

Air Quality Monitoring Network

Namoi / North West Slopes spring 2023



Air quality in the Namoi/North West Slopes region met the national benchmarks¹ on 99% of days (Figure 1) during spring 2023 despite the region experiencing dry conditions.

- Air quality in the Namoi/North West Slopes region was fair on 9 days (10% of the time) and poor on one day (1% of the time).
- Across the 6 monitoring stations operating in the region², air quality was in the good air quality category for 81 days (89% of the time) (Figure 1).
- One exceedance of the daily PM_{2.5}³ benchmark was observed at the Wil-gai industry monitoring station on 3 November 2023.
- PM₁₀ and gaseous pollutants nitrogen dioxide (NO₂) and ozone (O₃) all met national benchmarks at all stations during spring 2023.

Throughout the region, maximum temperatures were very-much-above average, while minimum temperatures were above average. Rainfall was average to below average throughout the region during spring. Groundcover throughout the region was stable, which likely helped limit dust activity.

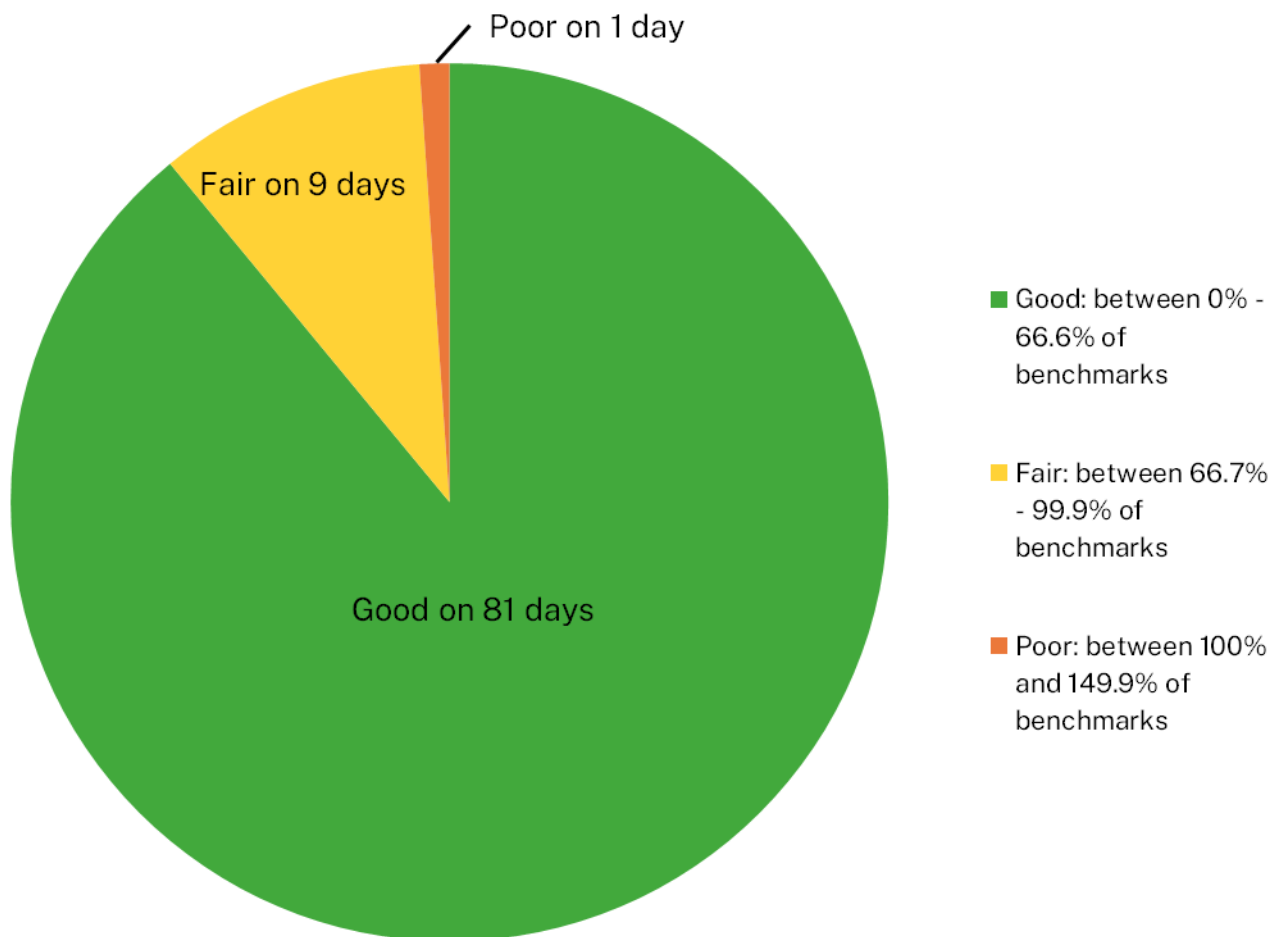


Figure 1 Regional air quality in the Namoi/North West Slopes region during spring 2023

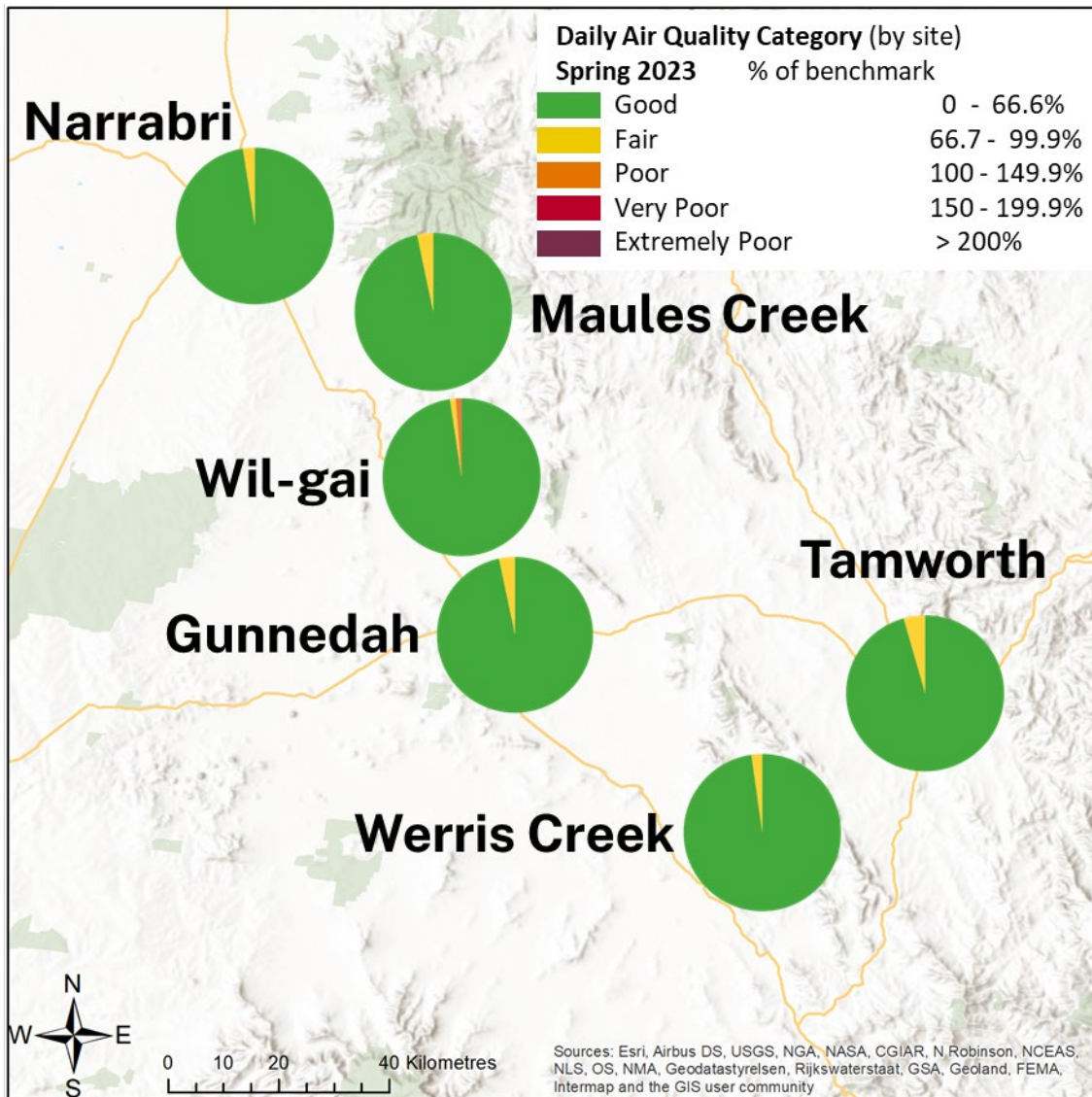


Figure 2 Air quality categories at each monitoring station in the Namoi/North West Slopes region during spring 2023

Seasonal air quality summary: spring 2023

There was one day above the national benchmark for PM_{2.5}, recorded at Wil-gai on 3 November 2023 (Table 1). There were no other days above the benchmarks in the Namoi/North West Slopes region during spring 2023.

Table 1 Number of days above the relevant national benchmarks – spring 2023

Station	PM ₁₀ daily benchmark [50 µg/m ³]	PM _{2.5} daily benchmark [25 µg/m ³]	NO ₂ hourly benchmark ⁴ [8 pphm]	O ₃ 8-hourly benchmark ⁴ [6.5 pphm]
Gunnedah	0	0	0	0
Narrabri	0	0	–	–
Tamworth	0	0	0	0
Maules Creek	0	0	–	–
Werris Creek	0	0	–	–
Wil-gai	0	1	–	–

- = not monitored

Daily time series plots

Figure 2 shows the daily average PM10 levels, and Figure 3 shows the daily average PM2.5 levels, both observed during spring 2023. Figure 4 and Figure 5 show the daily maximum 8-hour rolling O₃ levels and daily maximum hourly NO₂ levels at Gunnedah and Tamworth.

Levels over the PM2.5 benchmark were observed at Wil-gai on 3 November 2023.

PM10, O₃ and NO₂ were below their benchmarks during spring 2023.

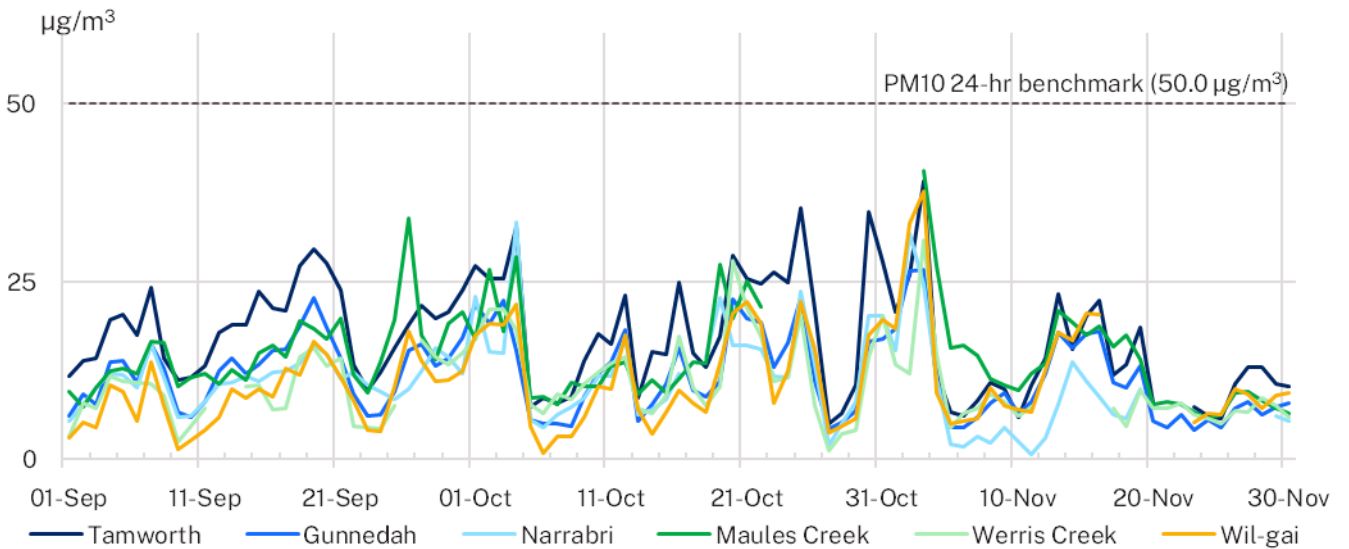


Figure 3 Daily average PM10 in spring 2023⁵

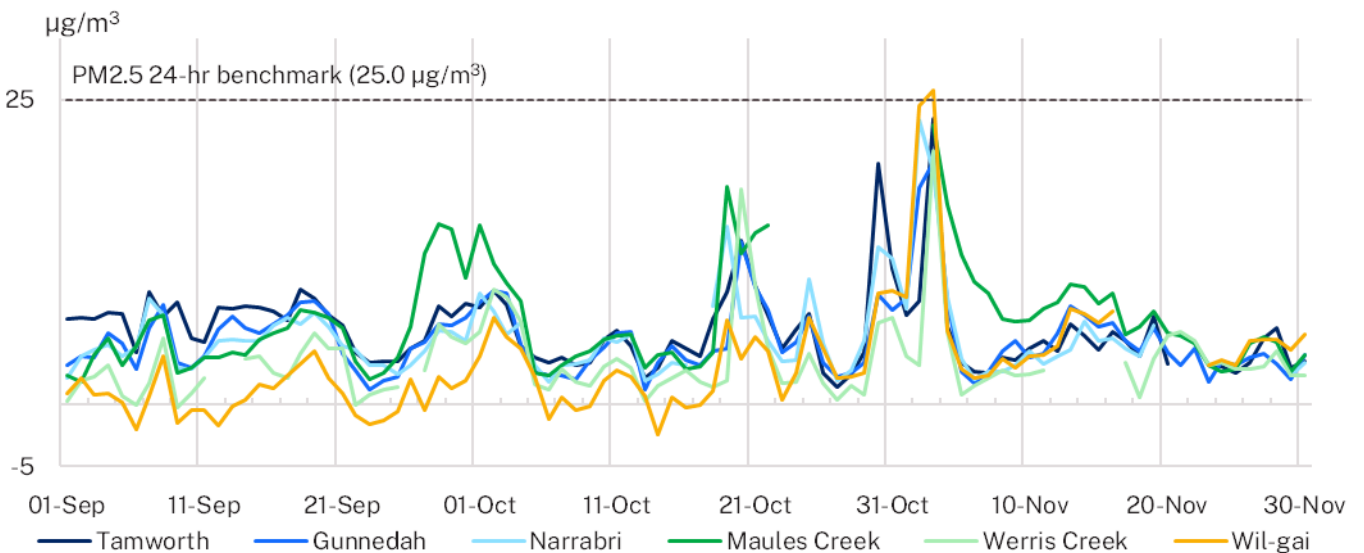


Figure 4 Daily average PM2.5 in spring 2023

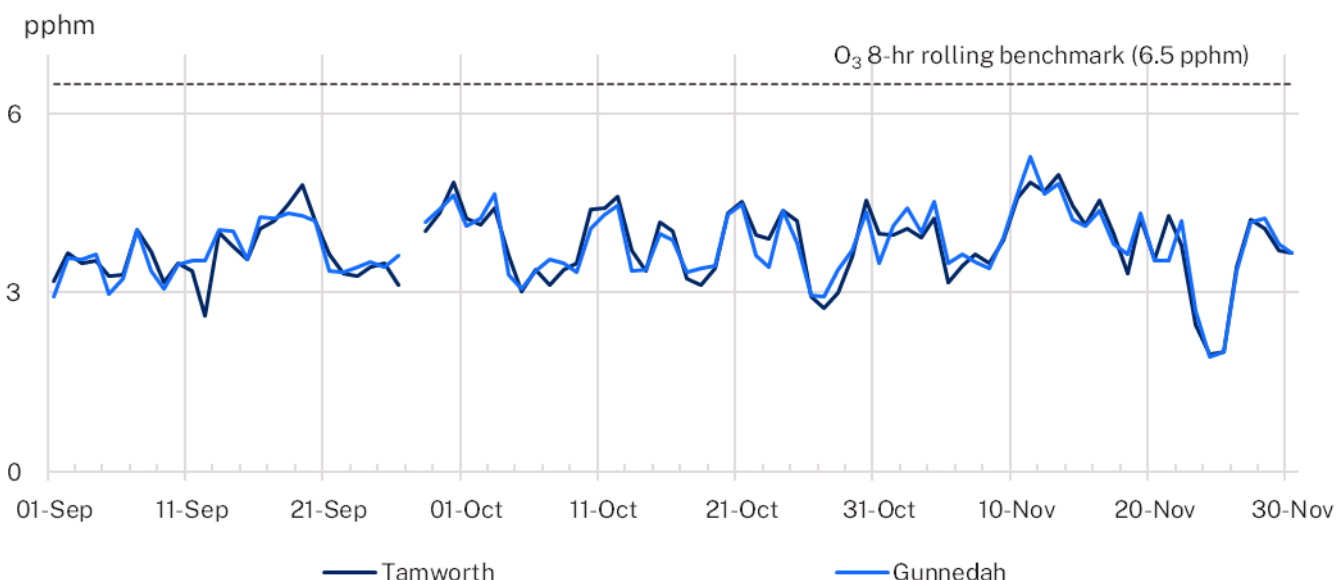


Figure 5 Ozone (O₃) daily maximum 8-hour average concentrations in spring 2023

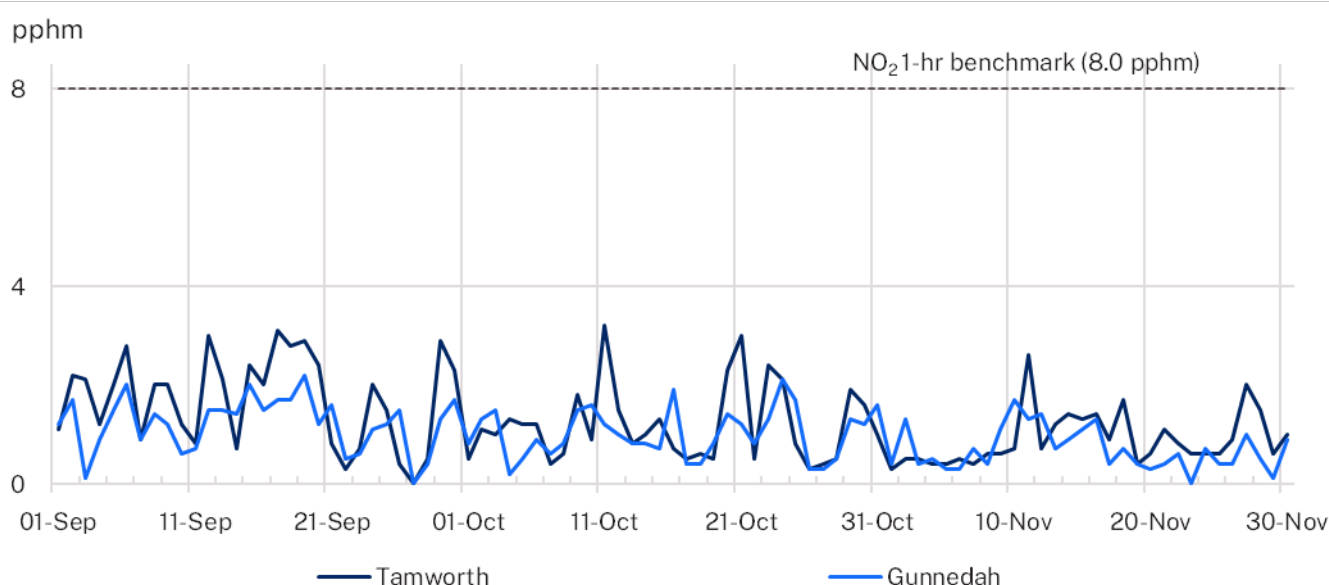


Figure 6 Nitrogen dioxide (NO₂) daily maximum 1-hour average concentrations in spring 2023

Seasonal weather and climate

Rainfall during spring 2023 was average to below average throughout the Namoi/North West Slopes region. The NSW area-averaged rainfall total for spring 2023 was 107 mm, which is 16% below the long-term (1961–1990) average⁶.

During spring in the Namoi/North West Slopes region, maximum temperatures were much higher than average, while minimum temperatures ranged from average to above average⁷.

Drought conditions and dust activity

The NSW Department of Primary Industries combined drought indicator in Figure 6 shows 65% of New South Wales was in drought at the end of November 2023⁸. Low levels of dust activity were reported during spring by DustWatch⁹ in the North West Local Land Services region, which covers the air quality monitoring stations in the Namoi/North West Slopes region.

DustWatch reported that groundcover remained stable throughout spring, and wind speeds were below average in September and November, likely helping to reduce dust levels. Wind speeds for October were slightly above average.

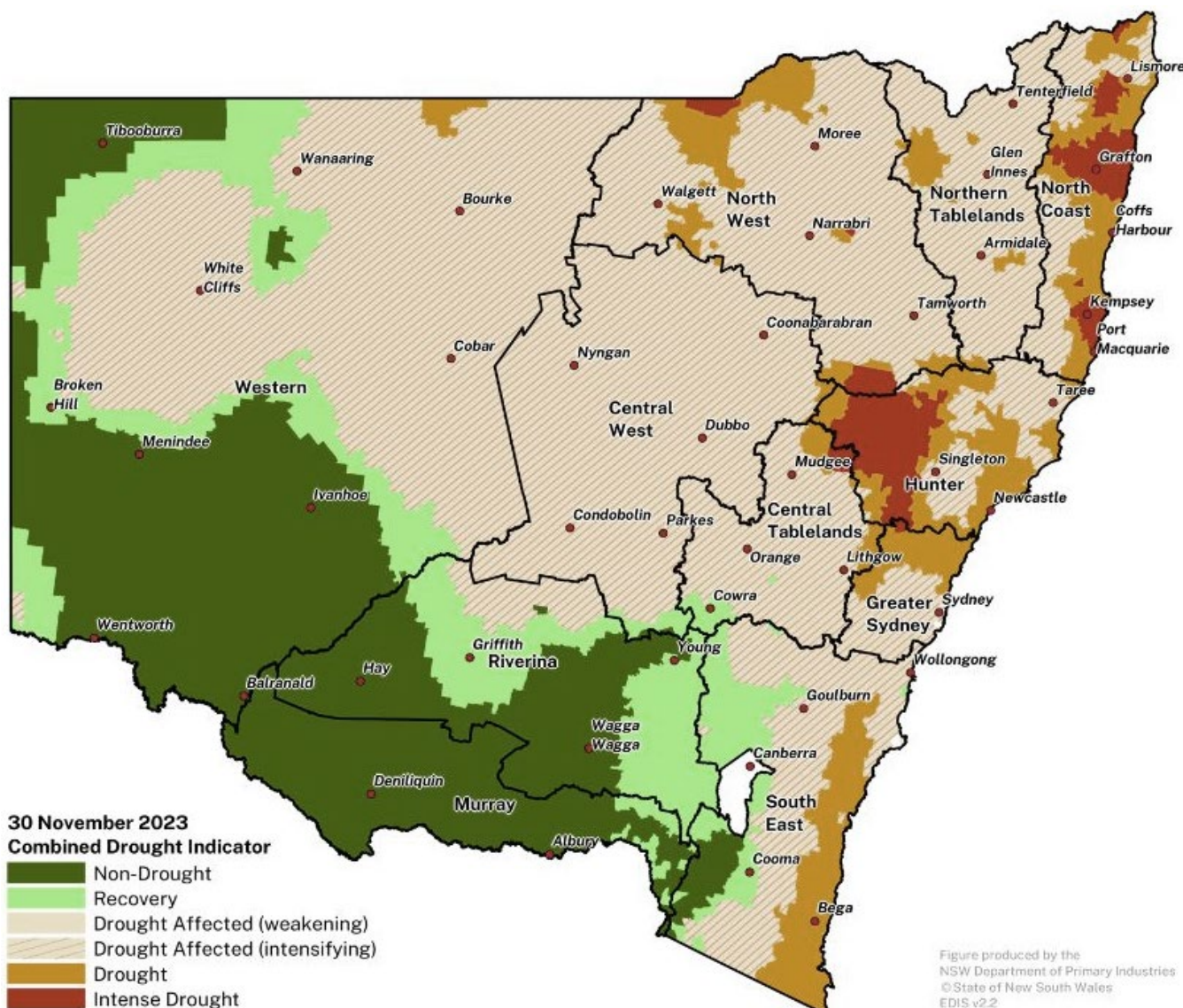


Figure 7 Department of Primary Industries NSW combined drought indicator for the 12 months to 30 November 2023

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

Rainfall

Rainfall deciles for the 3 months to the end of November 2023 (Figure 7) show average to below-average rainfall across the Namoi/North West Slopes region. Totals for the season ranged between 100 to 200 millimetres (mm) for most of the region. Compared to spring 2022, the Namoi/North West Slopes observed approximately 200 to 400 mm less rainfall in spring 2023, 100 to 400 mm less rainfall than in spring 2021, and broadly similar rainfall to totals observed in spring 2020. Rainfall in spring 2022 and 2021 was above to well above average across the region, while in spring 2020, it ranged from average to below average.

Seasonal rainfall totals for spring 2023 at Tamworth aviation weather service (AWS) (172 mm)¹⁰ and Gunnedah AWS (136.4 mm) Bureau of Meteorology (BOM) stations were below their respective long-term average spring totals (187.3 mm and 168.5 mm). Rainfall totals for spring 2023 at the department’s Tamworth and Gunnedah air quality monitoring stations (AQMS) recorded 163 mm and 139.6 mm of rainfall, respectively. Figure 8 shows daily rainfall and temperature trends for Gunnedah during spring 2023.



Figure 8 NSW rainfall deciles – spring 2023

Figure credit: ©Commonwealth of Australia 2024, Bureau of Meteorology. Base period: 1900-Nov 2023. Dataset: AGCD v2. Issued 20/09/2024

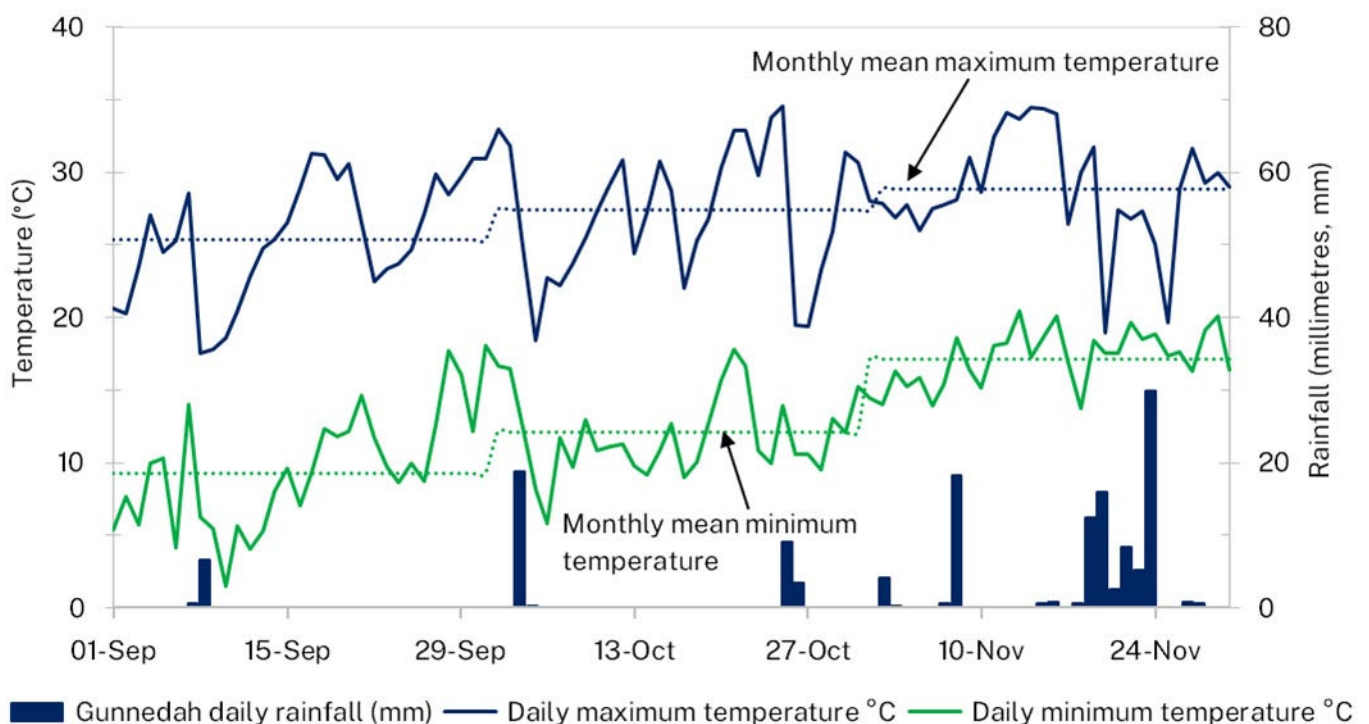


Figure 9 Gunnedah AQMS meteorology conditions, showing rainfall days and seasonal maximum and minimum temperatures during spring 2023

Temperature

Maximum temperatures were very-much-above average throughout the Namoi/North West Slopes region in spring 2023 (Figure 9). Minimum temperatures for spring 2023 were average to above average across the region.

Maximum temperatures at the Gunnedah AQMS ranged from 17.5 to 34.5 °C (solid blue line in Figure 8) with an average of 27.2 °C for spring 2023. This is average, compared to the long-term average spring maximum temperature observed at the Gunnedah AWS, of 27.2 °C¹¹.

Minimum temperatures at the Gunnedah AQMS ranged from 1.5–20.5 °C (solid green line in Figure 8) with an average of 12.9 °C for spring 2023. This is 3°C above average when compared to the long-term spring average minimum temperature observed at the Gunnedah AWS of 9.9 °C.

Maximum and minimum temperatures at the Tamworth and Narrabri AQMS were between 0.2 to 1.9°C above the long-term spring averages observed at the Tamworth and Narrabri AWS.

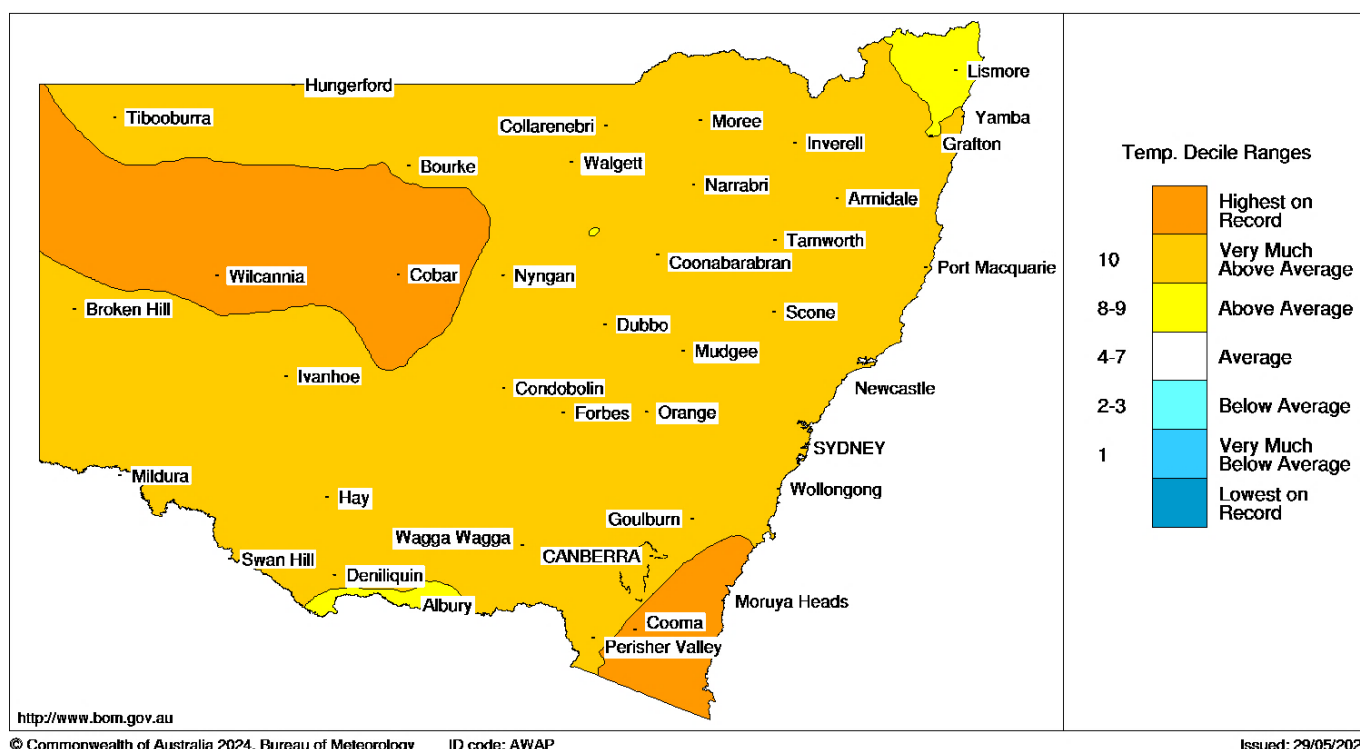


Figure 10 NSW maximum temperature deciles – spring 2023

Figure credit: ©Commonwealth of Australia 2024, Bureau of Meteorology. ID code: AWAP. Issued 29/05/2024

Wind

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

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

As is typical for the Namoi/North West Slopes region during spring, prevailing winds during spring 2023 were generally light to moderate south-easterlies. However, some influence from other sectors was observed at all 3 stations.

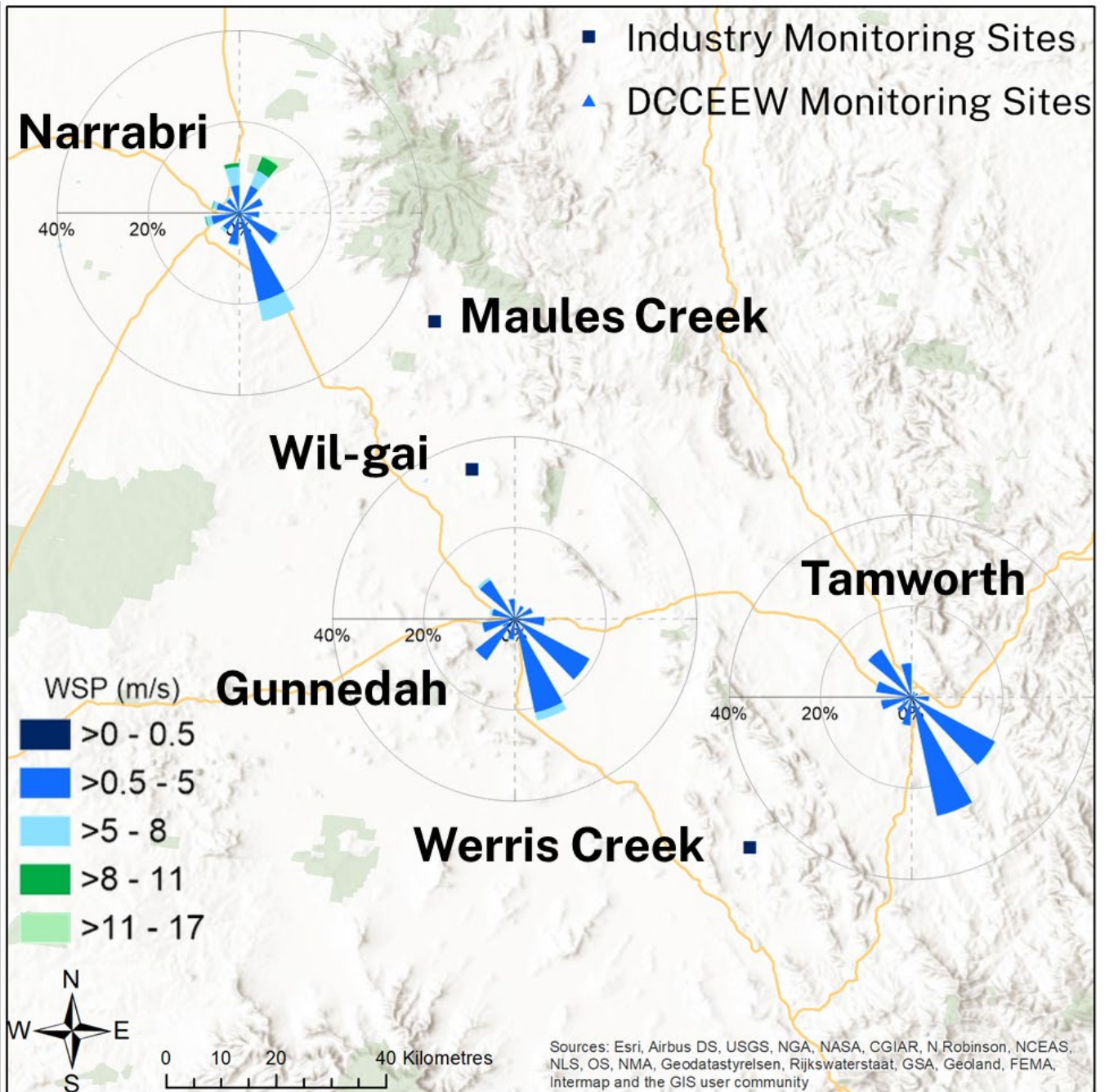


Figure 11 Wind rose map for the Namoi/North West Slopes during spring 2023

Pollution roses from hourly particle data

Pollution roses are similar to the wind roses shown in Figure 10. Pollution roses in Figure 11 and Figure 12 show the wind direction and particle levels at Narrabri, Gunnedah and Tamworth. The length of the bars indicate the percentage of time the wind blows from each direction. The colours along the bars indicate the concentration levels of particles. Figure 11 and Figure 12 show pollution roses for PM10 and PM2.5 at Narrabri, Gunnedah and Tamworth for spring 2023.

Elevated levels of hourly PM10 and PM2.5 were predominantly associated with south-easterly winds at all stations with some distinctions.

Lower particle levels were observed across all wind directions at Gunnedah and Tamworth, while they were associated with south-easterlies at Narrabri. Narrabri's highest hourly PM10 concentrations during spring 2023 came from the north-east.

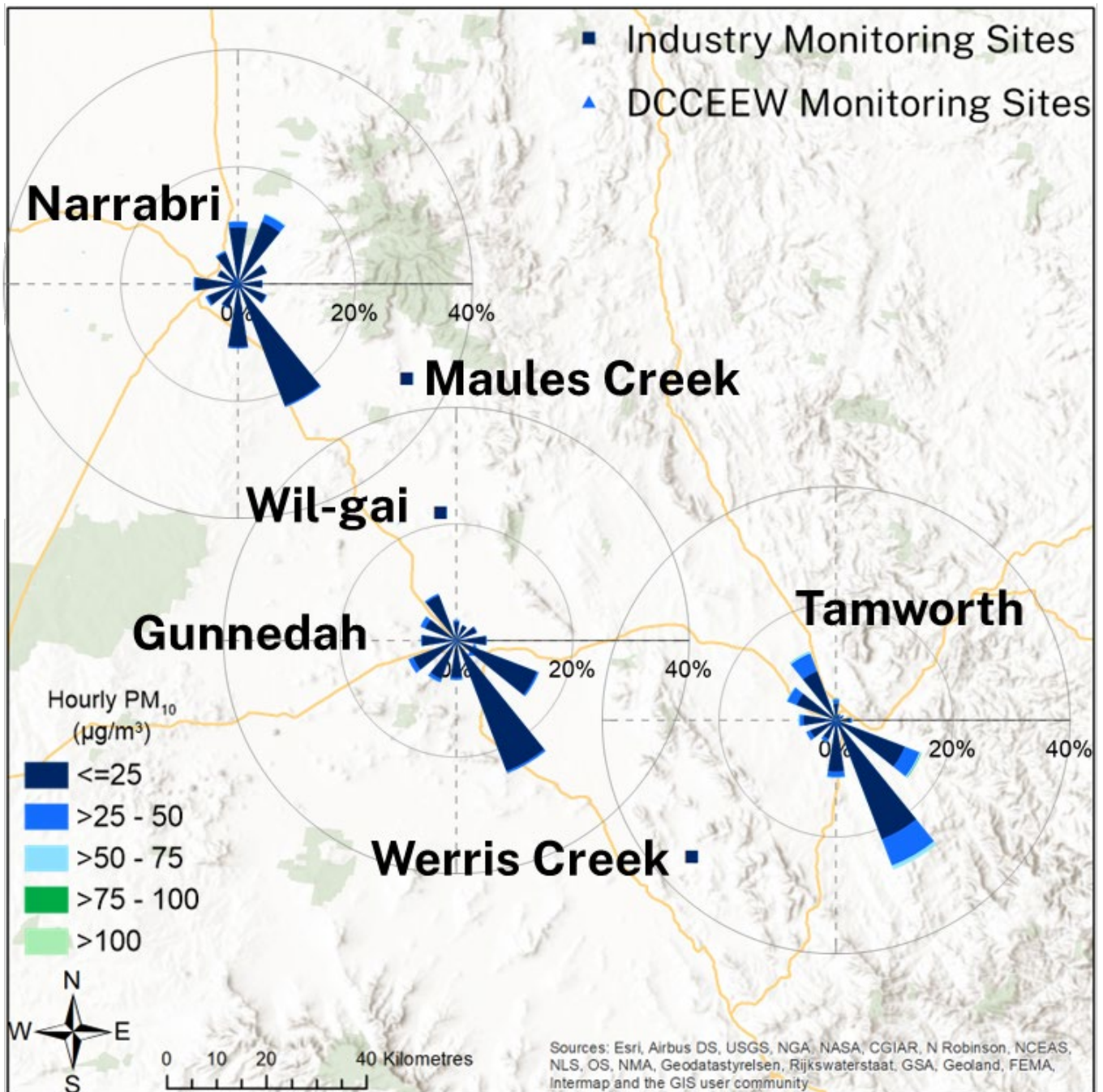


Figure 12 Pollution roses for hourly PM10 in spring 2023

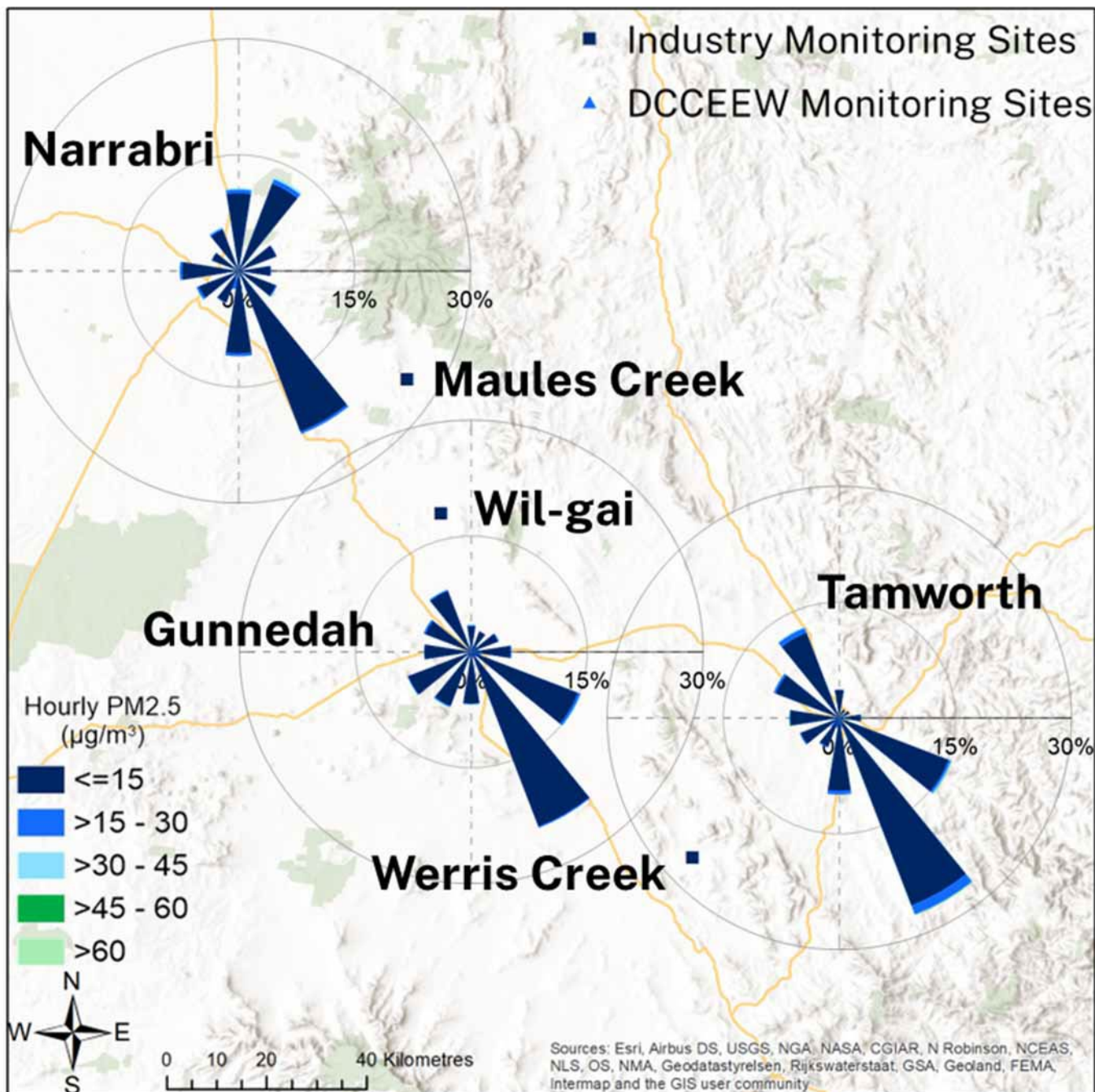


Figure 13 Pollution roses for hourly PM2.5 in spring 2023

Online performance of monitoring stations

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

Table 2 presents the online performance of Gunnedah, Narrabri, and Tamworth monitoring stations during spring 2023. Gunnedah and Tamworth met online targets for PM10 and PM2.5, while PM10 and PM2.5 at Narrabri did not meet online targets due to instrumentation faults.

Table 2 Online performance (%) from 1 September to 30 November 2023

Station	Particles PM10 daily	Particles PM2.5 daily	Gases NO ₂ hourly	Gases O ₃ hourly	Meteorology wind hourly
Gunnedah	100.0	100.0	92.3	93.5	99.1
Narrabri	89.0	89.0	–	–	99.8
Tamworth	97.9	97.8	93.8	93.8	99.8

‘ – ‘ not monitored.

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¹ 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 New South Wales. For this reason, AAQ NEPM standards are referred to as benchmarks in this document.

² The NSW Department of Climate Change, Energy, the Environment and Water (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 Environment Protection Authority (EPA) as part of the Namoi Region Air Quality Monitoring Project (NRAQMP).

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 due to calibration issues, instrument error and power outages. Data losses at DCCEEW stations were due to instrument issues and maintenance.

⁶ Bureau of Meteorology Seasonal Climate Summary for New South Wales in spring 2023. Accessed January 2024.

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

⁸ NSW Department of Primary Industries NSW State seasonal update – November 2023, accessed January 2024.

⁹ NSW Department of Climate Change, Energy, the Environment and Water DustWatch Reports: September 2023, October 2023 and November 2023, accessed October 2024.

¹⁰ Bureau of Meteorology AWS data for Tamworth, Narrabri and Gunnedah Airports. Accessed September 2024.

¹¹ Gunnedah AWS began operation in 2001.