exceptional – hazard reduction burn
16 Sep	South West Slopes	Wagga Wagga North (53.8)	Not exceptional – local dust
18 Sep	South West Sydney	Bargo (50.9)	Not exceptional – local dust
18 Sep	Illawarra	Kembla Grange (56.3)	Not exceptional – local dust
21 Sep	South West Sydney	Bargo (51.7)	Not exceptional – local dust
30 Sep	South West Sydney	Bargo (78.9)	Not exceptional – local dust
02 Oct	Upper Hunter	Muswellbrook (50.4)	Not exceptional – local dust
03 Oct	Illawarra	Wollongong (50.8)	Not exceptional – local dust
22 Oct	Upper Hunter	Muswellbrook (59.4)	Not exceptional – local dust

Date (dd Mmm)	Region	Stations exceeding 1-day average PM10 standard concentration (µg/m^3)	Event classification
24 Oct	Illawarra	Kembla Grange (74.1)	Not exceptional – local dust
25 Oct	Illawarra	Kembla Grange (57.9)	Not exceptional – local dust
30 Oct	Illawarra	Kembla Grange (50.1)	Not exceptional – local dust
18 Nov	South West Sydney	Bringelly (53.2)	Not exceptional – local dust
20 Nov	Illawarra	Kembla Grange (58.7)	Not exceptional – local dust
07 Dec	Illawarra	Kembla Grange (51.2)	Not exceptional – local dust
10 Dec	North West Slopes	Narrabri (53)	Exceptional – bushfire
17 Dec	North West Slopes	Gunnedah (61.3)	Exceptional – bushfire
18 Dec	South West Sydney	Bargo (50.9)	Not exceptional – local dust
19 Dec	East Sydney	Bradfield Highway (51.5)	Exceptional – bushfire
19 Sep	North West Slopes	Gunnedah (55.5)	Exceptional – bushfire

4.6 Particles as PM2.5

Table 21 Summary for PM2.5: maximum daily (1-day) average concentrations (2023)

Region/station	Number of valid days	Maximum 1-day average (µg/m³)	
		Highest	Date (dd Mmm)
East Sydney			
Alexandria†	329	**82.4**	12 Sep
Bradfield Highway†	357	**60.5**	12 Sep
Cook and Phillip#†	*331*	***58.8***	*12 Sep*
Earlwood†	354	**92.2**	12 Sep
Macquarie Park†	359	**33.3**	14 Sep
Randwick†	354	**67.7**	12 Sep
Rozelle†	345	**35.4**	14 Sep
Central West Sydney			
Lidcombe†	359	**44.5**	14 Sep
Parramatta North#	*335*	*24.0*	*12 Sep*
Prospect†	355	**29.6**	14 Sep
Rouse Hill†	355	**32.6**	12 Sep
South West Sydney			
Bargo†	350	**27.5**	13 Sep
Bringelly†	353	**45.4**	14 Sep
Camden#†	*325*	***90.9***	*13 Sep*
Campbelltown West†	351	**79.6**	12 Sep
Liverpool†	363	**66.2**	13 Sep
Oakdale†	346	**70.2**	14 Sep
North West Sydney			
Penrith†	362	**40.7**	12 Sep
Richmond†	343	**30.9**	12 Jun
St Marys†	354	**36.8**	12 Sep
Illawarra			
Albion Park South	358	22.0	14 Sep
Kembla Grange	344	21.1	15 Sep
Wollongong†	351	**25.4**	13 Sep
Central Coast			
Wyong	341	15.9	18 Sep
Lake Macquarie			
Morisset	350	23.2	16 Sep
Lower Hunter			
Beresfield	359	16.6	11 Jun
Newcastle	356	21.6	16 Sep

Region/station	Number of valid days	Maximum 1-day average (µg/m³)	
		Highest	Date (dd Mmm)
Wallsend	350	16.5	16 Sep
Upper Hunter			
Merriwa†	354	**27.1**	19 Dec
Muswellbrook†	361	**25.2**	19 Dec
Singleton	357	21.6	19 Dec
Central Tablelands			
Bathurst†	357	**35.3**	10 Mar
Orange#†	*326*	*24.9*	*13 Jul*
North West Slopes			
Gunnedah†	353	**50.1**	17 Dec
Narrabri†	339	**47.0**	10 Dec
Tamworth	354	23.4	03 Nov
Northern Tablelands			
Armidale†	358	**31.8**	21 Jun
Mid North Coast			
Coffs Harbour	352	17.7	17 Oct
Port Macquarie†	346	**30.5**	12 Aug
South West Slopes			
Albury	335	17.3	14 May
Wagga Wagga North	353	19.2	11 Jun
Southern Tablelands			
Goulburn	363	17.7	04 Jul

Maximum PM2.5 1-day average concentrations ranged from 92.2 µg/m³ at Earlwood on 12 September 2023, to 15.9 µg/m³ at Wyong on 18 September 2023.

Twenty of 21 stations in Sydney recorded their highest 1-day PM2.5 average between 12–14 September 2023 as a result of hazard reduction burning in Sydney's south. All 3 Illawarra stations, as well as Newcastle and Wallsend, also recorded their highest 1-day PM2.5 average in September.

Stations in the Upper Hunter as well as Gunnedah and Narrabri recorded their highest 1-day PM2.5 averages in December 2023 during the Duck Creek Pilliga Forest bushfire.

In 2023, 17 of 42 stations recorded their highest 1-day PM2.5 average since the 2019–20 bushfires, while Merriwa recorded its first exceedance on 19 December 2023.

Table 22 Summary for PM2.5 by USEPA Federal Reference Method: maximum 1-day average concentrations (2023)

Region/station	Number of valid days	Maximum 1-day average (µg/m³)	
		Highest	Date (dd Mmm)
East Sydney			
Lidcombe†	114	**40.4**	14 Sep

Notes:

Data availability rates are based on a 1-day-in-3 sampling regime.

Using the USEPA FRM, Lidcombe recorded an exceedance of the 1-day PM2.5 standard on 14 September 2023 due to smoke from hazard reduction burning in southern Sydney.

4.6.1 Days above 1-day PM2.5 standard

There were 24 days above the PM2.5 1-day standard in 2023. This is compared to 16 days in 2022 and 23 in 2021. These exceedance days occurred at 27 stations (Table 21).

Of the 24 exceedance days, 10 days were due to wood smoke from domestic wood heaters. The remaining 14 days were split evenly between 7 exceedance days due to hazard reduction burning and 7 due to bushfire smoke. Exceedances ranged from 92.2 µg/m^3 at Earlwood on 12 September to 25.1 µg/m^3 at both Oakdale and Wollongong on 11 and 14 September 2023 respectively.

The 7 exceedance days due to hazard reduction burning were observed mostly in Sydney, with 28 stations exceeding between 7 and 15 September 2023. Wollongong also exceeded the 1-day PM2.5 standard twice during this period.

Bushfires accounted for the remaining 7 exceedance days, with 6 of those occurring over the 9 to 19 December 2023 period due to the Duck Creek Pilliga Forest bushfire. Fourteen exceedances were recorded at 8 stations, with both Gunnedah and Narrabri exceeded the 1-day PM2.5 standard on 4 occasions. All other stations exceeded the standard once. The 1-day PM2.5 standard was also exceeded at Bathurst on 10 March 2023 due to a mixture of local dust and bushfire smoke. Although Bathurst City Council was undertaking heavy regeneration earthworks on the Macquarie River approximately 200 m from the station, smoke from what was likely the Alpha Road bushfire was also recorded at the station, resulting in the exceptional event classification for PM2.5 for this day.

Table 23 Days exceeding the 1-day AAQ NEPM PM2.5 standard (µg/m³) (2023)

Date (dd Mmm)	Region	Stations exceeding 1-day average PM2.5 standard concentration (µg/m³)	Event classification
10 Mar	Central Tablelands	Bathurst (35.3)	Exceptional – mix dust & burning
11 Jun	Northern Tablelands	Armidale (29.7)	Non-exceptional – wood smoke
12 Jun	Northern Tablelands	Armidale (29.1)	Non-exceptional – wood smoke
12 Jun	North West Sydney	Richmond (30.9)	Non-exceptional – wood smoke
17 Jun	North West Slopes	Gunnedah (27.8)	Non-exceptional – wood smoke
17 Jun	Northern Tablelands	Armidale (25)	Non-exceptional – wood smoke
21 Jun	Northern Tablelands	Armidale (31.8)	Non-exceptional – wood smoke
22 Jun	Northern Tablelands	Armidale (27.1)	Non-exceptional – wood smoke
12 Jul	Northern Tablelands	Armidale (28.5)	Non-exceptional – wood smoke
21 Jul	Northern Tablelands	Armidale (30.8)	Non-exceptional – wood smoke
26 Jul	Northern Tablelands	Armidale (27.2)	Non-exceptional – wood smoke
29 Jul	Central West Sydney	Rouse Hill (27.9)	Non-exceptional – wood smoke
12 Aug	Mid North Coast	Port Macquarie (30.5)	Non-exceptional – wood smoke
07 Sep	South West Sydney	Liverpool (30.2)	Exceptional – hazard reduction burn
07 Sep	East Sydney	Macquarie Park (30.9)	Exceptional – hazard reduction burn
10 Sep	Central West Sydney	Lidcombe (30)	Exceptional – hazard reduction burn
11 Sep	East Sydney	Alexandria (43.6), Bradfield Highway (54.1), Cook and Phillip (32.1), Earlwood (29.8), Randwick (32), Rozelle (27)	Exceptional – hazard reduction burn
11 Sep	South West Sydney	Bringelly (29.2), Oakdale (25.1)	Exceptional – hazard reduction burn
11 Sep	North West Sydney	Richmond (25.7)	Exceptional – hazard reduction burn
11 Sep	Central West Sydney	Rouse Hill (31.7)	Exceptional – hazard reduction burn
12 Sep	East Sydney	Alexandria (82.4), Bradfield Highway (60.5), Cook and Phillip (58.8), Earlwood (92.2), Randwick (67.7), Rozelle (26.9)	Exceptional – hazard reduction burn
12 Sep	South West Sydney	Campbelltown West (79.6)	Exceptional – hazard reduction burn

Date (dd Mmm)	Region	Stations exceeding 1-day average PM2.5 standard concentration (µg/m^3)	Event classification
12 Sep	North West Sydney	Penrith (40.7), Richmond (28), St Marys (36.8)	Exceptional – hazard reduction burn
12 Sep	Central West Sydney	Prospect (29), Rouse Hill (32.6)	Exceptional – hazard reduction burn
13 Sep	East Sydney	Alexandria (28.3), Bradfield Highway (29.6), Cook and Phillip (28.1), Earlwood (30.6)	Exceptional – hazard reduction burn
13 Sep	South West Sydney	Bargo (27.5), Bringelly (34), Camden (90.9), Campbelltown West (43.5), Liverpool (66.2)	Exceptional – hazard reduction burn
13 Sep	Central West Sydney	Lidcombe (32.5)	Exceptional – hazard reduction burn
13 Sep	North West Sydney	St Marys (29.3)	Exceptional – hazard reduction burn
13 Sep	Illawarra	Wollongong (25.4)	Exceptional – hazard reduction burn
14 Sep	East Sydney	Alexandria (44.4), Bradfield Highway (49.4), Cook and Phillip (46.5), Earlwood (38.6), Macquarie Park (33.3), Randwick (42.2), Rozelle (35.4)	Exceptional – hazard reduction burn
14 Sep	South West Sydney	Bringelly (45.4), Campbelltown West (49.1), Liverpool (31.9), Oakdale (62)	Exceptional – hazard reduction burn
14 Sep	Central West Sydney	Lidcombe (44.5), Prospect (29.6), Rouse Hill (27.2)	Exceptional – hazard reduction burn
14 Sep	Illawarra	Wollongong (25.1)	Exceptional – hazard reduction burn
15 Sep	South West Sydney	Camden (39.6), Campbelltown West (32.4), Liverpool (35.6)	Exceptional – hazard reduction burn
15 Sep	Central West Sydney	Lidcombe (25.6)	Exceptional – hazard reduction burn
09 Dec	North West Slopes	Gunnedah (34.4), Narrabri (39.3)	Exceptional – bushfire
10 Dec	North West Slopes	Narrabri (47)	Exceptional – bushfire
12 Dec	North West Slopes	Narrabri (32.3)	Exceptional – bushfire
17 Dec	North West Slopes	Gunnedah (50.1), Narrabri (25.3)	Exceptional – bushfire
18 Dec	North West Slopes	Gunnedah (31.2)	Exceptional – bushfire
19 Dec	East Sydney	Alexandria (25.2), Bradfield Highway (29.4), Macquarie Park (30.4)	Exceptional – bushfire
19 Dec	North West Slopes	Gunnedah (45.5)	Exceptional – bushfire
19 Dec	Upper Hunter	Merriwa (27.1), Muswellbrook (25.2)	Exceptional – bushfire

Date (dd Mmm)	Region	Stations exceeding 1-day average PM2.5 standard concentration (µg/m^3)	Event classification
19 Dec	Central West Sydney	Rouse Hill (29.4)	Exceptional – bushfire

5. Section D: assessment of progress toward achieving the goal

In 2023, the *National Environment Protection (Ambient Air Quality) Measure* (NEPM or AAQ NEPM) was implemented under the *Protection of the Environment Operations Act 1997* (POEO Act), the Protection of the Environment Operations (Clean Air) Regulation 2022 (Clean Air Regulation), the Protection of the Environment Operations (General) Regulation 2022 (General Regulation), and the NSW Clean Air Strategy 2021–2030 (DPE 2022) to achieve the goal of AAQ NEPM in clause 6.

The POEO Act sets the statutory framework for managing air quality in NSW. The Protection of the Environment Operations (Clean Air) Regulation 2022 provides measures to control emissions from industry, motor vehicles and fuels, domestic solid fuel heaters (e.g. wood heaters) and open burning. The Protection of the Environment Operations (General) Regulation 2022 establishes the licensing scheme for major industrial premises and economic incentives for licensed businesses and industry to reduce pollution, including emissions to air. The Clean Air Strategy presents a cohesive set of priorities and actions to support liveable communities, healthy environments and the NSW economy, by reducing the adverse effects of air pollution on NSW communities.

In NSW, the Department of Climate Change, Energy, the Environment and Water (the department) and the NSW Environment Protection Authority (EPA) work together to reduce the impacts of air pollution. The department develops policies and programs to improve compliance with NEPM goals and protect public health, operates a comprehensive air quality monitoring network, undertakes air quality forecasting to provide timely information so people can reduce their risk of exposure, and provides expert technical advice on air quality issues. The NSW EPA develops and implements regulation and conducts compliance activities. Both agencies work closely with stakeholders to inform, educate and involve stakeholders in improving air quality management.

5.1 Air quality management in the Greater Metropolitan Region and regional New South Wales

The department and the EPA deliver numerous actions that target the pollutants of most concern in NSW, namely particles in the GMR and some regional centres, and ground-level ozone by targeting precursor emissions. These actions are designed to improve knowledge about air emissions, air quality and the impacts of air pollution; inform and engage the community and other stakeholders; and reduce air quality impacts from industry, vehicles and commercial and domestic activities.

At 31 December 2023, the department operated 95 long-term monitoring stations in the NSW air quality monitoring network, which comprised several networks (see Section A).

Air quality data and information are made publicly available on the department's website, updated hourly. Automated text messages and emails are sent to subscribers when air quality is measured to exceed national air quality standards for gases, or national reporting levels for particles. A daily forecast is also sent to subscribers and published on the department's website for the Sydney region. The department also collaborates with the EPA, other agencies and science partners to deliver research to inform air policies and programs.

The following outlines the key mechanisms for managing air quality and the activities implemented in 2023.

5.2 Policy and legislation

5.2.1 Clean Air Strategy 2021–2030

The NSW Clean Air Strategy 2021–2030 presents a whole of NSW Government approach to improving air quality, reducing emissions and protecting communities. The strategy was released in February 2022 following public consultation in 2021. It presents a cohesive set of priorities and actions to support liveable communities, healthy environments and the NSW economy, by reducing the adverse effects of air pollution on NSW communities. It sets out actions under 5 priority areas where the biggest gains for air quality and health can be made: better preparedness for pollution events; cleaner industry; cleaner transport, engines, and fuels; healthier homes; and better places.

The strategy integrates and builds on other key initiatives that tackle some of the state's biggest air pollution sources, including the Net Zero Plan and other key energy, transport and planning strategies. Agencies across the NSW Government are working to deliver strategy actions. More information on the strategy is available on the department's NSW Clean Air Strategy webpage.

5.2.2 Clean Air Regulation

The Protection of the Environment Operations (Clean Air) Regulation was remade in December 2022 with most changes to the Regulation taking effect from that date. The extension of the summer petrol volatility period, during which lower volatility petrol must be supplied to reduce ozone, commenced from 1 November 2023. This delay was to allow petrol suppliers to manage their supply agreements for cleaner petrol.

The key changes to the Regulation are summarised on the NSW EPA Clean Air Regulations webpage.

5.3 Air quality monitoring

In 2023 the department's network of long-term air quality monitoring stations was maintained. No existing stations were removed. As of 31 December 2023, the NSW air quality monitoring network totalled 95 stations, consisting of 56 NATA-accredited stations plus 39 indicative rural monitoring sites. The network provides detailed air quality information that is available on the web and updated hourly. Information about

the network and current and historic data can be found on the department's air quality monitoring network webpage. The website also explains how air quality monitoring in NSW strives to meet the objectives of the AAQ NEPM in the NSW Air Quality Monitoring Plan.

5.4 Air emissions and health impacts research

5.4.1 Broken Hill environmental lead study

The Broken Hill community lead monitoring program continued in 2023, with a 1-day-in-6 sampling schedule at 4 locations monitored against the NEPM standard for lead in ambient air. The averages across 2023 at the 4 stations ranged from 0.042 to 0.116 µg/m^3. These are well under the NEPM health standard of 0.50 µg/m^3 but are higher than the 0.02 µg/m^3 lead level measured in the GMR in 2004, which was the last year of monitoring after the phase-out of leaded petrol. Further monitoring and analysis continue to provide a better understanding of the sources and averages expected across Broken Hill.

5.4.2 Sydney Air Quality Study

This multi-year study commenced in 2016 to improve understanding of air quality and the impacts of air pollution in the Greater Sydney Region. The study supports evidence-based air policies and programs by identifying persistent and emerging issues and highlighting opportunities to improve air quality and realise public health and economic benefits.

The first phase of the study (2017 to 2019) was released in November 2020: see Sydney Air Quality Study (DPIE 2020c). The Sydney Air Quality Study Stage 2 (2020 to 2022) published in January 2023 and was carried out in collaboration with NSW Health and the NSW EPA (DPE 2023). The project quantifies the contribution of major emission sources to air pollution and its potential impacts on health and the economy.

Stage 2 of the study showed that natural and human-made sources contributed 52% and 48% respectively to the population-weighted annual average PM2.5 concentrations (DPE 2023).

The total quantified health impacts (costs) from different sources were valued around AUD (2021) $4,000-$5,000 million annually.

The study ranked (highest to lowest) the health impact and associated cost of anthropogenic sources of air pollution: wood heaters, industry, on-road mobile (exhaust), power stations, domestic-commercial, non-road diesel and marine, and on-road mobile (non-exhaust).

5.4.3 Warringah Freeway upgrade: air quality monitoring

In early 2022, the department established a compliance monitoring station at Cammeray Park near North Sydney. This was commissioned on behalf of the NSW EPA to monitor air quality around the Warringah Freeway Upgrade/Western Harbour Tunnel

over a 2-year period, starting before major construction and monitoring during construction.

This monitoring project includes a research monitoring station at Cammeray with hourly data reported on the new NSW Air Quality website, and a network of 10 particle sensors located along a transect from Wollstonecraft to Middle Harbour. Details of this monitoring project, including quarterly data reports, are available on the NSW EPA website.

5.4.4 Incident air quality monitoring in 2023

In April 2023 the department provided advice and input to the NSW EPA following community dust concerns in the Cadia Valley as part of the Cadia Valley monitoring program.

An air monitoring program was commenced to understand the trends of dust generation and overall quality of the air in the region. A tiered monitoring approach was employed, with a temporary air quality monitoring station at Millthorpe installed in late July 2023 and 2 DustTrak particle monitors installed at Forest Reef and Errowanbang in November 2023. Data for these sites are reported hourly to the NSW Air Quality website. Thirty-six low-cost sensors have also been deployed to the region.

In December 2023, automatic weather stations were installed at Forest Reef and Errowanbang. Four wind-activated high-volume air samplers (HVAS) were also installed in December 2023 to monitor total suspended particles and metal concentrations. More information, including an analysis of the air quality monitoring data is available on the NSW EPA website.

Campaign monitoring was undertaken at Padstow in Sydney to identify and understand trends of dust generation and emissions from a construction and demolition waste facility. Knowing Our Ambient Local Air-quality sensors (KOALAs) and a DustTrak were deployed to monitor dust concentrations.

5.5 Enhancing air quality forecasting in New South Wales

This program was established to progressively expand the scope of and enhance air quality forecasting capabilities in NSW. The department issues a daily air quality forecast for the Greater Sydney Region. Through this program the department is working towards more accurately forecasting air quality for Greater Sydney and its subregions and is progressively expanding forecasting to the whole of the NSW GMR.

To improve the accuracy of the forecasting system, the department is developing and testing new methods based on artificial neural network models and machine learning.

5.6 Industry emissions

In 2023 the NSW EPA continued to implement its regulatory responsibilities, including licensing scheduled industry activities and conducting compliance and enforcement programs. The POEO Act, the Protection of the Environment Operations (Clean Air) Regulation 2022 and the Protection of the Environment Operations (General) Regulation

2022 set the framework for managing air pollution from major industries in NSW in 2023.

5.6.1 Load-based licensing

The EPA's load-based licensing scheme requires some environment protection licensees to pay part of their annual licence fees based on the load of certain air and water pollutants their activities release to the environment. By tying the fees payable to pollutant loads, the scheme aims to provide an ongoing economic incentive for licensees to improve their environmental performance beyond the levels required by regulation or licence conditions alone. In 2023 the NSW EPA continued to progress a review of the load-based licensing scheme, which aims to improve the scheme's efficiency and effectiveness.

5.6.2 Coal-fired power stations

In 2023 the NSW EPA continued to regulate NSW coal-fired power stations under the POEO Act, the Protection of the Environment Operations (Clean Air) Regulation and individual environment protection licences which contain specific requirements for each facility.

Through licence variations, the NSW EPA has progressed the investigation and installation of in-stack, real-time continuous particulate monitoring systems of all operational NSW coal-fired power stations. The changes will strengthen monitoring and reporting accuracy and assist in the efficient operation of the power station boilers.

In 2023, the NSW EPA completed statutory reviews of the coal-fired power stations' licences, following a proactive public consultation campaign. The NSW EPA is consulting with licensees and will progressively implement licence changes throughout 2024. The EPA's website contains information about the outcomes of the licence review and the changes the EPA will be implementing. The licences for the 4 operating coal-fired power stations are available on the POEO public register.

In April 2023, the Hunter Valley's Liddell Power Station, Australia's oldest power station, ceased operations. The facility had been operating for 52 years. It is expected that its closure will improve air quality in nearby communities, including reductions in particulate matter and sulfur dioxide.

5.6.3 Update of approved methods for air quality sampling and modelling documents

Approved methods for the modelling and assessment of air pollutants in NSW (NSW EPA 2022a) lists the statutory methods to be used for modelling and assessing emissions of air pollutants in NSW: *Approved methods for the modelling and assessment of air pollutants*.

The *Approved methods for the sampling and analysis of air pollutants in NSW* (NSW EPA 2022b) lists the methods that NSW industries and commercial premises must use to

ensure they comply with NSW air quality regulations by sampling and analysing their emissions of air pollutants: *Approved methods for sampling and analysis of air pollutants*.

In 2022 the NSW EPA released updated versions of both documents. In 2023 the EPA continued to apply the approved methods for air quality sampling and modelling to assist in implementing its regulatory responsibilities.

5.6.4 Hunter region coalmines dust management

Wetter weather conditions due to the La Niña climatic conditions helped manage dust emissions from coalmines during 2021 and 2022. Due to extended wet weather, targeted dust compliance campaigns were not conducted during the 2021–22 or 2022–23 spring and summer seasons.

In 2023, in response to forecast El Niño conditions, the NSW EPA conducted a Bust the Dust Campaign from late August to early December 2023 coinciding with warmer and windier seasonal conditions. Bust the Dust targeted dust mitigation measures at licensed coal mining sites in the Hunter Valley incorporating off-site observations using unmanned aerial vehicles (drones) and on-site unannounced inspections. The campaign found that mines were generally implementing dust mitigation measures, with the campaign reinforcing with licensees the need to increase dust mitigation measures during adverse weather conditions.

During the campaign, the NSW EPA in conjunction with NSW Health, the Resources Regulator, the department's Climate and Atmospheric Science Branch and the Department of Planning and Environment's Compliance section hosted a community-drop-in session attended by community members of Muswellbrook and Singleton local government areas.

5.7 Non-road diesel and marine emissions

5.7.1 National Clean Air Agreement – evaluating the potential for a national approach to non-road diesel engine emissions

Under the National Clean Air Agreement, in 2023 the department and the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) continued to evaluate the potential for a national approach to manage non-road diesel engine emissions in Australia.

Non-road diesel engines are used in a wide range of industries and applications, including construction, mining, manufacturing, airport services, agriculture and marine sectors. Diesel engine exhaust contains high levels of pollutants, including fine particles (PM2.5) and NOx, and has been declared as carcinogenic by the World Health Organization's International Agency for Research on Cancer. It contributes to premature deaths and health-related problems, such as cardiovascular, cardiopulmonary and respiratory diseases, and lung cancer.

Unlike other countries (including the United States, the European Union, China, India, Brazil and Japan), and unlike on-road (passenger) vehicles in Australia, there are

currently no national standards or approaches to manage emissions from non-road diesel engines in Australia.

In 2023 the department continued to work with DCCEEW on a cost–benefit analysis examining the impact of options to manage emissions from non-road diesel engines. The cost–benefit analysis report was published in early 2023, and based on the findings, progressed to an impact analysis process. Public consultation of the draft impact analysis was undertaken from 24 May to 14 July 2023. Further information on the project can be found on the National Clean Air Agreement website.

5.7.2 Government resource efficiency policy

In 2023 the department's Sustainable Government team continued to administer the NSW Government resource efficiency policy (OEH 2019). The policy includes requirements to address non-road diesel engine emissions through government procurement and contracts.

For non-road diesel engines, government agencies must continue to comply with European Union (EU) or USEPA standards when purchasing or leasing such equipment. Agencies must also consider air emissions from contractor-supplied equipment in tender processes for construction projects over $10 million. The tender selection process either incorporates a weighting for air emission standards in conjunction with other environmental considerations, or a statement by contractors on how they will reduce emissions from their equipment accompanied by their equipment's air emissions data.

5.7.3 Locomotives

Amendments to the POEO Act to regulate railway rolling stock operations, in addition to railway infrastructure operators, came into effect in July 2019. The amendments mean that rolling stock operators are required to hold an environment protection licence and are directly accountable for their environmental performance, including managing air emissions.

The NSW EPA issued the new rolling stock operator licences in 2020. The requirements in the licence are for new locomotives to meet US Tier 2 particulate matter emissions. There are no air emission limits for locomotives already operating on the rail network. The licences, however, include operating conditions and pollution studies that seek to minimise impacts on air quality through idling. In 2023 the NSW EPA continued to work with the rail industry to progressively reduce locomotive air emissions.

5.8 Vehicle and fuel emissions

5.8.1 Regulation of motorway tunnel ventilation stacks

In July 2019 the POEO Act was amended to include changes to the way that road tunnel ventilation stacks are regulated. From March 2020, motorway tunnel ventilation stack environment protection licences place strict operating requirements on air emissions from ventilation stacks. The licences also require air quality monitoring of tunnel

ventilation stacks, and the monitoring data to be made publicly available through the tunnel operators' websites and provided to the NSW EPA for review. In 2023 the NSW EPA continued to regulate tunnel ventilation stacks under licences. The EPA undertook compliance activities such as monitoring reviews, site inspections and pollution studies to ensure ventilation stacks are operated according to licence conditions.

5.8.2 Smoky vehicles program

In NSW it is an offence for a vehicle to emit excessive air impurities for a continuous period of more than 10 seconds. Penalty notices may be issued to the registered owners of vehicles emitting excessive air impurities. The public can also report smoky vehicles via the NSW EPA's Environment Line website or mobile phone application.

Program data is available by financial year. More than 1,400 public reports were received over 2022–23, indicating a high level of awareness in the community of the unacceptability of excessive visible emissions. In 2022–23 the NSW EPA issued 596 advisory letters to vehicle owners based on public reports.

5.8.3 Vapour recovery at service stations

Vapour recovery stage 1 technology captures displaced vapours from storage tanks when a tanker delivers fuel to a service station, and vapour recovery stage 2 technology captures vapours displaced at the bowser when a motorist refuels.

In 2023 the NSW Vapour Recovery Compliance Program continued to be implemented under the Protection of the Environment Operations (Clean Air) Regulation 2022 by local councils at service stations across the Sydney, Wollongong, Newcastle and Central Coast metropolitan areas, as well as the Lower Hunter and Illawarra regions. Implementation of vapour recovery at these service stations has reduced emissions of volatile organic compounds (VOCs) by an estimated 8,600 tonnes per year.

5.8.4 Summer low-volatility petrol

In 2023 the NSW EPA continued to implement the summer low-volatility petrol program. To manage ozone formation in the Sydney region, regulatory requirements limit petrol volatility to 62 kilopascals (a measure of vapour pressure) over the summer period from 1 November to 31 March each year. Petrol importers and blenders must test and report to the NSW EPA on batch volatility. The petrol volatility limits reduce VOC emissions in the Sydney region by an estimated 2,470 tonnes each summer.

5.8.5 National vehicle and fuel standards

The Australian Government is responsible for fuel quality and vehicle emission standards for new on-road vehicles. These standards are being reviewed.

The NSW Government has consistently supported harmonisation of national vehicle emission standards with Euro standards, together with tightening of fuel standards to enable adoption of control technologies to meet the tighter vehicle standards. Over 2023, the department continued to support early adoption of the Euro 6/VI emissions standards for diesel vehicles and enabling changes to fuel quality standards. In 2023

departmental staff represented the State on the national Fuel Standards Consultative Committee.

5.9 Wood smoke management

Reducing wood smoke and fine particle pollution is a priority action in the NSW Clean Air Strategy 2021–2030. Under the strategy, the NSW Government is committed to further research to inform the development of future actions on wood heaters.

The department and the NSW EPA also support local councils across NSW in managing wood smoke through research, periodic wood smoke reduction programs and providing community education materials for use by local councils. Previous social research undertaken for the NSW EPA identified the lack of awareness of wood smoke impacts on health as the key barrier to changing people's wood heater use.

In 2023 the NSW EPA continued to provide a range of educational materials for local councils to raise public awareness about wood smoke impacts and the correct operation of wood heaters. The materials are available in English and 5 community languages: Arabic, Cantonese, Hindi, Mandarin and Vietnamese. The local community education campaign materials are available on the NSW EPA's Council resource kit webpage.

The NSW EPA also regulates the sale of wood heaters. All appliances must meet minimum emission and efficiency standards as set out in the Protection of the Environment (Clean Air) Regulation 2022.

6. Section E: population exposure analysis

This section addresses clause 17(2A) of the AAQ NEPM, which requires that:

> Each participating jurisdiction must evaluate and report population exposures to:
>
> a. particles as PM2.5 from June 2018
>
> b. nitrogen dioxide and photochemical oxidants (as ozone) from June 2021.
>
> Note: To ensure national consistency, evaluation and reporting shall be undertaken in accordance with any procedures or methods agreed by participating jurisdictions.

6.1 Assessing population exposure

This section sets out the approach adopted by NSW for assessing PM2.5, nitrogen dioxide and ozone population exposure and presents results for 2023. At the time of this report, there is no agreed approach between participating jurisdictions on the procedures or methods to ensure nationally consistent evaluation and reporting. The inter-jurisdictional Expert Working Group advising the AAQ NEPM review has endorsed the NSW approach to reporting population exposure for PM2.5, pending the finalisation of a more detailed assessment method.

The methodology previously developed for population exposure to PM2.5 has been extended to determine the population exposure to nitrogen dioxide and ozone, to meet the above-mentioned legislative requirement in the amended NEPM.

6.1.1 New South Wales approach to exposure assessment

The NSW Government developed a method to account for population exposure when tracking changes in pollutant concentrations. The approach was described in the background paper *Clean Air Metric* (NSW Government 2017), published for the NSW Clean Air Summit in June 2017.

The method involves 2 main steps:

1. estimate the population exposure
2. calculate the Clean Air Metric (CAM).

Estimate the population exposure

Population exposure is estimated using the following steps:

- Download the Australian Bureau of Statistics (ABS) 2023 Australian population grid data (1-km resolution) (ABS 2023). The population density for the NSW GMR was plotted for 2023, as illustrated in Figure 3.
- The 2023 1-year average PM2.5 concentrations at all AAQ NEPM monitoring stations across NSW are collated and spatially interpolated onto 1-km grids to coincide with the Australian Bureau of Statistics 1-km gridded population data using the kriging method. Results from the kriging method show the spatial distribution of 1-year average PM2.5 (Figure 4).

  - Kriging estimates variable values over a continuous spatial field, using a small set of sampled data points. In general, the accuracy of kriging interpolation is limited when the number of observations collected is small, the spatial extent of the data is limited, or the data are not sufficiently spatially correlated. Kriging assumes stationarity (that the joint probability distribution does not change within the study space and the same variogram model is assumed to be valid across the study area) and isotropy (uniformity in all directions).
- the spatially interpolated pollution concentrations in Figure 4 are then multiplied by the population (Figure 3) in each 1-km grid to generate the population-weighted pollution exposure. The population-weighted pollution exposure is then normalised by the maximum value in the NSW GMR domain. The resulting values are multiplied by 10 to produce the final population exposure maps (scaled from 0 to 10), resulting in the PM2.5 exposure seen in Figure 5.

The steps above are repeated to estimate:

- nitrogen dioxide annual average spatial distribution, using nitrogen dioxide 1-year average concentrations for 2023 (Figure 6) and nitrogen dioxide annual population exposure for 2023 (Figure 7)
- ozone annual 8-hour maximum spatial distribution, using ozone hourly 8-hour rolling average concentrations for 2023 (Figure 8). An 8-hour rolling average of 6.5 pphm was introduced in 2021 as the ozone AAQ NEPM standard. To evaluate ozone exposures, a similar approach to that used by State of Global Air (2023) was followed, which used the population-weighted annual maximum 8-hour ozone concentrations. The ozone population exposure is shown in Figure 9.

Calculate the Clean Air Metric (CAM)

The Clean Air Metric (CAM) is calculated using the following steps:

- Results from population-weighted pollution exposure maps (which are the product of multiplying the air pollution concentration and the population in each 1-km grid) are summed across all grid points in the selected region (Greater Sydney or NSW GMR) and divided by the total regional population.
- The resulting CAM can be represented in 2 ways: (1) population-weighted pollutant concentrations or (2) CAM index, which is obtained by dividing the population-weighted pollutant concentration by the AAQ NEPM standard for the individual pollutant. The individual CAM values (CAM-PM2.5, CAM-nitrogen dioxide and CAM-ozone) are derived in this way.
- The overall CAM index for 2023 was determined by considering the maximum value from CAM-PM2.5, CAM-nitrogen dioxide and CAM-ozone.

For further information on the original CAM methodology, see Riley et al. (2017) and NSW Government (2017).

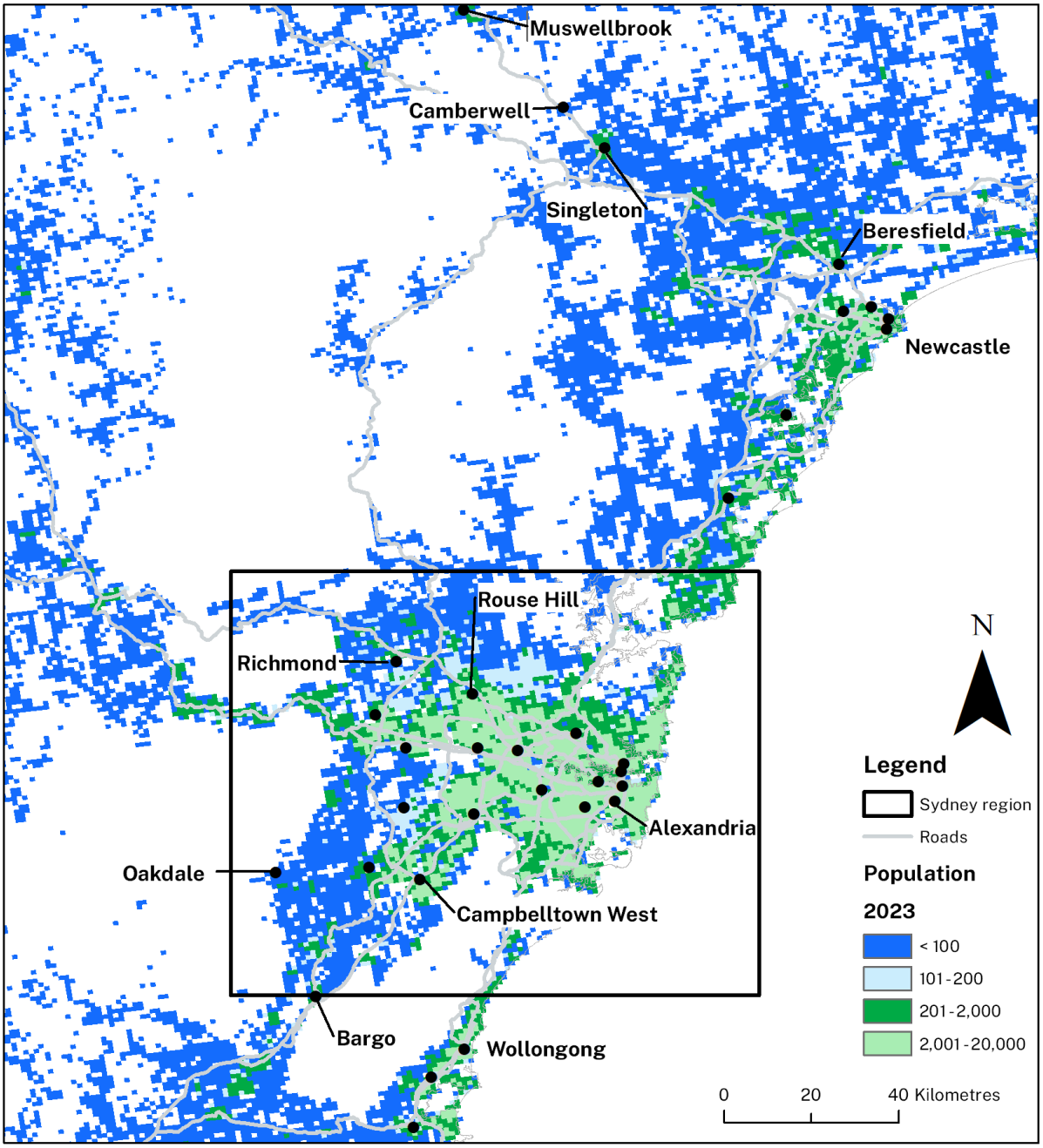


Figure 3 **Population density (population/km^2) for NSW GMR, including the Greater Sydney Region (inset) in 2023. The AAQ NEPM stations monitoring PM2.5 in 2023 are identified by black dots.**

6.1.2 Exposure assessment for particles as PM2.5

The spatial distribution of 1-year average PM2.5 concentrations in the NSW GMR for 2022 (Figure 4) illustrates that large parts of populated areas in the Greater Sydney Region had 1-year average PM2.5 concentrations in the range 5.01–7.0 µg/m^3.

Figure 5 shows that the regions characterised by the highest PM2.5 exposure in 2023 (shaded in green) align with the populated areas concentrated along the Greater Sydney Region transport corridors, as well as eastern Sydney. Exposure to PM2.5 is

lower over the Illawarra, Central Coast and Lower Hunter regions (shaded in blue to green).

The Sydney Air Quality Study findings show anthropogenic sources account for 48% of the overall long-term PM2.5 exposure (NSW DPE 2023). Among the anthropogenic sources, wood heaters, industry, and on-road motor vehicles are the top 3 primary contributors to PM2.5 exposure in Sydney.

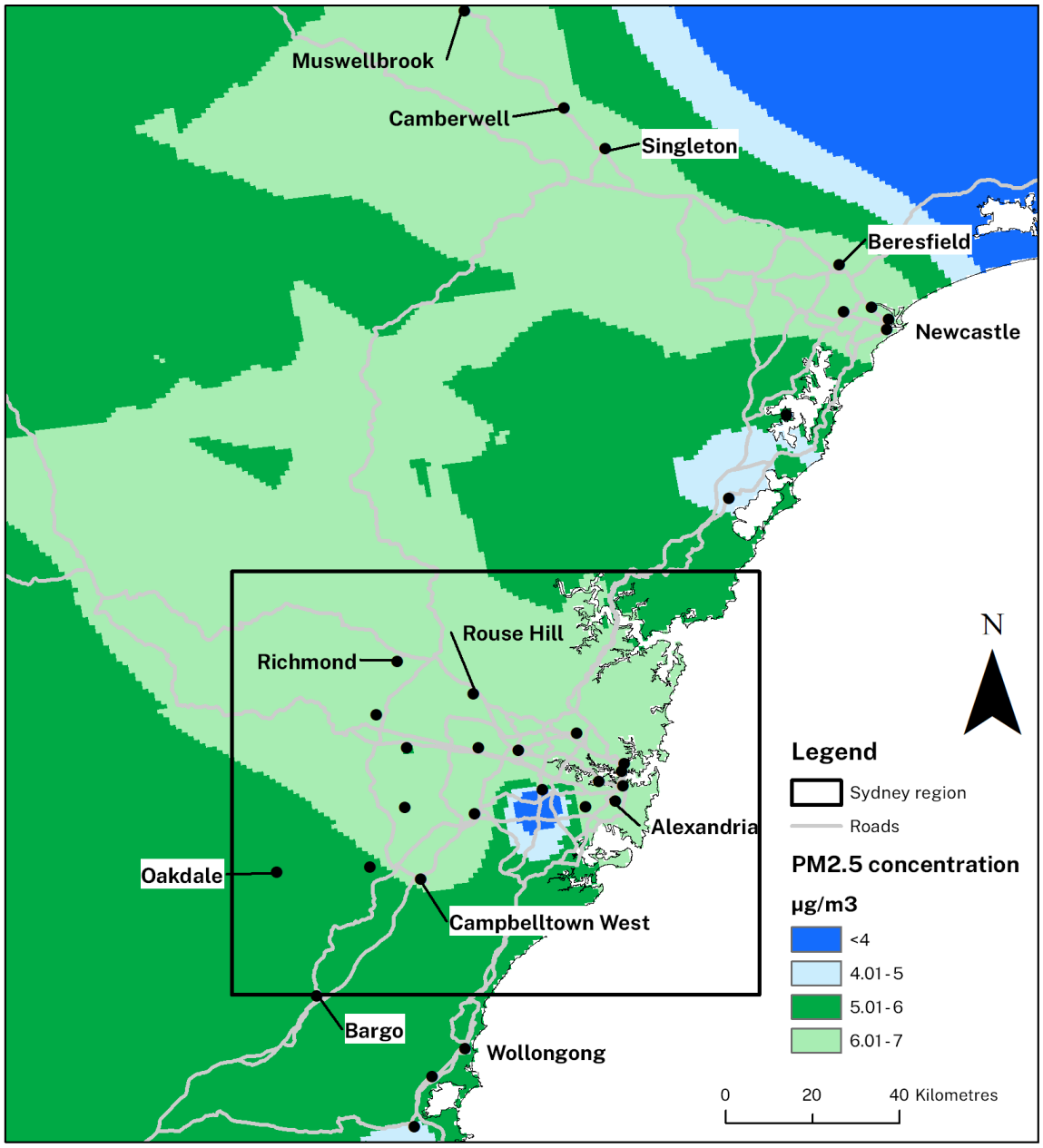


Figure 4 **Spatial distribution of PM2.5 1-year average concentrations in the NSW GMR, including the Greater Sydney Region (inset) in 2023. The AAQ NEPM stations monitoring PM2.5 in 2023 are identified by black dots.**

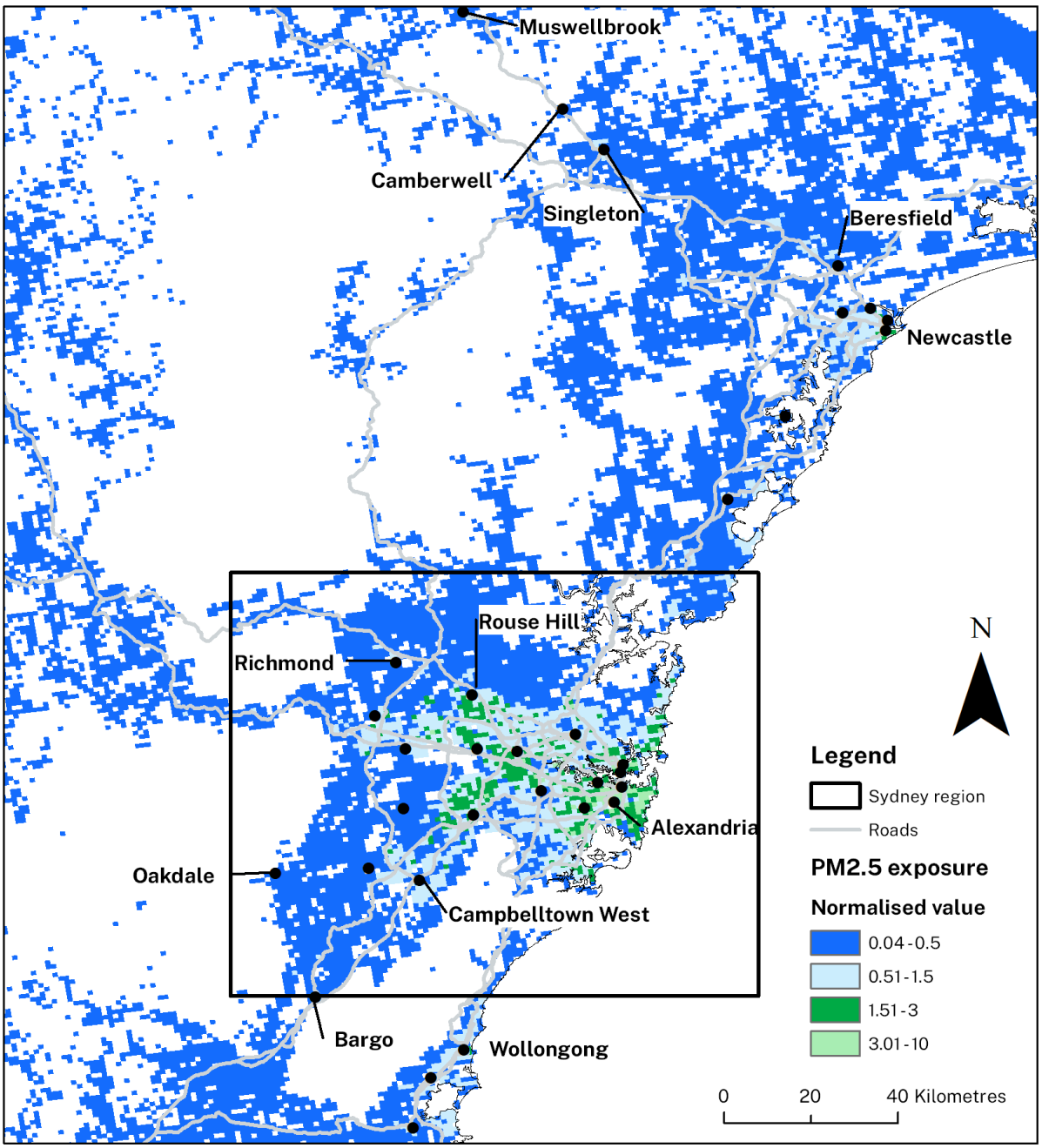


Figure 5 **PM2.5 exposure in the NSW GMR and the Greater Sydney Region (inset) in 2023**

6.1.3 Exposure assessment for nitrogen dioxide

Figure 6 presents the spatial distribution of 1-year average nitrogen dioxide concentrations in the NSW GMR for 2023. One-year average nitrogen dioxide levels in parts of the Greater Sydney and Hunter regions ranged between 0.5 to 1.0 pphm (parts per hundred million) (shaded dark green) and remained below the AAQ NEPM standard of 1.5 pphm. However, areas of eastern and southern Sydney show 1-year average nitrogen dioxide levels between 1.0 and 2.0 pphm. The highest recorded 1-year average nitrogen dioxide concentration of 1.9 ppm was observed at Bradfield Highway, and

3 other stations in Sydney recording 1-year averages greater than 1.0 ppm (Cook and Phillip, Alexandria and Lidcombe).

Regions characterised by higher nitrogen dioxide exposure in 2023 generally coincided with major transport corridors in the Greater Sydney Region (Figure 7, shaded lighter green). Exposure levels were lower elsewhere in the NSW GMR, particularly the south-east, north-west and Upper Hunter (shaded light blue and dark blue).

Anthropogenic sources are the major contributors to oxides of nitrogen (NOx) emissions in the NSW GMR, including industrial (60%), off-road mobile (22%) and on-road mobile (17%) sources, which make up over 98% of human-made emissions (NSW EPA 2019).

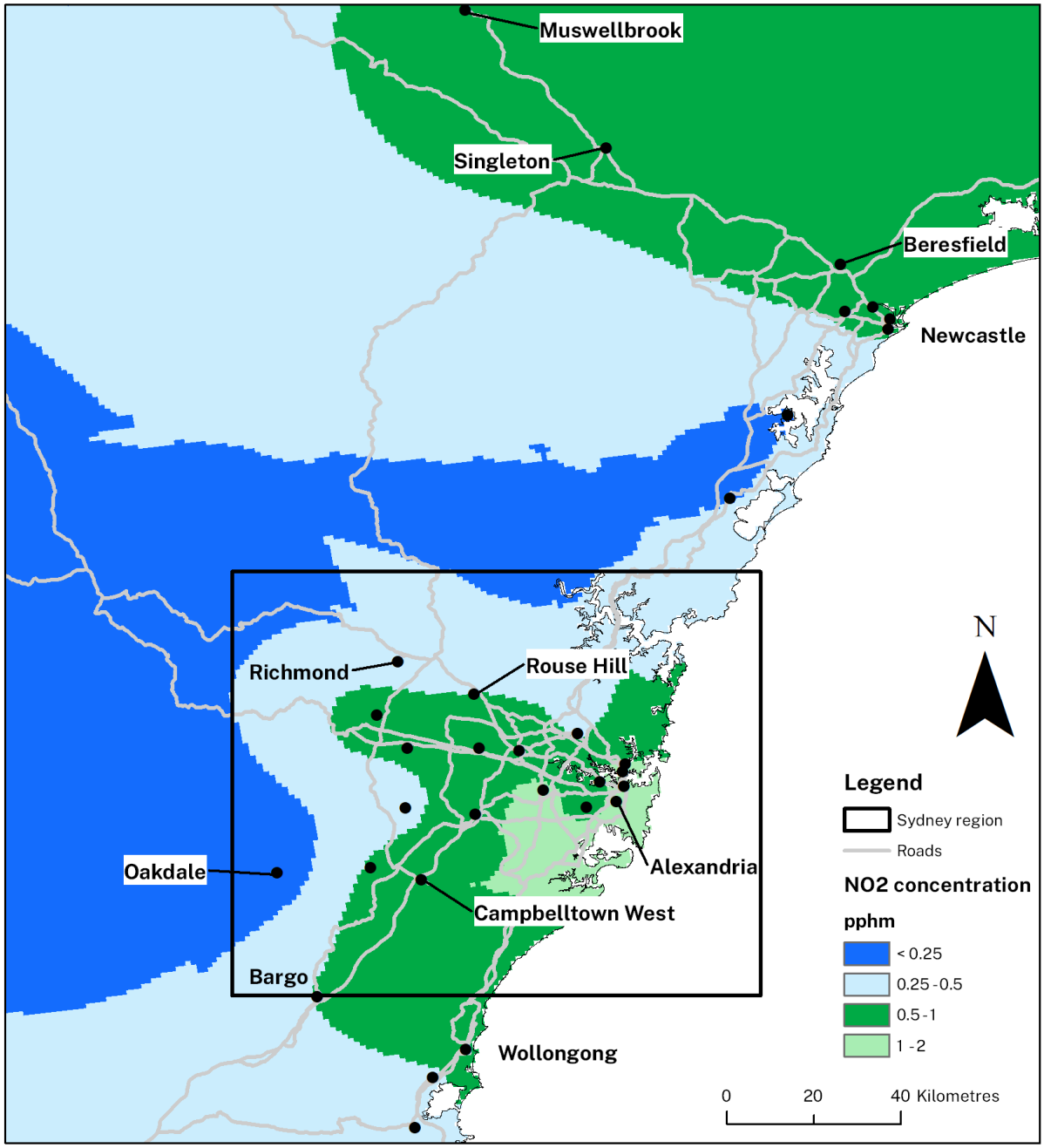


Figure 6 Spatial distribution of nitrogen dioxide (NO_2) 1-year average concentrations in the NSW GMR, including the Greater Sydney Region (inset) in 2023. The AAQ NEPM stations monitoring nitrogen dioxide in 2023 are identified by black dots.

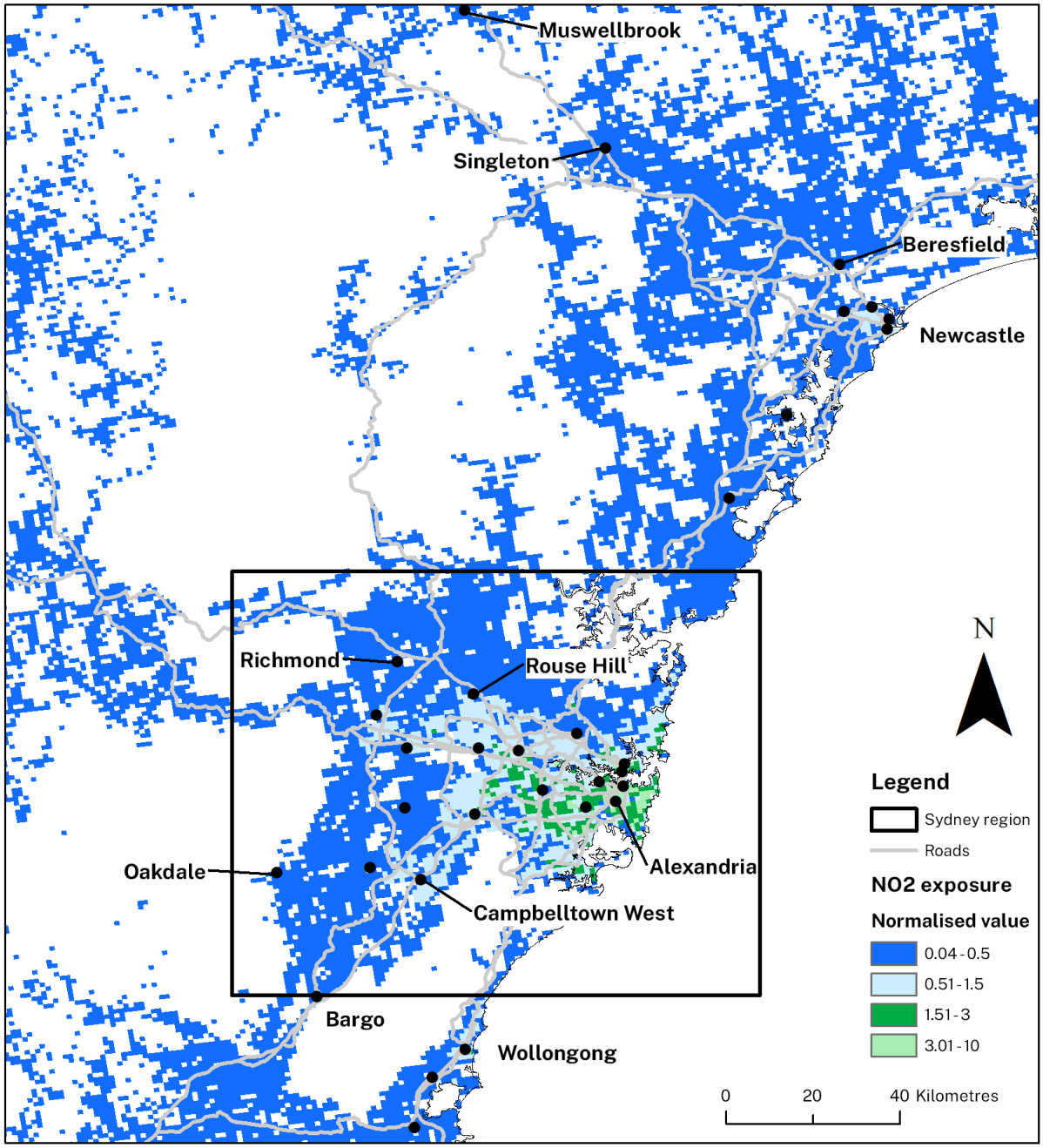


Figure 7 **Nitrogen dioxide (NO_2) exposure in the NSW GMR and Greater Sydney Region (inset) during 2023**

6.1.4 Exposure assessment for ozone

Figure 8 presents the spatial distribution of annual maximum 8-hour ozone concentrations in the NSW GMR for 2023, showing that most areas of the NSW GMR, except for the coastal fringe in Sydney, were characterised by high 8-hour ozone concentrations (light green). Eleven stations, including 10 in Sydney, recorded exceedances of the 8-hour rolling ozone standard in 2023.

Figure 9 shows ozone exposure across the GMR during 2023, with regions experiencing the highest ozone exposure shaded in green, particularly along transport corridors and

areas of industrial activity. Areas of lower ozone exposure tended to occur along the coastal fringe and areas with low population densities, such as south-west and north-west Sydney, the Central Coast and the Hunter.

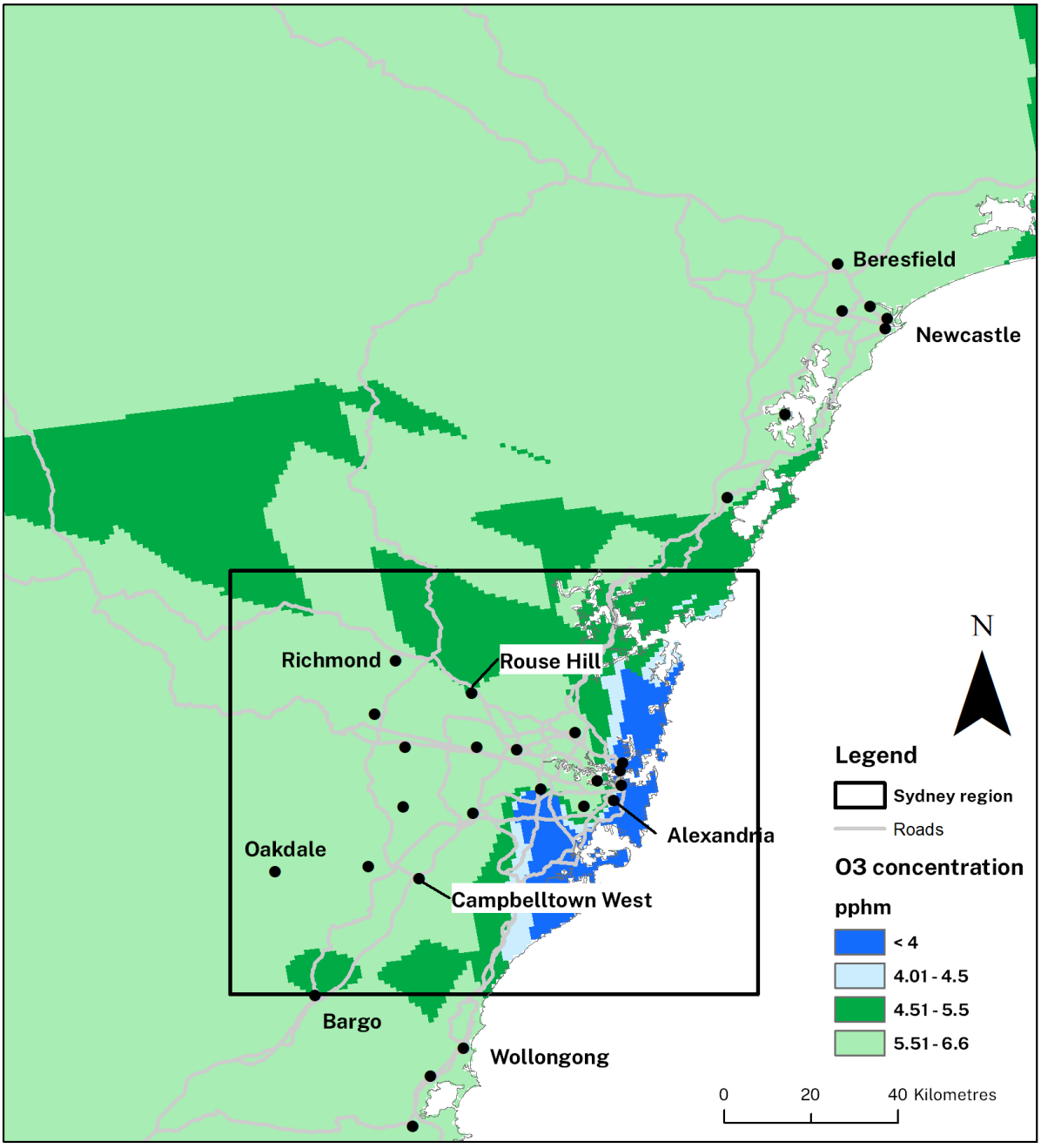


Figure 8 **Spatial distribution of annual maximum 8-hour ozone (O_3) concentrations in the NSW GMR, including the Greater Sydney Region in 2023. The AAQ NEPM stations monitoring ozone in 2023 are identified by black dots**

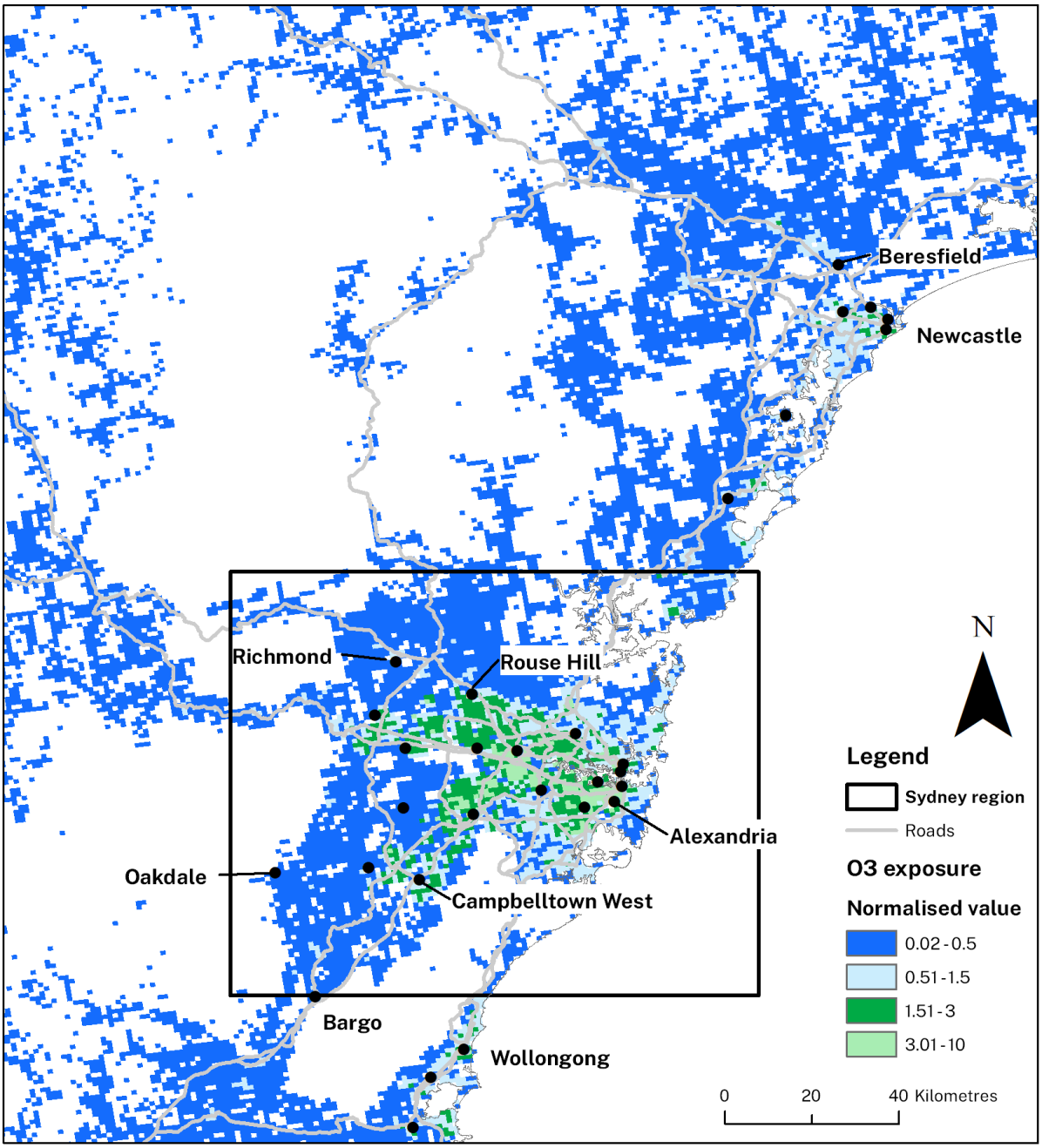


Figure 9 **Ozone (O_3) exposure in the NSW GMR and Greater Sydney Region (inset) during 2023**

6.1.5 Clean Air Metric

The Clean Air Metric (CAM) accounts for population exposure when assessing changes to average air quality. Table 24 shows the 2023 CAM results for the 2 domains: the Greater Sydney Region and the NSW GMR. The CAM is presented in 2 ways:

1. population-weighted concentrations for PM2.5, nitrogen dioxide and ozone
2. CAM indices for PM2.5 (CAM-PM2.5), nitrogen dioxide (CAM-NO_2) and ozone (CAM-O_3), obtained by dividing population-weighted concentrations by the AAQ NEPM standard for each pollutant.

Table 24 **2023 population-weighted pollutant concentration, CAM indices and overall CAM index for the Greater Sydney Region and the NSW GMR**

Region	2023 population	2023 population-weighted pollutant concentration			2023 CAM index			2023 overall – CAM index
		PM2.5 (µg/m^3)	NO_2 (pphm)	O_3 (pphm)	PM2.5 index	NO_2 index	O_3 index	
Sydney	5,205,462	6.21	0.80	5.28	82	53	81	82
GMR	6,397,010	6.18	0.75	5.47	80	50	84	84

Notes:

CAM index figures indicate population exposure to each pollutant as a percentage of the AAQ NEPM standard.

- The 2023 population-weighted PM2.5 concentrations for the Greater Sydney Region and the NSW GMR are 6.21 and 6.18 µg/m^3 respectively. The CAM indices derived for PM2.5 from CAM-PM2.5 were 82 and 80 respectively for 2023. These results show the Greater Sydney Region and the NSW GMR populations were exposed to 82% and 80% of the AAQ NEPM 1-year PM2.5 standard of 8.0 µg/m^3.
- The 2023 population-weighted nitrogen dioxide concentrations for the Greater Sydney Region and the NSW GMR are 0.80 and 0.75 pphm respectively. The CAM-NO_2 values indicate that nitrogen dioxide exposure in the Greater Sydney Region and NSW GMR were 53% and 50% respectively of the AAQ NEPM 1-year NO_2 standard of 1.5 pphm.
- The 2023 population-weighted 8-hour ozone concentration for the Greater Sydney Region and the NSW GMR were 5.28 and 5.47 pphm respectively. The CAM-O_3 values represent 81% and 84% of the AAQ NEPM 8-hour rolling standard of 6.5 pphm.
- The Greater Sydney Region's 2023 CAM index of 82 was driven by PM2.5, while the 2023 CAM index of 84 for the NSW GMR was driven by ozone.

6.1.6 Trends in CAM-PM2.5

Trend analysis allows for assessing sources contributing to poor air quality. This is because air quality can vary significantly from year to year due to exceptional events such as bushfires and dust storms, as well as climatological events such as El Niño and La Niña. Prior to 2021, calculations for the CAM index were based only on PM2.5, hence the trend analysis is not extended to nitrogen dioxide and ozone. CAM trends for PM2.5 (CAM-PM2.5) in the Greater Sydney Region and NSW GMR for the years 1996 to 2023 are shown in Figure 10 and Figure 11 respectively.

- Following the highest CAM-PM2.5 levels in 2019 and the lowest in 2022 during the 2019 to 2023 analysis period, CAM-PM2.5 values for 2023 show a reversion to more typical values in Figure 10.
- Although higher than 2022, CAM-PM2.5 values for 2023 were significantly lower than bushfire-impacted 2019. Despite 2020 to 2022 coinciding with consecutive

La Niña events, COVID-19 lockdowns during 2020 and 2021 likely led to reduced emissions from transportation and industrial processes.

- Down from the highest area-averaged annual rainfall for NSW in 2022, rainfall totals for 2023 were 22.9% below average across the state (BOM 2024). Lower rainfall likely contributed to higher PM2.5 in 2023 through better burning conditions for hazard reduction burns and bushfire activity.

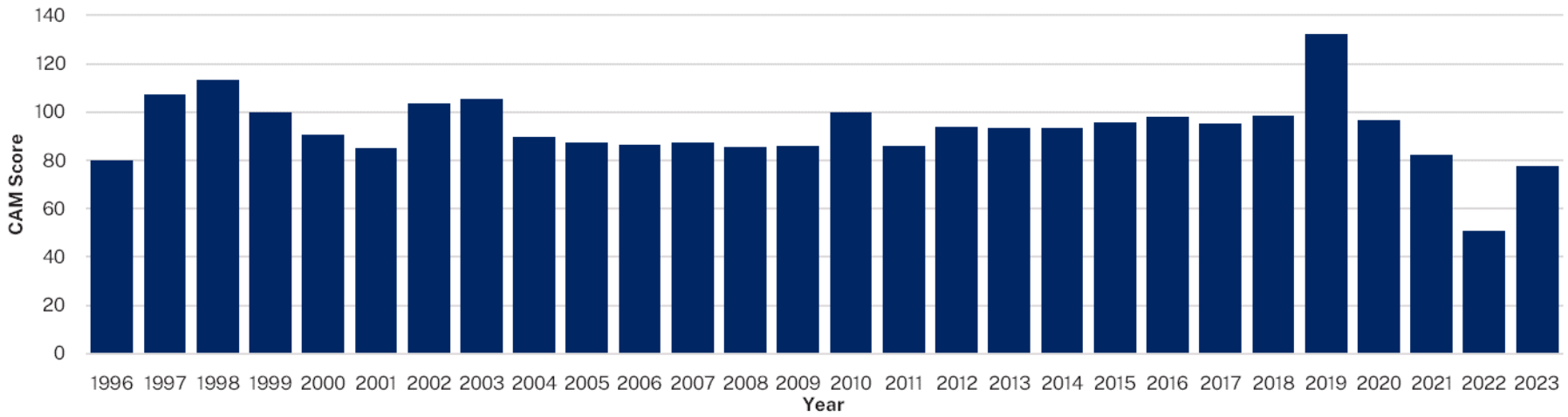


Figure 10 **CAM-PM2.5 population-weighted time series for Greater Sydney Region 1996 to 2023**

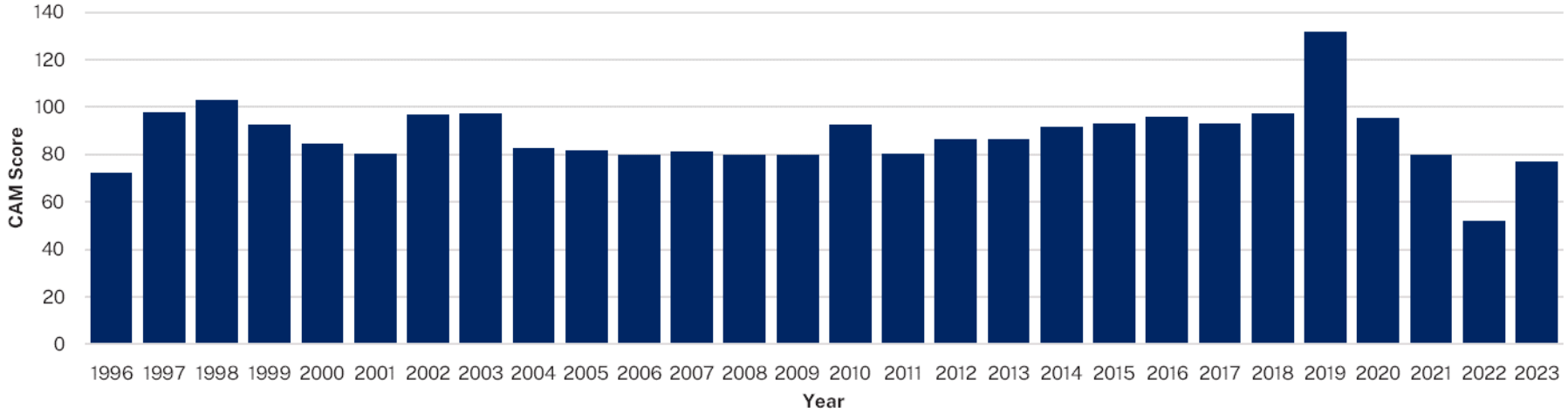


Figure 11 **CAM-PM2.5 population-weighted time series for the NSW Greater Metropolitan Region 1996 to 2023**

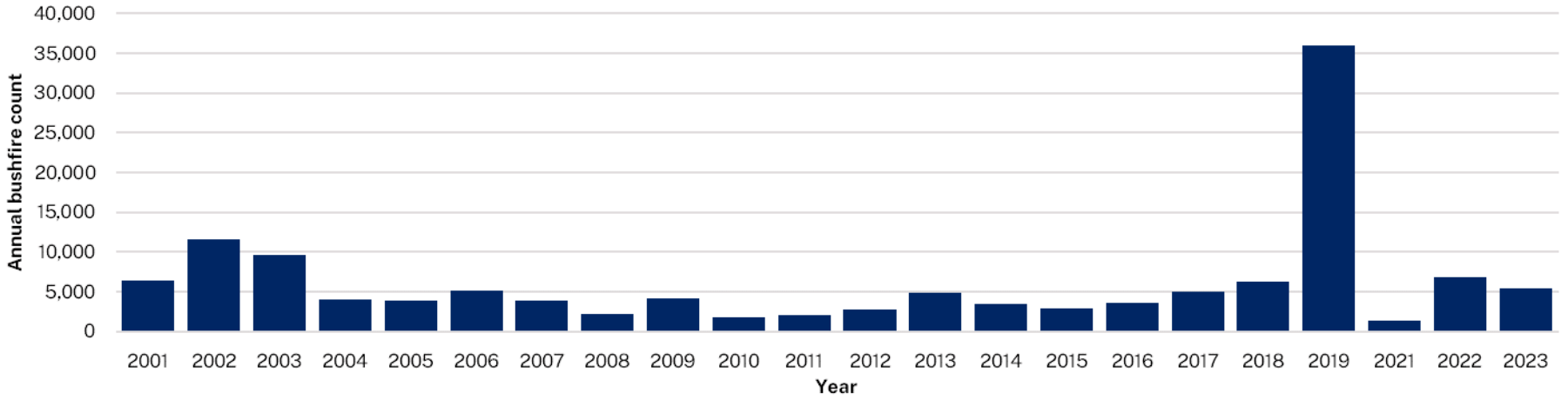


Figure 12 **Annual active fire count in NSW observed through MODIS Terra satellite 2001 to 2023**
Source: Fire Information for Resource Management Systems, NASA MODIS Terra satellite (NASA FIRMS 2024)

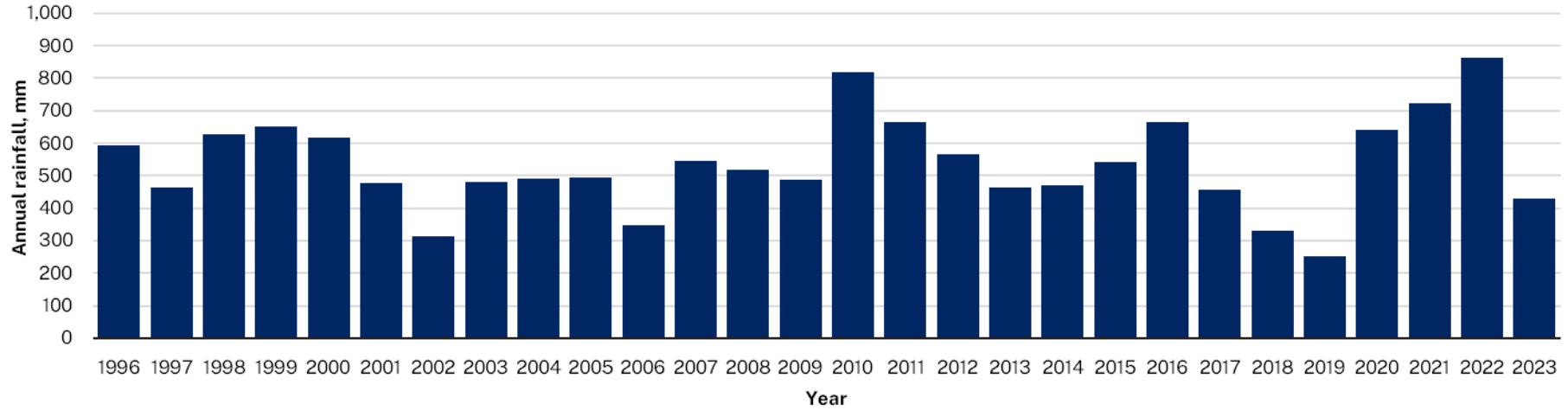


Figure 13 **Annual rainfall (mm) in NSW/ACT 1996 to 2023**
Source: BOM 2024

7. References

General

ABS (2023) Australian population grid data (1-km resolution), Australian Bureau of Statistics website, accessed December 2023.

BOM (2024) Climate change – trends and extremes: Australian climate variability and change time series graphs New South Wales/ACT, Australian Bureau of Meteorology website, accessed April 2024.

DPE (2022) NSW Clean air strategy 2021–2030, Department of Planning & Environment.

DPE (2023) Sydney Air Quality Study program report stage 2: Health impact assessment, NSW Department of Planning and Environment.

DPIE (2020a) NSW Air Quality Monitoring Plan 2021–25, NSW Department of Planning, Industry and Environment, accessed September 2024.

DPIE (2020b) New South Wales annual compliance report 2018: National Environment Protection (Ambient Air Quality) Measure, NSW Department of Planning, Industry and Environment.

DPIE (2020c) Air quality study for the NSW Greater Metropolitan Region: A Sydney Air Quality Study program report, NSW Department of Planning, Industry and Environment.

ICON (2024) NSW Rural Fire Service Incident Control Online System, accessed November 2024.

NASA FIRMS (National Aeronautics and Space Administration Fire Information for Resource Management System) (2024) Country Yearly Summary, NASA, accessed October 2024.

NEPC Peer Review Committee (2002) National Environment Protection (Ambient Air Quality) Measure technical paper no. 8: annual reports, National Environment Protection Committee.

NEPC Peer Review Committee (2001) National Environment Protection (Ambient Air Quality) Measure technical paper no. 5: data collection and handling, National Environment Protection Committee.

NSW EPA (2022a) *Approved methods for the modelling and assessment of air pollutants in New South Wales*, NSW Environment Protection Authority, www.epa.nsw.gov.au/your-environment/air/industrial-emissions/approved-methods-for-the-modelling-and-assessment-of-air-pollutants.

NSW EPA (2022b) Approved methods for the sampling and analysis of air pollutants in NSW, NSW Environment Protection Authority.

NSW EPA (2019) *2013 calendar year air emissions inventory for the Greater Metropolitan Region in NSW*, NSW Environment Protection Authority.

NSW Government (2017) Clean Air Metric, background paper prepared for NSW Clean Air Summit, Sydney June 2017, NSW Government.

OEH (2019) NSW Government Resource Efficiency Policy, Office of Environment and Heritage, Sydney.

Riley M, Scorgie Y, Jiang N, Capnerhurst J and Salter D (2017) 'A metric for assessing population-weighted average air quality exposure in New South Wales', 23rd International Clean Air and Environment Conference, Brisbane, 15 to 18 October 2017.

State of Global Air (2023) How we estimate exposure, State of Global Air website, a collaboration between the Health Effects Institute and the Institute for Health Metrics and Evaluation, with expert input from the University of British Columbia, accessed January 2024.

Legislation

- National Environment Protection (Ambient Air Quality) Measure (Cth) February 2016 amendment
- National Environment Protection (Ambient Air Quality) Measure (Cth) May 2021 amendment
- Protection of the Environment Operations Act 1997
- Protection of the Environment Operations (Clean Air) Regulation 2022
- Protection of the Environment Operations (Clean Air) Regulation 2010 (repealed)
- Protection of the Environment Operations (Clean Air) Regulation 2021 (repealed)
- Protection of the Environment Operations (General) Regulation 2022
- Protection of the Environment Operations (General) Regulation 2021 (repealed)

More information

- Air quality concentration data – NSW Government webpage
- Air quality monitoring network – NSW Environment and Heritage webpage
- Air quality special statement spring–summer 2019–20 – NSW Environment and Heritage webpage
- Ambient air quality NEPM technical papers, National Environment Protection Council, all content archived (previously Environment Protection and Heritage Council) – Federal Government webpage
- Approved methods for the modelling and assessment of air pollutants in NSW – NSW EPA webpage
- Approved methods for the sampling and analysis of air pollutants in NSW – NSW EPA webpage
- Cadia Valley monitoring program – NSW Environment and Heritage webpage
- Council resource kit – NSW EPA webpage
- Clean Air Strategy – NSW Environment and Heritage webpage

- Draft NSW Clean Air Strategy: public consultation – NSW Environment and Heritage webpage
- POEO public register – NSW EPA website
- NASA Worldview – National Aeronautics and Space Administration (NASA) Worldview application website
- NASA MODIS Terra satellite data, country yearly summary data for 2021 – Fire Information for Resource Management Systems webpage
- National Clean Air Agreement Noxious Emissions from Non-Road Diesel Engines – Federal DCCEEW webpage
- NSW Air Quality website – NSW Government webpage
- NSW Air Quality Monitoring Plan 2021 to 2025 – NSW Environment and Heritage webpage
- NSW Government's Clean Air Summit – NSW EPA webpage
- NSW Government Resource Efficiency Policy (GREP) – NSW Government webpage
- Protection of the Environment Operations (Clean Air) Regulation 2022 – NSW EPA webpage
- Sydney Air Quality Study – NSW Environment and Heritage webpage
- Sydney Air Quality Study – Stage 2 – NSW Environment and Heritage publication
- The Cadia region – NSW EPA webpage
- Warringah freeway upgrade: air quality monitoring – NSW EPA webpage
- World Health Organization International Agency for Research on Cancer (PDF 186 KB) – World Health Organization document

Appendix A: 5-year trends analysis

This section presents air pollutant trends for each active AAQ NEPM station monitoring the pollutant from 2019 to 2023 inclusive. The following statistics are presented for each pollutant at each station for all AAQ NEPM standards:

- 5-year trends in data availability for each pollutant based on hourly data for gaseous pollutants and 1-day data for PM10 and PM2.5
- 5-year trends in annual maximum concentrations and the 99th, 98th, 95th, 90th, 75th and 50th percentiles for each standard with an averaging period of less than a year for each pollutant
- 5-year trends in annual means for relevant pollutants and standards.

General notes on tabulated data

- ppm – parts per million
- All **bold** entries indicate the national standard was exceeded, or the exceedance was a non-exceptional event. These entries are marked by a hash (#).
- *Italicised* entries denote data availability for a year that is between 15 and 75%. Note that for this trend analysis, quarterly availability figures of less than 75% are not considered – only the annual figure is assessed. These entries are marked by a dagger (†).
- Entries with data availability less than 15% are included only if a national standard was exceeded. These entries are marked by an asterisk (*).

The following abbreviations are used on occasion in tables 25 to 30:

- CW: Central West
- SW: South West
- NW: North West
- Hwy: Highway
- W: West
- C: Central
- Macq: Macquarie
- L: Lower
- U: Upper
- Nth: North
- Sth: South
- S: Southern
- N: Northern.

Carbon monoxide

Table 25 **Statistical summary trend (5-year) by station for the carbon monoxide maximum 8-hour rolling average standard (9.0 ppm) from 2019 to 2023**

Region	Station	Year	Data avail (%)	Exceed days	Max 8-hour rolling average (ppm) (9.0 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
East Sydney	Alexandria	2019	–	–	–	–	–	–	–	–	–
East Sydney	Alexandria	2020	–	–	–	–	–	–	–	–	–
East Sydney	*Alexandria*[#]	*2021*	*19.3*	*0*	*0.2*	*0.2*	*0.1*	*0.0*	*0.0*	*0.0*	*-0.1*
East Sydney	*Alexandria*[#]	*2022*	*65.7*	*0*	*1.0*	*0.9*	*0.8*	*0.5*	*0.4*	*0.1*	*0.0*
East Sydney	*Alexandria*[#]	*2023*	*68.7*	*0*	*0.8*	*0.7*	*0.6*	*0.5*	*0.4*	*0.1*	*0.0*
East Sydney	Bradfield Hwy	2019	91.3	0	2.4	1.2	1.0	0.9	0.8	0.6	0.5
East Sydney	Bradfield Hwy	2020	89.2	0	2.6	0.9	0.7	0.6	0.5	0.4	0.3
East Sydney	Bradfield Hwy	2021	88.7	0	1.1	0.9	0.9	0.7	0.5	0.4	0.3
East Sydney	Bradfield Hwy	2022	83.6	0	0.9	0.7	0.7	0.6	0.5	0.4	0.3
East Sydney	Bradfield Hwy	2023	92.4	0	0.9	0.7	0.6	0.6	0.5	0.4	0.3
East Sydney	*Cook and Phillip*[#]	*2019*	*29.0*	*0*	*1.8*	*1.8*	*1.4*	*0.9*	*0.6*	*0.3*	*0.2*
East Sydney	Cook and Phillip	2020	89.3	0	2.8	0.7	0.6	0.5	0.4	0.3	0.2
East Sydney	Cook and Phillip	2021	91.7	0	0.7	0.6	0.6	0.5	0.4	0.3	0.2
East Sydney	Cook and Phillip	2022	76.9	0	0.4	0.4	0.4	0.3	0.2	0.1	0.1
East Sydney	Cook and Phillip	2023	92.7	0	0.8	0.5	0.3	0.2	0.2	0.1	0.0
East Sydney	Macquarie Park	2019	93.1	0	3.5	1.2	1.0	0.6	0.5	0.4	0.3
East Sydney	Macquarie Park	2020	95.1	0	2.4	0.9	0.8	0.6	0.5	0.4	0.3
East Sydney	Macquarie Park	2021	92.9	0	5.1	1.7	0.7	0.6	0.5	0.4	0.3
East Sydney	Macquarie Park	2022	94.1	0	0.7	0.6	0.5	0.5	0.4	0.4	0.3

Region	Station	Year	Data avail (%)	Exceed days	Max 8-hour rolling average (ppm) (9.0 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
East Sydney	Macquarie Park	2023	94.0	0	0.5	0.4	0.4	0.3	0.3	0.2	0.1
East Sydney	Rozelle	2019	93.9	0	2.2	1.0	0.8	0.7	0.6	0.4	0.3
East Sydney	Rozelle	2020	94.4	0	2.6	1.0	0.8	0.7	0.5	0.4	0.3
East Sydney	Rozelle	2021	94.4	0	1.3	0.8	0.7	0.6	0.5	0.3	0.2
East Sydney	Rozelle	2022	92.8	0	0.8	0.7	0.6	0.5	0.4	0.3	0.2
East Sydney	Rozelle	2023	90.6	0	0.7	0.6	0.6	0.5	0.4	0.3	0.3
CW Sydney	Lidcombe	2019	–	–	–	–	–	–	–	–	–
CW Sydney	*Lidcombe*[#]	*2020*	*62.7*	*0*	*0.9*	*0.9*	*0.8*	*0.7*	*0.6*	*0.4*	*0.3*
CW Sydney	Lidcombe	2021	93.7	0	0.9	0.7	0.7	0.6	0.5	0.4	0.2
CW Sydney	Lidcombe	2022	94.5	0	0.7	0.6	0.6	0.5	0.4	0.3	0.2
CW Sydney	Lidcombe	2023	89.3	0	1.3	0.8	0.7	0.6	0.5	0.3	0.2
CW Sydney	Parramatta Nth	2019	94.6	0	3.2	1.2	0.9	0.8	0.7	0.5	0.3
CW Sydney	Parramatta Nth	2020	94.6	0	2.0	1.1	0.9	0.8	0.7	0.4	0.3
CW Sydney	Parramatta Nth	2021	95.0	0	0.9	0.9	0.8	0.7	0.6	0.4	0.3
CW Sydney	Parramatta Nth	2022	93.4	0	0.8	0.8	0.7	0.6	0.6	0.4	0.3
CW Sydney	Parramatta Nth	2023	94.2	0	1.0	0.7	0.6	0.5	0.4	0.3	0.2
CW Sydney	Prospect	2019	94.9	0	2.8	1.3	0.9	0.7	0.6	0.3	0.2
CW Sydney	Prospect	2020	94.8	0	1.8	1.0	0.9	0.6	0.5	0.3	0.1
CW Sydney	Prospect	2021	93.5	0	1.0	0.8	0.7	0.6	0.4	0.2	0.1
CW Sydney	Prospect	2022	93.6	0	0.9	0.7	0.6	0.5	0.4	0.2	0.1
CW Sydney	Prospect	2023	87.7	0	1.0	0.8	0.6	0.5	0.4	0.2	0.1
CW Sydney	*Rouse Hill*[#]	*2019*	*55.2*	*0*	*3.6*	*3.1*	*1.6*	*0.9*	*0.6*	*0.3*	*0.2*
CW Sydney	Rouse Hill	2020	94.6	0	1.9	0.8	0.7	0.6	0.5	0.3	0.2
CW Sydney	Rouse Hill	2021	93.4	0	1.5	0.9	0.6	0.4	0.4	0.3	0.2

Region	Station	Year	Data avail (%)	Exceed days	Max 8-hour rolling average (ppm) (9.0 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
CW Sydney	Rouse Hill	2022	94.7	0	0.6	0.5	0.4	0.3	0.3	0.3	0.2
CW Sydney	Rouse Hill	2023	94.5	0	0.7	0.6	0.5	0.4	0.3	0.3	0.2
SW Sydney	Camden	2019	92.8	0	2.0	1.5	1.2	0.7	0.4	0.3	0.2
SW Sydney	Camden	2020	94.0	0	2.6	1.1	0.7	0.4	0.3	0.3	0.2
SW Sydney	Camden	2021	94.6	0	1.5	0.5	0.4	0.3	0.3	0.2	0.2
SW Sydney	Camden	2022	94.3	0	0.5	0.5	0.4	0.3	0.3	0.2	0.2
SW Sydney	*Camden[#]*	*2023*	*69.0*	*0*	*1.4*	*0.5*	*0.4*	*0.3*	*0.2*	*0.2*	*0.2*
SW Sydney	Campbelltown W	2019	94.4	0	2.9	1.6	1.2	0.8	0.6	0.4	0.4
SW Sydney	Campbelltown W	2020	94.3	0	2.3	1.0	0.8	0.7	0.5	0.4	0.3
SW Sydney	Campbelltown W	2021	94.6	0	1.9	0.9	0.4	0.3	0.2	0.2	0.1
SW Sydney	Campbelltown W	2022	92.0	0	0.4	0.4	0.3	0.3	0.2	0.0	0.0
SW Sydney	Campbelltown W	2023	92.0	0	1.4	0.9	0.4	0.4	0.3	0.2	0.1
SW Sydney	Liverpool	2019	93.6	0	1.8	1.4	1.2	1.0	0.8	0.5	0.3
SW Sydney	Liverpool	2020	92.2	0	2.1	1.3	1.2	0.9	0.7	0.5	0.2
SW Sydney	Liverpool	2021	93.4	0	1.2	1.0	0.9	0.7	0.5	0.2	0.1
SW Sydney	Liverpool	2022	88.1	0	1.1	0.8	0.7	0.5	0.4	0.1	-0.1
SW Sydney	Liverpool	2023	91.6	0	1.3	0.9	0.8	0.6	0.4	0.2	0.0
NW Sydney	Penrith	2019	–	–	–	–	–	–	–	–	–
NW Sydney	*Penrith[#]*	*2020*	*47.1*	*0*	*0.8*	*0.7*	*0.7*	*0.6*	*0.5*	*0.3*	*0.2*
NW Sydney	Penrith	2021	94.7	0	0.8	0.7	0.7	0.6	0.5	0.3	0.2
NW Sydney	Penrith	2022	91.6	0	0.6	0.6	0.6	0.4	0.3	0.2	0.1
NW Sydney	Penrith	2023	91.6	0	0.5	0.4	0.4	0.3	0.3	0.1	0.0
Illawarra	Wollongong	2019	94.0	0	2.3	1.7	0.9	0.6	0.5	0.4	0.3
Illawarra	Wollongong	2020	93.5	0	3.3	1.0	0.8	0.5	0.5	0.4	0.2

Region	Station	Year	Data avail (%)	Exceed days	Max 8-hour rolling average (ppm) (9.0 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
Illawarra	Wollongong	2021	93.8	0	0.7	0.6	0.6	0.5	0.4	0.3	0.2
Illawarra	Wollongong	2022	94.3	0	0.7	0.6	0.5	0.4	0.4	0.3	0.2
Illawarra	Wollongong	2023	94.0	0	1.2	0.7	0.6	0.5	0.4	0.3	0.2
Central Coast	Wyong	2019	94.4	0	2.4	1.1	0.7	0.4	0.3	0.2	0.2
Central Coast	Wyong	2020	92.6	0	1.7	0.7	0.5	0.4	0.3	0.3	0.2
Central Coast	Wyong	2021	93.8	0	0.4	0.3	0.3	0.3	0.2	0.2	0.1
Central Coast	Wyong	2022	91.0	0	0.3	0.1	0.1	0.1	0.0	0.0	-0.1
Central Coast	Wyong	2023	90.1	0	0.1	0.1	0.1	0.1	0.0	0.0	-0.1
Lake Macq.	Morisset	2019	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset*	2020	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset	2021	91.3	0	0.2	0.2	0.2	0.2	0.1	0.1	0.1
Lake Macq.	Morisset	2022	94.5	0	0.3	0.2	0.2	0.1	0.1	0.1	0.0
Lake Macq.	Morisset	2023	94.1	0	0.3	0.2	0.2	0.1	0.1	0.1	0.0
L Hunter	Newcastle	2019	92.3	0	1.5	1.1	0.9	0.7	0.6	0.4	0.3
L Hunter	Newcastle	2020	92.6	0	2.6	1.1	0.8	0.7	0.5	0.4	0.3
L Hunter	Newcastle	2021	93.9	0	0.9	0.8	0.8	0.6	0.5	0.3	0.2
L Hunter	Newcastle	2022	94.5	0	0.9	0.8	0.7	0.6	0.4	0.3	0.2
L Hunter	Newcastle	2023	93.1	0	0.9	0.8	0.8	0.6	0.4	0.3	0.2
U Hunter	Merriwa	2019	–	–	–	–	–	–	–	–	–
U Hunter	*Merriwa#*	*2020*	*39.9*	*0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.0*	*0.0*
U Hunter	Merriwa	2021	88.6	0	0.1	0.1	0.1	0.1	0.1	0.0	0.0
U Hunter	Merriwa	2022	90.8	0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
U Hunter	Merriwa	2023	93.3	0	0.5	0.2	0.1	0.1	0.1	0.0	0.0
Mid Nth Coast	Coffs Harbour*	2019	–	–	–	–	–	–	–	–	–

Region	Station	Year	Data avail (%)	Exceed days	Max 8-hour rolling average (ppm) (9.0 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
Mid Nth Coast	Coffs Harbour	2020	94.8	0	0.8	0.5	0.5	0.4	0.3	0.3	0.2
Mid Nth Coast	Coffs Harbour	2021	88.5	0	0.7	0.4	0.3	0.3	0.3	0.2	0.2
Mid Nth Coast	Coffs Harbour	2022	93.4	0	0.3	0.3	0.3	0.2	0.2	0.2	0.2
Mid Nth Coast	Coffs Harbour	2023	88.3	0	0.5	0.4	0.4	0.4	0.3	0.3	0.2
Mid Nth Coast	*Port Macquarie*[#†]	*2019*	*41.7*	***2***	***9.6***	*4.0*	*2.6*	*1.3*	*0.7*	*0.3*	*0.1*
Mid Nth Coast	Port Macquarie	2020	82.8	0	2.3	0.8	0.5	0.4	0.3	0.3	0.2
Mid Nth Coast	Port Macquarie	2021	93.3	0	0.5	0.4	0.4	0.3	0.2	0.2	0.1
Mid Nth Coast	Port Macquarie	2022	95.4	0	0.3	0.3	0.3	0.2	0.2	0.1	0.1
Mid Nth Coast	Port Macquarie	2023	93.4	0	0.6	0.3	0.2	0.1	0.1	0.0	0.0

Nitrogen dioxide

Table 26 **Statistical summary trend (5-year) by station for the nitrogen dioxide maximum 1-hour rolling average AAQ NEPM standard (0.080 ppm) and 1-year average AAQ NEPM standard (0.015 ppm) from 2019 to 2023**

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
East Sydney	Alexandria	2019	–	–	–	–	–	–	–	–	–	–
East Sydney	Alexandria	2020	–	–	–	–	–	–	–	–	–	–
East Sydney	*Alexandria[#]*	*2021*	*22.0*	*0*	*0.035*	*0.035*	*0.035*	*0.029*	*0.026*	*0.020*	*0.016*	*0.007*
East Sydney	Alexandria	2022	89.4	0	0.042	0.038	0.034	0.031	0.029	0.024	0.019	0.009
East Sydney	Alexandria	2023	90.4	0	0.046	0.040	0.038	0.034	0.031	0.027	0.022	0.011
East Sydney	Bradfield Hwy[†]	2019	88.1	**9**	**0.153**	**0.102**	**0.086**	0.066	0.059	0.051	0.043	**0.025**
East Sydney	Bradfield Hwy	2020	90.8	0	0.068	0.061	0.056	0.052	0.047	0.042	0.037	**0.022**
East Sydney	Bradfield Hwy	2021	94.4	0	0.065	0.061	0.058	0.050	0.045	0.039	0.033	**0.019**
East Sydney	Bradfield Hwy	2022	83.5	0	0.066	0.053	0.050	0.047	0.044	0.038	0.031	**0.018**
East Sydney	Bradfield Hwy	2023	89.2	0	0.068	0.063	0.058	0.049	0.044	0.037	0.031	**0.019**
East Sydney	*Cook and Phillip[#†]*	*2019*	*29.7*	***1***	***0.110***	***0.088***	*0.065*	*0.047*	*0.039*	*0.029*	*0.024*	*0.012*
East Sydney	Cook and Phillip	2020	88.1	0	0.046	0.044	0.041	0.035	0.033	0.028	0.023	0.013
East Sydney	Cook and Phillip	2021	88.8	0	0.047	0.038	0.036	0.035	0.033	0.027	0.022	0.012
East Sydney	Cook and Phillip	2022	93.7	0	0.040	0.037	0.035	0.032	0.031	0.026	0.021	0.011
East Sydney	Cook and Phillip	2023	93.0	0	0.057	0.049	0.042	0.037	0.033	0.028	0.023	0.012
East Sydney	Earlwood	2019	93.3	0	0.061	0.040	0.038	0.035	0.032	0.027	0.022	0.010
East Sydney	Earlwood	2020	93.0	0	0.040	0.036	0.035	0.030	0.027	0.024	0.019	0.009
East Sydney	Earlwood	2021	93.3	0	0.039	0.033	0.031	0.028	0.026	0.023	0.018	0.009
East Sydney	Earlwood	2022	92.9	0	0.033	0.030	0.029	0.027	0.026	0.022	0.017	0.008

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
East Sydney	Earlwood	2023	89.9	0	0.041	0.034	0.033	0.030	0.028	0.024	0.019	0.009
East Sydney	Macquarie Park	2019	93.1	0	0.026	0.024	0.024	0.022	0.019	0.017	0.013	0.005
East Sydney	Macquarie Park	2020	94.9	0	0.030	0.026	0.023	0.020	0.018	0.015	0.011	0.004
East Sydney	Macquarie Park	2021	93.4	0	0.073	0.023	0.021	0.018	0.016	0.012	0.010	0.004
East Sydney	Macquarie Park	2022	93.9	0	0.023	0.022	0.021	0.018	0.016	0.013	0.009	0.003
East Sydney	Macquarie Park	2023	92.5	0	0.026	0.024	0.023	0.020	0.018	0.014	0.010	0.004
East Sydney	Randwick	2019	93.7	0	0.051	0.034	0.033	0.031	0.028	0.024	0.019	0.007
East Sydney	Randwick	2020	93.9	0	0.037	0.031	0.028	0.025	0.023	0.021	0.015	0.005
East Sydney	Randwick	2021	92.7	0	0.029	0.027	0.026	0.025	0.023	0.020	0.015	0.005
East Sydney	Randwick	2022	92.9	0	0.032	0.030	0.029	0.027	0.026	0.023	0.016	0.006
East Sydney	Randwick	2023	92.0	0	0.040	0.034	0.033	0.030	0.028	0.024	0.019	0.007
East Sydney	Rozelle[†]	2019	93.7	**1**	**0.090**	0.044	0.040	0.036	0.033	0.027	0.021	0.010
East Sydney	Rozelle	2020	94.8	0	0.043	0.037	0.035	0.032	0.029	0.024	0.018	0.008
East Sydney	Rozelle	2021	92.5	0	0.035	0.031	0.030	0.029	0.027	0.022	0.016	0.007
East Sydney	Rozelle	2022	92.8	0	0.031	0.029	0.028	0.026	0.024	0.020	0.014	0.006
East Sydney	Rozelle	2023	88.7	0	0.042	0.037	0.033	0.031	0.029	0.024	0.018	0.008
CW Sydney	Lidcombe	2019	–	–	–	–	–	–	–	–	–	–
CW Sydney	*Lidcombe[#]*	*2020*	*71.0*	*0*	*0.050*	*0.047*	*0.041*	*0.038*	*0.033*	*0.027*	*0.022*	*0.010*
CW Sydney	Lidcombe	2021	94.9	0	0.050	0.045	0.040	0.035	0.031	0.025	0.020	0.009
CW Sydney	Lidcombe	2022	94.5	0	0.040	0.037	0.035	0.032	0.030	0.025	0.020	0.010
CW Sydney	Lidcombe	2023	92.4	0	0.053	0.048	0.046	0.041	0.034	0.029	0.023	0.011
CW Sydney	Parramatta Nth	2019	92.2	0	0.070	0.048	0.043	0.037	0.033	0.028	0.023	0.010
CW Sydney	Parramatta Nth	2020	94.1	0	0.037	0.036	0.034	0.029	0.026	0.023	0.018	0.007
CW Sydney	Parramatta Nth	2021	94.7	0	0.047	0.033	0.030	0.028	0.025	0.022	0.018	0.007

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
CW Sydney	Parramatta Nth	2022	92.1	0	0.034	0.030	0.029	0.027	0.025	0.020	0.016	0.007
CW Sydney	Parramatta Nth	2023	93.4	0	0.046	0.038	0.035	0.030	0.028	0.023	0.018	0.008
CW Sydney	Prospect	2019	94.5	0	0.049	0.039	0.037	0.035	0.032	0.027	0.021	0.009
CW Sydney	Prospect	2020	94.5	0	0.043	0.039	0.036	0.032	0.029	0.024	0.018	0.007
CW Sydney	Prospect	2021	93.0	0	0.043	0.037	0.035	0.033	0.028	0.023	0.018	0.007
CW Sydney	Prospect	2022	94.1	0	0.042	0.031	0.030	0.028	0.026	0.021	0.016	0.006
CW Sydney	Prospect	2023	92.3	0	0.049	0.041	0.039	0.034	0.031	0.025	0.019	0.008
CW Sydney	*Rouse Hill#*	*2019*	*56.1*	*0*	*0.050*	*0.036*	*0.035*	*0.030*	*0.028*	*0.023*	*0.015*	*0.006*
CW Sydney	Rouse Hill	2020	95.0	0	0.034	0.032	0.031	0.026	0.023	0.017	0.012	0.005
CW Sydney	Rouse Hill	2021	95.0	0	0.034	0.030	0.029	0.026	0.021	0.017	0.012	0.005
CW Sydney	Rouse Hill	2022	94.4	0	0.033	0.027	0.026	0.024	0.021	0.016	0.012	0.005
CW Sydney	Rouse Hill	2023	93.4	0	0.036	0.030	0.028	0.027	0.024	0.018	0.013	0.005
SW Sydney	Bargo	2019	93.8	0	0.066	0.056	0.049	0.036	0.030	0.024	0.017	0.006
SW Sydney	Bargo	2020	93.9	0	0.045	0.039	0.034	0.030	0.026	0.021	0.015	0.005
SW Sydney	Bargo	2021	89.8	0	0.053	0.033	0.028	0.025	0.023	0.017	0.012	0.004
SW Sydney	Bargo	2022	85.1	0	0.034	0.026	0.024	0.021	0.019	0.014	0.010	0.002
SW Sydney	Bargo	2023	91.0	0	0.048	0.044	0.039	0.032	0.027	0.022	0.015	0.005
SW Sydney	Bringelly	2019	93.5	0	0.034	0.028	0.024	0.022	0.019	0.015	0.012	0.005
SW Sydney	Bringelly	2020	83.0	0	0.030	0.022	0.020	0.018	0.015	0.012	0.008	0.003
SW Sydney	Bringelly	2021	92.8	0	0.024	0.022	0.021	0.018	0.015	0.012	0.008	0.003
SW Sydney	Bringelly	2022	92.4	0	0.022	0.018	0.017	0.015	0.013	0.010	0.006	0.003
SW Sydney	Bringelly	2023	88.6	0	0.025	0.023	0.021	0.019	0.017	0.012	0.008	0.003
SW Sydney	Camden	2019	93.1	0	0.030	0.026	0.024	0.020	0.018	0.015	0.011	0.005
SW Sydney	Camden	2020	93.9	0	0.037	0.026	0.020	0.017	0.015	0.012	0.008	0.004

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
SW Sydney	Camden	2021	94.6	0	0.026	0.022	0.020	0.016	0.013	0.010	0.008	0.004
SW Sydney	Camden	2022	94.3	0	0.022	0.016	0.016	0.014	0.012	0.009	0.006	0.003
SW Sydney	*Camden[#]*	*2023*	*70.0*	*0*	*0.041*	*0.023*	*0.022*	*0.018*	*0.014*	*0.010*	*0.007*	*0.004*
SW Sydney	Campbelltown W	2019	94.1	0	0.059	0.049	0.047	0.040	0.036	0.030	0.025	0.011
SW Sydney	Campbelltown W	2020	93.8	0	0.051	0.041	0.039	0.036	0.033	0.027	0.022	0.009
SW Sydney	Campbelltown W	2021	94.6	0	0.055	0.041	0.037	0.033	0.030	0.025	0.020	0.008
SW Sydney	Campbelltown W	2022	92.2	0	0.042	0.035	0.033	0.030	0.027	0.023	0.018	0.007
SW Sydney	Campbelltown W	2023	92.0	0	0.060	0.049	0.046	0.042	0.036	0.029	0.022	0.009
SW Sydney	Liverpool	2019	94.6	0	0.050	0.048	0.042	0.037	0.035	0.031	0.025	0.012
SW Sydney	Liverpool	2020	91.3	0	0.048	0.038	0.037	0.035	0.033	0.027	0.023	0.011
SW Sydney	Liverpool	2021	94.9	0	0.042	0.037	0.035	0.032	0.030	0.026	0.021	0.010
SW Sydney	Liverpool	2022	94.6	0	0.036	0.032	0.030	0.029	0.026	0.022	0.017	0.008
SW Sydney	Liverpool	2023	93.8	0	0.063	0.041	0.035	0.032	0.029	0.026	0.020	0.009
SW Sydney	Oakdale	2019	92.6	0	0.028	0.023	0.021	0.015	0.011	0.007	0.004	0.002
SW Sydney	Oakdale	2020	94.8	0	0.055	0.020	0.013	0.009	0.008	0.005	0.003	0.001
SW Sydney	Oakdale	2021	94.0	0	0.068	0.014	0.011	0.008	0.006	0.004	0.002	0.001
SW Sydney	Oakdale	2022	93.7	0	0.012	0.010	0.009	0.008	0.006	0.004	0.002	0.001
SW Sydney	Oakdale	2023	93.0	0	0.025	0.016	0.013	0.010	0.007	0.004	0.003	0.001
NW Sydney	Penrith	2019	–	–	–	–	–	–	–	–	–	–
NW Sydney	*Penrith[#]*	*2020*	*46.7*	*0*	*0.032*	*0.030*	*0.026*	*0.025*	*0.022*	*0.018*	*0.013*	*0.005*
NW Sydney	Penrith	2021	94.4	0	0.030	0.025	0.023	0.021	0.020	0.016	0.012	0.005
NW Sydney	Penrith	2022	93.2	0	0.028	0.026	0.025	0.023	0.020	0.016	0.012	0.005
NW Sydney	Penrith	2023	94.1	0	0.034	0.031	0.029	0.027	0.025	0.021	0.015	0.007
NW Sydney	Richmond	2019	94.1	0	0.030	0.025	0.023	0.022	0.019	0.014	0.010	0.005

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
NW Sydney	Richmond	2020	93.1	0	0.035	0.025	0.021	0.017	0.015	0.012	0.007	0.003
NW Sydney	Richmond	2021	93.7	0	0.029	0.019	0.017	0.015	0.013	0.009	0.006	0.002
NW Sydney	Richmond	2022	92.1	0	0.018	0.016	0.015	0.013	0.011	0.008	0.005	0.001
NW Sydney	Richmond	2023	90.9	0	0.021	0.020	0.019	0.016	0.015	0.011	0.008	0.003
NW Sydney	St Marys	2019	93.9	0	0.033	0.029	0.027	0.024	0.021	0.016	0.011	0.004
NW Sydney	St Marys	2020	94.2	0	0.034	0.030	0.025	0.020	0.018	0.015	0.011	0.004
NW Sydney	St Marys	2021	93.2	0	0.033	0.024	0.023	0.021	0.018	0.014	0.011	0.004
NW Sydney	St Marys	2022	93.5	0	0.030	0.025	0.022	0.019	0.017	0.014	0.010	0.004
NW Sydney	St Marys	2023	92.8	0	0.036	0.031	0.029	0.025	0.022	0.018	0.012	0.006
Illawarra	Albion Park Sth	2019	94.7	0	0.041	0.031	0.029	0.025	0.022	0.016	0.010	0.004
Illawarra	Albion Park Sth	2020	94.8	0	0.039	0.030	0.027	0.023	0.018	0.013	0.008	0.003
Illawarra	Albion Park Sth	2021	93.9	0	0.032	0.027	0.023	0.018	0.015	0.012	0.007	0.002
Illawarra	Albion Park Sth	2022	94.5	0	0.031	0.024	0.023	0.021	0.018	0.013	0.008	0.003
Illawarra	Albion Park Sth	2023	94.1	0	0.037	0.030	0.029	0.024	0.021	0.016	0.010	0.004
Illawarra	Kembla Grange	2019	93.5	0	0.042	0.029	0.028	0.025	0.022	0.017	0.013	0.005
Illawarra	Kembla Grange	2020	92.1	0	0.038	0.030	0.028	0.023	0.020	0.015	0.010	0.004
Illawarra	Kembla Grange	2021	93.0	0	0.028	0.024	0.022	0.020	0.018	0.013	0.008	0.003
Illawarra	Kembla Grange	2022	90.0	0	0.027	0.023	0.021	0.018	0.015	0.011	0.007	0.002
Illawarra	Kembla Grange	2023	91.6	0	0.052	0.033	0.030	0.027	0.023	0.017	0.010	0.005
Illawarra	Wollongong	2019	93.1	0	0.040	0.038	0.036	0.032	0.029	0.022	0.017	0.006
Illawarra	Wollongong	2020	92.8	0	0.041	0.036	0.035	0.032	0.029	0.023	0.017	0.006
Illawarra	Wollongong	2021	94.1	0	0.042	0.032	0.031	0.028	0.024	0.020	0.014	0.005
Illawarra	Wollongong	2022	93.7	0	0.029	0.027	0.026	0.025	0.023	0.019	0.013	0.004
Illawarra	Wollongong	2023	93.4	0	0.055	0.043	0.036	0.033	0.030	0.025	0.017	0.007

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
C Coast	Wyong	2019	94.0	0	0.036	0.030	0.027	0.023	0.020	0.016	0.012	0.004
C Coast	Wyong	2020	93.3	0	0.035	0.026	0.025	0.022	0.019	0.015	0.011	0.003
C Coast	Wyong	2021	93.1	0	0.028	0.023	0.021	0.020	0.018	0.014	0.010	0.003
C Coast	Wyong	2022	88.7	0	0.031	0.021	0.019	0.017	0.016	0.013	0.009	0.002
C Coast	Wyong	2023	89.0	0	0.027	0.025	0.023	0.020	0.018	0.014	0.010	0.002
Lake Macq.	Morisset	2019	–	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset*	2020	–	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset	2021	93.4	0	0.026	0.024	0.022	0.017	0.015	0.012	0.008	0.003
Lake Macq.	Morisset	2022	94.2	0	0.025	0.022	0.019	0.015	0.013	0.009	0.007	0.002
Lake Macq.	Morisset	2023	93.8	0	0.029	0.023	0.021	0.017	0.014	0.011	0.007	0.002
L Hunter	Beresfield	2019	89.9	0	0.056	0.038	0.032	0.029	0.026	0.023	0.018	0.008
L Hunter	Beresfield	2020	91.2	0	0.035	0.031	0.030	0.026	0.025	0.020	0.016	0.007
L Hunter	Beresfield	2021	94.1	0	0.034	0.031	0.028	0.026	0.023	0.020	0.016	0.006
L Hunter	Beresfield	2022	91.8	0	0.029	0.028	0.027	0.025	0.023	0.019	0.015	0.006
L Hunter	Beresfield	2023	93.3	0	0.038	0.034	0.032	0.030	0.027	0.023	0.018	0.008
L Hunter	Newcastle	2019	94.5	0	0.044	0.039	0.036	0.033	0.031	0.026	0.018	0.008
L Hunter	Newcastle	2020	92.1	0	0.034	0.031	0.030	0.028	0.025	0.021	0.015	0.005
L Hunter	Newcastle	2021	92.6	0	0.035	0.030	0.029	0.027	0.025	0.021	0.014	0.005
L Hunter	Newcastle	2022	92.1	0	0.038	0.029	0.027	0.024	0.022	0.017	0.011	0.004
L Hunter	Newcastle	2023	87.1	0	0.034	0.032	0.030	0.027	0.024	0.020	0.014	0.005
L Hunter	Wallsend	2019	92.6	0	0.042	0.035	0.032	0.029	0.026	0.020	0.015	0.007
L Hunter	Wallsend	2020	94.6	0	0.029	0.027	0.027	0.024	0.023	0.018	0.013	0.006
L Hunter	Wallsend	2021	94.8	0	0.033	0.026	0.025	0.024	0.021	0.017	0.012	0.005
L Hunter	Wallsend	2022	93.7	0	0.028	0.025	0.023	0.021	0.020	0.016	0.011	0.005

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
L Hunter	Wallsend	2023	93.2	0	0.031	0.029	0.027	0.025	0.022	0.018	0.013	0.006
U Hunter	Merriwa	2019	–	–	–	–	–	–	–	–	–	–
U Hunter	*Merriwa#*	*2020*	*39.9*	*0*	*0.034*	*0.034*	*0.027*	*0.025*	*0.019*	*0.016*	*0.010*	*0.003*
U Hunter	Merriwa	2021	88.8	0	0.032	0.029	0.026	0.023	0.019	0.014	0.008	0.003
U Hunter	Merriwa	2022	90.2	0	0.028	0.025	0.023	0.019	0.017	0.014	0.009	0.003
U Hunter	Merriwa	2023	93.3	0	0.027	0.027	0.024	0.022	0.019	0.015	0.010	0.003
U Hunter	Muswellbrook	2019	93.5	0	0.058	0.043	0.039	0.036	0.033	0.028	0.023	0.010
U Hunter	Muswellbrook	2020	89.3	0	0.039	0.035	0.032	0.029	0.027	0.023	0.019	0.008
U Hunter	Muswellbrook	2021	92.3	0	0.032	0.031	0.029	0.027	0.025	0.022	0.018	0.008
U Hunter	Muswellbrook	2022	81.1	0	0.030	0.027	0.026	0.025	0.023	0.020	0.017	0.007
U Hunter	Muswellbrook	2023	93.6	0	0.041	0.037	0.034	0.033	0.030	0.024	0.019	0.008
U Hunter	Singleton	2019	93.8	0	0.037	0.034	0.032	0.028	0.026	0.022	0.018	0.007
U Hunter	Singleton	2020	92.1	0	0.033	0.031	0.028	0.026	0.023	0.019	0.015	0.006
U Hunter	Singleton	2021	91.3	0	0.032	0.030	0.028	0.024	0.022	0.019	0.015	0.005
U Hunter	Singleton	2022	90.6	0	0.027	0.024	0.023	0.021	0.020	0.017	0.013	0.004
U Hunter	Singleton	2023	91.6	0	0.034	0.031	0.028	0.026	0.023	0.020	0.016	0.006
NW Slopes	Gunnedah	2019	94.6	0	0.036	0.029	0.027	0.025	0.023	0.018	0.013	0.005
NW Slopes	Gunnedah	2020	94.4	0	0.028	0.025	0.024	0.022	0.019	0.015	0.010	0.003
NW Slopes	Gunnedah	2021	95.2	0	0.051	0.023	0.022	0.020	0.018	0.014	0.009	0.003
NW Slopes	Gunnedah	2022	92.0	0	0.026	0.024	0.021	0.018	0.015	0.011	0.007	0.002
NW Slopes	Gunnedah	2023	93.2	0	0.026	0.025	0.024	0.021	0.019	0.015	0.010	0.003
NW Slopes	Tamworth	2019	–	–	–	–	–	–	–	–	–	–
NW Slopes	Tamworth	2020	–	–	–	–	–	–	–	–	–	–
NW Slopes	Tamworth	2021	–	–	–	–	–	–	–	–	–	–

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
NW Slopes	Tamworth	2022	–	–	–	–	–	–	–	–	–	–
NW Slopes	Tamworth	2023	94.6	0	0.034	0.033	0.032	0.029	0.027	0.020	0.012	0.004
Mid Nth Coast	Coffs Harbour*	2019	–	–	–	–	–	–	–	–	–	–
Mid Nth Coast	Coffs Harbour	2020	94.8	0	0.042	0.027	0.025	0.021	0.018	0.012	0.008	0.003
Mid Nth Coast	Coffs Harbour	2021	92.9	0	0.049	0.024	0.021	0.019	0.017	0.013	0.009	0.003
Mid Nth Coast	Coffs Harbour	2022	90.9	0	0.025	0.024	0.023	0.021	0.018	0.013	0.009	0.003
Mid Nth Coast	Coffs Harbour	2023	90.8	0	0.029	0.024	0.023	0.021	0.018	0.013	0.009	0.003
Mid Nth Coast	*Port Macquarie#*	*2019*	*41.7*	*0*	*0.038*	*0.023*	*0.018*	*0.012*	*0.008*	*0.005*	*0.003*	*0.004*
Mid Nth Coast	Port Macquarie	2020	94.3	0	0.034	0.033	0.031	0.025	0.021	0.011	0.007	0.003
Mid Nth Coast	Port Macquarie	2021	94.6	0	0.030	0.026	0.024	0.020	0.017	0.012	0.008	0.003
Mid Nth Coast	Port Macquarie	2022	97.1	0	0.031	0.018	0.017	0.014	0.013	0.010	0.007	0.002
Mid Nth Coast	Port Macquarie	2023	97.0	0	0.024	0.017	0.016	0.014	0.013	0.011	0.007	0.002
SW Slopes	Albury	2019	–	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2020	–	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2021	–	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2022	–	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2023	92.9	0	0.032	0.028	0.026	0.023	0.021	0.018	0.014	0.005
SW Slopes	Wagga Wagga Nth	2019	–	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2020	–	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2021	–	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2022	–	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2023	82.4	0	0.039	0.029	0.024	0.022	0.020	0.016	0.011	0.003
S Tablelands	*Goulburn#†*	*2019*	*13.8*	***2***	***0.161***	***0.161***	***0.142***	*0.027*	*0.021*	*0.015*	*0.008*	*0.004*
S Tablelands	Goulburn†	2020	93.1	**2**	**0.099**	0.030	0.028	0.025	0.021	0.014	0.009	0.003

Region	Station	Year	Data avail (%)	Exceed days	Max 1-hour ave (ppm) (0.080 ppm)	Percentiles (ppm)						1-year mean (ppm) (0.015 ppm)
						99th	98th	95th	90th	75th	50th	
S Tablelands	Goulburn	2021	93.4	0	0.029	0.026	0.024	0.021	0.019	0.013	0.008	0.003
S Tablelands	Goulburn	2022	87.6	0	0.027	0.025	0.023	0.019	0.015	0.009	0.005	0.002
S Tablelands	Goulburn	2023	94.6	0	0.034	0.030	0.029	0.026	0.022	0.015	0.008	0.003

Sulfur dioxide

Table 27 **Statistical summary trend (5-year) by station for the sulfur dioxide maximum 1-hour average AAQ NEPM standard (0.100 ppm) and 1-day average AAQ NEPM standard (0.020 ppm) from 2019 to 2023**

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
East Sydney	Alexandria	1-hour	2019	–	–	–	–	–	–	–	–	–
East Sydney	Alexandria	1-hour	2020	–	–	–	–	–	–	–	–	–
East Sydney	*Alexandria#*	*1-hour*	*2021*	*22.4*	*0*	*0.011*	*0.011*	*0.008*	*0.006*	*0.004*	*0.002*	*0.001*
East Sydney	Alexandria	1-hour	2022	92.1	0	0.017	0.009	0.007	0.005	0.003	0.001	0.001
East Sydney	Alexandria	1-hour	2023	90.7	0	0.021	0.012	0.010	0.007	0.005	0.002	0.001
East Sydney	Alexandria	1-day	2019	–	–	–	–	–	–	–	–	–
East Sydney	Alexandria	1-day	2020	–	–	–	–	–	–	–	–	–
East Sydney	*Alexandria#*	*1-day*	*2021*	*23.3*	*0*	*0.002*	*0.002*	*0.002*	*0.001*	*0.001*	*0.000*	*0.000*
East Sydney	Alexandria	1-day	2022	95.9	0	0.003	0.002	0.002	0.001	0.001	0.000	0.000
East Sydney	Alexandria	1-day	2023	93.4	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000
East Sydney	*Bradfield Hwy#*	*1-hour*	*2019*	*73.0*	*0*	*0.023*	*0.014*	*0.013*	*0.009*	*0.007*	*0.004*	*0.003*

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
East Sydney	Bradfield Hwy	1-hour	2020	86.6	0	0.012	0.009	0.007	0.004	0.003	0.002	0.002
East Sydney	Bradfield Hwy	1-hour	2021	93.0	0	0.015	0.012	0.011	0.007	0.005	0.003	0.002
East Sydney	Bradfield Hwy	1-hour	2022	83.3	0	0.019	0.012	0.008	0.006	0.004	0.003	0.002
East Sydney	Bradfield Hwy	1-hour	2023	88.7	0	0.018	0.013	0.011	0.009	0.006	0.003	0.002
East Sydney	Bradfield Hwy	1-day	2019	76.2	0	0.006	0.005	0.004	0.003	0.002	0.002	0.001
East Sydney	Bradfield Hwy	1-day	2020	90.2	0	0.003	0.003	0.002	0.002	0.001	0.001	0.001
East Sydney	Bradfield Hwy	1-day	2021	96.2	0	0.003	0.003	0.003	0.002	0.002	0.001	0.001
East Sydney	Bradfield Hwy	1-day	2022	86.6	0	0.004	0.003	0.002	0.002	0.002	0.001	0.001
East Sydney	Bradfield Hwy	1-day	2023	92.6	0	0.007	0.004	0.003	0.002	0.002	0.001	0.001
East Sydney	*Cook and Phillip*[#]	*1-hour*	*2019*	*30.0*	*0*	*0.018*	*0.016*	*0.013*	*0.011*	*0.007*	*0.004*	*0.002*
East Sydney	Cook and Phillip	1-hour	2020	86.2	0	0.019	0.013	0.010	0.006	0.004	0.002	0.001
East Sydney	Cook and Phillip	1-hour	2021	91.5	0	0.016	0.013	0.012	0.007	0.005	0.002	0.001
East Sydney	Cook and Phillip	1-hour	2022	92.4	0	0.013	0.010	0.009	0.005	0.004	0.001	0.001
East Sydney	Cook and Phillip	1-hour	2023	92.8	0	0.016	0.014	0.011	0.008	0.006	0.002	0.001
East Sydney	*Cook and Phillip*[#]	*1-day*	*2019*	*31.0*	*0*	*0.003*	*0.003*	*0.002*	*0.002*	*0.001*	*0.001*	*0.001*
East Sydney	Cook and Phillip	1-day	2020	89.1	0	0.003	0.003	0.002	0.001	0.001	0.001	0.000
East Sydney	Cook and Phillip	1-day	2021	97.3	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000
East Sydney	Cook and Phillip	1-day	2022	95.9	0	0.004	0.002	0.002	0.001	0.001	0.000	0.000
East Sydney	Cook and Phillip	1-day	2023	95.3	0	0.004	0.003	0.003	0.002	0.001	0.001	0.000
East Sydney	Macquarie Park	1-hour	2019	92.1	0	0.029	0.019	0.015	0.009	0.007	0.003	0.001
East Sydney	Macquarie Park	1-hour	2020	95.1	0	0.035	0.020	0.016	0.010	0.006	0.002	0.001
East Sydney	Macquarie Park	1-hour	2021	93.5	0	0.034	0.016	0.012	0.008	0.005	0.002	0.001
East Sydney	Macquarie Park	1-hour	2022	92.4	0	0.031	0.013	0.012	0.007	0.004	0.001	0.001

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
East Sydney	Macquarie Park	1-hour	2023	93.2	0	0.023	0.016	0.013	0.010	0.007	0.002	0.001
East Sydney	Macquarie Park	1-day	2019	95.3	0	0.004	0.003	0.003	0.002	0.001	0.001	0.000
East Sydney	Macquarie Park	1-day	2020	99.2	0	0.004	0.003	0.002	0.002	0.001	0.000	0.000
East Sydney	Macquarie Park	1-day	2021	97.3	0	0.006	0.003	0.002	0.002	0.001	0.000	0.000
East Sydney	Macquarie Park	1-day	2022	96.2	0	0.003	0.003	0.002	0.001	0.001	0.000	0.000
East Sydney	Macquarie Park	1-day	2023	96.4	0	0.004	0.004	0.003	0.002	0.001	0.000	0.000
East Sydney	Randwick	1-hour	2019	93.0	0	0.029	0.022	0.015	0.013	0.008	0.005	0.003
East Sydney	Randwick	1-hour	2020	94.9	0	0.014	0.011	0.010	0.007	0.005	0.003	0.002
East Sydney	Randwick	1-hour	2021	92.6	0	0.022	0.015	0.013	0.009	0.007	0.004	0.002
East Sydney	Randwick	1-hour	2022	92.8	0	0.028	0.016	0.012	0.008	0.006	0.003	0.002
East Sydney	Randwick	1-hour	2023	90.6	0	0.024	0.016	0.012	0.010	0.007	0.003	0.002
East Sydney	Randwick	1-day	2019	96.2	0	0.005	0.004	0.003	0.002	0.002	0.001	0.001
East Sydney	Randwick	1-day	2020	98.9	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001
East Sydney	Randwick	1-day	2021	95.9	0	0.005	0.003	0.003	0.002	0.002	0.001	0.001
East Sydney	Randwick	1-day	2022	96.2	0	0.004	0.004	0.003	0.002	0.002	0.001	0.001
East Sydney	Randwick	1-day	2023	93.4	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001
East Sydney	Rozelle	1-hour	2019	94.0	0	0.032	0.016	0.015	0.011	0.008	0.004	0.002
East Sydney	Rozelle	1-hour	2020	94.8	0	0.016	0.009	0.009	0.007	0.005	0.002	0.001
East Sydney	Rozelle	1-hour	2021	90.9	0	0.020	0.012	0.010	0.007	0.005	0.002	0.001
East Sydney	Rozelle	1-hour	2022	93.0	0	0.029	0.012	0.010	0.007	0.005	0.001	0.001
East Sydney	Rozelle	1-hour	2023	87.1	0	0.024	0.014	0.012	0.010	0.007	0.002	0.001
East Sydney	Rozelle	1-day	2019	97.5	0	0.005	0.004	0.004	0.003	0.002	0.001	0.001
East Sydney	Rozelle	1-day	2020	98.6	0	0.003	0.002	0.002	0.002	0.001	0.001	0.000

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
East Sydney	Rozelle	1-day	2021	94.2	0	0.004	0.003	0.003	0.002	0.001	0.001	0.000
East Sydney	Rozelle	1-day	2022	95.3	0	0.004	0.003	0.003	0.002	0.001	0.000	0.000
East Sydney	Rozelle	1-day	2023	90.4	0	0.003	0.003	0.003	0.002	0.002	0.001	0.000
CW Sydney	Lidcombe	1-hour	2019	–	–	–	–	–	–	–	–	–
CW Sydney	*Lidcombe#*	*1-hour*	*2020*	*69.1*	*0*	*0.017*	*0.013*	*0.011*	*0.005*	*0.004*	*0.002*	*0.001*
CW Sydney	Lidcombe	1-hour	2021	94.7	0	0.016	0.011	0.010	0.006	0.004	0.002	0.001
CW Sydney	Lidcombe	1-hour	2022	93.0	0	0.025	0.013	0.009	0.006	0.004	0.002	0.001
CW Sydney	Lidcombe	1-hour	2023	93.7	0	0.027	0.016	0.013	0.009	0.006	0.003	0.001
CW Sydney	Lidcombe	1-day	2019	–	–	–	–	–	–	–	–	–
CW Sydney	*Lidcombe#*	*1-day*	*2020*	*71.3*	*0*	*0.003*	*0.003*	*0.002*	*0.002*	*0.001*	*0.001*	*0.000*
CW Sydney	Lidcombe	1-day	2021	98.6	0	0.004	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Lidcombe	1-day	2022	96.7	0	0.003	0.002	0.002	0.001	0.001	0.000	0.000
CW Sydney	Lidcombe	1-day	2023	97.8	0	0.005	0.004	0.003	0.002	0.002	0.001	0.000
CW Sydney	Parramatta Nth	1-hour	2019	94.9	0	0.030	0.018	0.015	0.010	0.006	0.004	0.002
CW Sydney	Parramatta Nth	1-hour	2020	94.8	0	0.020	0.013	0.009	0.007	0.005	0.003	0.001
CW Sydney	Parramatta Nth	1-hour	2021	94.9	0	0.015	0.013	0.009	0.006	0.004	0.002	0.001
CW Sydney	Parramatta Nth	1-hour	2022	94.6	0	0.015	0.011	0.008	0.005	0.004	0.002	0.001
CW Sydney	Parramatta Nth	1-hour	2023	93.7	0	0.036	0.015	0.011	0.008	0.006	0.003	0.001
CW Sydney	Parramatta Nth	1-day	2019	98.6	0	0.006	0.004	0.003	0.002	0.002	0.001	0.001
CW Sydney	Parramatta Nth	1-day	2020	98.4	0	0.005	0.003	0.002	0.002	0.001	0.001	0.001
CW Sydney	Parramatta Nth	1-day	2021	98.6	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Parramatta Nth	1-day	2022	98.4	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
CW Sydney	Parramatta Nth	1-day	2023	97.0	0	0.004	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Prospect	1-hour	2019	94.7	0	0.021	0.017	0.014	0.010	0.006	0.003	0.002
CW Sydney	Prospect	1-hour	2020	94.1	0	0.018	0.014	0.011	0.007	0.005	0.002	0.001
CW Sydney	Prospect	1-hour	2021	93.5	0	0.015	0.012	0.010	0.006	0.004	0.002	0.001
CW Sydney	Prospect	1-hour	2022	94.5	0	0.017	0.012	0.011	0.007	0.005	0.002	0.001
CW Sydney	Prospect	1-hour	2023	92.7	0	0.024	0.013	0.011	0.008	0.006	0.003	0.002
CW Sydney	Prospect	1-day	2019	98.4	0	0.004	0.003	0.003	0.002	0.002	0.001	0.001
CW Sydney	Prospect	1-day	2020	98.1	0	0.004	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Prospect	1-day	2021	97.0	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Prospect	1-day	2022	97.5	0	0.003	0.002	0.002	0.002	0.001	0.001	0.000
CW Sydney	Prospect	1-day	2023	95.9	0	0.004	0.003	0.003	0.002	0.001	0.001	0.000
CW Sydney	Rouse Hill	1-hour	2019	55.2	0	0.033	0.015	0.012	0.009	0.005	0.003	0.001
CW Sydney	Rouse Hill	1-hour	2020	95.0	0	0.019	0.016	0.011	0.007	0.005	0.002	0.001
CW Sydney	Rouse Hill	1-hour	2021	94.9	0	0.018	0.012	0.009	0.007	0.005	0.002	0.001
CW Sydney	Rouse Hill	1-hour	2022	94.6	0	0.021	0.013	0.010	0.006	0.004	0.002	0.001
CW Sydney	Rouse Hill	1-hour	2023	93.0	0	0.026	0.016	0.013	0.009	0.007	0.003	0.001
CW Sydney	*Rouse Hill[#]*	*1-day*	*2019*	*57.3*	*0*	*0.005*	*0.004*	*0.003*	*0.003*	*0.002*	*0.001*	*0.000*
CW Sydney	Rouse Hill	1-day	2020	98.6	0	0.005	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Rouse Hill	1-day	2021	98.9	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Rouse Hill	1-day	2022	98.1	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000
CW Sydney	Rouse Hill	1-day	2023	97.0	0	0.006	0.004	0.004	0.002	0.002	0.001	0.001
SW Sydney	Bargo	1-hour	2019	93.7	0	0.020	0.008	0.007	0.005	0.003	0.002	0.001

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
SW Sydney	Bargo	1-hour	2020	94.6	0	0.012	0.008	0.006	0.003	0.002	0.001	0.001
SW Sydney	Bargo	1-hour	2021	91.4	0	0.009	0.006	0.005	0.003	0.002	0.001	0.001
SW Sydney	Bargo	1-hour	2022	94.1	0	0.012	0.007	0.006	0.004	0.003	0.002	0.001
SW Sydney	Bargo	1-hour	2023	92.5	0	0.022	0.012	0.008	0.004	0.003	0.002	0.001
SW Sydney	Bargo	1-day	2019	97.0	0	0.006	0.003	0.002	0.002	0.001	0.001	0.000
SW Sydney	Bargo	1-day	2020	98.1	0	0.003	0.002	0.001	0.001	0.001	0.000	0.000
SW Sydney	Bargo	1-day	2021	94.0	0	0.002	0.002	0.002	0.001	0.001	0.000	0.000
SW Sydney	Bargo	1-day	2022	97.5	0	0.003	0.002	0.002	0.001	0.001	0.000	0.000
SW Sydney	Bargo	1-day	2023	96.2	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000
SW Sydney	Bringelly	1-hour	2019	93.4	0	0.028	0.010	0.009	0.007	0.005	0.002	0.001
SW Sydney	Bringelly	1-hour	2020	87.2	0	0.022	0.006	0.005	0.004	0.003	0.002	0.001
SW Sydney	Bringelly	1-hour	2021	93.4	0	0.009	0.006	0.005	0.004	0.002	0.001	0.001
SW Sydney	Bringelly	1-hour	2022	93.9	0	0.010	0.007	0.006	0.004	0.003	0.001	0.001
SW Sydney	Bringelly	1-hour	2023	92.3	0	0.009	0.007	0.006	0.004	0.003	0.002	0.001
SW Sydney	Bringelly	1-day	2019	97.8	0	0.004	0.002	0.002	0.002	0.001	0.001	0.000
SW Sydney	Bringelly	1-day	2020	91.0	0	0.003	0.002	0.001	0.001	0.001	0.001	0.000
SW Sydney	Bringelly	1-day	2021	97.3	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000
SW Sydney	Bringelly	1-day	2022	97.5	0	0.002	0.002	0.001	0.001	0.001	0.001	0.000
SW Sydney	Bringelly	1-day	2023	95.9	0	0.003	0.001	0.001	0.001	0.001	0.001	0.000
SW Sydney	Campbelltown W	1-hour	2019	87.1	0	0.020	0.012	0.010	0.007	0.005	0.002	0.001
SW Sydney	Campbelltown W	1-hour	2020	94.7	0	0.012	0.007	0.006	0.004	0.003	0.002	0.001
SW Sydney	Campbelltown W	1-hour	2021	94.6	0	0.014	0.006	0.005	0.004	0.003	0.002	0.001
SW Sydney	Campbelltown W	1-hour	2022	90.7	0	0.010	0.008	0.006	0.005	0.004	0.002	0.001

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
SW Sydney	Campbelltown W	1-hour	2023	93.1	0	0.017	0.010	0.008	0.006	0.004	0.002	0.001
SW Sydney	Campbelltown W	1-day	2019	90.4	0	0.004	0.003	0.003	0.002	0.002	0.001	0.000
SW Sydney	Campbelltown W	1-day	2020	98.9	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000
SW Sydney	Campbelltown W	1-day	2021	98.4	0	0.002	0.002	0.001	0.001	0.001	0.001	0.000
SW Sydney	Campbelltown W	1-day	2022	93.4	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000
SW Sydney	Campbelltown W	1-day	2023	96.7	0	0.003	0.002	0.002	0.002	0.001	0.001	0.000
SW Sydney	Liverpool	1-hour	2019	94.6	0	0.016	0.014	0.011	0.008	0.005	0.003	0.002
SW Sydney	Liverpool	1-hour	2020	92.4	0	0.015	0.010	0.008	0.005	0.004	0.002	0.001
SW Sydney	Liverpool	1-hour	2021	94.3	0	0.017	0.010	0.008	0.005	0.004	0.002	0.001
SW Sydney	Liverpool	1-hour	2022	94.3	0	0.013	0.009	0.008	0.006	0.004	0.002	0.001
SW Sydney	Liverpool	1-hour	2023	93.5	0	0.024	0.011	0.009	0.007	0.005	0.002	0.001
SW Sydney	Liverpool	1-day	2019	98.1	0	0.004	0.003	0.002	0.002	0.002	0.001	0.001
SW Sydney	Liverpool	1-day	2020	95.6	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000
SW Sydney	Liverpool	1-day	2021	98.1	0	0.003	0.002	0.002	0.002	0.001	0.001	0.000
SW Sydney	Liverpool	1-day	2022	98.1	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000
SW Sydney	Liverpool	1-day	2023	97.5	0	0.004	0.003	0.002	0.002	0.001	0.001	0.000
NW Sydney	Penrith	1-hour	2019	–	–	–	–	–	–	–	–	–
NW Sydney	*Penrith*[#]	*1-hour*	*2020*	*47.1*	*0*	*0.020*	*0.010*	*0.010*	*0.007*	*0.006*	*0.004*	*0.002*
NW Sydney	Penrith	1-hour	2021	94.9	0	0.010	0.009	0.007	0.006	0.005	0.003	0.002
NW Sydney	Penrith	1-hour	2022	94.4	0	0.011	0.010	0.009	0.007	0.006	0.004	0.002
NW Sydney	Penrith	1-hour	2023	91.0	0	0.011	0.009	0.007	0.005	0.004	0.003	0.002
NW Sydney	Penrith	1-day	2019	–	–	–	–	–	–	–	–	–

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
NW Sydney	*Penrith*[#]	*1-day*	*2020*	*49.2*	*0*	*0.003*	*0.003*	*0.002*	*0.002*	*0.001*	*0.001*	*0.000*
NW Sydney	Penrith	1-day	2021	98.9	0	0.003	0.002	0.002	0.002	0.001	0.001	0.001
NW Sydney	Penrith	1-day	2022	98.6	0	0.005	0.003	0.003	0.002	0.002	0.001	0.001
NW Sydney	Penrith	1-day	2023	94.2	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000
NW Sydney	Richmond	1-hour	2019	93.4	0	0.023	0.013	0.009	0.006	0.004	0.002	0.001
NW Sydney	Richmond	1-hour	2020	92.5	0	0.012	0.010	0.006	0.004	0.003	0.001	0.001
NW Sydney	Richmond	1-hour	2021	94.1	0	0.012	0.007	0.006	0.004	0.003	0.001	0.001
NW Sydney	Richmond	1-hour	2022	93.1	0	0.012	0.008	0.007	0.005	0.003	0.001	0.001
NW Sydney	Richmond	1-hour	2023	90.2	0	0.015	0.011	0.007	0.005	0.004	0.002	0.001
NW Sydney	Richmond	1-day	2019	96.7	0	0.004	0.003	0.002	0.002	0.001	0.001	0.000
NW Sydney	Richmond	1-day	2020	95.6	0	0.003	0.002	0.002	0.001	0.001	0.000	0.000
NW Sydney	Richmond	1-day	2021	97.3	0	0.002	0.002	0.002	0.001	0.001	0.001	0.000
NW Sydney	Richmond	1-day	2022	96.4	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000
NW Sydney	Richmond	1-day	2023	93.2	0	0.005	0.003	0.002	0.001	0.001	0.000	0.000
Illawarra	Albion Park Sth	1-hour	2019	94.0	0	0.025	0.020	0.017	0.015	0.012	0.006	0.001
Illawarra	Albion Park Sth	1-hour	2020	93.4	0	0.022	0.016	0.015	0.012	0.009	0.003	0.000
Illawarra	Albion Park Sth	1-hour	2021	93.9	0	0.020	0.016	0.015	0.010	0.007	0.003	0.000
Illawarra	Albion Park Sth	1-hour	2022	94.5	0	0.016	0.013	0.010	0.008	0.006	0.002	0.001
Illawarra	Albion Park Sth	1-hour	2023	94.0	0	0.020	0.019	0.016	0.012	0.008	0.004	0.001
Illawarra	Albion Park Sth	1-day	2019	97.5	0	0.008	0.007	0.006	0.004	0.003	0.001	0.000
Illawarra	Albion Park Sth	1-day	2020	97.0	0	0.005	0.005	0.004	0.003	0.002	0.000	0.000
Illawarra	Albion Park Sth	1-day	2021	97.5	0	0.006	0.005	0.004	0.003	0.001	0.000	0.000

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
Illawarra	Albion Park Sth	1-day	2022	98.4	0	0.005	0.004	0.003	0.002	0.001	0.001	0.000
Illawarra	Albion Park Sth	1-day	2023	97.8	0	0.006	0.005	0.004	0.003	0.002	0.001	0.000
Illawarra	Wollongong	1-hour	2019	92.1	0	0.034	0.025	0.018	0.013	0.011	0.007	0.004
Illawarra	Wollongong	1-hour	2020	92.4	0	0.020	0.015	0.014	0.011	0.008	0.006	0.002
Illawarra	Wollongong	1-hour	2021	92.8	0	0.021	0.015	0.015	0.012	0.009	0.005	0.002
Illawarra	Wollongong	1-hour	2022	94.3	0	0.017	0.013	0.012	0.009	0.008	0.005	0.002
Illawarra	Wollongong	1-hour	2023	93.9	0	0.025	0.015	0.014	0.010	0.008	0.005	0.002
Illawarra	Wollongong	1-day	2019	95.3	0	0.006	0.005	0.004	0.003	0.002	0.001	0.001
Illawarra	Wollongong	1-day	2020	95.4	0	0.004	0.004	0.003	0.002	0.002	0.001	0.000
Illawarra	Wollongong	1-day	2021	95.9	0	0.006	0.005	0.004	0.003	0.002	0.001	0.000
Illawarra	Wollongong	1-day	2022	97.8	0	0.004	0.003	0.002	0.002	0.001	0.001	0.000
Illawarra	Wollongong	1-day	2023	97.5	0	0.006	0.003	0.003	0.002	0.001	0.001	0.000
C Coast	Wyong	1-hour	2019	94.4	0	0.061	0.043	0.034	0.023	0.015	0.005	0.001
C Coast	Wyong	1-hour	2020	93.7	0	0.069	0.038	0.028	0.017	0.009	0.004	0.001
C Coast	Wyong	1-hour	2021	87.6	0	0.030	0.025	0.022	0.016	0.010	0.004	0.001
C Coast	Wyong	1-hour	2022	87.3	0	0.045	0.026	0.024	0.018	0.010	0.003	0.001
C Coast	Wyong	1-hour	2023	92.2	0	0.044	0.038	0.033	0.022	0.015	0.005	0.001
C Coast	Wyong	1-day	2019	97.8	0	0.006	0.005	0.005	0.003	0.002	0.001	0.000
C Coast	Wyong	1-day	2020	97.8	0	0.008	0.005	0.004	0.003	0.002	0.001	0.000
C Coast	Wyong	1-day	2021	91.2	0	0.005	0.004	0.003	0.002	0.002	0.001	0.000
C Coast	Wyong	1-day	2022	89.9	0	0.007	0.005	0.004	0.002	0.002	0.001	0.000
C Coast	Wyong	1-day	2023	95.9	0	0.005	0.004	0.004	0.003	0.002	0.001	0.000
Lake Macq.	Morisset	1-hour	2019	–	–	–	–	–	–	–	–	–

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
Lake Macq.	Morisset*	1-hour	2020	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset	1-hour	2021	93.4	0	0.071	0.067	0.045	0.026	0.019	0.011	0.005
Lake Macq.	Morisset†	1-hour	2022	92.1	**1**	**0.183**	0.061	0.040	0.023	0.018	0.008	0.003
Lake Macq.	Morisset	1-hour	2023	91.4	0	0.086	0.060	0.045	0.027	0.021	0.011	0.005
Lake Macq.	Morisset	1-day	2019	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset*	1-day	2020	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset	1-day	2021	96.7	0	0.016	0.009	0.007	0.004	0.003	0.002	0.001
Lake Macq.	Morisset	1-day	2022	95.6	0	0.018	0.008	0.007	0.004	0.002	0.001	0.001
Lake Macq.	Morisset	1-day	2023	94.5	0	0.011	0.007	0.006	0.005	0.003	0.002	0.001
L Hunter	Beresfield	1-hour	2019	94.5	0	0.068	0.027	0.025	0.019	0.017	0.012	0.007
L Hunter	Beresfield	1-hour	2020	94.1	0	0.038	0.026	0.023	0.017	0.014	0.009	0.005
L Hunter	Beresfield	1-hour	2021	94.6	0	0.027	0.022	0.020	0.015	0.013	0.009	0.005
L Hunter	Beresfield	1-hour	2022	93.7	0	0.024	0.020	0.018	0.015	0.012	0.008	0.004
L Hunter	Beresfield	1-hour	2023	94.4	0	0.028	0.025	0.021	0.018	0.014	0.009	0.005
L Hunter	Beresfield	1-day	2019	98.9	0	0.009	0.007	0.006	0.004	0.003	0.002	0.001
L Hunter	Beresfield	1-day	2020	98.1	0	0.008	0.006	0.005	0.004	0.003	0.002	0.001
L Hunter	Beresfield	1-day	2021	98.9	0	0.005	0.005	0.004	0.003	0.003	0.002	0.001
L Hunter	Beresfield	1-day	2022	97.5	0	0.006	0.005	0.004	0.003	0.002	0.002	0.001
L Hunter	Beresfield	1-day	2023	97.8	0	0.006	0.006	0.004	0.003	0.003	0.002	0.001
L Hunter	Newcastle	1-hour	2019	94.7	0	0.046	0.024	0.023	0.016	0.013	0.009	0.005
L Hunter	Newcastle	1-hour	2020	93.4	0	0.040	0.027	0.022	0.015	0.011	0.006	0.003
L Hunter	Newcastle	1-hour	2021	92.6	0	0.037	0.026	0.021	0.018	0.013	0.006	0.003

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
L Hunter	Newcastle	1-hour	2022	93.2	0	0.049	0.026	0.022	0.013	0.010	0.006	0.002
L Hunter	Newcastle	1-hour	2023	90.9	0	0.044	0.030	0.025	0.020	0.013	0.007	0.003
L Hunter	Newcastle	1-day	2019	98.4	0	0.006	0.005	0.004	0.004	0.003	0.002	0.001
L Hunter	Newcastle	1-day	2020	97.0	0	0.007	0.005	0.004	0.003	0.002	0.001	0.001
L Hunter	Newcastle	1-day	2021	95.6	0	0.006	0.005	0.004	0.003	0.003	0.002	0.001
L Hunter	Newcastle	1-day	2022	97.0	0	0.005	0.004	0.004	0.003	0.002	0.001	0.001
L Hunter	Newcastle	1-day	2023	94.5	0	0.006	0.005	0.004	0.003	0.003	0.002	0.001
L Hunter	Wallsend	1-hour	2019	90.6	0	0.050	0.032	0.029	0.023	0.018	0.011	0.006
L Hunter	Wallsend	1-hour	2020	93.8	0	0.040	0.033	0.026	0.020	0.014	0.010	0.005
L Hunter	Wallsend	1-hour	2021	93.3	0	0.042	0.028	0.026	0.018	0.015	0.007	0.003
L Hunter	Wallsend	1-hour	2022	93.8	0	0.030	0.025	0.022	0.017	0.013	0.007	0.003
L Hunter	Wallsend	1-hour	2023	93.4	0	0.038	0.029	0.026	0.020	0.015	0.009	0.003
L Hunter	Wallsend	1-day	2019	93.4	0	0.009	0.006	0.006	0.004	0.003	0.002	0.001
L Hunter	Wallsend	1-day	2020	97.5	0	0.010	0.007	0.006	0.004	0.003	0.002	0.001
L Hunter	Wallsend	1-day	2021	95.9	0	0.007	0.005	0.005	0.003	0.002	0.001	0.001
L Hunter	Wallsend	1-day	2022	97.0	0	0.006	0.004	0.004	0.003	0.002	0.001	0.001
L Hunter	Wallsend	1-day	2023	96.7	0	0.006	0.005	0.004	0.003	0.002	0.001	0.001
U Hunter	Merriwa	1-hour	2019	–	–	–	–	–	–	–	–	–
U Hunter	*Merriwa[#]*	*1-hour*	*2020*	*32.9*	*0*	*0.032*	*0.029*	*0.023*	*0.019*	*0.016*	*0.010*	*0.004*
U Hunter	Merriwa	1-hour	2021	88.8	0	0.034	0.029	0.025	0.020	0.017	0.010	0.003
U Hunter	Merriwa	1-hour	2022	89.4	0	0.041	0.031	0.028	0.020	0.016	0.011	0.005
U Hunter	Merriwa	1-hour	2023	92.4	0	0.047	0.028	0.026	0.021	0.015	0.010	0.004

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
U Hunter	Merriwa	1-day	2019	–	–	–	–	–	–	–	–	–
U Hunter	*Merriwa*[#]	*1-day*	*2020*	*33.9*	*0*	*0.009*	*0.009*	*0.008*	*0.006*	*0.004*	*0.003*	*0.001*
U Hunter	Merriwa	1-day	2021	89.6	0	0.008	0.007	0.007	0.006	0.005	0.003	0.001
U Hunter	Merriwa	1-day	2022	91.2	0	0.009	0.008	0.006	0.005	0.005	0.003	0.001
U Hunter	Merriwa	1-day	2023	95.6	0	0.013	0.007	0.006	0.005	0.004	0.002	0.001
U Hunter	Muswellbrook[†]	1-hour	2019	93.3	**5**	**0.130**	**0.107**	0.092	0.072	0.045	0.027	0.008
U Hunter	Muswellbrook[†]	1-hour	2020	89.2	**2**	**0.135**	0.072	0.069	0.048	0.031	0.018	0.006
U Hunter	Muswellbrook[†]	1-hour	2021	92.3	**1**	**0.123**	0.081	0.066	0.047	0.034	0.018	0.004
U Hunter	Muswellbrook	1-hour	2022	81.2	0	0.100	0.074	0.062	0.047	0.032	0.015	0.005
U Hunter	Muswellbrook[†]	1-hour	2023	93.8	**2**	**0.124**	0.072	0.056	0.039	0.028	0.011	0.003
U Hunter	Muswellbrook[†]	1-day	2019	97.0	**1**	**0.024**	0.018	0.017	0.012	0.009	0.004	0.002
U Hunter	Muswellbrook	1-day	2020	92.1	0	0.015	0.013	0.010	0.008	0.006	0.004	0.001
U Hunter	Muswellbrook	1-day	2021	95.9	0	0.016	0.012	0.011	0.008	0.006	0.003	0.001
U Hunter	Muswellbrook	1-day	2022	84.7	0	0.016	0.014	0.011	0.008	0.006	0.003	0.001
U Hunter	Muswellbrook[†]	1-day	2023	97.8	**1**	**0.025**	0.013	0.009	0.007	0.005	0.002	0.001
U Hunter	Singleton	1-hour	2019	95.1	0	0.096	0.048	0.044	0.036	0.028	0.015	0.006
U Hunter	Singleton	1-hour	2020	94.6	0	0.055	0.045	0.039	0.030	0.024	0.012	0.005
U Hunter	Singleton	1-hour	2021	94.6	0	0.067	0.055	0.048	0.035	0.023	0.011	0.004
U Hunter	Singleton	1-hour	2022	94.5	0	0.050	0.039	0.036	0.022	0.016	0.007	0.003
U Hunter	Singleton	1-hour	2023	92.9	0	0.055	0.037	0.031	0.021	0.017	0.009	0.004
U Hunter	Singleton	1-day	2019	98.9	0	0.012	0.008	0.007	0.005	0.004	0.003	0.001
U Hunter	Singleton	1-day	2020	98.4	0	0.011	0.010	0.008	0.006	0.004	0.002	0.001

Region	Station	Averaging period	Year	Data avail (%)	Exceed days	Max conc (ppm) 1-hour (0.100 ppm), 1-day (0.020 ppm)	Percentiles (ppm)					
							99th	98th	95th	90th	75th	50th
U Hunter	Singleton	1-day	2021	98.6	0	0.011	0.009	0.008	0.005	0.004	0.002	0.001
U Hunter	Singleton	1-day	2022	98.4	0	0.010	0.008	0.005	0.004	0.003	0.001	0.001
U Hunter	Singleton	1-day	2023	96.2	0	0.011	0.007	0.005	0.004	0.003	0.002	0.001
Mid Nth Coast	*Port Macquarie#*	*1-hour*	*2019*	*41.8*	*0*	*0.081*	*0.013*	*0.010*	*0.005*	*0.002*	*0.001*	*0.000*
Mid Nth Coast	Port Macquarie	1-hour	2020	94.1	0	0.039	0.010	0.006	0.003	0.002	0.001	0.000
Mid Nth Coast	Port Macquarie	1-hour	2021	91.6	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000
Mid Nth Coast	Port Macquarie	1-hour	2022	92.4	0	0.006	0.003	0.002	0.002	0.001	0.001	0.000
Mid Nth Coast	Port Macquarie	1-hour	2023	93.2	0	0.026	0.006	0.006	0.003	0.001	0.001	0.000
Mid Nth Coast	*Port Macquarie#*	*1-day*	*2019*	*42.5*	*0*	*0.015*	*0.015*	*0.005*	*0.004*	*0.003*	*0.001*	*0.001*
Mid Nth Coast	Port Macquarie	1-day	2020	93.4	0	0.004	0.002	0.002	0.001	0.000	0.000	0.000
Mid Nth Coast	Port Macquarie	1-day	2021	92.3	0	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Mid Nth Coast	Port Macquarie	1-day	2022	92.6	0	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Mid Nth Coast	Port Macquarie	1-day	2023	93.4	0	0.004	0.002	0.001	0.001	0.001	0.000	0.000

Ozone

This section presents a 5-year statistical trend summary by station for the AAQ NEPM rolling 8-hour average ozone standard (0.065 ppm).

Exceptional event rule for ozone

Exceedances of the AAQ NEPM standard are classified into one of 2 event categories:

- non-exceptional events (exceedances caused by photochemical smog)
- exceptional events (exceedances caused by bushfires and jurisdiction-authorised hazard reduction burning).

Event days that are deemed exceptional are allowable under the AAQ NEPM goal, while non-exceptional days are not allowed.

The exceptional event rule is **not applied** to ozone exceedances prior to 2021. The update to AAQ NEPM in 2021 required jurisdictions to identify any exceptional events relating to ozone, in addition to PM10 and PM2.5 and therefore exclude these event days from compliance assessments against the NEPM standard.

Table 28 presents the 5-year statistical trend summary for the ozone 0.065 ppm 8-hour rolling average concentrations for ozone from 2019 to 2023. Consider the following notes:

- Where shown, the smaller number in brackets () next to the overall ozone exceedance total is the number of non-exceptional event days recorded at that station during a particular year. Both numbers are given in bold. For example, **7 (3)** indicates there were 7 total exceedance days at that station, while 3 of these were non-exceptional events. As non-exceptional events were observed, the station did not meet the ozone standard for that year, and these numbers are written in bold as a result. These entries are marked with a dagger (†).
- Exceedance days that are not written in bold and have a 0 in brackets (0) next to the total indicate all exceedances were considered exceptional events, meaning the station met the ozone standard for that year.
- Stations whose entries are italicised indicate less than 75% of data was available for that year, and are marked with a hash (#).
- Exceedances will be in bold if non-exceptional events were observed at that station, or if the maximum average exceeds the 0.065 pphm standard. These entries are marked with a dagger (†).
- While stations with less than 15% of data availability are usually excluded, stations that recorded both less than 15% of data and at least one exceedance are reported below. These entries are marked with an asterisk (*).

Table 28 **Statistical summary trend (5-year) by station for ozone maximum 8-hour rolling average AAQ NEPM standard (0.065 ppm) from 2019 to 2023**

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
East Sydney	Alexandria	2019	–	–	–	–	–	–	–	–	–
East Sydney	Alexandria	2020	–	–	–	–	–	–	–	–	–
East Sydney	*Alexandria*[#]	*2021*	*22.4*	*0*	*0.048*	*0.046*	*0.038*	*0.034*	*0.031*	*0.027*	*0.024*
East Sydney	Alexandria	2022	80.7	0	0.046	0.043	0.036	0.030	0.026	0.022	0.018
East Sydney	Alexandria	2023	80.3	0	0.048	0.039	0.033	0.028	0.024	0.020	0.016
East Sydney	Bradfield Hwy	2019	88.8	0	0.035	0.029	0.028	0.024	0.022	0.017	0.012
East Sydney	Bradfield Hwy	2020	88.4	0	0.033	0.029	0.027	0.024	0.022	0.018	0.014
East Sydney	Bradfield Hwy	2021	92.0	0	0.034	0.028	0.025	0.023	0.022	0.017	0.013
East Sydney	Bradfield Hwy	2022	83.9	0	0.037	0.027	0.023	0.021	0.019	0.016	0.012
East Sydney	Bradfield Hwy	2023	92.5	0	0.029	0.026	0.023	0.021	0.019	0.015	0.011
East Sydney	*Cook and Phillip*[#]	*2019*	*28.4*	*0*	*0.057*	*0.056*	*0.055*	*0.047*	*0.033*	*0.027*	*0.023*
East Sydney	Cook and Phillip	2020	87.0	0	0.046	0.037	0.035	0.031	0.027	0.023	0.019
East Sydney	Cook and Phillip	2021	82.5	0	0.046	0.035	0.033	0.029	0.027	0.022	0.018
East Sydney	Cook and Phillip	2022	91.3	0	0.045	0.039	0.033	0.028	0.025	0.022	0.017
East Sydney	Cook and Phillip	2023	89.5	0	0.040	0.037	0.035	0.030	0.026	0.023	0.017
East Sydney	Earlwood[†]	2019	93.9	**5**	**0.089**	**0.072**	0.061	0.047	0.040	0.030	0.025
East Sydney	Earlwood[†]	2020	94.1	**2**	**0.081**	0.058	0.048	0.043	0.037	0.031	0.025
East Sydney	Earlwood	2021	93.5	0	0.059	0.052	0.044	0.038	0.035	0.030	0.025
East Sydney	Earlwood	2022	92.3	0	0.056	0.048	0.042	0.034	0.030	0.027	0.023
East Sydney	Earlwood[†]	2023	93.2	**1 (1)**	**0.072**	0.053	0.047	0.044	0.039	0.030	0.025
East Sydney	Macquarie Park[†]	2019	91.8	**8**	**0.090**	**0.072**	**0.067**	0.056	0.047	0.034	0.027

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
East Sydney	Macquarie Park†	2020	92.2	**1**	**0.075**	0.059	0.055	0.048	0.042	0.034	0.026
East Sydney	Macquarie Park†	2021	94.0	1 (0)	**0.066**	0.057	0.050	0.043	0.038	0.032	0.027
East Sydney	Macquarie Park	2022	95.0	0	0.059	0.049	0.045	0.036	0.033	0.028	0.024
East Sydney	Macquarie Park	2023	94.6	0	0.063	0.057	0.054	0.046	0.041	0.033	0.027
East Sydney	Randwick†	2019	94.4	**5**	**0.090**	**0.071**	0.059	0.045	0.039	0.032	0.028
East Sydney	Randwick†	2020	95.0	**2**	**0.078**	0.058	0.052	0.044	0.039	0.033	0.028
East Sydney	Randwick	2021	92.8	0	0.063	0.044	0.043	0.039	0.035	0.032	0.027
East Sydney	Randwick	2022	94.7	0	0.055	0.051	0.044	0.036	0.034	0.030	0.025
East Sydney	Randwick	2023	93.3	0	0.057	0.053	0.048	0.042	0.039	0.032	0.027
East Sydney	Rozelle†	2019	94.1	**4**	**0.102**	**0.066**	0.054	0.043	0.036	0.030	0.026
East Sydney	Rozelle†	2020	94.8	**2**	**0.071**	0.062	0.050	0.043	0.037	0.031	0.026
East Sydney	Rozelle	2021	94.6	0	0.054	0.045	0.043	0.038	0.034	0.030	0.025
East Sydney	Rozelle	2022	93.2	0	0.052	0.044	0.039	0.035	0.033	0.030	0.024
East Sydney	Rozelle	2023	89.5	0	0.059	0.047	0.043	0.040	0.036	0.030	0.025
CW Sydney	Lidcombe	2019	–	–	–	–	–	–	–	–	–
CW Sydney	*Lidcombe#*	*2020*	*71.3*	*0*	*0.055*	*0.051*	*0.048*	*0.042*	*0.037*	*0.031*	*0.026*
CW Sydney	Lidcombe†	2021	94.1	**1 (1)**	**0.071**	0.057	0.050	0.042	0.036	0.030	0.025
CW Sydney	Lidcombe	2022	94.0	0	0.057	0.050	0.048	0.036	0.031	0.027	0.023
CW Sydney	Lidcombe†	2023	91.6	**1 (1)**	**0.077**	0.058	0.052	0.045	0.041	0.032	0.026
CW Sydney	Parramatta Nth†	2019	94.9	**15**	**0.100**	**0.075**	**0.070**	0.063	0.053	0.036	0.029
CW Sydney	Parramatta Nth†	2020	95.1	**3**	**0.080**	0.065	0.061	0.051	0.044	0.033	0.027
CW Sydney	Parramatta Nth†	2021	95.3	**2 (2)**	**0.072**	0.056	0.053	0.043	0.037	0.031	0.026
CW Sydney	Parramatta Nth	2022	95.0	0	0.056	0.051	0.046	0.037	0.032	0.028	0.023

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
CW Sydney	Parramatta Nth†	2023	94.8	**1 (1)**	**0.074**	0.057	0.054	0.046	0.042	0.033	0.026
CW Sydney	Prospect†	2019	94.3	**20**	**0.101**	**0.079**	**0.071**	**0.066**	0.051	0.036	0.029
CW Sydney	Prospect†	2020	94.8	**3**	**0.079**	0.065	0.060	0.053	0.044	0.034	0.028
CW Sydney	Prospect†	2021	94.3	**2 (2)**	**0.067**	0.058	0.052	0.043	0.039	0.032	0.027
CW Sydney	Prospect	2022	94.4	0	0.052	0.052	0.047	0.039	0.033	0.029	0.025
CW Sydney	Prospect†	2023	93.2	**1 (1)**	**0.071**	0.060	0.056	0.047	0.043	0.035	0.028
CW Sydney	*Rouse Hill#†*	*2019*	*57.0*	***9***	***0.085***	***0.082***	***0.069***	*0.065*	*0.053*	*0.037*	*0.031*
CW Sydney	Rouse Hill†	2020	94.7	**3**	**0.071**	0.063	0.058	0.051	0.042	0.034	0.028
CW Sydney	Rouse Hill†	2021	92.7	**1 (1)**	**0.066**	0.053	0.047	0.043	0.037	0.032	0.027
CW Sydney	Rouse Hill	2022	92.6	0	0.053	0.048	0.045	0.037	0.033	0.029	0.025
CW Sydney	Rouse Hill	2023	93.9	0	0.055	0.052	0.051	0.046	0.042	0.035	0.029
SW Sydney	Bargo†	2019	93.9	**21**	**0.107**	**0.083**	**0.078**	**0.069**	0.052	0.038	0.030
SW Sydney	Bargo†	2020	93.7	**4**	**0.090**	**0.066**	0.061	0.049	0.043	0.034	0.028
SW Sydney	Bargo†	2021	93.5	**1 (1)**	**0.074**	0.053	0.047	0.041	0.037	0.032	0.028
SW Sydney	Bargo	2022	94.7	0	0.059	0.045	0.042	0.037	0.033	0.029	0.026
SW Sydney	Bargo†	2023	94.2	**1 (1)**	**0.066**	0.061	0.056	0.049	0.043	0.035	0.029
SW Sydney	Bringelly†	2019	93.2	**20**	**0.094**	**0.079**	**0.074**	**0.068**	0.053	0.036	0.030
SW Sydney	Bringelly†	2020	87.7	**3**	**0.079**	0.064	0.061	0.053	0.044	0.034	0.028
SW Sydney	Bringelly†	2021	94.8	**2 (2)**	**0.076**	0.060	0.055	0.044	0.041	0.032	0.027
SW Sydney	Bringelly	2022	94.7	0	0.057	0.049	0.044	0.039	0.035	0.029	0.025
SW Sydney	Bringelly†	2023	92.8	**1 (1)**	**0.075**	0.060	0.058	0.048	0.043	0.035	0.029
SW Sydney	Camden†	2019	93.2	**20**	**0.102**	**0.083**	**0.078**	**0.068**	0.058	0.036	0.030
SW Sydney	Camden†	2020	94.5	**3**	**0.077**	0.065	0.060	0.053	0.044	0.035	0.029

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
SW Sydney	Camden†	2021	94.6	**2 (2)**	**0.076**	0.057	0.052	0.043	0.038	0.031	0.027
SW Sydney	Camden	2022	94.9	0	0.056	0.047	0.042	0.038	0.033	0.029	0.025
SW Sydney	*Camden#†*	*2023*	*70.0*	***1 (1)***	***0.074***	*0.062*	*0.059*	*0.051*	*0.046*	*0.038*	*0.030*
SW Sydney	Campbelltown W†	2019	91.4	**21**	**0.095**	**0.082**	**0.076**	**0.068**	0.053	0.035	0.028
SW Sydney	Campbelltown W†	2020	95.1	**4**	**0.080**	**0.069**	0.059	0.052	0.042	0.031	0.026
SW Sydney	Campbelltown W†	2021	93.2	**2 (2)**	**0.074**	0.058	0.054	0.042	0.037	0.031	0.026
SW Sydney	Campbelltown W	2022	92.5	0	0.060	0.044	0.042	0.037	0.034	0.029	0.024
SW Sydney	Campbelltown W	2023	93.9	0	0.065	0.061	0.057	0.047	0.041	0.033	0.027
SW Sydney	Liverpool†	2019	94.1	**11**	**0.081**	**0.075**	**0.073**	0.061	0.051	0.034	0.027
SW Sydney	Liverpool†	2020	92.6	**1**	**0.066**	0.059	0.055	0.047	0.041	0.031	0.026
SW Sydney	Liverpool†	2021	94.8	**2 (2)**	**0.070**	0.064	0.054	0.044	0.039	0.031	0.025
SW Sydney	Liverpool	2022	92.2	0	0.056	0.051	0.046	0.038	0.032	0.028	0.023
SW Sydney	Liverpool†	2023	94.0	**1 (1)**	**0.083**	0.060	0.055	0.047	0.042	0.032	0.026
SW Sydney	Oakdale†	2019	92.3	**18**	**0.106**	**0.085**	**0.080**	**0.066**	0.055	0.038	0.031
SW Sydney	Oakdale†	2020	94.9	**3**	**0.084**	0.064	0.061	0.051	0.045	0.037	0.031
SW Sydney	Oakdale†	2021	93.4	**2 (2)**	**0.068**	0.049	0.046	0.042	0.039	0.032	0.028
SW Sydney	Oakdale	2022	94.4	0	0.053	0.045	0.042	0.038	0.034	0.030	0.027
SW Sydney	Oakdale†	2023	91.9	**1 (1)**	**0.066**	0.057	0.053	0.047	0.042	0.035	0.029
NW Sydney	Penrith	2019	–	–	–	–	–	–	–	–	–
NW Sydney	*Penrith#*	*2020*	*47.1*	*0*	*0.062*	*0.056*	*0.049*	*0.046*	*0.04*	*0.034*	*0.029*
NW Sydney	Penrith†	2021	95.0	**1 (1)**	**0.077**	0.055	0.048	0.044	0.038	0.032	0.026
NW Sydney	Penrith	2022	95.0	0	0.052	0.048	0.047	0.038	0.034	0.028	0.024
NW Sydney	Penrith	2023	94.6	0	0.062	0.056	0.055	0.047	0.044	0.037	0.028

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
NW Sydney	Richmond†	2019	94.1	**13**	**0.100**	**0.083**	**0.073**	0.060	0.051	0.037	0.030
NW Sydney	Richmond†	2020	92.8	**2**	**0.074**	0.063	0.058	0.053	0.043	0.035	0.029
NW Sydney	Richmond†	2021	92.1	**1 (1)**	**0.076**	0.052	0.049	0.043	0.038	0.032	0.027
NW Sydney	Richmond	2022	88.0	0	0.053	0.047	0.044	0.038	0.034	0.029	0.026
NW Sydney	Richmond	2023	91.1	0	0.056	0.053	0.052	0.046	0.044	0.037	0.029
NW Sydney	St Marys†	2019	94.4	**19**	**0.097**	**0.085**	**0.080**	**0.067**	0.053	0.037	0.031
NW Sydney	St Marys†	2020	94.9	**3**	**0.085**	0.063	0.059	0.051	0.042	0.033	0.027
NW Sydney	St Marys	2021	90.1	0	0.060	0.051	0.048	0.042	0.037	0.031	0.026
NW Sydney	St Marys	2022	93.7	0	0.051	0.049	0.045	0.040	0.034	0.029	0.025
NW Sydney	St Marys†	2023	92.5	**1 (1)**	**0.069**	0.057	0.053	0.048	0.043	0.036	0.028
Illawarra	Albion Park Sth	2019	94.3	0	0.061	0.058	0.057	0.043	0.038	0.031	0.028
Illawarra	Albion Park Sth†	2020	92.3	**2**	**0.068**	0.054	0.046	0.042	0.036	0.031	0.027
Illawarra	Albion Park Sth	2021	92.8	0	0.055	0.046	0.043	0.037	0.033	0.030	0.026
Illawarra	Albion Park Sth	2022	89.3	0	0.065	0.053	0.038	0.034	0.032	0.029	0.025
Illawarra	Albion Park Sth†	2023	93.4	**1 (1)**	**0.069**	0.050	0.045	0.039	0.035	0.030	0.027
Illawarra	Kembla Grange†	2019	94.1	**3**	**0.076**	0.063	0.054	0.045	0.039	0.031	0.028
Illawarra	Kembla Grange†	2020	92.5	**2**	**0.070**	0.057	0.048	0.042	0.037	0.031	0.027
Illawarra	Kembla Grange	2021	92.3	0	0.058	0.044	0.041	0.038	0.033	0.029	0.026
Illawarra	Kembla Grange	2022	94	0	0.059	0.046	0.040	0.035	0.032	0.029	0.026
Illawarra	Kembla Grange	2023	92.6	0	0.056	0.041	0.038	0.032	0.029	0.025	0.019
Illawarra	Wollongong†	2019	94.5	**2**	**0.078**	0.065	0.059	0.046	0.039	0.032	0.028
Illawarra	Wollongong†	2020	93.1	**1**	**0.066**	0.052	0.047	0.043	0.037	0.031	0.027
Illawarra	Wollongong	2021	94	0	0.048	0.043	0.039	0.037	0.031	0.029	0.025

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
Illawarra	Wollongong	2022	93.4	0	0.060	0.048	0.040	0.033	0.031	0.028	0.025
Illawarra	Wollongong	2023	94.1	0	0.056	0.042	0.038	0.032	0.029	0.024	0.019
C Coast	Wyong†	2019	93.3	**5**	**0.080**	**0.067**	0.058	0.045	0.040	0.032	0.028
C Coast	Wyong†	2020	93.9	**1**	**0.082**	0.055	0.050	0.044	0.039	0.032	0.028
C Coast	Wyong	2021	92.8	0	0.050	0.047	0.043	0.039	0.035	0.030	0.026
C Coast	Wyong	2022	93.1	0	0.062	0.049	0.043	0.035	0.032	0.029	0.024
C Coast	Wyong	2023	94.3	0	0.056	0.051	0.046	0.041	0.038	0.032	0.027
Lake Macq.	Morisset	2019	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset*	2020	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset	2021	93.6	0	0.058	0.046	0.044	0.040	0.037	0.032	0.028
Lake Macq.	Morisset	2022	92.7	0	0.062	0.053	0.046	0.036	0.034	0.030	0.027
Lake Macq.	Morisset	2023	94.7	0	0.058	0.051	0.050	0.045	0.039	0.034	0.029
L Hunter	Beresfield†	2019	94.3	**7**	**0.079**	**0.073**	0.065	0.052	0.045	0.034	0.027
L Hunter	Beresfield†	2020	93.1	**1**	**0.071**	0.056	0.053	0.044	0.038	0.031	0.025
L Hunter	Beresfield	2021	94.2	0	0.053	0.047	0.043	0.038	0.034	0.028	0.024
L Hunter	Beresfield	2022	92.6	0	0.051	0.045	0.041	0.034	0.031	0.028	0.023
L Hunter	Beresfield	2023	93.3	0	0.062	0.043	0.04	0.034	0.029	0.022	0.015
L Hunter	Newcastle†	2019	94.6	**3**	**0.075**	0.060	0.054	0.044	0.038	0.032	0.027
L Hunter	Newcastle†	2020	94	**2**	**0.070**	0.056	0.050	0.040	0.036	0.032	0.027
L Hunter	Newcastle	2021	93.7	0	0.048	0.045	0.040	0.037	0.034	0.030	0.025
L Hunter	Newcastle	2022	94.4	0	0.047	0.041	0.038	0.034	0.032	0.029	0.024
L Hunter	Newcastle	2023	91.6	0	0.058	0.041	0.038	0.033	0.03	0.025	0.019
L Hunter	Wallsend†	2019	92.7	**5**	**0.084**	**0.069**	0.060	0.052	0.042	0.033	0.027
L Hunter	Wallsend†	2020	93.1	**1**	**0.078**	0.058	0.054	0.043	0.037	0.032	0.026

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
L Hunter	Wallsend	2021	94.3	0	0.052	0.046	0.044	0.038	0.034	0.029	0.025
L Hunter	Wallsend	2022	89.2	0	0.050	0.044	0.041	0.034	0.031	0.028	0.023
L Hunter	Wallsend	2023	92.5	0	0.062	0.043	0.04	0.034	0.03	0.024	0.017
U Hunter	Merriwa	2019	–	–	–	–	–	–	–	–	–
U Hunter	*Merriwa*[#]	*2020*	*35.5*	*0*	*0.055*	*0.05*	*0.047*	*0.045*	*0.041*	*0.036*	*0.032*
U Hunter	Merriwa	2021	88.9	0	0.049	0.044	0.043	0.040	0.036	0.032	0.028
U Hunter	Merriwa	2022	90.9	0	0.050	0.044	0.041	0.037	0.033	0.030	0.027
U Hunter	Merriwa	2023	91.3	0	0.063	0.059	0.054	0.050	0.047	0.040	0.032
C Tablelands	Bathurst	2019	–	–	–	–	–	–	–	–	–
C Tablelands	Bathurst	2020	–	–	–	–	–	–	–	–	–
C Tablelands	Bathurst	2021	–	–	–	–	–	–	–	–	–
C Tablelands	Bathurst	2022	–	–	–	–	–	–	–	–	–
C Tablelands	Bathurst	2023	94.5	0	0.056	0.046	0.045	0.042	0.040	0.034	0.028
C Tablelands	Orange	2019	–	–	–	–	–	–	–	–	–
C Tablelands	Orange	2020	–	–	–	–	–	–	–	–	–
C Tablelands	Orange	2021	–	–	–	–	–	–	–	–	–
C Tablelands	Orange	2022	–	–	–	–	–	–	–	–	–
C Tablelands	Orange	2023	89.4	0	0.054	0.051	0.049	0.045	0.042	0.037	0.031
NW Slopes	Gunnedah[†]	2019	94.7	**6**	**0.087**	**0.070**	0.065	0.058	0.051	0.042	0.033
NW Slopes	Gunnedah[†]	2020	93.0	**3**	**0.074**	0.063	0.059	0.052	0.046	0.038	0.031
NW Slopes	Gunnedah	2021	92.5	0	0.047	0.043	0.042	0.040	0.037	0.032	0.028
NW Slopes	Gunnedah	2022	92.9	0	0.045	0.041	0.038	0.035	0.032	0.029	0.026
NW Slopes	Gunnedah	2023	93.5	0	0.062	0.054	0.048	0.045	0.043	0.037	0.031
NW Slopes	Tamworth	2019	–	–	–	–	–	–	–	–	–

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
NW Slopes	Tamworth	2020	–	–	–	–	–	–	–	–	–
NW Slopes	Tamworth	2021	–	–	–	–	–	–	–	–	–
NW Slopes	Tamworth	2022	–	–	–	–	–	–	–	–	–
NW Slopes	Tamworth	2023	94.6	0	0.061	0.050	0.048	0.045	0.043	0.038	0.031
Mid Nth Coast	*Coffs Harbour[#†]*	*2019*	*10.3*	***2***	***0.095***	***0.095***	***0.093***	***0.068***	*0.045*	*0.036*	*0.031*
Mid Nth Coast	Coffs Harbour	2020	90.4	0	0.044	0.042	0.042	0.039	0.036	0.032	0.028
Mid Nth Coast	Coffs Harbour	2021	93.3	0	0.043	0.039	0.036	0.034	0.032	0.029	0.025
Mid Nth Coast	Coffs Harbour	2022	93.7	0	0.038	0.036	0.035	0.032	0.031	0.028	0.023
Mid Nth Coast	Coffs Harbour	2023	90.9	0	0.05	0.044	0.042	0.038	0.036	0.032	0.027
Mid Nth Coast	*Port Macquarie[#†]*	*2019*	*41.3*	***3***	***0.085***	*0.054*	*0.045*	*0.037*	*0.033*	*0.028*	*0.022*
Mid Nth Coast	Port Macquarie	2020	83.6	0	0.048	0.042	0.038	0.036	0.034	0.030	0.025
Mid Nth Coast	Port Macquarie	2021	93.0	0	0.039	0.038	0.034	0.033	0.031	0.027	0.022
Mid Nth Coast	Port Macquarie	2022	95.9	0	0.041	0.034	0.032	0.029	0.028	0.025	0.021
Mid Nth Coast	Port Macquarie	2023	94.3	0	0.041	0.039	0.036	0.033	0.030	0.026	0.022
SW Slopes	Albury	2019	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2020	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2021	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2022	–	–	–	–	–	–	–	–	–
SW Slopes	Albury	2023	84.2	0	0.057	0.052	0.050	0.046	0.041	0.033	0.027
SW Slopes	Wagga Wagga Nth	2019	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2020	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2021	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2022	–	–	–	–	–	–	–	–	–
SW Slopes	Wagga Wagga Nth	2023	79.6	0	0.058	0.052	0.048	0.045	0.042	0.035	0.027

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max 8-hour rolling average (ppm) (0.065 ppm)	Percentiles (ppm)					
						99th	98th	95th	90th	75th	50th
S Tablelands	*Goulburn#†*	*2019*	*14.4*	***7***	***0.116***	***0.116***	***0.101***	***0.08***	***0.068***	*0.058*	*0.038*
S Tablelands	Goulburn†	2020	95.0	**6**	**0.082**	**0.071**	0.063	0.050	0.042	0.034	0.029
S Tablelands	Goulburn	2021	94.9	0	0.051	0.044	0.043	0.038	0.034	0.030	0.026
S Tablelands	Goulburn	2022	87.9	0	0.046	0.041	0.039	0.036	0.033	0.029	0.026
S Tablelands	Goulburn	2023	95.1	0	0.053	0.051	0.051	0.044	0.041	0.035	0.029

Particles as PM10

This section presents a 5-year statistical trend summary by station for the following AAQ NEPM standards applicable to PM10:

- 1-day PM10 standard (50.0 µg/m^3)
- 1-year PM10 standard (25.0 µg/m^3).

Exceptional event rule for PM10

Exceedances of the AAQ NEPM PM10 1-day standard are classified into one of 2 event categories:

- non-exceptional events (exceedances caused by local or regional dust events, or wood smoke from domestic wood heaters)
- exceptional events (exceedances caused by continental-scale dust events, bushfires and jurisdiction-authorised hazard reduction burning).

Event days that are deemed exceptional are allowable under the AAQ NEPM goal, while non-exceptional days are not allowed.

Table 29 presents the 5-year statistical trend summary for the 1-day and 1-year PM10 standards from 2019 to 2023. Consider the following notes:

- Where shown, the smaller number in brackets () next to the overall ozone exceedance total is the number of non-exceptional event days recorded at that station during a particular year. Both numbers are given in bold. For example, **7 (3)** indicates there were 7 total exceedance days at that station, while 3 of these were non-exceptional events. As non-exceptional events were observed, the station did not meet the PM10 1-day standard for that year, and these numbers are written in bold as a result. These entries are marked with a dagger (†).
- Exceedance days that are not written in bold and have a 0 in brackets (0) next to the total indicate all exceedances were considered exceptional events, meaning the station met the PM10 1-day standard for that year.
- Stations whose entries are italicised indicate less than 75% of data was available for that year, and are marked with a hash (#).
- Exceedances will be in bold if maximum 1-day average exceeds the standard, irrespective of whether the exceedance is exceptional or non-exceptional in nature. Entries where the 1-year average exceeds the standard are also given in bold. These are marked with a dagger (†).
- While stations with less than 15% of data availability are usually excluded, stations that recorded both less than 15% of data and at least one exceedance are reported below. These entries are marked with an asterisk (*).

Table 29 **Statistical summary trend (5-year) by station for the maximum PM10 1-day average AAQ NEPM standard (50.0 µg/m³) and 1-year average (25.0 µg/m³) from 2019 to 2023**

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
East Sydney	Alexandria	2019	–	–	–	–	–	–	–	–	–	–
East Sydney	Alexandria	2020	–	–	–	–	–	–	–	–	–	–
East Sydney	*Alexandria#*	*2021*	*17.0*	*0*	*30.6*	*30.6*	*30.4*	*28.1*	*24.1*	*18.0*	*14.0*	*14.9*
East Sydney	*Alexandria#*	*2022*	*49.0*	*0*	*21.3*	*19.9*	*19.8*	*17.9*	*16.3*	*13.4*	*10.1*	*10.7*
East Sydney	Alexandria†	2023	90.1	3 (0)	**91.9**	45.2	36.3	27.5	23.8	18.1	13.2	14.6
East Sydney	Bradfield Hwy†	2019	95.1	17 (0)	**170.3**	**95.8**	**84.0**	49.8	35.2	26.2	20.6	24.0
East Sydney	Bradfield Hwy†	2020	92.6	4 (0)	**126.3**	**53.1**	47.0	35.9	29.4	21.1	16.3	18.3
East Sydney	Bradfield Hwy	2021	97.5	0	46.0	35.3	31.6	25.5	22.4	18.3	14.0	14.6
East Sydney	Bradfield Hwy	2022	96.4	0	31.4	24.6	23.9	21.9	19.2	15.5	12.2	12.6
East Sydney	Bradfield Hwy†	2023	97.8	4 (0)	**70.5**	**52.4**	38.6	32.2	25.7	21.2	16.7	17.8
East Sydney	*Cook and Phillip#†*	*2019*	*24.9*	*13 (0)*	***116.8***	***113.9***	***104.9***	***84.3***	***66.8***	*35.0*	*22.0*	***29.6***
East Sydney	Cook and Phillip†	2020	86.9	4 (0)	**130.8**	**50.5**	39.2	30.5	25.1	18.0	14.0	15.7
East Sydney	Cook and Phillip	2021	84.7	0	36.9	30.1	29.4	24.4	20.0	16.6	12.9	13.4
East Sydney	Cook and Phillip	2022	95.9	0	24.5	21.4	19.8	18.1	15.8	12.7	9.3	9.9
East Sydney	Cook and Phillip†	2023	90.7	2 (0)	**67.4**	37.4	32.3	25.8	21.7	16.8	12.6	14.2
East Sydney	Earlwood†	2019	98.4	17 (0)	**129.4**	**100.1**	**79.7**	48.9	36.6	26.5	19.2	23.0
East Sydney	Earlwood†	2020	99.5	9 (0)	**116.7**	**67.8**	**53.4**	34.7	29.4	21.8	15.8	18.5
East Sydney	Earlwood	2021	97.8	0	37.6	32.7	30.8	26.3	23.5	18.8	14.8	15.4
East Sydney	Earlwood	2022	98.4	0	25.8	24.1	22.9	20.6	18.0	15.6	12.7	12.9

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
East Sydney	Earlwood†	2023	96.7	1 (0)	**96.3**	37.9	33.8	27.3	24.4	18.4	14.6	15.9
East Sydney	Macquarie Park†	2019	98.6	16 (0)	**187.3**	**94.1**	**78.1**	46.2	32.9	22.7	15.1	19.9
East Sydney	Macquarie Park†	2020	98.9	7 (0)	**146.7**	**62.0**	**51.2**	33.5	24.9	17.0	13.3	15.7
East Sydney	Macquarie Park†	2021	96.4	2 (0)	**125.2**	29.5	27.0	22.2	19.5	15.3	12.3	13.2
East Sydney	Macquarie Park	2022	95.9	0	25.9	23.8	22.0	18.5	16.6	13.3	10.9	11.4
East Sydney	Macquarie Park	2023	93.4	0	44.7	37.1	29.5	25.6	21.9	16.7	13.2	14.5
East Sydney	Randwick†	2019	97.5	19 (0)	**127.7**	**89.7**	**79.2**	**52.8**	38.6	28.3	20.1	24.1
East Sydney	Randwick†	2020	99.2	9 (0)	**137.3**	**67.0**	**59.2**	37.5	30.9	22.9	16.6	19.5
East Sydney	Randwick	2021	97.5	0	37.6	32.5	31.1	27.4	24.8	19.9	15.8	16.3
East Sydney	Randwick	2022	99.2	0	37.4	30.1	28.6	24.7	21.8	17.5	13.8	14.6
East Sydney	Randwick†	2023	97.0	2 (0)	**89.0**	40.8	35.2	28.8	25.5	19.1	15.4	16.6
East Sydney	Rozelle†	2019	96.7	18 (0)	**142.7**	**89.7**	**76.7**	**50.1**	35.9	26.5	18.6	22.7
East Sydney	Rozelle†	2020	97.8	7 (0)	**113.5**	**67.7**	**50.9**	34.4	28.6	21.0	15.9	18.1
East Sydney	Rozelle†	2021	98.6	1 (0)	**52.6**	33.3	30.6	26.8	24.0	18.9	14.7	15.5
East Sydney	Rozelle	2022	95.1	0	28.5	25.8	24.6	21.3	18.3	15.6	12.1	12.9
East Sydney	Rozelle	2023	94.8	0	40.9	36.2	32.0	27.6	24.2	18.6	14.6	15.7
CW Sydney	Lidcombe	2019	–	–	–	–	–	–	–	–	–	–
CW Sydney	*Lidcombe#*	*2020*	*76.0*	*0*	*42.0*	*38.9*	*33.5*	*28.6*	*24.9*	*19.7*	*15.5*	*16.1*
CW Sydney	Lidcombe	2021	98.6	0	39.2	36.2	32.5	27.2	24.6	18.8	14.6	15.7
CW Sydney	Lidcombe	2022	99.2	0	27.9	27.3	25.2	21.7	18.8	15.7	12.7	13.3
CW Sydney	Lidcombe†	2023	99.2	1 (0)	**51.4**	40.4	36.5	28.2	24.9	19.6	15.4	16.6
CW Sydney	Parramatta Nth†	2019	99.5	22 (0)	**195.3**	**126.1**	**92.8**	**59.3**	40.9	29.6	20.3	**25.5**

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
CW Sydney	Parramatta Nth†	2020	99.5	9 (0)	**188.9**	**71.8**	**54.6**	37.7	30.4	21.8	16.5	19.3
CW Sydney	Parramatta Nth	2021	99.5	0	42.5	38.3	37.0	32.0	26.8	21.0	15.5	17.1
CW Sydney	Parramatta Nth	2022	99.2	0	42.7	27.5	25.8	22.5	20.2	16.9	13.6	14.1
CW Sydney	Parramatta Nth	2023	97.5	0	48.8	36.5	33.9	30.0	25.8	19.7	15.4	16.8
CW Sydney	*Prospect*†	2019	99.2	25 (0)	**182.8**	**129.1**	**93.4**	**63.5**	41.1	29.9	20.4	**26.0**
CW Sydney	Prospect†	2020	99.5	10 (0)	**245.8**	**81.5**	**59.4**	40.3	31.7	23.0	16.8	20.2
CW Sydney	Prospect	2021	99.2	0	44.6	41.2	37.4	32.3	28.1	21.1	16.0	17.2
CW Sydney	Prospect	2022	89.3	0	29.2	26.6	25.3	22.9	19.9	16.1	13.3	13.4
CW Sydney	Prospect	2023	99.2	0	44.4	38.0	34.4	30.3	26.0	20.1	15.8	16.8
CW Sydney	Rouse Hill†	2019	59.5	24 (0)	**216.2**	**165.2**	**125.7**	**86.3**	**59.2**	31.0	18.2	**27.3**
CW Sydney	Rouse Hill†	2020	98.6	**10 (1)**	**220.3**	**80.2**	**55.3**	36.2	29.1	20.6	14.8	18.3
CW Sydney	Rouse Hill†	2021	98.4	**1 (1)**	**51.6**	40.9	33.7	27.0	23.0	18.8	13.9	15.0
CW Sydney	Rouse Hill	2022	99.5	0	23.8	22.5	21.9	19.3	16.9	14.3	11.2	11.8
CW Sydney	Rouse Hill	2023	99.5	0	48.6	35.3	32.1	26.3	24.0	18.0	14.3	15.4
SW Sydney	Bargo†	2019	98.1	21 (0)	**188.9**	**129.5**	**96.5**	**54.4**	36.3	23.9	15.4	21.2
SW Sydney	Bargo†	2020	97.3	6 (0)	**265.7**	**135.2**	47.3	31.5	25.3	17.6	12.2	16.0
SW Sydney	Bargo†	2021	98.1	1 (0)	**63.9**	30.3	24.7	21.5	18.9	14.7	10.9	11.8
SW Sydney	Bargo	2022	98.6	0	25.4	20.3	18.7	16.7	15.2	12.0	9.3	9.9
SW Sydney	Bargo†	2023	98.1	**5 (4)**	**78.9**	**51.0**	43.0	32.5	26.0	17.6	12.7	15.0
SW Sydney	Bringelly†	2019	98.6	24 (0)	**134.0**	**112.3**	**87.7**	**63.9**	39.9	27.5	18.8	23.6
SW Sydney	Bringelly†	2020	98.9	11 (0)	**241.8**	**82.3**	**63.1**	37.7	30.8	21.6	14.6	18.3
SW Sydney	Bringelly†	2021	98.4	1 (0)	**69.0**	33.7	30.8	27.3	24.5	19.4	14.2	15.3

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
SW Sydney	Bringelly	2022	98.4	0	28.7	26.4	23.9	21.1	18.8	14.9	11.4	12.1
SW Sydney	Bringelly†	2023	97.3	**1 (1)**	**53.2**	41.7	36.3	31.2	27.5	20.2	14.4	16.2
SW Sydney	Camden†	2019	97.0	27 (0)	**139.2**	**120.2**	**108.6**	**68.7**	41.0	25.1	16.0	22.5
SW Sydney	Camden†	2020	97.0	9 (0)	**268.6**	**88.4**	**64.7**	35.1	26.0	18.0	12.8	16.6
SW Sydney	Camden†	2021	99.5	1 (0)	**66.2**	29.1	27.6	24.2	20.4	15.9	12.1	13.0
SW Sydney	Camden	2022	98.6	0	24.2	20.9	19.4	17.4	15.2	12.6	9.3	10.1
SW Sydney	Camden†	2023	96.2	2 (0)	**89.9**	36.4	32.1	24.8	21.9	15.6	12.0	13.7
SW Sydney	Campbelltown W†	2019	98.1	24 (0)	**132.0**	**116.6**	**94.0**	**60.5**	37.5	25.4	16.9	22.3
SW Sydney	Campbelltown W†	2020	99.5	10 (0)	**249.7**	**85.1**	**60.3**	33.9	27.4	18.9	13.4	17.0
SW Sydney	Campbelltown W†	2021	98.9	3 (0)	**111.9**	36.0	29.2	24.1	20.2	16.3	12.6	13.8
SW Sydney	Campbelltown W	2022	96.4	0	30.2	22.0	21.5	18.6	16.2	13.6	10.6	11.3
SW Sydney	Campbelltown W†	2023	98.1	2 (0)	**78.1**	35.0	32.8	25.7	21.9	17.0	12.9	14.4
SW Sydney	Liverpool†	2019	98.9	**28 (1)**	**178.9**	**128.5**	**93.0**	**61.0**	43.9	31.4	23.2	**27.7**
SW Sydney	Liverpool†	2020	96.2	**7 (2)**	**195.1**	**71.3**	**51.1**	38.6	32.7	24.7	18.3	20.8
SW Sydney	Liverpool†	2021	99.5	**4 (1)**	**82.8**	**51.1**	40.2	32.8	27.9	21.9	16.7	18.1
SW Sydney	Liverpool	2022	98.6	0	36.1	28.8	26.9	24.4	21.8	17.5	14.0	14.6
SW Sydney	Liverpool†	2023	98.9	2 (0)	**76.4**	44.0	42.1	35.5	30.2	23.6	17.8	19.3
SW Sydney	Oakdale†	2019	97.0	**28 (1)**	**216.8**	**168.3**	**143.1**	**81.5**	39.5	22.4	12.9	22.4

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
SW Sydney	Oakdale	2020	99.2	10 (0)	**248.9**	**85.1**	**74.0**	32.2	22.6	15.3	9.9	14.4
SW Sydney	Oakdale†	2021	97.5	1 (0)	**73.2**	26.1	22.3	20.2	17.8	13.0	9.6	10.6
SW Sydney	Oakdale	2022	98.9	0	22.8	19.4	18.0	16.1	14.1	10.6	7.9	8.8
SW Sydney	Oakdale†	2023	94.8	1 (0)	**64.5**	30.8	27.6	24.5	20.9	14.4	11.0	12.4
NW Sydney	Penrith	2019	–	–	–	–	–	–	–	–	–	–
NW Sydney	*Penrith#*	*2020*	*48.6*	*0*	*38.1*	*38.0*	*37.5*	*30.2*	*25.7*	*20.6*	*15.2*	*15.9*
NW Sydney	Penrith†	2021	95.6	2 (0)	**73.5**	38.2	32.8	29.2	25.7	20.6	15.5	16.7
NW Sydney	Penrith	2022	99.2	0	30.5	28.1	24.0	22.3	19.7	16.5	13.5	13.8
NW Sydney	Penrith	2023	98.1	0	42.6	34.7	33.0	28.0	24.5	19.8	15.6	16.6
NW Sydney	Richmond†	2019	98.1	28 (0)	**193.4**	**123.2**	**101.5**	**65.4**	43.8	26.8	17.4	24.2
NW Sydney	Richmond†	2020	93.7	9 (0)	**237.7**	**79.9**	**60.9**	35.6	26.8	18.4	13.3	17.0
NW Sydney	Richmond†	2021	95.6	1 (0)	**54.0**	30.3	27.3	23.8	21.5	17.1	12.5	13.6
NW Sydney	Richmond	2022	97.0	0	24.5	20.9	19.9	17.4	15.4	12.2	9.9	10.3
NW Sydney	Richmond	2023	92.3	0	40.3	35.1	31.9	27.2	21.6	17.2	12.6	14.0
NW Sydney	St Marys†	2019	98.4	26 (0)	**159.8**	**119.8**	**90.2**	**65.2**	43.3	29.7	19.5	24.6
NW Sydney	St Marys†	2020	99.2	11 (0)	**260.3**	**89.6**	**66.4**	39.4	31.0	21.3	14.6	18.9
NW Sydney	St Marys†	2021	96.2	1 (0)	**54.9**	36.1	35.5	31.6	26.5	20.2	14.5	16.2
NW Sydney	St Marys	2022	97.8	0	29.7	26.6	23.8	20.7	18.0	14.8	11.7	12.0
NW Sydney	St Marys	2023	96.7	0	42.5	37.4	36.0	29.2	25.0	19.8	14.8	16.1
Illawarra	Albion Park Sth†	2019	92.9	14 (0)	**104.3**	**73.9**	**65.1**	44.1	35.9	23.3	16.1	19.5
Illawarra	Albion Park Sth†	2020	98.1	10 (0)	**153.3**	**90.8**	**64.8**	35.4	28.2	19.8	13.7	17.1
Illawarra	Albion Park Sth	2021	98.1	0	39.4	33.1	28.0	23.4	20.6	16.1	12.1	13.1

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
Illawarra	Albion Park Sth	2022	98.6	0	29.9	25.5	23.0	21.1	17.6	13.4	9.9	10.9
Illawarra	Albion Park Sth	2023	97.5	0	36.7	34.4	30.8	27.0	22.0	15.5	12.2	13.4
Illawarra	Kembla Grange†	2019	93.4	**21 (10)**	**115.8**	**89.4**	**78.2**	**55.1**	44.8	32.5	21.1	**25.5**
Illawarra	Kembla Grange†	2020	97.3	**19 (7)**	**187.7**	**94.6**	**73.4**	**52.0**	37.7	25.6	16.3	21.5
Illawarra	Kembla Grange†	2021	98.4	1 (0)	**62.3**	40.6	38.4	34.5	29.5	21.6	15.9	17.6
Illawarra	Kembla Grange	2022	98.9	0	43.8	37.7	30.8	25.6	22.5	18.0	13.5	14.5
Illawarra	Kembla Grange†	2023	93.4	**8 (2)**	**74.1**	**58.1**	**51.0**	42.4	34.4	25.9	18.2	20.9
Illawarra	Wollongong†	2019	88.5	17 (0)	**117.6**	**91.2**	**75.8**	**51.7**	40.7	27.0	17.5	22.6
Illawarra	Wollongong†	2020	95.9	11 (0)	**121.6**	**82.5**	**63.6**	39.2	33.1	22.2	15.0	18.8
Illawarra	Wollongong	2021	98.4	0	43.2	40.2	32.8	26.8	23.8	19.7	13.7	15.1
Illawarra	Wollongong	2022	97.5	0	45.4	31.8	30.1	26.1	23.4	18.4	12.8	14.3
Illawarra	Wollongong†	2023	95.9	**1 (1)**	**50.8**	41.9	39.4	31.7	28.1	20.1	15.3	16.5
C Coast	Wyong†	2019	97.5	19 (0)	**128.4**	**99.8**	**85.6**	**52.8**	35.6	24.4	16.1	21.1
C Coast	Wyong†	2020	99.2	5 (0)	**90.5**	**59.8**	46.8	36.2	28.4	18.6	13.3	15.9
C Coast	Wyong	2021	98.4	0	44.9	34.6	28.5	23.7	21.5	16.9	12.2	13.5
C Coast	Wyong	2022	95.3	0	27.4	26.1	23.2	19.9	17.5	14.4	11.0	11.7
C Coast	Wyong	2023	97.8	0	37.8	34.3	29.6	26.0	21.7	16.3	12.8	13.9
Lake Macq.	Morisset	2019	–	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset*	2020	–	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset	2021	96.2	0	28.5	23.6	21.2	17.4	16.2	12.3	8.8	9.6
Lake Macq.	Morisset	2022	94.8	0	21.2	19.1	18.0	15.2	13.0	10.2	7.5	7.9
Lake Macq.	Morisset	2023	95.6	0	33.8	30.7	26.3	22.3	18.1	13.3	10.1	11.2

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
L Hunter	Beresfield†	2019	98.6	30 (0)	**136.7**	**106.2**	**84.1**	**63.7**	40.7	29.6	21.0	**25.9**
L Hunter	Beresfield†	2020	99.2	6 (0)	**77.7**	**55.0**	46.7	37.1	29.7	22.2	16.3	18.5
L Hunter	Beresfield	2021	99.5	0	36.3	31.8	30.4	26.9	23.6	19.4	15.4	15.9
L Hunter	Beresfield	2022	98.4	0	26.2	25.2	23.8	21.4	19.9	17.2	14.0	14.3
L Hunter	Beresfield	2023	98.4	0	41.0	37.1	34.5	30.7	26.3	21.1	16.6	17.8
L Hunter	Newcastle†	2019	98.4	29 (0)	**125.8**	**107.0**	**86.1**	**62.7**	46.3	33.9	23.7	**28.4**
L Hunter	Newcastle†	2020	97.8	9 (0)	**116.2**	**75.3**	**52.2**	43.4	34.1	27.1	20.5	22.4
L Hunter	Newcastle	2021	98.4	0	44.3	38.1	36.0	29.6	27.5	23.8	18.7	19.2
L Hunter	Newcastle	2022	98.9	0	43.7	36.4	34.7	30.2	26.0	21.6	16.6	17.5
L Hunter	Newcastle	2023	98.4	0	49.0	43.7	40.5	35.3	30.1	23.9	19.0	20.1
L Hunter	Wallsend†	2019	95.3	21 (0)	**127.9**	**86.4**	**74.8**	**55.5**	38.3	26.3	18.7	22.9
L Hunter	Wallsend†	2020	99.2	6 (0)	**77.9**	**65.4**	44.0	34.7	28.7	20.5	15.5	17.7
L Hunter	Wallsend	2021	96.7	0	33.0	27.8	25.9	22.9	21.2	17.9	14.3	14.7
L Hunter	Wallsend	2022	97.8	0	27.0	25.6	23.4	19.3	17.5	14.7	12.2	12.7
L Hunter	Wallsend	2023	96.4	0	39.0	34.7	31.9	29.1	25.3	19.1	14.5	16.1
U Hunter	Aberdeen†	2019	99.5	**51 (2)**	**246.7**	**105.1**	**100.9**	**73.2**	**57.1**	32.7	22.7	**29.5**
U Hunter	Aberdeen†	2020	99.5	8 (0)	**267.7**	**78.0**	**53.5**	38.6	31.5	19.8	14.3	17.8
U Hunter	Aberdeen	2021	99.2	0	33.2	28.5	25.7	21.4	19.5	15.9	12.2	12.9
U Hunter	Aberdeen	2022	97.8	0	32.1	24.0	22.3	19.5	18.3	14.9	11.7	12.3
U Hunter	Aberdeen	2023	99.5	0	43.3	34.8	33.0	27.1	23.9	19.1	14.4	15.3
U Hunter	Merriwa†	2019	97.3	47 (0)	**302.1**	**131.6**	**114.0**	**86.5**	**59.4**	30.0	18.4	**27.9**
U Hunter	Merriwa†	2020	97.5	12 (0)	**620.7**	**85.6**	**71.8**	44.2	31.3	18.7	12.5	18.2

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
U Hunter	Merriwa	2021	95.6	0	35.4	30.8	27.3	22.2	18.5	15.0	10.6	11.7
U Hunter	Merriwa	2022	93.2	0	27.4	23.4	22.1	19.5	18.1	14.1	10.4	11.2
U Hunter	Merriwa	2023	97.3	0	49.4	36.7	34.2	27.2	22.4	18.2	13.2	14.2
U Hunter	Muswellbrook†	2019	99.2	**58 (3)**	**231.3**	**114.3**	**108.8**	**84.3**	**60.2**	39.6	28.7	**34.4**
U Hunter	Muswellbrook†	2020	98.9	**15 (1)**	**181.0**	**83.0**	**58.2**	44.7	35.4	25.7	19.3	22.5
U Hunter	Muswellbrook	2021	99.2	0	43.5	37.3	33.3	30.2	26.3	22.4	17.6	18.2
U Hunter	Muswellbrook	2022	98.6	0	37.1	29.0	27.8	26.2	24.3	20.2	15.9	16.6
U Hunter	Muswellbrook†	2023	98.9	**2 (2)**	**59.4**	44.3	41.5	37.3	33.0	26.6	20.4	21.9
U Hunter	Singleton†	2019	98.9	**40 (3)**	**206.1**	**117.5**	**103.8**	**78.3**	**52.9**	34.6	24.5	**30.1**
U Hunter	Singleton†	2020	99.5	**10 (1)**	**82.4**	**65.3**	**55.7**	42.6	34.3	25.8	17.7	20.5
U Hunter	Singleton†	2021	99.2	1 (0)	**58.2**	36.9	35.8	31.0	27.4	21.4	16.5	17.5
U Hunter	Singleton	2022	99.2	0	34.5	29.4	27.3	23.7	21.6	17.9	13.6	14.5
U Hunter	Singleton	2023	98.1	0	48.0	43.4	39.1	35.3	29.9	23.7	17.7	19.1
C Tablelands	Bathurst†	2019	99.2	40 (0)	**296.6**	**201.0**	**159.0**	**103.0**	**51.7**	26.0	16.0	**27.4**
C Tablelands	Bathurst†	2020	98.4	14 (0)	**320.4**	**185.2**	**76.9**	45.1	26.7	16.2	11.0	17.0
C Tablelands	Bathurst	2021	96.4	0	29.2	28.1	27.4	21.9	18.5	13.7	10.1	11.3
C Tablelands	Bathurst	2022	99.2	0	23.2	18.9	16.0	14.5	12.4	10.6	8.3	8.8
C Tablelands	Bathurst†	2023	97.0	**2 (1)**	**59.7**	27.1	24.9	21.9	19.8	15.2	11.1	12.5
C Tablelands	Orange†	2019	94.0	**35 (1)**	**423.7**	**236.1**	**174.6**	**90.8**	**50.8**	27.4	18.4	**28.3**
C Tablelands	Orange†	2020	97.0	12 (0)	**291.8**	**130.3**	**75.1**	42.7	29.7	20.1	12.8	17.9
C Tablelands	Orange	2021	99.2	0	46.3	32.0	30.1	25.6	20.9	15.1	10.1	11.4
C Tablelands	Orange	2022	97.8	0	43.1	31.0	24.8	17.9	14.4	10.8	7.4	8.6

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
C Tablelands	Orange	2023	89.3	0	34.1	29.0	27.6	23.6	20.3	15.8	11.0	11.8
NW Slopes	Gunnedah†	2019	91.8	30 (0)	**205.2**	**123.6**	**102.5**	**72.5**	41.8	27.6	18.9	24.8
NW Slopes	Gunnedah†	2020	95.1	3 (0)	**101.2**	**52.8**	38.5	28.0	23.8	17.5	12.0	13.9
NW Slopes	Gunnedah	2021	86.8	0	42.7	26.5	24.6	21.1	18.6	13.8	10.3	11.2
NW Slopes	*Gunnedah#*	*2022*	*72.9*	*0*	*36.4*	*32.3*	*28.8*	*24.3*	*17.8*	*12.7*	*10.2*	*11.2*
NW Slopes	Gunnedah†	2023	96.4	2 (0)	**61.3**	43.2	30.2	26.3	22.5	16.3	10.9	12.9
NW Slopes	Narrabri†	2019	98.6	31 (0)	**232.6**	**156.4**	**128.8**	**79.5**	46.2	23.6	13.9	23.2
NW Slopes	Narrabri†	2020	98.1	8 (0)	**119.6**	**80.3**	**65.3**	30.9	20.5	13.0	9.1	12.4
NW Slopes	Narrabri	2021	84.4	0	36.4	20.6	16.0	12.3	11.0	8.6	6.7	7.0
NW Slopes	Narrabri	*2022*	92.6	0	17.0	14.7	13.3	11.5	10.1	8.2	6.2	6.7
NW Slopes	Narrabri†	2023	92.9	1 (0)	**53.0**	36.6	24.3	18.0	14.4	11.2	8.4	9.4
NW Slopes	Tamworth†	2019	98.9	52 (0)	**240.2**	**199.1**	**169.2**	**111.1**	**67.7**	33.2	22.7	**33.7**
NW Slopes	Tamworth†	2020	98.6	8 (0)	**178.0**	**99.8**	**53.3**	34.6	24.8	18.6	13.4	16.8
NW Slopes	Tamworth	2021	99.2	0	36.4	25.1	23.6	20.8	19.0	15.8	12.1	12.7
NW Slopes	Tamworth	2022	99.5	0	23.3	19.9	19.2	17.8	15.7	12.5	10.1	10.6
NW Slopes	Tamworth	2023	98.4	0	40.4	35.9	32.5	26.1	23.3	18.5	14.0	15.1
N Tablelands	Armidale†	2019	92.3	41 (0)	**309.7**	**187.1**	**134.2**	**106.0**	**58.9**	31.0	17.3	**27.9**
N Tablelands	Armidale†	2020	99.2	4 (1)	**112.5**	**50.5**	42.5	34.7	28.3	17.8	10.5	13.7
N Tablelands	Armidale	2021	99.5	0	41.0	27.2	26.9	22.8	21.0	14.6	8.4	10.4
N Tablelands	Armidale†	2022	98.6	1 (1)	**50.6**	38.7	34.9	24.3	18.8	11.3	7.6	9.7
N Tablelands	Armidale	2023	98.1	0	37.7	32.2	30.4	26.4	23.2	16.1	9.8	11.9
Mid Nth Coast	*Coffs Harbour#†*	*2019*	*10.7*	*11 (0)*	***134.3***	***134.3***	***133.6***	***125.8***	***96.2***	***54.2***	*34.3*	***42.6***

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
Mid Nth Coast	Coffs Harbour†	2020	96.4	2 (0)	**65.2**	32.4	28.4	24.0	19.1	14.4	10.1	11.9
Mid Nth Coast	Coffs Harbour	2021	92.9	0	26.0	23.9	22.0	18.0	15.0	11.7	9.5	10.0
Mid Nth Coast	Coffs Harbour	2022	92.9	0	32.1	20.1	17.6	15.1	13.4	11.0	8.9	9.3
Mid Nth Coast	Coffs Harbour	2023	96.4	0	34.5	28.7	24.8	21.2	16.9	12.0	9.2	10.5
Mid Nth Coast	*Port Macquarie#†*	*2019*	*40.3*	*45 (0)*	***480.5***	***374.6***	***249.5***	***151.1***	***85.7***	***54.0***	*31.0*	***47.8***
Mid Nth Coast	Port Macquarie†	2020	92.1	5 (0)	**249.9**	**66.8**	39.6	28.4	23.7	16.9	11.5	14.4
Mid Nth Coast	Port Macquarie	2021	92.9	0	31.9	24.8	21.6	19.0	16.3	13.4	10.1	10.8
Mid Nth Coast	Port Macquarie	2022	91.2	0	31.5	24.3	20.0	17.8	15.8	11.1	8.0	9.1
Mid Nth Coast	Port Macquarie	2023	94.8	0	36.2	34.1	29.4	23.7	19.1	14.4	10.4	11.9
SW Slopes	Albury†	*2019*	98.6	**25 (2)**	**222.4**	**134.1**	**83.1**	**56.3**	43.0	26.1	16.5	23.4
SW Slopes	Albury†	2020	97.5	**19 (1)**	**298.3**	**181.1**	**116.4**	**51.2**	27.1	18.9	14.0	20.1
SW Slopes	Albury†	2021	98.6	**1 (1)**	**52.3**	35.8	32.1	28.8	25.0	17.3	13.0	14.3
SW Slopes	Albury	2022	93.7	0	46.7	28.5	26.2	21.0	17.7	14.2	10.6	11.7
SW Slopes	Albury	2023	92.9	0	32.4	27.8	27.2	24.4	21.6	16.9	12.2	13.5
SW Slopes	Wagga Wagga Nth†	2019	94.8	**63 (24)**	**251.7**	**206.4**	**142.5**	**103.2**	**69.3**	42.9	24.4	**35.3**
SW Slopes	Wagga Wagga Nth†	2020	98.4	**25 (5)**	**295.3**	**140.4**	**96.3**	**59.5**	41.6	24.8	16.8	23.2
SW Slopes	Wagga Wagga Nth†	2021	98.4	**7 (7)**	**69.1**	**59.5**	**50.2**	38.3	32.5	23.2	14.5	17.7
SW Slopes	Wagga Wagga Nth	2022	98.9	0	46.8	39.2	32.1	27.3	21.5	15.5	11.3	13.1

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (50.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (25.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
SW Slopes	Wagga Wagga Nth†	*2023*	96.2	**2 (2)**	**62.5**	45.9	39.4	34.1	29.5	23.1	15.3	17.4
S Tablelands	*Goulburn#†*	*2019*	*14.8*	*24 (0)*	***494.1***	***494.1***	***424.5***	***318.6***	***252.7***	***103.0***	*43.0*	***83.4***
S Tablelands	Goulburn†	2020	97.3	18 (0)	**556.7**	**263.9**	**139.1**	**50.2**	22.1	15.5	10.6	19.2
S Tablelands	Goulburn	2021	98.9	0	30.1	23.6	20.8	17.2	15.3	12.4	8.3	9.2
S Tablelands	Goulburn	2022	97.3	0	19.6	17.0	16.3	13.6	11.8	9.4	6.6	7.2
S Tablelands	Goulburn	2023	99.5	0	23.8	20.3	19.9	18.2	16.2	13.5	10.1	10.4

Particles as PM2.5

This section presents a 5-year statistical trend summary by station for the following AAQ NEPM standards applicable to PM2.5:

- 1-day PM2.5 standard (25.0 µg/m^3)
- 1-year PM2.5 standard (8.0 µg/m^3).

Exceptional event rule for PM2.5

Exceedances of the AAQ NEPM PM2.5 1-day standard are classified into one of 2 event categories:

- non-exceptional events (exceedances caused by local or regional dust events, or wood smoke from domestic wood heaters)
- exceptional events (exceedances caused by continental-scale dust events, bushfires and jurisdiction-authorised hazard reduction burning).

Event days that are deemed exceptional are allowable under the AAQ NEPM goal, while non-exceptional days are not allowed.

Table 30 presents the 5-year statistical trend summary for the 1-day and 1-year PM2.5 standards from 2019 to 2023. Consider the following notes:

- Where shown, the number in brackets () next to the overall PM2.5 exceedance total is the number of non-exceptional event days recorded at that station during a particular year. Both numbers are given in bold. For example, **7 (3)** indicates there were 7 total exceedance days at that station, while 3 of these were non-exceptional events. As non-exceptional events were observed, the station did not meet the PM2.5 1-day standard for that year, and these numbers are written in bold as a result. These entries are marked with a dagger (†).
- Exceedance days that are not written in bold and have a 0 in brackets (0) next to the total indicate all exceedances were considered exceptional events, meaning the station met the PM2.5 1-day standard for that year.
- Stations whose entries are italicised indicate less than 75% of data was available for that year and are marked with a hash (#).
- Exceedances will be in bold if the maximum 1-day average exceeds the standard, irrespective of whether the exceedance is exceptional or non-exceptional in nature. Entries where the 1-year average exceeds the standard are also given in bold. These entries are marked with a dagger (†).
- While stations with less than 15% of data availability are usually excluded, stations that recorded both less than 15% of data and at least one exceedance are reported below. These entries are marked with an asterisk (*).

A note on PM2.5 monitoring methods

The current USEPA-approved (United States Environmental Protection Agency) method for PM2.5 compliance monitoring (also known as the Federal Reference Method, or FRM) is a non-continuous, 1-day-in-3 technique that requires pre- and post-laboratory

weighing. As this involves a substantial delay in acquiring and reporting data, the NSW Government uses continuous monitoring techniques for near-real-time reporting of air quality (for example, by using TEOM or BAM monitors). The latest AAQ NEPM update (2021) requires the reporting of all PM2.5 data measured using all relevant methods, including the compliance method (FRM) and the continuous monitoring technique used.

During 2012, NSW commenced a staggered phasing-out of continuous TEOM PM2.5 monitors, by replacing them with the USEPA-equivalent method for PM2.5 continuous monitoring, namely beta attenuation monitors (BAMs). The BAM method differs from the TEOM in terms of sample treatment by using higher temperatures intermittently to reduce moisture levels in the sample stream. This technique is intended to promote less retention of volatile components absorbed into the fine particulate matter.

Table 30 **Statistical summary trend (5-year) by station for the maximum PM2.5 1-day average AAQ NEPM standard (25.0 µg/m³) and 1-year average (8.0 µg/m³) from 2019 to 2023**

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
East Sydney	Alexandria	2019	–	–	–	–	–	–	–	–	–	–
East Sydney	Alexandria	2020	–	–	–	–	–	–	–	–	–	–
East Sydney	*Alexandria#*	*2021*	*17.0*	*0*	*19.2*	*19.2*	*16.7*	*13.1*	*11.3*	*8.1*	*6.1*	*6.6*
East Sydney	*Alexandria#*	*2022*	*49.0*	*0*	*13.3*	*12.8*	*11.3*	*9.6*	*8.2*	*5.9*	*4.5*	*4.7*
East Sydney	Alexandria†	2023	90.1	5 (0)	**82.4**	**34.0**	20.2	14.3	11.9	8.8	6.2	7.3
East Sydney	Bradfield Hwy†	2019	95.1	25 (0)	**145.8**	**66.4**	**52.8**	**33.4**	22.4	13.7	10.6	**13.2**
East Sydney	Bradfield Hwy†	2020	92.6	6 (0)	**109.1**	**37.4**	24.2	19.0	15.1	10.6	7.7	**9.1**
East Sydney	Bradfield Hwy†	2021	97.5	4 (0)	**40.7**	**26.5**	20.2	14.2	11.1	8.4	5.9	6.7
East Sydney	Bradfield Hwy	2022	96.4	0	16.1	14.8	12.5	10.4	8.8	7.0	5.2	5.4
East Sydney	Bradfield Hwy†	2023	97.8	5 (0)	**60.5**	**31.4**	19.4	14.4	12.7	9.8	7.3	**8.3**
East Sydney	*Cook and Phillip#†*	*2019*	*24.7*	*19 (0)*	***96.5***	***93.9***	***83.4***	***58.8***	***36.3***	*15.3*	*8.0*	***15.6***
East Sydney	Cook and Phillip†	2020	86.9	7 (0)	**112.5**	**35.2**	**25.8**	16.9	13.7	9.5	6.3	7.8
East Sydney	Cook and Phillip†	2021	84.1	1 (0)	**29.5**	19.5	16.5	13.0	10.9	8.3	6.0	6.4
East Sydney	Cook and Phillip	2022	95.9	0	14.0	12.0	9.8	8.2	7.3	5.4	3.9	4.3
East Sydney	Cook and Phillip†	2023	90.7	4 (0)	**58.8**	**29.5**	19.2	12.6	10.7	8.2	5.7	6.9
East Sydney	Earlwood†	2019	95.6	22 (0)	**86.2**	**68.3**	**47.2**	**29.6**	17.5	11.5	7.7	**10.5**
East Sydney	Earlwood†	2020	97.3	9 (0)	**85.1**	**32.3**	**27.4**	18.8	14.7	9.5	6.1	8.0
East Sydney	Earlwood†	2021	96.7	3 (0)	**31.0**	**25.1**	20.6	14.6	11.2	7.6	5.5	6.6
East Sydney	Earlwood	2022	98.4	0	17.2	14.0	12.1	10.0	7.9	6.1	4.7	5.2

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
East Sydney	Earlwood†	2023	97.0	4 (0)	**92.2**	**29.9**	20.7	13.8	11.8	8.2	5.6	7.1
East Sydney	Macquarie Park†	2019	98.6	18 (0)	**152.0**	**61.9**	**42.7**	25.0	15.3	9.7	6.2	**9.2**
East Sydney	Macquarie Park†	2020	98.9	8 (0)	**77.8**	**34.4**	**29.6**	16.2	12.4	8.1	5.5	7.1
East Sydney	Macquarie Park†	2021	97.8	5 (0)	**213.1**	**70.3**	19.3	13.5	10.4	7.3	5.1	7.3
East Sydney	Macquarie Park	2022	98.1	0	17.6	11.3	9.2	7.8	6.8	5.4	4.2	4.4
East Sydney	Macquarie Park†	2023	98.4	3 (0)	**33.3**	25.0	14.7	10.8	9.5	7.1	5.2	6.0
East Sydney	Randwick†	2019	91.0	18 (0)	**95.2**	**53.8**	**42.8**	**27.5**	16.7	11.1	8.6	**10.8**
East Sydney	Randwick†	2020	92.1	8 (0)	**114.8**	**36.2**	**27.7**	16.1	12.3	8.6	6.0	7.6
East Sydney	Randwick†	2021	95.9	1 (0)	**31.2**	19.6	16.6	12.7	9.6	7.6	5.9	6.4
East Sydney	Randwick	2022	96.2	0	14.6	11.2	10.1	8.8	7.5	6.0	4.6	4.9
East Sydney	Randwick†	2023	97.0	3 (0)	**67.7**	24.4	15.8	11.7	9.4	7.2	5.1	6.2
East Sydney	Rozelle†	2019	95.6	21 (0)	**101.8**	**53.5**	**50.6**	**28.3**	16.4	11.2	7.8	**10.3**
East Sydney	Rozelle†	2020	98.4	8 (0)	**87.3**	**33.7**	**27.9**	18.0	13.6	8.8	5.9	7.5
East Sydney	Rozelle†	2021	98.6	3 (0)	**61.7**	24.8	19.3	13.4	10.1	7.3	5.4	6.3
East Sydney	Rozelle	2022	96.7	0	12.7	11.2	9.8	8.7	7.5	5.7	4.2	4.6
East Sydney	Rozelle†	2023	94.5	3 (0)	**35.4**	23.8	18.0	12.2	10.0	7.5	5.5	6.3
CW Sydney	Lidcombe	2019	–	–	–	–	–	–	–	–	–	–
CW Sydney	*Lidcombe#*	*2020*	*69.1*	*0*	*22.9*	*19.6*	*18.1*	*15.0*	*12.4*	*8.4*	*6.0*	*6.9*
CW Sydney	Lidcombe†	2021	97.5	3 (0)	**31.5**	24.9	18.5	13.4	10.2	7.1	5.1	6.1
CW Sydney	Lidcombe	2022	98.9	0	14.0	11.0	10.3	8.8	7.3	5.8	4.5	4.7
CW Sydney	Lidcombe†	2023	98.4	4 (0)	**44.5**	**25.9**	18.8	12.9	10.9	7.8	5.5	6.6

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
CW Sydney	Parramatta Nth†	2019	99.5	21 (0)	**130.1**	**66.6**	**41.5**	**26.7**	17.5	11.3	7.5	**10.5**
CW Sydney	Parramatta Nth†	2020	96.2	10 (0)	**72.9**	**36.0**	**29.8**	20.7	14.7	9.3	6.5	**8.2**
CW Sydney	Parramatta Nth†	2021	98.9	3 (0)	**27.4**	23.2	18.9	14.6	12.2	7.9	5.4	6.6
CW Sydney	Parramatta Nth	2022	99.2	0	16.9	13.9	11.9	10.2	8.5	6.3	4.8	5.2
CW Sydney	Parramatta Nth	2023	91.8	0	24.0	21.6	18.9	14.0	10.7	8.2	5.7	6.6
CW Sydney	Prospect†	2019	92.3	25 (0)	**134.1**	**72.7**	**51.5**	**33.9**	19.2	13.2	8.5	**11.9**
CW Sydney	Prospect†	2020	97.5	**13 (2)**	**70.8**	**37.9**	**30.9**	21.2	15.4	9.5	7.0	**8.6**
CW Sydney	Prospect†	2021	98.9	2 (0)	**37.3**	21.7	20.4	15.6	11.9	8.1	5.8	6.9
CW Sydney	Prospect	2022	89.3	0	18.2	13.0	11.7	10.2	8.3	6.5	5.0	5.3
CW Sydney	Prospect†	2023	97.3	2 (0)	**29.6**	22.8	21.5	14.6	12.0	9.1	6.7	7.4
CW Sydney	*Rouse Hill#†*	*2019*	*58.9*	*24 (0)*	***183.5***	***108.0***	***69.3***	***44.1***	***29.8***	*12.2*	*6.8*	***12.7***
CW Sydney	Rouse Hill†	2020	97.5	10 (0)	**61.3**	**37.4**	**26.9**	19.2	13.6	8.1	5.4	7.1
CW Sydney	Rouse Hill†	2021	98.1	4 (0)	**40.5**	**26.8**	17.1	13.2	10.3	7.0	5.0	5.9
CW Sydney	Rouse Hill	2022	99.5	0	14.8	12.2	9.6	8.2	7.2	5.7	4.3	4.6
CW Sydney	Rouse Hill†	2023	97.3	**5 (1)**	**32.6**	**28.0**	21.9	13.4	11.0	8.1	5.7	6.7
SW Sydney	Bargo†	2019	95.3	21 (0)	**170.7**	**107.4**	**69.3**	**28.5**	16.0	9.7	6.4	**10.4**
SW Sydney	Bargo†	2020	94.8	14 (0)	**121.9**	**68.0**	**54.4**	19.2	11.2	8.0	5.0	7.8
SW Sydney	Bargo†	2021	97.0	4 (0)	**65.3**	**28.2**	14.5	9.8	7.9	6.3	4.5	5.3
SW Sydney	Bargo	2022	95.3	0	11.8	8.7	8.1	7.3	6.2	4.7	3.4	3.7
SW Sydney	Bargo†	2023	95.9	1 (0)	**27.5**	17.4	12.6	10.7	9.4	6.9	5.2	5.7
SW Sydney	Bringelly†	2019	98.1	27 (0)	**178.0**	**67.2**	**55.2**	**35.4**	19.0	11.9	7.5	**11.3**

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
SW Sydney	Bringelly†	2020	95.9	12 (0)	**78.1**	**47.7**	**32.3**	20.7	14.3	10.2	6.8	**8.5**
SW Sydney	Bringelly†	2021	98.9	3 (0)	**57.4**	23.0	17.3	15.3	12.6	8.8	6.1	7.2
SW Sydney	Bringelly	2022	99.2	0	17.8	14.6	12.4	10.4	8.3	6.4	4.6	5.1
SW Sydney	Bringelly†	2023	96.7	3 (0)	**45.4**	21.4	17.1	14.3	11.7	8.5	5.9	7.0
SW Sydney	Camden†	2019	95.3	28 (0)	**155.3**	**111.6**	**66.9**	**41.6**	20.1	11.2	7.1	**11.8**
SW Sydney	Camden†	2020	97.8	11 (0)	**149.3**	**46.1**	**35.8**	18.5	12.9	8.2	5.5	7.7
SW Sydney	Camden†	2021	96.4	3 (0)	**66.7**	23.9	14.8	11.7	10.0	7.6	5.3	6.1
SW Sydney	Camden	2022	97.3	0	16.1	12.3	11.0	8.9	7.2	5.6	4.1	4.4
SW Sydney	Camden†	2023	89.0	2 (0)	**90.9**	22.7	18.9	10.7	9.3	6.8	4.7	5.8
SW Sydney	Campbelltown W†	2019	89.3	27 (0)	**106.0**	**82.2**	**63.9**	**38.1**	21.4	11.9	8.0	**11.8**
SW Sydney	Campbelltown W†	2020	98.4	12 (0)	**69.0**	**47.9**	**36.1**	17.4	13.1	8.6	5.4	7.5
SW Sydney	Campbelltown W†	2021	98.6	5 (0)	**99.9**	**31.6**	16.6	11.9	9.1	6.8	5.2	6.3
SW Sydney	Campbelltown W	2022	94.5	0	23.2	13.5	9.9	8.8	7.5	5.8	4.3	4.6
SW Sydney	Campbelltown W†	2023	96.2	4 (0)	**79.6**	**34.1**	16.2	10.9	9.1	6.7	5.0	6.1
SW Sydney	Liverpool†	2019	96.2	**32 (1)**	**156.0**	**84.4**	**60.9**	**34.0**	21.4	13.6	9.4	**12.8**
SW Sydney	Liverpool†	2020	94.8	**7 (1)**	**73.6**	**33.1**	**25.4**	20.8	16.8	11.2	7.5	**9.1**
SW Sydney	Liverpool†	2021	98.9	**6 (1)**	**52.2**	**32.7**	24.3	17.2	14.3	9.0	6.3	7.9
SW Sydney	Liverpool	2022	98.9	0	21.9	15.1	13.2	10.4	9.4	7.0	4.8	5.5

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
SW Sydney	Liverpool†	2023	99.5	4 (0)	**66.2**	**30.3**	20.7	16.0	12.9	9.2	6.4	7.7
SW Sydney	Oakdale†	2019	95.9	28 (0)	**250.2**	**158.6**	**124.0**	**55.5**	18.2	9.8	5.7	**13.2**
SW Sydney	Oakdale†	2020	97.3	11 (0)	**161.6**	**60.7**	**41.8**	16.2	9.7	6.4	4.6	6.7
SW Sydney	Oakdale†	2021	97.8	1 (0)	**100.0**	14.3	10.9	7.8	6.8	5.2	3.8	4.5
SW Sydney	Oakdale	2022	98.6	0	16.6	9.0	8.3	6.4	5.6	4.3	3.3	3.5
SW Sydney	Oakdale†	2023	94.8	2 (0)	**70.2**	18.9	10.8	9.0	7.6	5.8	4.3	5.0
NW Sydney	Penrith	2019	–	–	–	–	–	–	–	–	–	–
NW Sydney	*Penrith#*	*2020*	*45.4*	*0*	*24.2*	*19.3*	*17.5*	*15.1*	*12.9*	*9.7*	*6.7*	*7.4*
NW Sydney	Penrith†	2021	99.5	4 (0)	**72.5**	**26.0**	20.7	17.2	14.9	9.3	6.6	7.9
NW Sydney	Penrith	2022	98.9	0	22.2	20.8	13.9	10.7	9.2	7.2	5.3	5.8
NW Sydney	Penrith†	2023	99.2	1 (0)	**40.7**	20.6	17.7	13.9	12.0	9.2	6.5	7.5
NW Sydney	Richmond†	2019	86.6	32 (0)	**141.2**	**83.8**	**61.4**	**43.7**	**26.2**	12.9	8.7	**13.1**
NW Sydney	Richmond†	2020	91.5	9 (0)	**93.0**	**45.7**	**29.3**	19.9	13.9	10.2	6.8	**8.4**
NW Sydney	Richmond†	2021	98.4	4 (0)	**44.1**	**25.5**	18.1	15.1	12.3	8.2	5.7	6.8
NW Sydney	Richmond	2022	95.3	0	15.7	13.9	11.5	9.3	7.8	6.1	4.4	4.8
NW Sydney	Richmond†	2023	94.0	3 (0)	**30.9**	23.5	16.8	13.4	10.7	8.0	5.9	6.6
NW Sydney	St Marys†	2019	97.3	21 (0)	**88.3**	**64.8**	**40.9**	**29.2**	16.4	10.8	7.2	**9.8**
NW Sydney	St Marys†	2020	89.1	9 (0)	**82.5**	**39.0**	**27.2**	16.3	11.1	8.8	6.2	7.6
NW Sydney	St Marys†	2021	95.6	1 (0)	**40.3**	19.3	14.8	12.3	9.5	7.0	5.1	5.8
NW Sydney	St Marys	2022	98.1	0	12.6	10.6	8.7	7.7	6.3	4.8	3.6	3.9
NW Sydney	St Marys†	2023	97.0	2 (0)	**36.8**	17.6	15.7	10.7	9.1	7.3	5.1	5.8

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
Illawarra	Albion Park Sth†	2019	92.9	12 (0)	**49.4**	**39.1**	**33.6**	20.2	15.0	10.0	6.9	**8.6**
Illawarra	Albion Park Sth†	2020	99.2	10 (0)	**96.3**	**51.5**	**36.0**	16.8	10.7	7.3	4.9	6.8
Illawarra	Albion Park Sth	2021	97.5	0	23.3	12.7	12.1	8.9	7.8	6.0	4.2	4.8
Illawarra	Albion Park Sth	2022	98.6	0	13.6	9.8	8.9	7.8	6.3	4.7	3.5	3.8
Illawarra	Albion Park Sth	2023	98.1	0	22.0	15.9	14.4	10.1	8.3	5.8	4.4	4.9
Illawarra	Kembla Grange†	2019	95.9	12 (0)	**70.1**	**47.7**	**38.9**	21.8	15.3	9.9	6.4	**8.8**
Illawarra	Kembla Grange†	2020	95.9	11 (0)	**100.4**	**47.1**	**40.1**	17.6	11.7	7.1	4.9	7.0
Illawarra	Kembla Grange	2021	98.6	0	23.5	16.0	11.4	9.8	8.1	6.3	4.6	5.1
Illawarra	Kembla Grange	2022	97.0	0	12.2	10.1	9.4	7.5	6.4	5.0	3.5	4.0
Illawarra	Kembla Grange	2023	94.2	0	21.1	19.6	18.0	12.9	9.3	7.0	5.1	5.8
Illawarra	Wollongong†	2019	97.8	14 (0)	**81.5**	**50.9**	**36.5**	22.9	15.5	10.1	6.6	**9.0**
Illawarra	Wollongong†	2020	84.4	10 (0)	**100.9**	**46.8**	**40.9**	17.1	13.1	8.3	5.9	7.8
Illawarra	Wollongong	2021	96.4	0	23.4	13.9	13.0	10.5	8.9	7.2	5.3	5.7
Illawarra	Wollongong	2022	98.4	0	13.2	10.8	10.5	8.9	7.7	6.0	4.2	4.7
Illawarra	Wollongong†	2023	96.2	2 (0)	**25.4**	19.8	15.4	11.2	9.3	6.8	4.9	5.6
C Coast	Wyong†	2019	92.9	23 (0)	**202.1**	**72.5**	**51.8**	**27.2**	15.4	10.0	7.3	**10.5**
C Coast	Wyong†	2020	95.6	3 (0)	**63.9**	23.2	19.4	12.8	10.2	6.4	4.6	5.6
C Coast	Wyong	2021	98.4	0	14.8	12.0	10.7	8.7	7.7	6.1	4.5	4.7
C Coast	Wyong	2022	95.1	0	11.5	10.4	8.5	7.2	6.2	5.0	3.8	4.0
C Coast	Wyong	2023	93.4	0	15.9	13.9	11.4	10.3	8.7	6.4	4.3	4.9
Lake Macq.	Morisset	2019	–	–	–	–	–	–	–	–	–	–
Lake Macq.	Morisset*	2020	–	–	–	–	–	–	–	–	–	–

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
Lake Macq.	Morisset	2021	96.2	0	11.7	10.9	10.1	8.3	6.6	5.3	3.6	3.9
Lake Macq.	Morisset	2022	94.8	0	11.2	9.1	6.9	5.9	4.8	3.6	2.2	2.7
Lake Macq.	Morisset	2023	95.9	0	23.2	16.7	15.0	10.1	8.6	6.0	4.1	5.0
L Hunter	Beresfield†	2019	96.2	23 (0)	**100.5**	**61.5**	**51.8**	**32.4**	18.9	13.1	9.2	**12.1**
L Hunter	Beresfield†	2020	96.7	8 (0)	**49.7**	**35.7**	**27.5**	16.4	13.4	9.3	6.4	7.7
L Hunter	Beresfield	2021	99.2	0	18.9	15.0	14.1	11.5	10.1	7.5	5.4	5.9
L Hunter	Beresfield	2022	98.1	0	12.3	11.1	10.5	8.8	7.6	6.1	4.7	5.0
L Hunter	Beresfield	2023	98.4	0	16.6	15.3	14.3	12.9	11.1	8.1	6.0	6.7
L Hunter	Newcastle†	2019	98.6	26 (0)	**95.5**	**62.5**	**53.6**	**31.2**	17.0	11.7	8.0	**10.9**
L Hunter	*Newcastle#†*	*2020*	*73.8*	***5 (1)***	***78.5***	***32.7***	*25.0*	*20.0*	*13.4*	*9.4*	*6.6*	***8.1***
L Hunter	Newcastle	2021	97.3	0	21.1	14.8	14.2	12.3	9.8	7.9	5.7	6.3
L Hunter	Newcastle	2022	98.6	0	18.7	13.9	12.4	10.1	8.5	6.7	5.1	5.5
L Hunter	Newcastle	2023	97.5	0	21.6	16.5	15.9	13.4	11.9	8.2	6.0	6.7
L Hunter	Wallsend†	2019	95.6	19 (0)	**108.3**	**65.9**	**45.5**	**30.1**	16.9	11.3	7.6	**10.4**
L Hunter	Wallsend†	2020	98.6	5 (0)	**56.8**	**32.9**	21.8	16.9	12.8	8.6	6.1	7.3
L Hunter	Wallsend	2021	98.4	0	21.4	17.1	14.9	13.0	10.2	7.6	5.5	6.1
L Hunter	Wallsend	2022	96.7	0	18.7	12.7	11.1	9.7	8.1	6.3	4.7	5.1
L Hunter	Wallsend	2023	95.9	0	16.5	15.4	14.3	11.9	11.0	7.7	5.4	6.1
U Hunter	Merriwa	2019	–	–	–	–	–	–	–	–	–	–
U Hunter	*Merriwa#*	*2020*	*41.0*	*0*	*15.1*	*14.6*	*12.6*	*9.8*	*7.9*	*6.3*	*4.8*	*5.0*
U Hunter	Merriwa	2021	94.2	0	14.7	10.1	9.4	7.7	6.8	5.1	3.9	4.2
U Hunter	Merriwa	2022	91.5	0	13.6	8.5	7.3	6.6	5.7	4.2	3.1	3.4

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
U Hunter	Merriwa†	2023	97.0	1 (0)	**27.1**	13.9	11.4	9.3	7.9	6.0	4.1	4.7
U Hunter	Muswellbrook†	2019	95.1	**27 (2)**	**77.4**	**57.5**	**48.1**	**28.9**	21.6	14.3	9.8	**12.2**
U Hunter	Muswellbrook†	2020	97.8	**9 (2)**	**49.1**	**33.3**	**28.5**	19.3	17.4	11.8	8.2	**9.3**
U Hunter	Muswellbrook	2021	99.2	0	19.7	17.7	16.7	15.1	12.6	9.3	6.5	7.3
U Hunter	Muswellbrook	2022	99.2	0	16.3	15.1	14.1	11.8	10.4	7.6	5.7	6.2
U Hunter	Muswellbrook†	2023	98.9	1 (0)	**25.2**	16.5	15.2	13.7	12.1	9.5	6.9	7.5
U Hunter	Singleton†	2019	97.5	**22 (1)**	**69.3**	**67.2**	**52.5**	**28.2**	18.8	12.4	8.3	**10.9**
U Hunter	Singleton†	2020	98.1	**6 (1)**	**46.0**	**28.0**	24.2	18.5	15.1	10.4	7.0	**8.4**
U Hunter	Singleton	2021	96.7	0	18.0	16.1	14.9	13.4	11.0	7.9	5.9	6.3
U Hunter	Singleton	2022	97.8	0	18.1	13.5	12.5	10.1	8.6	6.4	4.8	5.1
U Hunter	Singleton	2023	97.8	0	21.6	16.7	14.2	12.4	10.8	8.8	6.0	6.7
C Tablelands	Bathurst†	2019	98.6	24 (0)	**199.5**	**126.9**	**83.7**	**42.1**	14.6	9.0	6.3	**11.3**
C Tablelands	Bathurst†	2020	98.6	13 (0)	**207.3**	**34.5**	**30.2**	18.5	11.6	8.0	5.3	7.6
C Tablelands	Bathurst	2021	99.5	0	13.8	12.9	11.4	10.0	8.8	6.5	4.7	5.1
C Tablelands	Bathurst	2022	95.1	0	11.3	9.2	8.7	7.5	6.7	5.2	3.8	4.1
C Tablelands	Bathurst†	2023	97.8	1 (0)	**35.3**	12.9	11.6	10.2	9.1	7.2	5.2	5.7
C Tablelands	Orange†	2019	94.0	**31 (4)**	**387.4**	**186.5**	**113.3**	**42.2**	23.8	14.7	7.7	**15.8**
C Tablelands	Orange†	2020	97.0	**15 (1)**	**92.3**	**43.7**	**34.3**	23.2	17.4	11.4	6.4	**9.1**
C Tablelands	Orange†	2021	99.2	**3 (1)**	**32.3**	24.2	22.4	17.3	13.6	8.2	5.2	6.6
C Tablelands	Orange†	2022	97.8	**5 (5)**	**38.9**	**26.8**	19.2	13.2	9.8	6.3	4.2	5.2
C Tablelands	Orange	2023	89.3	0	24.9	23.1	20.9	17.8	14.2	8.5	5.4	7.0
NW Slopes	Gunnedah†	2019	94.2	**24 (2)**	**94.1**	**83.4**	**58.9**	**29.0**	22.1	13.5	7.4	**11.2**

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
NW Slopes	Gunnedah†	2020	98.6	6 (0)	**34.7**	**28.1**	23.6	20.0	16.7	9.5	5.9	7.7
NW Slopes	Gunnedah	2021	86.8	0	23.9	22.0	19.8	15.9	12.3	8.0	5.4	6.5
NW Slopes	*Gunnedah#†*	*2022*	*72.9*	***4 (4)***	***28.2***	***25.8***	*23.4*	*17.1*	*11.1*	*7.7*	*5.3*	*6.4*
NW Slopes	Gunnedah†	2023	96.7	**5 (1)**	**50.1**	**31.7**	22.6	19.9	16.3	9.0	5.6	7.6
NW Slopes	Narrabri†	2019	98.6	20 (0)	**87.7**	**69.4**	**39.0**	**25.7**	16.4	7.3	4.6	7.8
NW Slopes	Narrabri†	2020	98.1	1 (0)	**42.4**	19.7	17.0	11.6	9.2	6.7	4.7	5.5
NW Slopes	Narrabri	2021	84.4	0	11.8	7.8	6.7	6.1	5.6	4.4	3.1	3.1
NW Slopes	Narrabri	2022	92.6	0	8.9	7.5	7.2	6.8	5.8	4.4	3.5	3.6
NW Slopes	Narrabri†	2023	92.9	4 (0)	**47.0**	**27.2**	16.1	8.8	7.4	5.3	4.0	4.8
NW Slopes	Tamworth†	2019	97.8	32 (0)	**164.2**	**122.7**	**97.4**	**43.5**	24.5	13.4	9.0	**14.4**
NW Slopes	Tamworth†	2020	97.8	4 (0)	**52.6**	**26.5**	21.4	15.9	11.6	8.5	5.7	6.8
NW Slopes	Tamworth	2021	95.9	0	15.5	13.1	12.6	10.8	9.1	6.6	4.7	5.1
NW Slopes	Tamworth	2022	96.2	0	20.2	14.0	13.0	10.9	8.3	5.7	4.0	4.7
NW Slopes	Tamworth	2023	97.0	0	23.4	19.3	16.4	13.0	11.5	8.5	5.5	6.6
N Tablelands	Armidale†	2019	95.9	**60 (24)**	**267.3**	**144.3**	**111.5**	**63.5**	**31.4**	21.0	9.6	**17.2**
N Tablelands	Armidale†	2020	99.2	**27 (23)**	**53.7**	**37.4**	**33.4**	**28.1**	23.1	11.7	5.8	**9.2**
N Tablelands	Armidale†	2021	99.5	**3 (3)**	**35.0**	**25.1**	22.4	19.0	16.2	10.8	4.8	7.2
N Tablelands	Armidale†	2022	98.6	**11 (11)**	**44.8**	**33.6**	**29.1**	20.2	15.8	8.6	4.6	7.1
N Tablelands	Armidale†	2023	98.1	**8 (8)**	**31.8**	**29.2**	**26.1**	22.8	19.0	12.1	5.9	**8.6**
Mid Nth Coast	*Coffs Harbour#†*	*2019*	*10.7*	*14 (0)*	***114.1***	***114.1***	***112.8***	***96.0***	***59.4***	***30.0***	*15.5*	***25.0***
Mid Nth Coast	Coffs Harbour†	2020	96.4	1 (0)	**44.9**	17.0	14.0	10.8	8.7	6.3	4.6	5.3

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
Mid Nth Coast	Coffs Harbour	2021	92.9	0	12.6	10.3	9.7	8.1	7.1	4.8	3.5	3.9
Mid Nth Coast	Coffs Harbour	2022	92.9	0	9.7	7.6	6.7	5.7	4.9	4.0	3.0	3.2
Mid Nth Coast	Coffs Harbour	2023	96.4	0	17.7	16.1	14.8	10.5	8.1	5.6	3.3	4.3
Mid Nth Coast	*Port Macquarie#†*	*2019*	*40.3*	*56 (0)*	***442.7***	***341.0***	***204.7***	***114.0***	***60.2***	***34.6***	*16.1*	***31.3***
Mid Nth Coast	Port Macquarie†	2020	92.1	3 (0)	**220.5**	**30.4**	20.0	13.5	9.7	6.9	4.7	6.5
Mid Nth Coast	Port Macquarie	2021	92.9	0	14.7	13.6	10.6	8.8	7.4	5.7	4.1	4.6
Mid Nth Coast	Port Macquarie	2022	91.2	0	9.4	8.1	7.1	6.1	5.3	4.2	3.0	3.3
Mid Nth Coast	Port Macquarie†	2023	94.8	**1 (1)**	**30.5**	17.6	15.1	11.7	9.3	6.3	4.1	5.1
SW Slopes	Albury†	2019	99.2	19 (0)	**167.1**	**89.4**	**51.9**	**25.1**	14.6	10.2	7.1	**10.1**
SW Slopes	Albury†	2020	93.2	16 (0)	**275.2**	**155.7**	**84.3**	23.6	14.7	9.9	6.6	**11.1**
SW Slopes	Albury	2021	94.2	0	24.6	20.9	18.5	16.0	13.6	9.0	6.1	7.3
SW Slopes	Albury	2022	94.8	0	15.3	14.2	13.1	11.7	10.2	7.6	5.1	5.6
SW Slopes	Albury	2023	91.8	0	17.3	15.0	13.9	11.4	10.2	7.9	6.1	6.5
SW Slopes	Wagga Wagga Nth†	2019	94.8	17 (0)	**239.6**	**90.8**	**57.3**	**25.5**	15.9	11.4	7.6	**11.3**
SW Slopes	Wagga Wagga Nth†	2020	98.4	13 (0)	**559.5**	**69.9**	**43.2**	21.1	16.0	9.8	6.1	**10.7**
SW Slopes	Wagga Wagga Nth†	2021	95.6	**1 (1)**	**25.4**	19.8	18.2	14.2	10.9	7.7	5.6	6.3
SW Slopes	Wagga Wagga Nth†	2022	98.6	**1 (1)**	**27.1**	17.4	14.7	12.6	9.8	6.6	4.5	5.3
SW Slopes	Wagga Wagga Nth	2023	96.7	0	19.2	17.0	15.5	13.2	11.0	8.2	5.9	6.6

Region	Station	Year	Data avail (%)	Exceed days (NEED)	Max daily average (µg/m³) 1-day standard (25.0 µg/m³)	Percentiles (ppm)						1-year mean (µg/m³) 1-year standard (8.0 µg/m³)
						99th	98th	95th	90th	75th	50th	
S Tablelands	*Goulburn#†*	*2019*	*14.8*	*28 (0)*	***333.7***	***333.7***	***320.5***	***253.2***	***226.7***	***82.0***	***26.1***	***60.4***
S Tablelands	Goulburn†	2020	97.3	16 (0)	**516.1**	**168.2**	**89.0**	23.7	14.1	9.2	5.3	**11.8**
S Tablelands	Goulburn†	2021	99.2	1 (0)	**25.4**	19.2	16.6	13.3	11.3	7.0	4.6	5.6
S Tablelands	Goulburn	2022	97.3	0	15.0	12.7	11.3	9.0	7.5	5.3	3.6	4.1
S Tablelands	Goulburn	2023	99.5	0	17.7	16.2	13.8	11.8	10.6	7.8	5.1	5.9

Appendix B: Exceptional event analyses

Multi-day pollution event due to hazard reduction burning in September 2023

Event description

From 7 to 15 September 2023, smoke from a number of hazard reduction burns (HRB) in Sydney resulted in 7 exceedances days due to particles. Air quality was predominately impacted by the Charlie Sector HRB that was 2,692 hectares (ha) in size and was undertaken at Holsworthy Barracks in southern Sydney (Table 31).

The PM10 1-day standard was exceeded on 7 days, while the PM2.5 1-day standard was exceeded on 6 days. Exceedances were recorded at 19 stations, with 7 stations exceeding on 4 days. Earlwood recorded the highest 1-day averages for PM10 and PM2.5 on 12 September 2023, with concentrations of 96.3 µg/m^3 and 92.2 µg/m^3 respectively.

Table 31 **Hazard reduction burns undertaken in Sydney during 7 to 15 September 2023**
Source: NSW Rural Fire Service Incident Control Online System (ICON) 2024

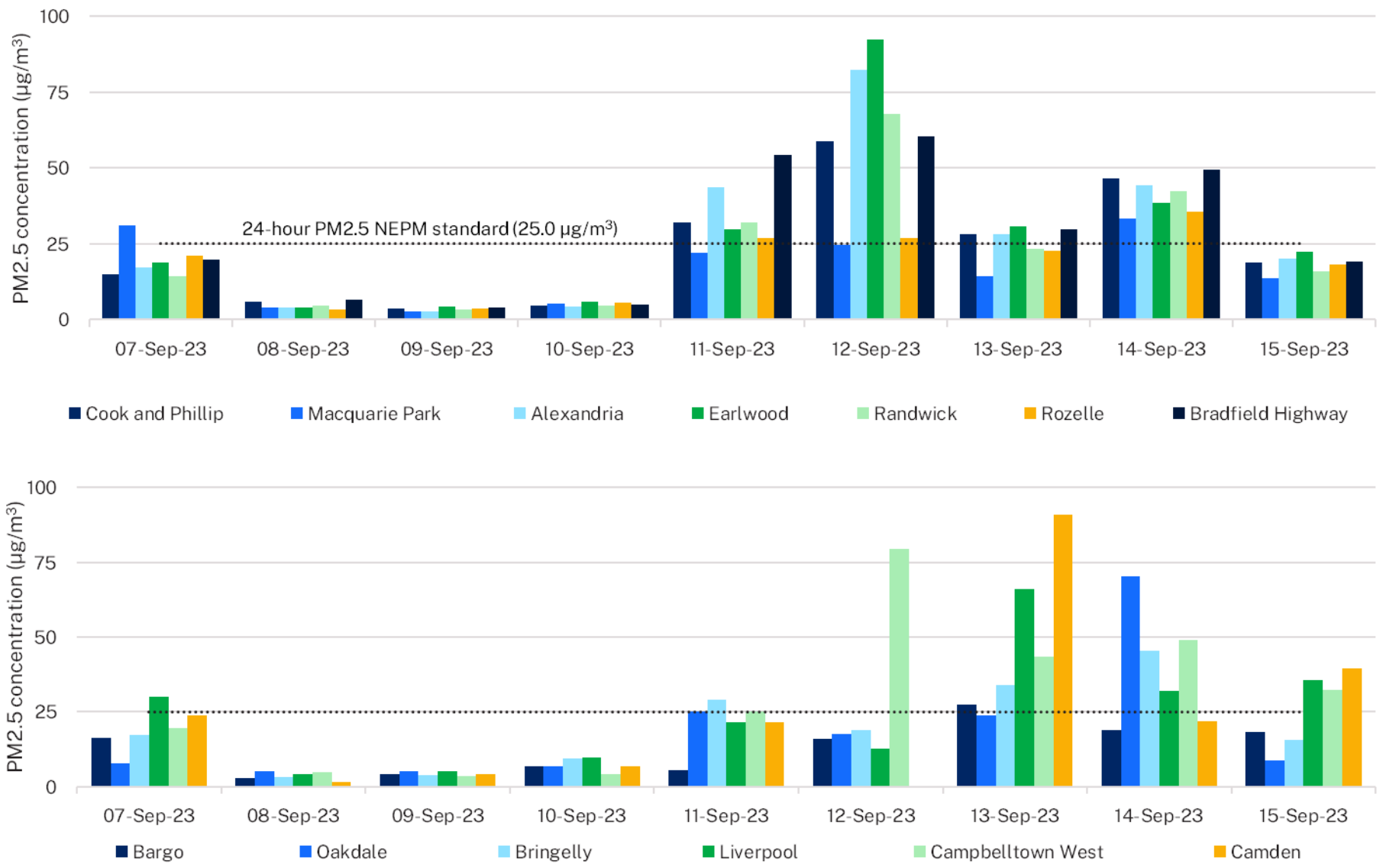
Hazard reduction burn name	Burn location	Planned burn area (hectares (ha))	Burn period
Charlie Sector	Holsworthy Barracks, Holsworthy	2,692	10/09/2023 to 14/09/2023
Ellis Trig	Terrey Hills	350	06/09/2023 to 07/09/2023
Jibbon	Bundeena	170	11/09/2023 to 12/09/2023
Timbarra	Ku-ring-gai National Park	140	10/09/2023 to 11/09/2023
Village SFAZ	Hill Top	54	07/09/2023 to 09/09/2023
Charlton Creek	Galston	315	10/09/2023 to 11/09/2023
Sackville Ferry Road	South Maroota	1.2	10/09/2023

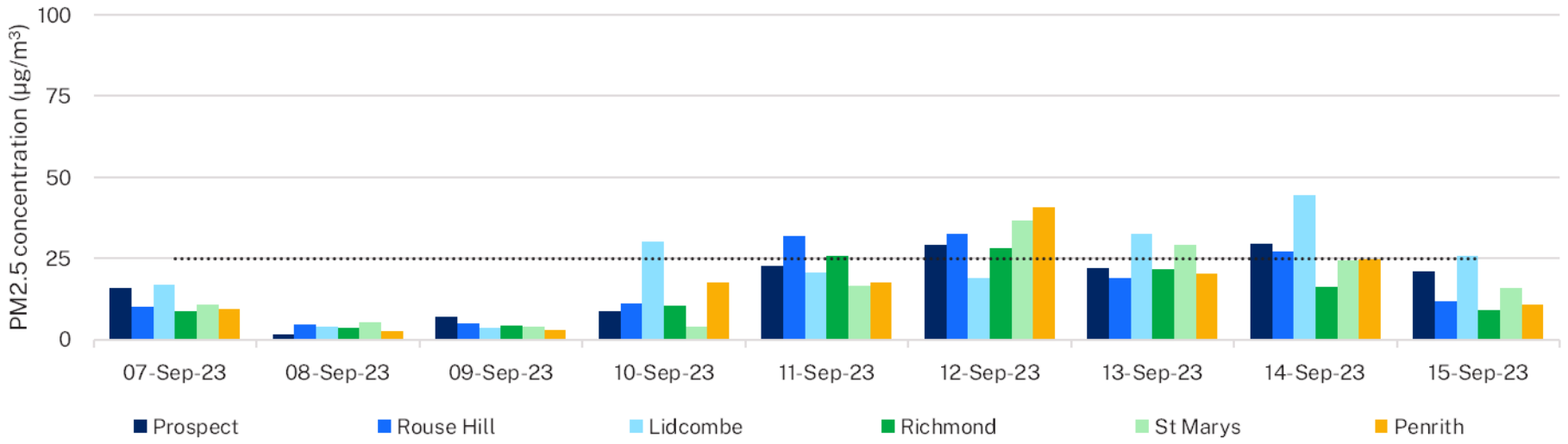
Event analysis

This period, particularly between 10 and 15 September 2023 during the Charlie Sector HRB was characterised by stable atmospheric conditions due to the presence of a high-pressure system over the state. The advent of overnight temperature inversions and calm winds trapped smoke at or near ground level, resulting in elevated particle

concentrations across Sydney overnight and in the early morning, particularly during 11 to 14 September 2023. Stations located closest to the Charlie Sector fireground generally recorded the highest 1-day averages and the most exceedances. Figure 14 shows this to be the case, as stations in Sydney East, such as Cook and Phillip, Alexandria and Earlwood observed elevated PM2.5 concentrations during this period, along with Camden, Liverpool and Campbelltown West, to the west of the burn site.

Prior to the Charlie Sector HRB commencing on 10 September 2023, exceedances at 2 stations were caused by the Ellis Trig HRB (Table 31). Rainfall across Sydney on 8 and 9 September delayed the Charlie Sector HRB which commenced on 10 September 2023.


PM2.5 concentration (µg/m³)
100
75
50
25
0
24-hour PM2.5 NEPM standard (25.0 µg/m³)
07-Sep-23
08-Sep-23
09-Sep-23
10-Sep-23
11-Sep-23
12-Sep-23
13-Sep-23
14-Sep-23
15-Sep-23
Cook and Phillip
Macquarie Park
Alexandria
Earlwood
Randwick
Rozelle
Bradfield Highway
PM2.5 concentration (µg/m³)
100
75
50
25
0
07-Sep-23
08-Sep-23
09-Sep-23
10-Sep-23
11-Sep-23
12-Sep-23
13-Sep-23
14-Sep-23
15-Sep-23
Bargo
Oakdale
Bringelly
Liverpool
Campbelltown West
Camden



Note: Camden data for 12 September 2023 is missing due to communications issues.

Figure 14 One-day average PM2.5 concentrations at selected stations in Sydney during 7 to 15 September 2023

Smoke from the Duck Creek Pilliga Forest bushfire in December 2023

Event description

Igniting on 8 December 2023 in the Pilliga State Forest near Duck Creek in the North West Slopes region, smoke from this fire resulted in 6 particle exceedance days. Exceedances were observed in the North West Slopes, Sydney East, Central West Sydney and the Upper Hunter regions. Exceedances of the PM10 1-day standard (50.0 µg/m^3) were observed on 3 days, while the 1-day PM2.5 standard (25.0 µg/m^3) was exceeded on all 6 days.

Five exceedance days occurred exclusively in the North West Slopes region during 9 to 18 December 2023. On 19 December 2023, smoke from this bushfire resulted in particle exceedances in Sydney (Sydney East and Central West Sydney), the Upper Hunter and at Gunnedah in the North West Slopes region.

Overall, exceedances were observed at 8 stations, including 7 on 19 December 2023. Both Gunnedah and Narrabri recorded 4 exceedance days, while Gunnedah recorded the highest 1-day averaged PM10 and PM2.5 concentrations during this event, with 61.3 µg/m^3 and 50.1 µg/m^3 respectively observed on 17 December 2023.

7.1.1 Event analysis

PM10 and PM2.5 exceedances due to smoke from the Duck Creek Pilliga Forest bushfire at Gunnedah and Narrabri between 9 and 18 December 2023 (Table 32) occurred due to hot, dry and at times windy conditions driving the growth of the bushfire.

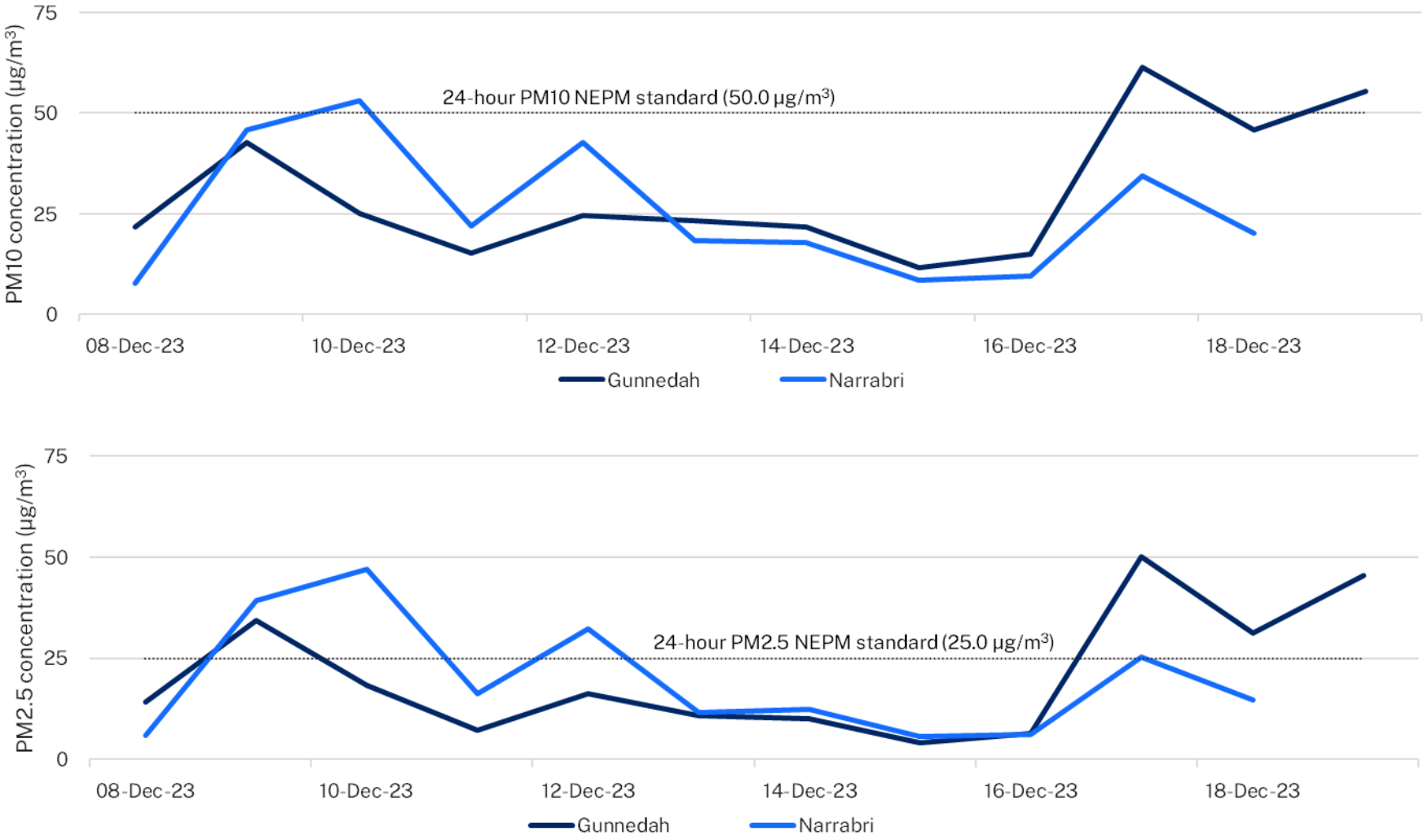


Figure 15 **One-day average PM10 (top) and PM2.5 (bottom) concentrations at Gunnedah and Narrabri during 9 to 18 December 2023**

Overnight on 18 December 2023, a fire-generated thunderstorm developed in association with the Duck Creek Pilliga Forest bushfire, generating large amounts of smoke due to erratic fire behaviour. Under the influence of generally north to north-westerly winds, smoke from the bushfire travelled towards Sydney and the Upper Hunter.

Due to the broad influence of a high-pressure system in the Tasman Sea, an overnight inversion was present during the early morning of 19 December 2023 in Sydney and the Upper Hunter. Following the erosion of the inversion, smoke from the Duck Creek fire sitting aloft likely mixed down to the surface, resulting in elevated PM10 and PM2.5 concentrations across Sydney and the Upper Hunter. Figure 16 illustrates this at Macquarie Park for 19 December 2023. The eroding inversion is characterised by a decrease in humidity and an increase in wind speed. Subsequently, hourly PM2.5 concentrations increased into the early afternoon.

Table 32 **PM10 and PM2.5 exceedance days across the AAQ NEPM network due to the Duck Creek Pilliga Forest bushfire between 9 and 19 December 2023**

Date	Exceeding station (PM10 1-day average concentration, µg/m^3)	Exceeding station (PM2.5 1-day average concentration, µg/m^3)
9/12/2023		Gunnedah (34.4), Narrabri (39.3)
10/12/2023	Narrabri (53.0)	Narrabri (47.0)
11/12/2023		
12/12/2023		Narrabri (32.3)
13/12/2023		
14/12/2023		
15/12/2023		
16/12/2023		
17/12/2023	Gunnedah (61.3)	Gunnedah (50.1), Narrabri (25.3)
18/12/2023		Gunnedah (31.2)
19/12/2023	Bradfield Highway (51.2), Gunnedah (55.5)	Alexandria (25.2), Bradfield Highway (29.4), Gunnedah (45.5), Macquarie Park (30.4), Merriwa (27.1), Muswellbrook (25.2), Rouse Hill (29.4)

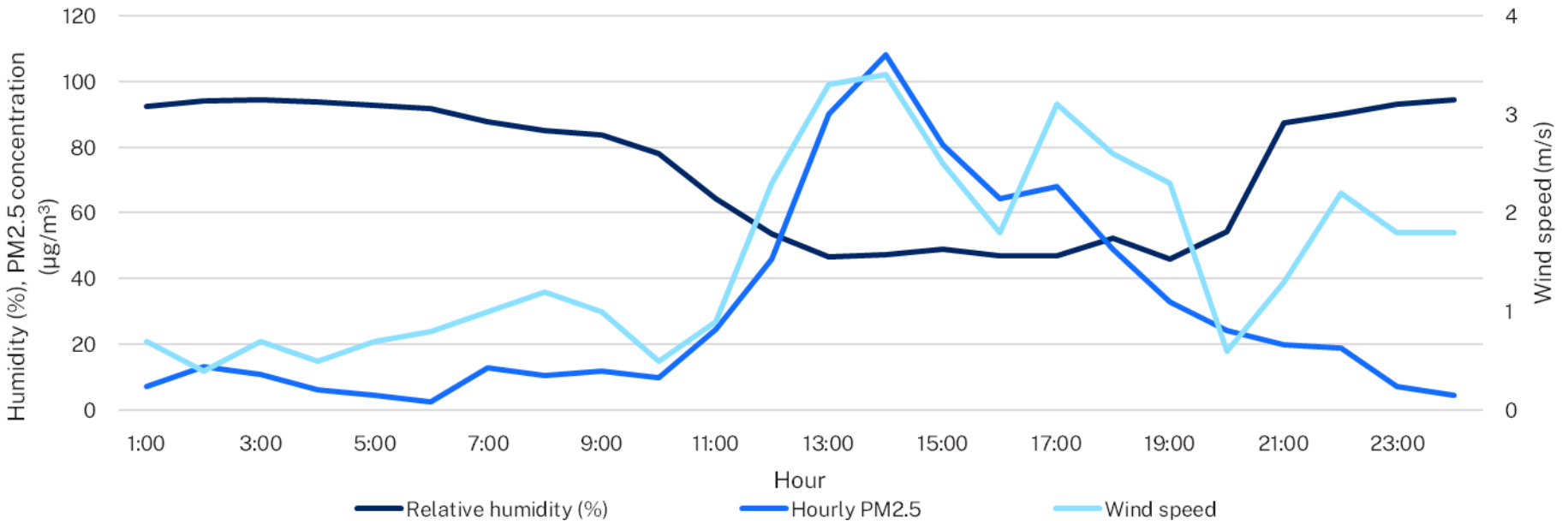


Figure 16 **Hourly averages for relative humidity, PM2.5 and wind speed on 19 December 2023**