

Air Quality Monitoring Network

Namoi/North West Slopes Summer 2023–24



Air quality in the Namoi/North West Slopes region¹ was in the good air quality category for 76 days (84% of the time) during summer 2023–24. During December 2023, air quality was largely influenced by the Duck Creek Pilliga Forest bushfire and a continuing drying trend across the region.

- Across the 6 monitoring stations operating in the region, pollutants met the national benchmarks² on 85 days (93% of the time, Figure 1).
- Daily PM10³ levels were above the national benchmark on 5 days during summer 2023–24. This occurred at Gunnedah, Narrabri, Maules Creek and Werris Creek.
- Daily PM2.5 levels were above the national benchmark on 6 days during summer 2023–24. All stations except Tamworth recorded daily PM2.5 levels above the national benchmark.
- Ozone (O₃) and nitrogen dioxide (NO₂) met national benchmarks at Gunnedah and Tamworth.

The Namoi/North West Slopes region experienced above to very much above average maximum temperatures, while minimum temperatures were very much above average across the region. Rainfall during summer 2023–24 was average to below average.

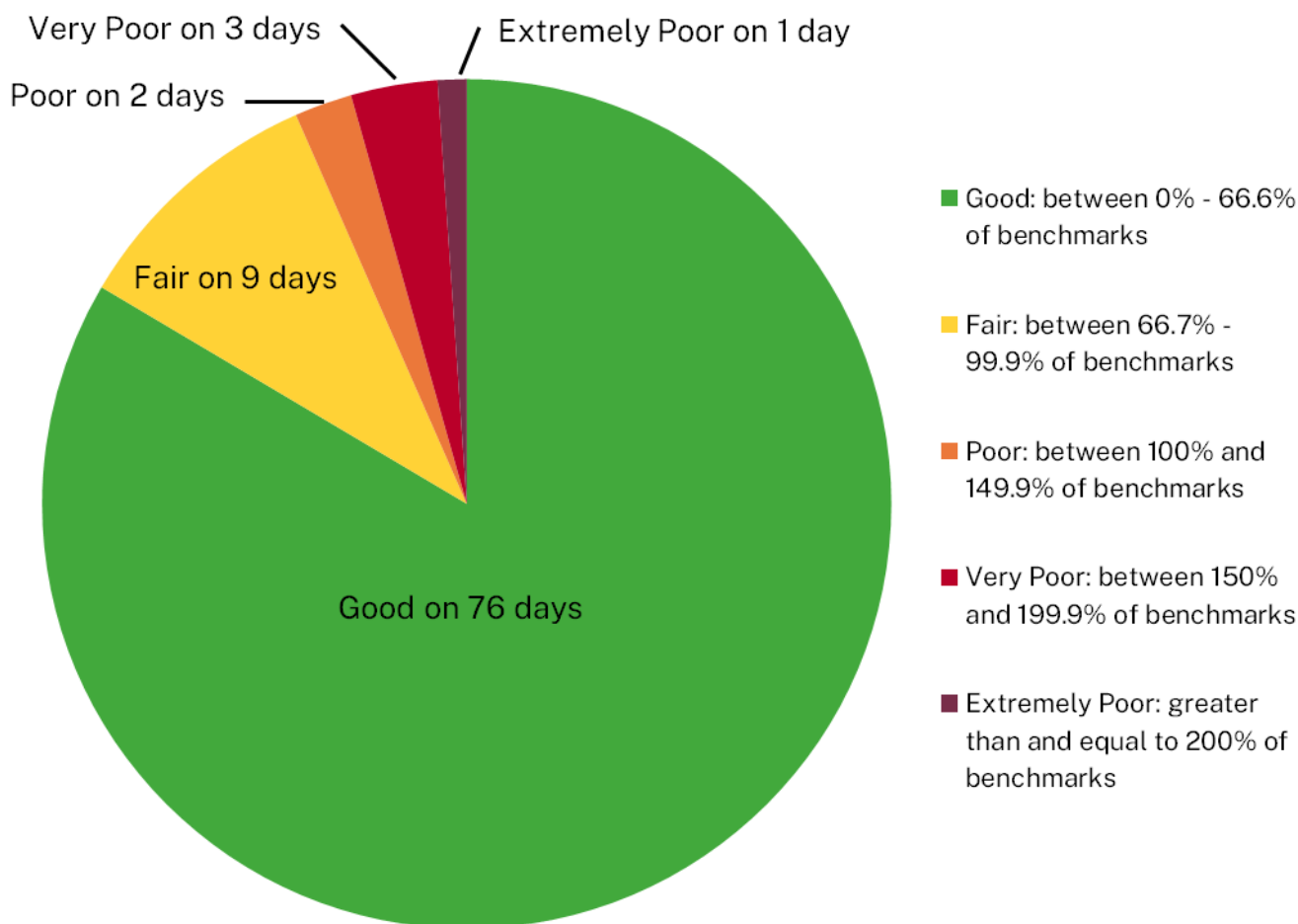


Figure 1 Regional air quality in the Namoi/North West Slopes region during summer 2023–24

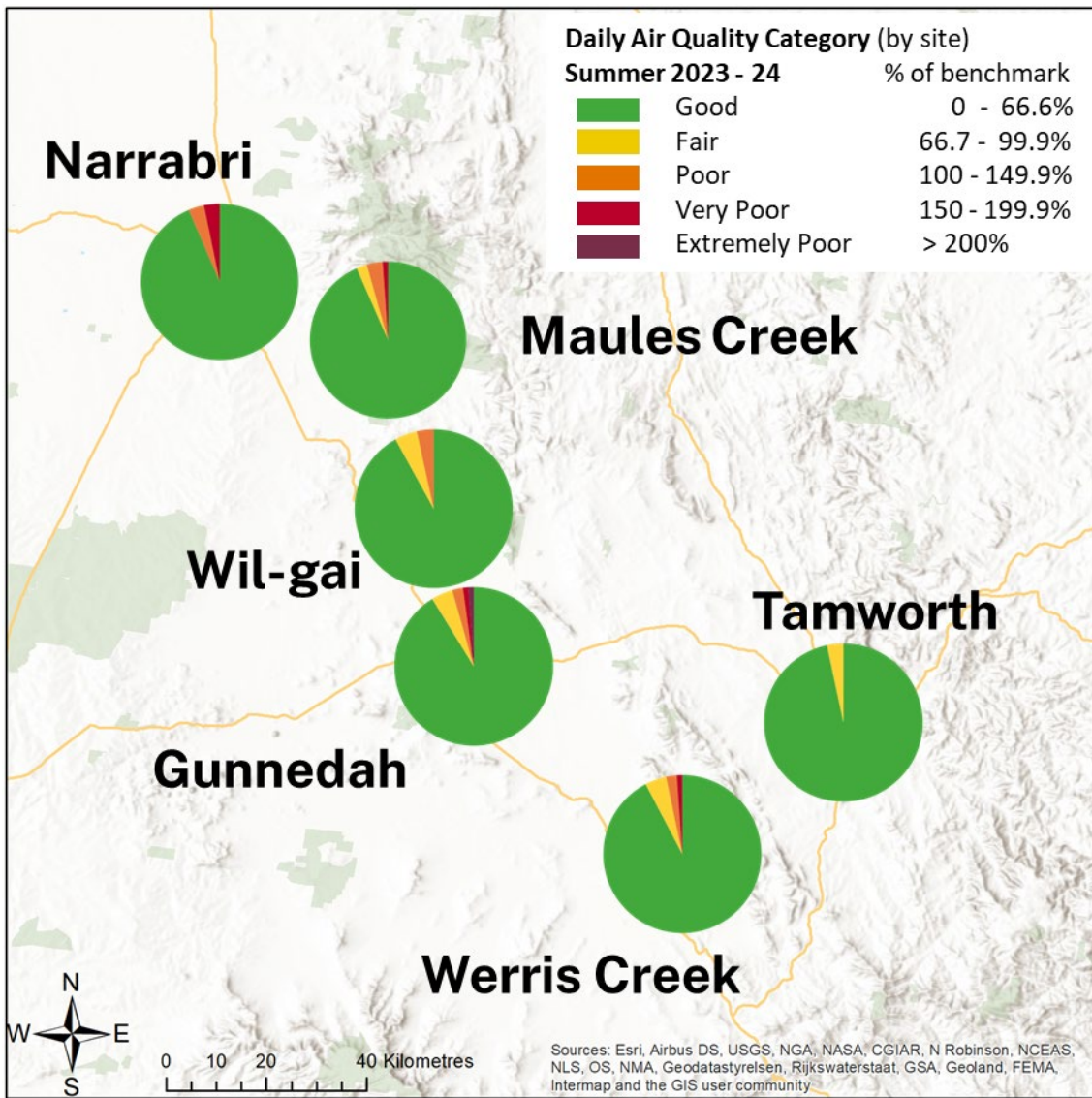


Figure 2 Air quality categories at each monitoring station in the Namoi/North West Slopes region during summer 2023–24

Summary statistics: summer 2023–24

There were 6 days above the national benchmarks during summer 2023–24, all of which were due to PM10 and/or PM2.5. All particle levels above the benchmarks were due to smoke from the Duck Creek Pilliga Forest bushfire in December 2023. PM10 levels above the national benchmark occurred on 5 days and were recorded on 2 days at Gunnedah and Maules Creek, and one day each at Narrabri and Werris Creek. PM2.5 levels exceeded the national benchmark on 6 days. These exceedances were recorded on 4 days at Gunnedah, Narrabri, and Maules Creek, and on 3 days at Werris Creek (Table 1).

Ozone and nitrogen dioxide levels remained below national benchmarks during summer 2023–24. Tamworth and Wil-gai stations did not record any exceedance of the national benchmarks.

Table 1 Number of days above each benchmark, by station, for summer 2023–24.

Station	PM10 daily benchmark [50 µg/m ³]	PM2.5 daily benchmark [25 µg/m ³]	NO ₂ hourly benchmark ⁴ [8 pphm]	O ₃ 8-hourly benchmark [6.5 pphm]
Gunnedah	2	4	0	0
Narrabri	1	4	–	–
Tamworth	0	0	0	0
Maules Creek	2	4	–	–
Werris Creek	1	3	–	–
Wil-gai	0	3	–	–

‘–’ not monitored.

Air quality: particle pollution summer 2023–24

Of the 7 days above the particle benchmarks, air quality on 4 of those days reached extremely poor at 4 monitoring stations during December 2023 due to the Duck Creek Pilliga Forest bushfire (Figure 3 and Figure 4).

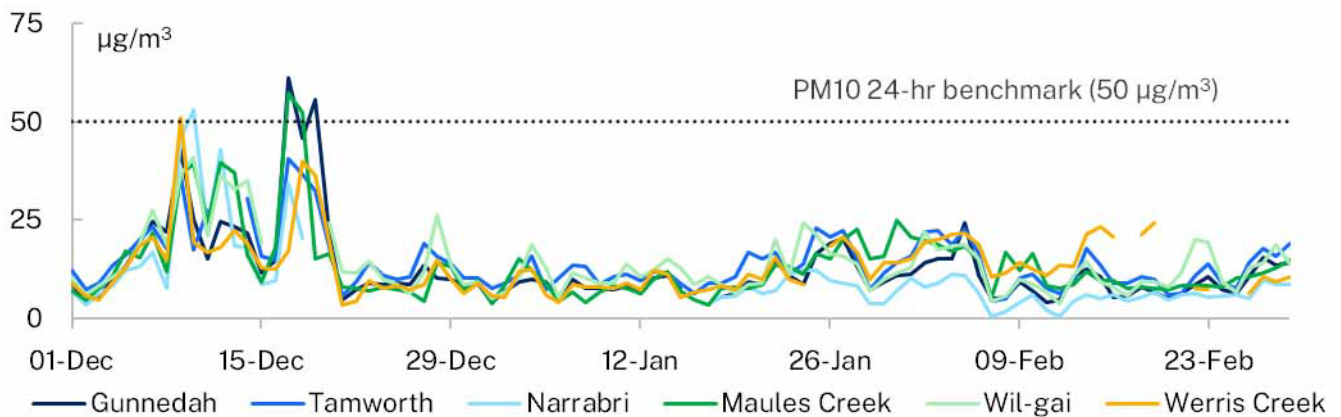


Figure 3 Daily average PM10 in summer 2023–24⁵

Gunnedah, Tamworth, Narrabri and Maules Creek also recorded PM2.5 concentrations above the national benchmark during summer 2024 (Figure 3). These exceedances are likely due to smoke from the Duck Creek Pilliga Forest bushfire during December 2023.

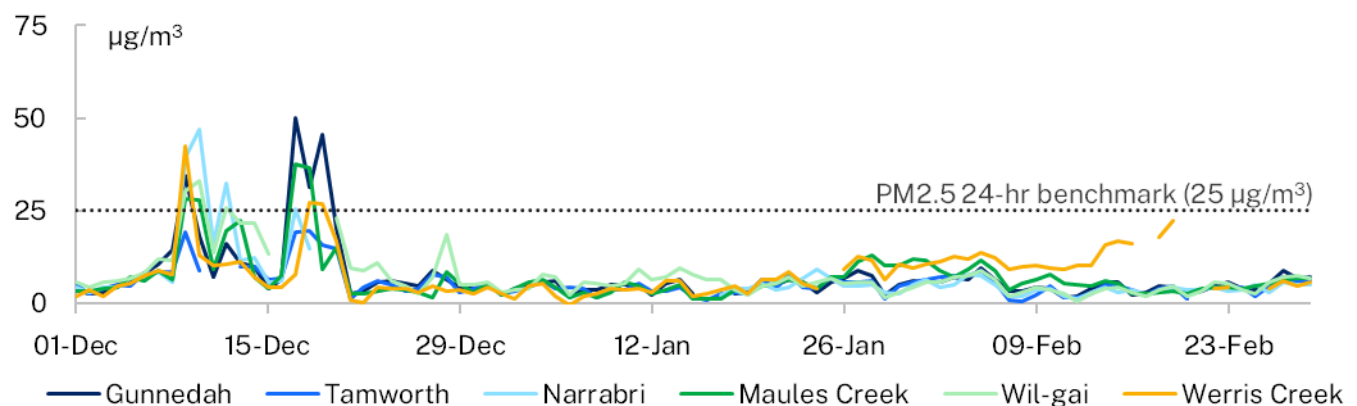


Figure 4 Daily average PM2.5 in summer 2023–24⁵

Air quality: gaseous pollution summer 2023–24

Figure 5 and Figure 6 show gaseous trends at the Gunnedah and Tamworth monitoring stations during summer 2023–24. Both ozone and nitrogen dioxide remained below national benchmarks throughout the season.

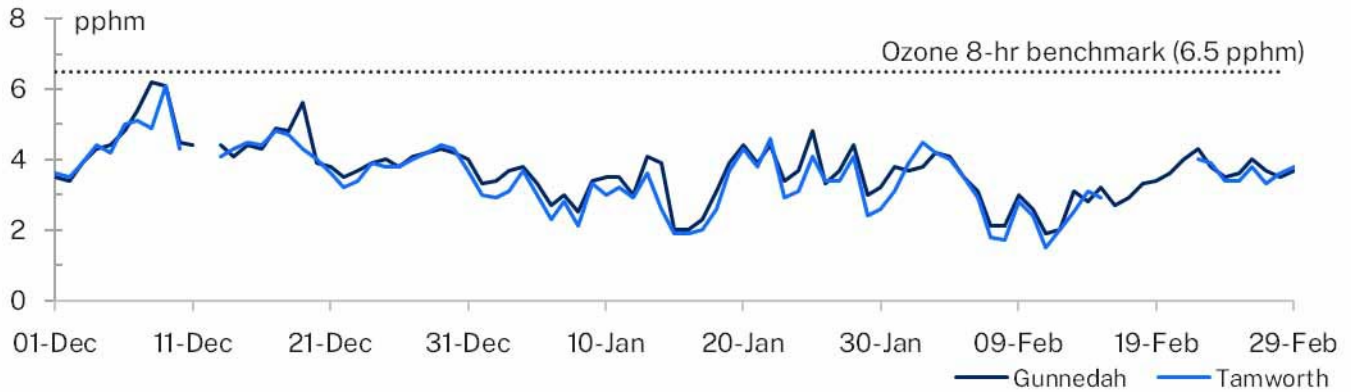


Figure 5 Ozone daily maximum 8-hour average concentrations at Gunnedah and Tamworth, during summer 2023–24⁵

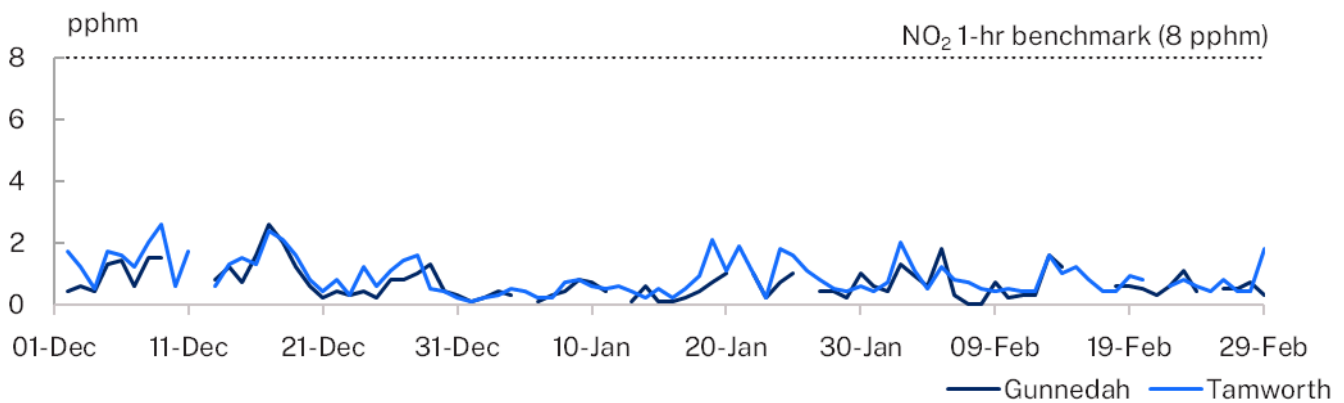


Figure 6 Nitrogen dioxide daily maximum 1-hour average concentrations at Gunnedah and Tamworth, during summer 2023–24⁵

Seasonal weather and climate

Summer 2023–24 rainfall totals were average to below average throughout most of the Namoi/North West Slopes during summer 2023–24 despite a continuing drying trend throughout the region. Maximum temperatures were above to very much above average, while minimum temperatures were very much above average for the region during summer 2023–24^{6,7}.

Drought conditions and dust activity

The NSW DPI Combined Drought Indicator (CDI) shows that 45% of New South Wales is in one of the 3 drought categories at the end of February 2024 (Figure 6)⁸. DustWatch⁹ reported few hours of dust in the region during summer 2023–24. Groundcover was stable during summer.

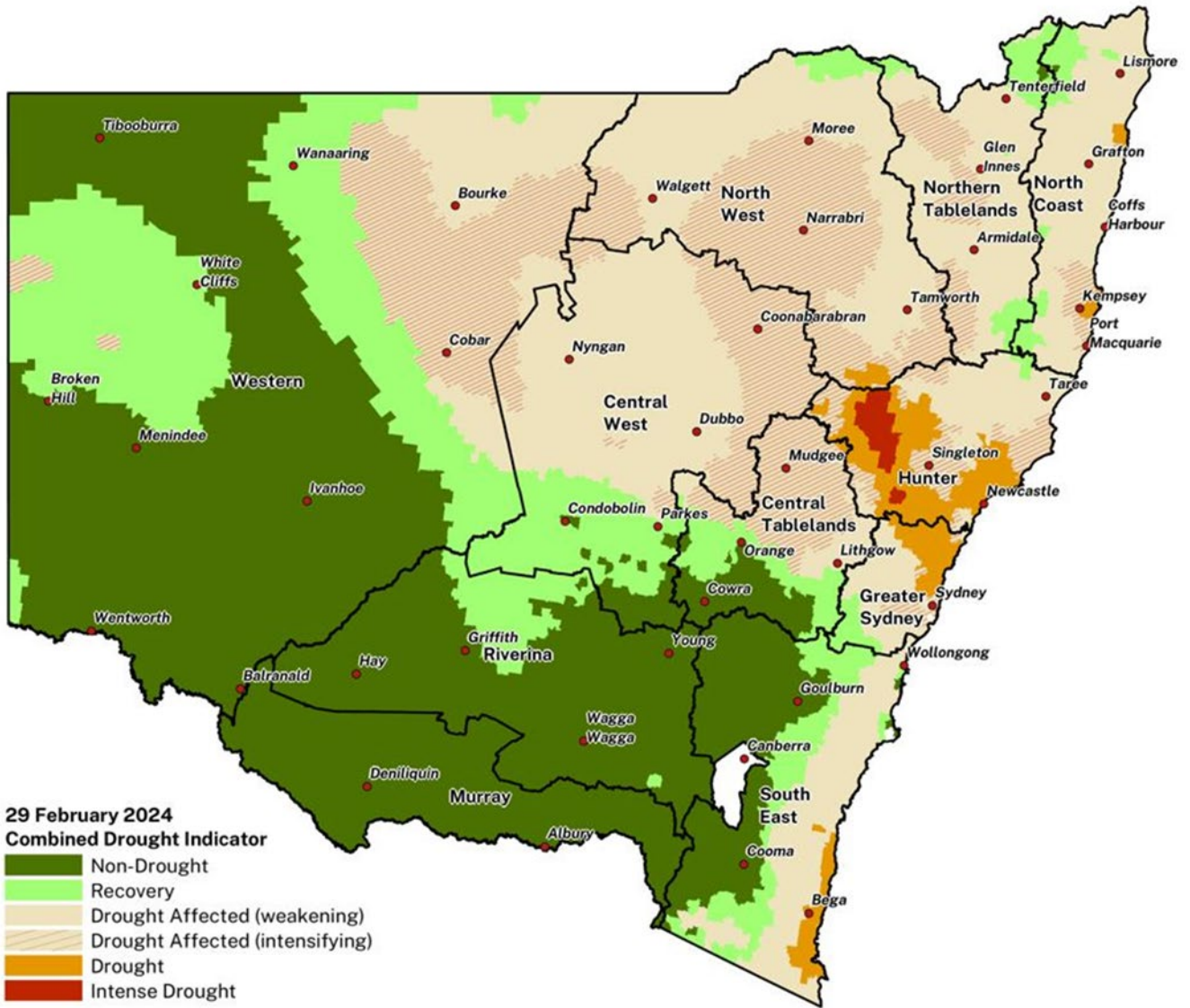


Figure 7 Department of Primary Industries NSW Combined Drought Indicator – 12 months to 29 February 2024

Figure produced by NSW Department of Primary Industries © State of New South Wales EDIS v2.2

Rainfall

The Bureau of Meteorology’s (BoM) seasonal rainfall summary (Figure 7) shows average to below average rainfall through the region during summer 2023–24. Rainfall totals across the region ranged between 100 to 300 millimetres (mm), which was 25 to 200 mm higher than summer 2022–23 and similar to totals from summer 2021–22. However, summer 2023–24 rainfall totals were 50 to 200 mm lower than summer 2020–21.

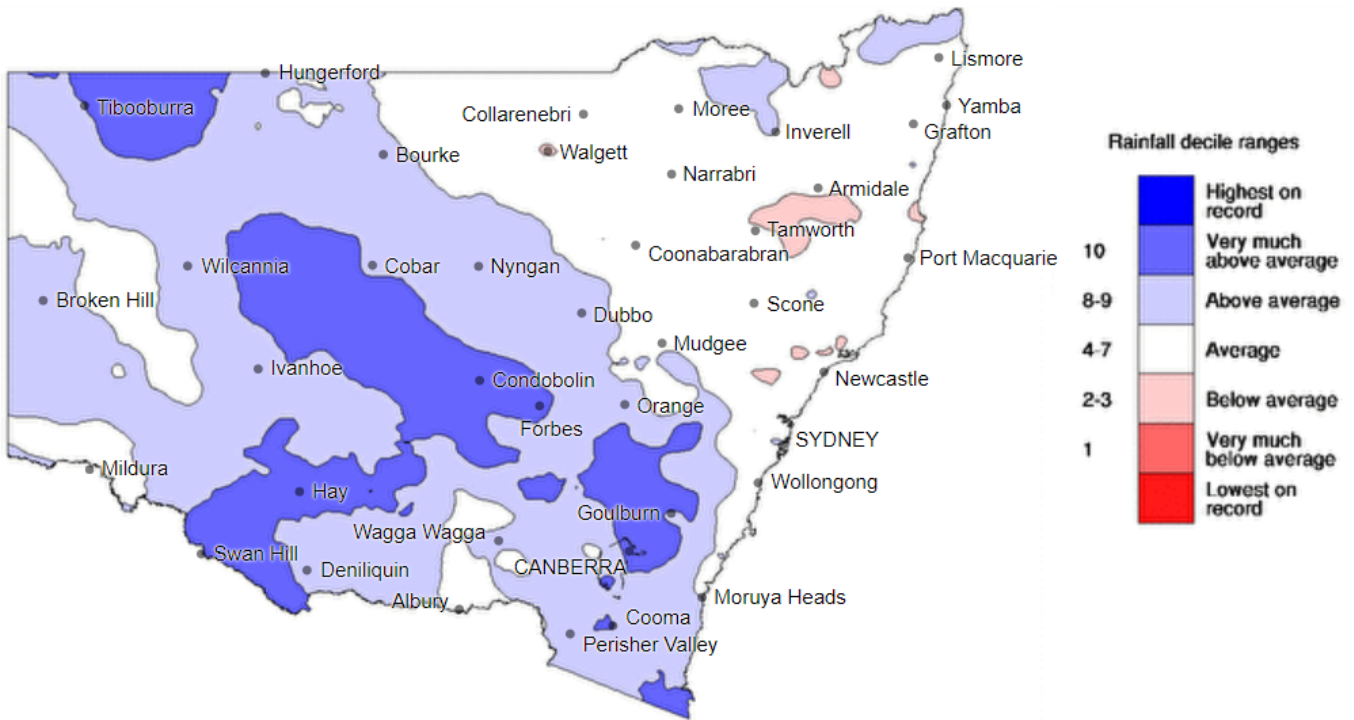


Figure 8 NSW rainfall deciles for summer 2023–24, (Commonwealth of Australia 2023, Bureau of Meteorology).

Figure credit: ©Commonwealth of Australia 2024, Bureau of Meteorology. Base period: 1900-Feb 2024. Dataset: AGCD v2. Issued 20/11/2024

Seasonal rainfall totals for summer 2023–24 at Tamworth AWS (198.4 mm) and Gunnedah AWS (140.2 mm)¹⁰ BoM stations were lower than their respective average long-term summer totals (212.4 mm and 190.3 mm). The department’s Gunnedah air quality monitoring station (Gunnedah AQM) recorded 153.8 mm of rainfall (Figure 8), below the Gunnedah AWS long-term total for summer (189.4 mm).

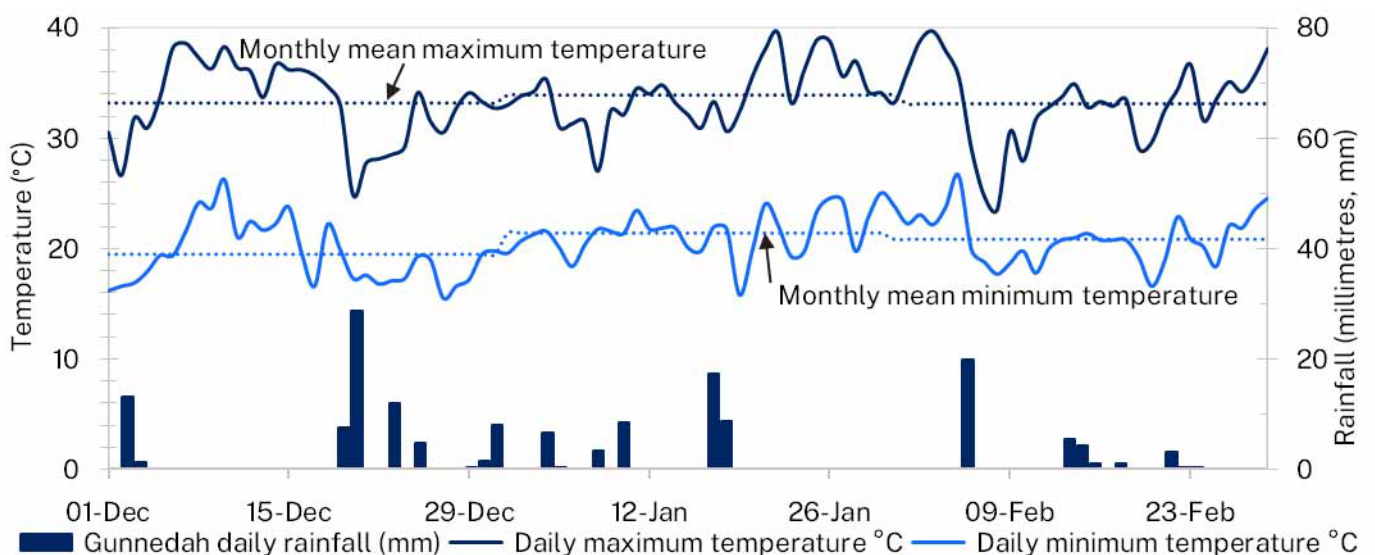


Figure 9 Daily maximum and minimum temperatures and daily rainfall totals at Gunnedah AQM station during summer 2023–24

Temperature

Maximum daytime temperatures across the Namoi/North West Slopes region were above average to very much above average (Figure 9), while minimum temperatures were very much above average.

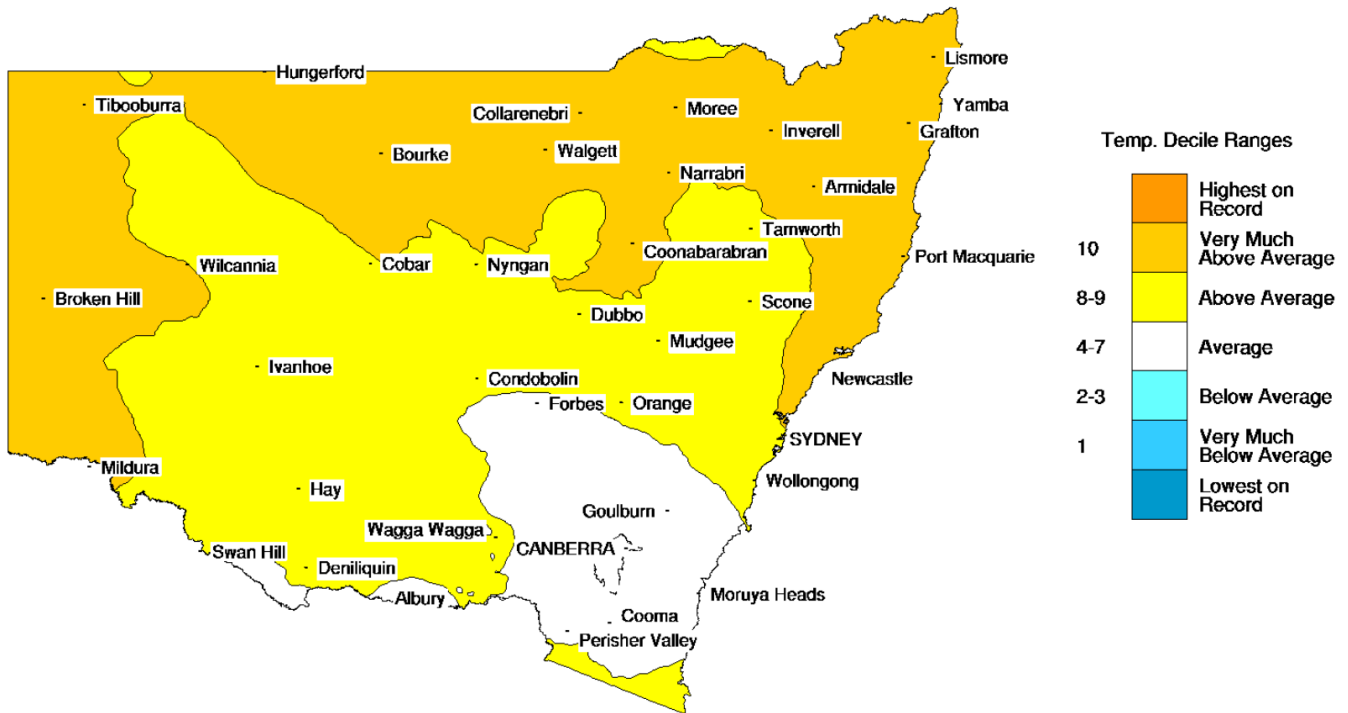


Figure 10 NSW maximum temperature deciles for summer 2023–24 (Commonwealth of Australia 2023, Bureau of Meteorology)

Figure credit: ©Commonwealth of Australia 2024, Bureau of Meteorology. ID code: AWAP. Issued 28/08/2024

Summer maximum temperatures at Gunnedah AQM station ranged from 23.5 to 39.7 °C (dark blue line in Figure 8), with an average of 33.4 °C. This equalled the long-term summer maximum at Gunnedah AWS (33.4 °C), which is above average for the Namoi/North West region, as indicated in Figure 9.

Minimum temperatures at the Gunnedah AQM station were also above average. Minimum temperatures ranged from 15.5 to 26.7°C (light blue line in Figure 8) with an average of 20.6 °C, 3 °C higher than the Gunnedah AWS long-term average summer minimum (17.6 °C).

Wind

The topography of the Namoi/North West Slopes region is characterised by highlands in the east and south, and to the west lies a broad floodplain. The Namoi River flows north west through Gunnedah and Narrabri, while the Peel River flows north west through Tamworth. The prevailing winds in the region generally follow the direction of these river valleys, from south east to north west.

The wind rose map at Figure 10 shows wind direction and speed in the region, with the length of the bars showing the percentage of time wind blows from each direction, and colours along the bars indicating wind speed categories.

As is typical for the Namoi region during the summer months, prevailing winds during summer 2023–24 were generally light to moderate south-easterlies. However, some influence from other sectors was observed from all 3 stations.

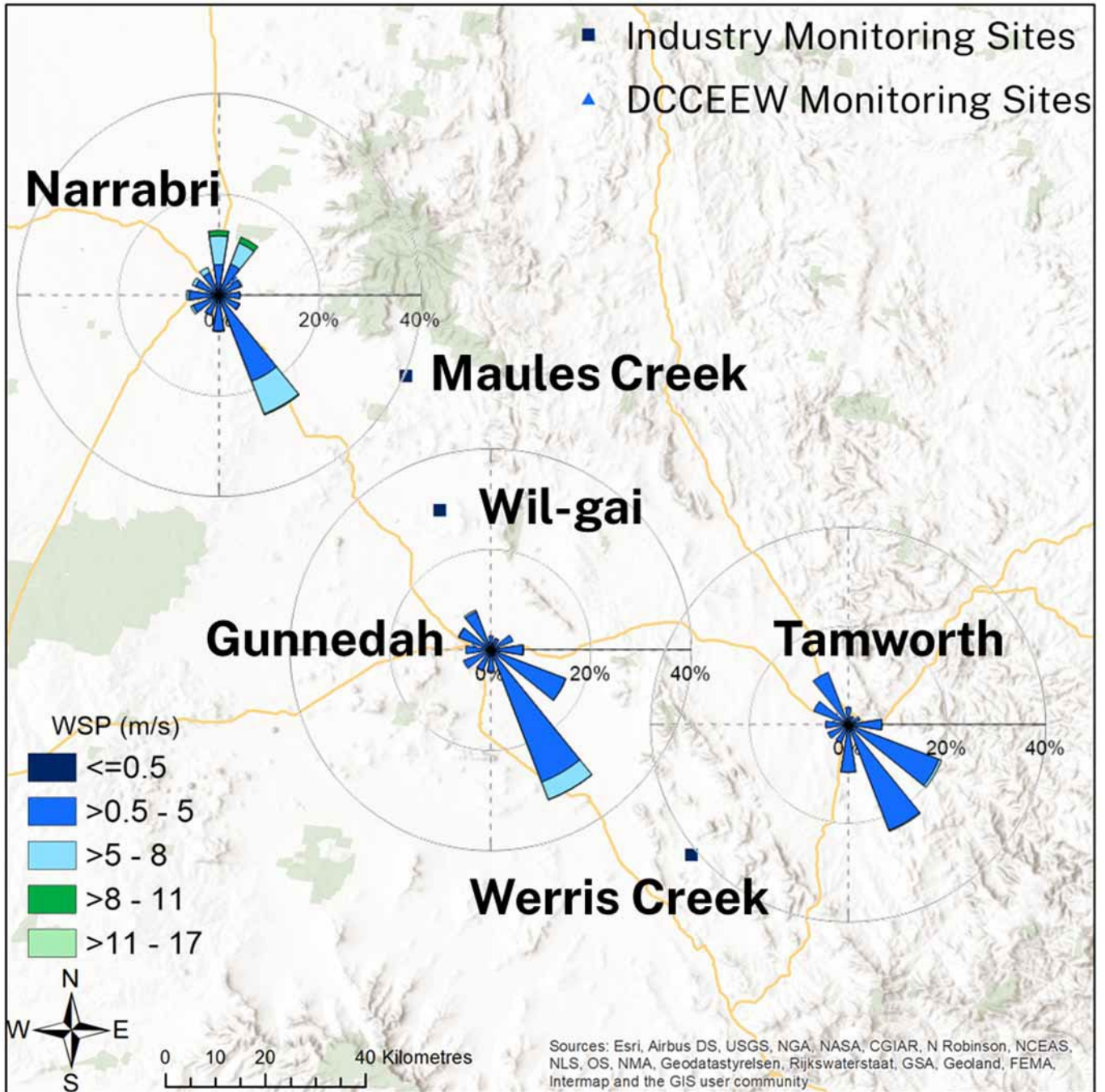


Figure 11 Wind rose map for the Namoi/North West Slopes during summer 2023–24.

Pollution roses from hourly particle data

The seasonal pollution rose maps below for summer 2023–24 (Figure 11) show the hourly PM₁₀ and PM_{2.5} particle concentrations recorded during the season for the 3 regional centres (Narrabri, Gunnedah and Tamworth). Elevated hourly PM₁₀ and PM_{2.5} concentrations occurred at all 3 stations between 8 to 19 December 2023 due to the impact of bushfire smoke from the Duck Creek Pilliga Forest bushfire. Although to the south and south west of Gunnedah, Narrabri and Tamworth, the highest concentrations occurred overnight on generally light to moderate winds. Narrabri recorded some elevated hourly PM₁₀ and PM_{2.5} concentrations on moderate to strong north to north easterly winds.

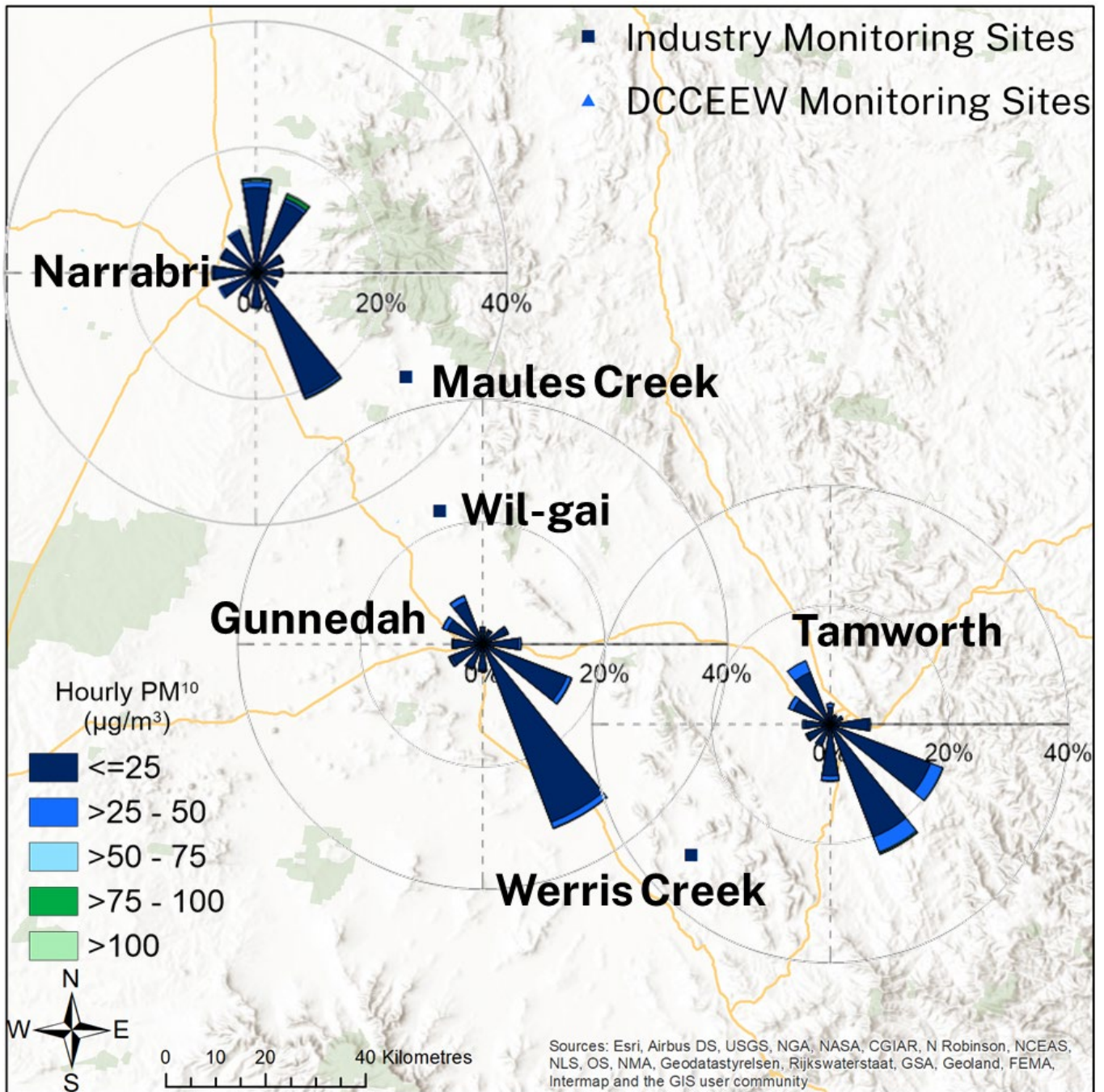


Figure 12 Pollution roses for hourly PM₁₀ for summer 2023–24

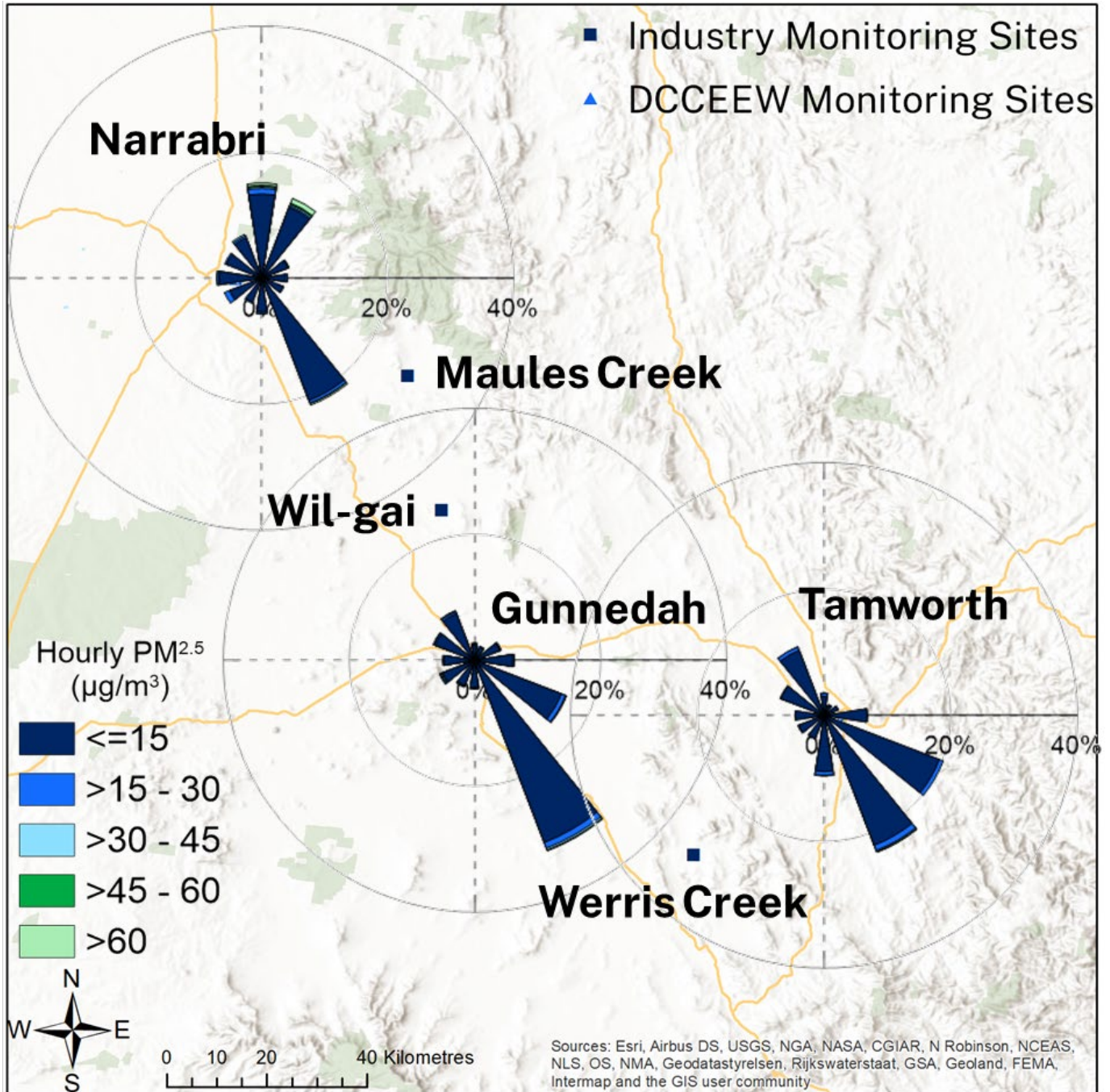


Figure 13 Pollution rose for hourly $\text{PM}_{2.5}$ for summer 2023–24

Online performance of monitoring stations

The target performance for air quality monitoring at the Department of Climate Change, Energy, the Environment and Water (DCCEEW) stations is at least 95% data availability for all criteria pollutants and meteorological parameters. The maximum online time attainable for gases, NO₂ and O₃, is 96% due to daily calibrations.

Table 2 presents online performance of the monitoring stations at Gunnedah, Narrabri, and Tamworth during summer 2023–24:

- PM10 and PM2.5 data at Narrabri did not meet online targets due to instrumentation faults.
- Online targets for ozone were not met at Tamworth due to instrumentation faults.

Table 2 Online performance (%) from 1 December 2023 to 29 February 2024.

Station	Particles PM10 daily	Particles PM2.5 daily	Gases NO ₂ hourly	Gases O ₃ hourly	Meteorology wind hourly
Gunnedah	98.8	98.8	90.5	95.3	100.0
Narrabri	68.7	68.5	–	–	100.0
Tamworth	98.7	97.7	94.3	89.9	100.0

‘– ‘ not monitored.

© 2024 State of NSW and Department of Climate Change, Energy, the Environment and Water
The State of NSW and the Department of Climate Change, Energy, the Environment and Water are pleased to allow this material to be reproduced in whole or in part for educational and non-commercial use, provided the meaning is unchanged and its source, publisher and authorship are acknowledged.

The Department of Climate Change, Energy, the Environment and Water has compiled this report in good faith, exercising all due care and attention. No representation is made about the accuracy, completeness, or suitability of the information in this publication for any particular purpose. The department shall not be liable for any damage which may occur to any person or organisation taking action or not on the basis of this publication. Readers should seek appropriate advice when applying the information to their specific needs.

This report was prepared by Jo Heidenreich and reviewed by Toan Trieu, Margaret Haak and Sean Watt.

Published by: Department of Climate Change, Energy, the Environment and Water, Locked Bag 5022, Parramatta NSW 2124. Ph: 131 555 Email: info@environment.nsw.gov.au; Web: www.environment.nsw.gov.au

ISSN 2209-9458 EH 2024/00394 December 2024

¹ The NSW Department of Climate Change, Energy, the Environment and Water (NSW DEECCW) operates air quality monitoring stations at Gunnedah, Tamworth and Narrabri. Local coal mining companies provide data from industrial air quality monitoring stations at Maules Creek, Wil-gai and Werris Creek on a weekly basis to the NSW Environmental Protection Agency (EPA) as part of the Namoi Region Air Quality Monitoring Project (NRAQMP).

² Data provided by industry from the Maules Creek, Werris Creek and Wil-gai monitoring stations are not used for compliance purposes under the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) standards. Data from these stations may provide a useful comparison with other DCCEEW stations across NSW. For this reason, AAQ NEPM standards are referred to as benchmarks in this document.

³ PM10 and PM2.5 refer to airborne particles, less than or equal to 2.5 and 10 micrometres in diameter, respectively, measured in micrograms per cubic metre ($\mu\text{g}/\text{m}^3$). NO₂ refers to nitrogen dioxide and O₃ refers to ozone, both of which are measured in parts per hundred million by volume or parts of pollutant per hundred million parts of air (pphm).

⁴ AAQ NEPM was amended in 2021. The 1-hour NO₂ standard decreased from 12 pphm to 8 pphm, while the 1-hour and 4-hour rolling ozone averages were replaced with an 8-hour rolling average ozone standard of 6.5 pphm.

⁵ Data losses at industry stations were due to power outages, lightning strikes and instrument faults. Data gaps at DCCEEW stations were due to maintenance and instrument issues.

⁶ Bureau of Meteorology Seasonal Climate Summary for New South Wales in Summer 2024. Accessed January 2024.

⁷ Bureau of Meteorology temperature and rainfall decile maps and 1-year to 3-year rainfall difference maps for summer 2023/24. Accessed September 2024

⁸ Department of Primary Industries State seasonal update – February 2024. Accessed January 2024.

⁹ NSW Department of Climate Change, Energy, the Environment and Water DustWatch Reports: December 2023, January 2024 and February 2024, Department of Planning and Environment, accessed October 2024.

¹⁰ Daily Weather Observations - Gunnedah Airport Automatic Weather Station (AWS), accessed July 2024.